

University of KwaZulu Natal

Title: An investigation of factors influencing employee participation in workplace safety programs, the case of ImproChem.

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Declaration of Originality

The author declares that the content of this research report, unless specifically indicated to the contrary, is his own work, and that the research report has not been submitted simultaneously, or at any other time, for another degree.

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Abstract

Background: There are a number of causes of workplace accidents. These accidents may result in minor or major injuries, equipment damage, and fatalities. The current study examined different factors that influence employee participation in workplace safety programs at ImproChem.

Method: A quantitative study was conducted and a sample of 395 participants was granted an opportunity to participate in a survey, with 124 participants completing the survey. An electronic questionnaire was administered via QuestionPro after which the results were analyzed.

Results: The results indicated that there are environmental factors that are barriers to safety performance. From the results it was found that 23% of the participants felt that safe working procedures were often available rather than being always available. Among the participants 3.2% indicated they were unaware of some of the ImproChem safety improvement programs, while 7% indicated that they have not received adequate safety training. A difference in safety culture was noted across the ImproChem departments. A total of 15.32% of the participants indicated there were no rewards associated with achieving a good safety record while other participants indicated that it is rare for management to reward safety performance. 70% of the participants indicated that they are afraid of making safety related errors. This may be due to the culture of blame and punishment.

One of the recommendations was to increase employee engagement on workplace safety programs aimed at making ImproChem a safe place to work in.

Conclusion: Employee engagement will increase employee motivation and the extent to which employees take ownership of their safety. This will enable ImproChem to reach their goal of “No harm to anyone ever” and reduce incident rates within the organization.

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Chapter 1: Introduction

1.1 Introduction

ImproChem forms part of 14 business units under the African Explosives and Chemical Industries (AECI) specialty chemical cluster. AECI, being the owner of ImproChem, is a specialty chemicals and explosives group originating in South Africa. The aim of AECI is to grow in South America, SouthEast Asia and Africa. In order to be aligned with AECI's business goal, ImproChem has a wide spectrum of customers across South Africa with a long-term plan to saturate Africa. ImproChem operates its major sites in Durban and Johannesburg over and above that ImproChem has small operation across the country. ImproChem provides energy, water and air solutions that add value to its customers, employees, communities as well as its owners. ImproChem is a supplier of specialty chemical raw materials and customer service for industrial use in the mining and manufacturing sectors (ImproChem, 2015).

Employees, customers and the well-being of the neighbouring community is of importance to ImproChem, as it recognises that a sustainable business cannot operate in isolation. ImproChem has necessary precautions in place to ensure that its products do not expose its employees, customers and community to any health and safety risks. Safety takes number one priority, even over normal unit operation. No work is more important than ImproChem's employees', customers' and the community's safety. Safety compliance with the legal authorities and the Chemical Service Group standard is of utmost importance, as it serves as a foundation on which all ImproChem operations are carried out (ImproChem, 2015).

ImproChem is committed to seeking continuous improvement as far as health, safety, environmental and quality (SHEQ) standards are concerned. ImproChem is also willing to work together with the

neighbouring communities and customers to ensure safer and healthier products and operational procedures. ImproChem's leadership team is committed to promote safety at all levels by providing appropriate safety training to all ImproChem employees and subcontractors. ImproChem's goal is "No harm to anyone ever" to ensure alignment with the AECI goal.

ImproChem was recognised for excellent health and safety results and an outstanding performance on safety, health, environmental and quality (SHEQ) standards by AECI in 2013. According to Littlefield (2010), many organisations around the world have recently started to demonstrate commitment to health and safety projects and programmes. There are many conjecturers of safety performance. In this study, the researcher aimed to investigate and clearly articulate methodologies that influence employee participation in safety performance.

Simon and Cistaro (2009:30) make the following statement on safety excellence:

[S]afety excellence is a product not only of the right programs but also of the right culture. Safety policies are the ingredients in the stew-policies, systems and processes as the meat and vegetables, while the prevailing culture is the broth. If the ingredients are cooking in a wholesome broth – a positive safety culture of trust, caring, and responsible leadership – everything works to its potential.

1.2 Motivation of the study

According to the Occupational Safe and Healthy Act 1993 (OSH Act), it is the duty of an employer to provide a safe and healthy environment for his or her employees as far as reasonable practicable. The duty of the employees is to look after their own health and safety and the safety of those who may be affected by their actions. Although many studies have been conducted and several safety culture models have been developed, there is limited research to validate organisational practices and values that have a direct impact on safety performance.

1.3 Focus of the study

Different safety culture dimensions were examined across a range of ImproChem departments that achieved their safety goals and those that did not achieve their safety goals. The organisational values and practices were assessed in connection with the total recordable injury rate (TRIR), fatalities and OSH Act (1993) requirements.

1.4 Problem statement

According to Galizzi (2014), risk tolerance and the ability to identify risks reduce the likelihood of reoccurrence of incidents and injuries. Karter and Molis (2011) contend that a better understanding of why and how the injuries occur can assist in identifying corrective action. Research conducted in South Africa by Zohar (2010) reveals that safety performance is affected by job insecurity, dissatisfaction and work stress. Chenhall (2010) recommends that safety culture should focus on learning and reporting rather than assigning blame. Many studies have been conducted; however, compliance with safety requirements is still a challenge in South African industries. The TRIR has not shown any improvement in conjunction with investments ImproChem has made to improve workplace safety. The number of fatalities and injuries keeps on increasing: The February 2015 TRIR showed an increase of 0.79 compare to the February 2014 TRIR, which was 0.59 (ImproChem, 2015). The increase was due to employees getting injured while performing their tasks and also the number of vehicle accidents that occurred while employees were on duty.

1.5 Research questions

The research questions were formulated to examine which safety culture types combined with organisational values and practices influence safety performance.

The research questions were formulated as follows:

1. Does the ImproChem workplace environment (non-human factors) affect employee safety performance?
2. How well do ImproChem employees understand ImproChem safety, health environmental and quality (SHEQ) requirements?
3. How well do ImproChem employees comply with and understand ImproChem SHEQ requirements?
4. Are the employees committed to improve safety within the organisation?
5. Are the employees provided with sufficient support to reduce safety incidents?
6. How does the ImproChem safety culture influence employee safety performance?

1.6 Research objectives

The following research objectives were developed based on the research questions:

1. To assess the extent to which non-human factors (working environment) influence employee safety performance.
2. To evaluate employees' level of understanding of ImproChem SHEQ requirements
3. To evaluate employees' level of compliance with ImproChem SHEQ requirements
4. To evaluate the extent to which employees take ownership of the ImproChem SHEQ improvement plan
5. To evaluate management's level of support in ensuring a safe working environment.
6. To evaluate how organisational culture influences employee participation in ImproChem safety measures.

1.7 Conclusion

Safety is a critical component in any organisation, which needs to be given the attention it deserves in ensuring business success. Every organisation should strive for continuous improvement where safety is concerned. Innovative strategies need to be incorporated into existing safety management practices to achieve safety excellence. Organisational safety is a broad topic that needs to be studied alongside organisational culture, leadership styles, employee attitudes and behaviours, and communication and performance management systems. In this research it was noted that culture influences behaviour, thus it is important to instil the correct culture in the organisation, which will then align employee values and practices to SHE goals. Some of the safety aspects such as attitude are difficult to measure directly, therefore it is of advantage to have systems in place that can measure employee safety performance and overall organisational safety. The study lays a foundation for future safety studies. The next chapter contains the literature review.

Chapter 2: Literature review

2.1 Introduction

The aim of the literature review was to investigate factors influencing employee participation in workplace safety programmes, particularly in relation to the case study of ImproChem. Passive employee participation in workplace safety programmes results in accidents and an increase in TRIR. There has also been an increasing awareness of the direct impact of safety on issues such as business profitability, employee productivity, customer perception, shareholder value and operational excellence.

When accidents occur business operations are affected due to the amount of time required to carry out investigations and the stand-down periods required to reflect on the incident and realign the workforce such that the learning is shared and all employees give their commitment to ensure they carry out their tasks in a safe manner that will ensure that similar incidents do not occur (Behm et al., 2004).

According to Tempesti (2014), risk tolerance and the ability to identify risks affect the reoccurrence of incidents and injuries. Karter and Molis (2011) contend that a better understanding of why and how the injuries occur can assist in identifying corrective action. Research conducted in South Africa by Masia (2011) reveals that safety performance is also affected by job insecurity, satisfaction and work stress. Allen and Tebbetts (2013) recommend that safety culture should focus on learning and reporting rather than assigning blame. Many studies on safety have been conducted; however, safety compliance is still a challenge in the South African industries (Henriqson et al., 2014).

In 2014, the TRIR did not improve in line with the investment made by ImproChem to improve workplace safety (ImproChem, 2015). There are many recognised indicators that contribute to the reoccurrence of accidents. Safety culture and safety climate have been regarded as leading safety

indicators, while accidents themselves have been regarded as lagging indicators, as they offer insight into the state of safety with no need to further review negative safety outcomes (Chenhall, 2010). The study conducted by Robert Cooke and The Reliability Group indicates that there are 80 variables that affect accident rates (Allison, 2013). These indicators associated with injuries at work include organisational culture and climate, safety culture and safety climate, work environment, employees selection practices, role clarity, and types of work procedures, job satisfaction and stress. A similar study by Foster (2013) also revealed five major indicators related to potential causes of safety accidents as being environmental, physical, agronomic, psychological and stress. The current review is comprised of the high-order concepts such as organisational culture and climate, safety culture and climate, and positive safety culture, and proceeds to elaborate on the relationship between organisational culture, climate, practices and the safety outcome variables, see figure 2.1 below:

2.2 Literature review framework



Figure 2.1: Literature review map

2.3 Organisational culture

According to Gao (2012), organisational culture refers to the shared perceptions regarding organisational norms, values, beliefs, procedures and practices. Organisational culture has appeared to be the most significant antecedent of performance in the workplace, as employees' perception of the organisational structure and state of affairs affect their perception of work behaviour and safety. Hecker et al. (2014) state that perceptions of organisational culture influence interactions among employees and as a result shape their responses to the work environment and affect their skills training activities and levels of motivation. It has been confirmed that a relationship between safety culture, organisational culture and safety perception does exist. Barnsteiner (2011) investigated this concept and concluded that safety culture is shaped by organisational culture which in turn influences safety performance.

Organisational culture can also refer to attitudes, philosophies, behaviours and beliefs and practices that constitute an organisation. Organisational culture makes the organisation unique through many characteristics that differentiate the organisation from other organisations (Henriqson et al., 2014). The differences may range from internal procedures and policies to public and customer relations. Day-to-day employee experience is influenced by organisational culture. Organisational culture also influences public perception. Brand image and a company's culture are closely related to each other, informing and reinforcing each other.

There is consensus among researchers that general organisational culture conveys significant influence on safety culture, which tends to influence employee safety behaviour and employee involvement in safety incidents.

Defining organizational culture:

Chenhall 2010 defines organizational culture as "Systems of shared meanings, assumptions, and underlying values". "Culture is more background and defined by beliefs and values. The level of analysis for culture is the organization" (Burke, 2008:184). Chenhall goes on to say "Any social group, to the extent that it is a distinctive unit, will have to some degree a culture differing from that of other groups, a somewhat different set of common understandings around which action is organized, and these differences will find expression in a language whose nuances are peculiar to that group"

“A set of understanding or meanings shared by a group of people. The meanings are largely tacit among members, are clearly relevant to the particular group, and are distinctive to the group. Meanings are passed on to new group members.”(Chenhall 2010)

2.4 Organisational climate

Organisational climate has been identified as an important originator of workplace performance, as employees’ perception of the organisational structures and affairs within the organisation shape their perceptions and work behaviour (Dollard & Bakker, 2010). Researchers have differentiated organisational climate from organisational culture based on the level of analysis – organisational climate being more focused on the micro level of the organisation and organisational culture reflecting the overall organisation (Chenhall, 2010). Change models and organisational performance, such as Tsai (2010) organisational blueprint model clarify the relationship between culture and climate based on the macro and micro levels of the organisation. Climate can also be defined as employees’ perceptions and attitudes affecting colleagues’ day-to-day experience within a team (Zohar, 2010).

Defining organizational climate:

According to Ngou et al., (2013) organizational culture is employees’ perception of their work environment, which influences their related behaviours and attitudes. A provision of a frame reference by which individuals make sense of organisational life. Burke (2008) states “Climate is the perceptions that individuals have of how their local work unit is managed and how effectively they and their day to day colleagues work together on the job. The level of analysis is therefore the group, the work unit. Climate is much more in the foreground of organizational members’ perception”

Bowen and Ostroff (2004, as cited in Ngo et al,2009:669) argues that “strong organizational climate affects how employees share a common interpretation of what behaviours are expected and rewarded, and hence a situation is created for better organizational performance”. (Davidson et al., 2015) state that an individual’s attitude concerning an organization is a combination of morale, trust, conflict, leadership credibility, rewards equity, scapegoating and resistance to change.

2.5 Corporate safety culture

There are many factors that create a structure for human behaviour in the workplace, as discussed above. Corporate culture sets restrictions for acceptable human behaviour by establishing behavioural limits and norms. Corporate culture serves as a foundation for employee and managerial decision making and a blueprint of how things are doing within the organisation (Chib & Kanetkar, 2014).

Safety culture is therefore a bi-product of corporate culture. Employee corporate attitudes influence employees' collective approach towards safety (Yule, 2003). The words and actions of senior management can set and nurture a positive safety culture. Corporate culture can also be defined as an atmosphere that shapes employees' attitude towards accident prevention and overall safety measures set by management.

Factors affecting safety culture include:

- Policies and procedures

Safety policies and procedures demonstrate the commitment management has to their employees' health and safety. Policies clearly articulate employers and employees' responsibilities and accountabilities. Compliance with OHS Act (1993) can be ensured if correct policies are in place. Safety procedures outline safe work practices to be followed in the workplace to ensure injuries and illnesses are prevented.

- Management's actions and priorities

Management's actions and priorities need to demonstrate to employees that business performance and safety performance are compatible. The organization's safety principles, beliefs, objectives, processes and strategies need to be first seen on management level to get buy in through all levels of the organization.

- Supervisory practices

Safety performance is enhanced when employees feel that their immediate supervisors are concerned about their health and safety, supervisors do not push production to the extent of compromising the lives of employees. When supervisors address safety concerns and remove safety barriers, employee participation in health and safety programmes is guaranteed.

- Response action to unsafe behaviours

One of the characteristics that build a positive safety culture is the organization's response action to unsafe behaviours. Research has shown that a culture of blame and punishment is not a suitable culture for accident prevention. Actions taken whenever an unsafe behaviour has been identified should enhance safety participation rather than instilling fear on the employees. Recently organizations have adopted the culture of no name no blame aimed to prevent accidents by removing safety barriers and changing employee attitude towards safety.

- Planning to achieve safety goals

Clearly articulating the organizations safety goals and constantly communicating the plans in place to ensure that the set goals are achieved can be a very powerful tool. In this manner employee becomes clear on the organization's expectations and how they are to contribute toward meeting the safety goals.

- Employee buy-in (involvement)

Good communication is usually related to employee participation and involvement in health and safety matters and also to other aspect of the organization (HSE, 2005). Employee buy-in is achieved when employees are convinced that their voice counts in the organization. When immediate supervisors and management seek safety continuous improvement input across all levels, employees safety climate improves which also improves their attitude towards workplace safety. Positive safety culture is also promoted within the organization.

- Employee training and motivation.

Employee training and motivation applies to both accident prevention and personal safety. Active employees who participate on hazard identification, risk assessment, suggest control measures to prevent accidents and incidents. Employees at different levels in the organization should be equipped with necessary skills to identify hazards, suggest suitable control measures, provide adequate feedback, thus fully taking ownership of workplace safety.

Most researchers point out that the ultimate responsibility for safety lies with management and the directors of the organisation. Safety culture is an important aspect as related to safe operation. According to Liu et al. (2015), safety culture is a concept which requires urgent attention from organisations. Researchers have not reached consensus on defining safety culture, as each individual researcher places emphasis on different elements of safety culture. Safety culture is an extremely difficult concept to define. Literature provides a wide range of definitions for safety culture. The UK Health and Safety Commission (HSE,2005) defines safety culture as the product of individual and group perceptions, values, competences, attitudes and patterns of actions that determine the level of commitment to, and the proficiency and style of, an organisation's safety and health management (Dollard & Bakker, 2010).

Organisations with positive safety culture are characterised by shared perceptions of the importance of safety and communication built upon mutual trust and by confidence in the effectiveness of preventative measures in place (Yule, 2003). A wide range of definitions of safety culture takes into consideration group shared values, beliefs and attitudes. Chenhall (2010) reveals that studies have shown 2 to 19 safety culture measurements, ranging from management to risk awareness and perceptions and attitudes of safety climate. The most often cited measures of safety culture are risk awareness and risk taking, leadership style and communication, management and workforce commitment, individual responsibility and management responsibility. Research has shown that individual human behaviours (safe/unsafe) are shaped by personal attitudes, values and beliefs; therefore, workplace safety is founded upon individual and organisational shared beliefs regarding the importance of safety (Ungku Fatimah et al., 2014).

Henriqson et al. (2014) argue that culture consists of social norms (unspoken rules of behaviour), which, if not adhered to, result in conflict. If a workforce reports all procedural irregularities, that is an indication of a positive safety norm. Yule (2003) argues that such a norm can only occur in an organisation with a reporting culture. A reporting culture can be defined as a culture that allows employees to freely report near misses and their errors to management without consequences. A less positive safety culture is best represented by a culture that exerts pressure on employee to perform tasks even if they can compromise their health and safety (Nielsen, 2014). Understanding the safety culture of an organisation, work site or a group as a whole can be difficult, but the most important is to identify and understand the dominant safety norms. Identifying and understanding these safety norms make it manageable to address specific safety-related issues.

Definitions of safety culture and safety culture characteristics

Copper (2000); Muniz et.al., (2007) states “Safety culture can be viewed as a component of corporate culture, which alludes to individual, job, and organizational characteristics that affect and influence health and safety”.

Characteristic of safety culture

- Job features
- Individual features
- Affect and influence health and safety
- Organisational characteristics

According to (Haukelid, 2008:416) “Safety culture should not be something separate from or in addition to an organizational culture, but constitutes an integrated part of this”.Haukelid (2008) believes that the characteristics of safety culture are an integrated part of organizational culture.

Cabrera et al.,(2007:1203) states “Safety culture can be construed to be manifested in shared values and meanings, and in particular organizational structure and processes, strategies, safety policies, goals, practices, leadership styles related to safety management systems”.

Characteristic of safety culture

- Shared meanings and values
- Particular organizational structure

- Processes
- Strategies
- Policies
- Goals
- Practices
- Leadership styles

Muniz et al., 2007:628 defines safety culture as “Positive safety culture is a set of values, attitudes, perceptions, and patterns of behaviour with regards to safety shared by members of an organization, as well as a set of policies, procedures and practices relating to reduction of employees’ exposure to occupational risks, implemented at every level of the organization, and reflecting a high level of concern and commitment to the prevention of illnesses and accidents.”

Characteristic of safety culture

- Value
- Attitudes
- Perceptions
- Patterns of behaviour
- Policies
- Procedures
- Practices
- Reduction of exposure to occupational risk
- Commitment in prevention of illness and accidents

Ahmad& Gibb,2003:30 states “Safety culture can be defined as set of beliefs, norms, attitudes, social technical practices that are aimed to minimize individuals exposure within and beyond an organization, to conditions considered injurious and dangerous.”

Characteristic of safety culture

- Beliefs
- Attitudes
- Norms
- Social technical practices

2.6 Safety climate

According to Kapp (2012), safety climate can be defined as a climate for physical health and safety that predicts individual safety behaviour, injury to health and industrial accidents. Dollard and Bakker (2010) define safety climate as employees' perception of management's performance and commitment with regard to safety procedures, policies and practices. Researchers have found that employees with negative perceptions of the safety climate (work pressure, high workload) are highly likely to engage in unsafe acts, which then lead to accidents, whereas with employees with positive perceptions of the safety climate, safety compliance does not become an issue, and as a result, few accidents are registered.

Another important factor is the perception employees have about their organisation. If employees perceive their organisation as a concerned, caring and supportive organisation with regard to employee well-being, it increases their levels of job satisfaction, and therefore employees are encouraged to take ownership of their own safety (Bakker, 2010). Safety culture and safety climate are closely related, as shared aspects are stressed in both concepts. The main difference is that safety culture looks into the shared values, beliefs and attitudes towards the organisation and the work in general, while safety climate looks closely into operations and daily employee perception of working practices, work environment, and management and organisational practices. The definitions may have common elements, as safety climate may imitate the fundamental culture of an organisation; however, its focus is narrower when compared to that of safety culture.

Table 2.1: Safety climate characteristics

Authors	Characteristic of safety culture
Wachter and Yorio (2013)	Risk level, attitude, importance of training, status of safety personnel, effects of safe behaviour on promotion
Huang et al. (2012)	Communication and support <ul style="list-style-type: none"> ✓ Work pressure ✓ Relevant procedures ✓ Personal protection team ✓ Relations ✓ Safety norms
Du and Sun (2012) Yeow and Goomas (2014)	Commitment of management <ul style="list-style-type: none"> ✓ Support from co-workers ✓ Support from supervisors ✓ Level of competence ✓ Employee participation
Lu and Tsai (2010)	Work environment safety <ul style="list-style-type: none"> ✓ Safety management ✓ Safety training ✓ Job safety ✓ Safety of co-workers ✓ Job pressure ✓ Safety norms
Chang and Wang (2010) Kapp (2012)	Management communication and commitment <ul style="list-style-type: none"> ✓ Plant maintenance ✓ Safety training

Gao (2012)	Leadership safety ✓ Safety instructions
	✓ Commitment to safety ✓ Safety leadership of immediate supervisors ✓ Attention to safety violations ✓ Leadership support

According to Chenhall (2010), a positive safety culture in an organisation is a foundation that interlinks with organisational culture. Mathis (2009) asserts that the „culture of safety“ should not be separate from „traditional safety“. The safety climate, in simpler terms, is a sub-element of safety culture, which relates to individual and group behaviours and attitudes in engaging with safe practices. A positive safety culture is a by-product of personal and group attitudes, values and perceptions, and an extension of safety climate inclusive of commitment to safety, values and trust.

According to O'Connor et al. (2011), safety climate can be defined as employee safety perceptions and attitudes at any given point in time with an intention to identify system weaknesses and safetyimprovement opportunities. In both safety culture and safety climate there is strong emphases on shared values and beliefs with regard to safety.

2.7 Positive safety culture

Compliance with safety regulations is a basic requirement to ensure safety; however, compliance on its own is not enough. Employees who simply comply with the minimum safety requirements are not likely to be able to identify potential hazards before they result in accidents. To be able to promote safe operations, employees themselves ought to have a positive attitude towards safety (Bakker, 2010). All employees must be able to put their safety and that of their fellow employees first. Every employee in the organisation, whether the field service technicians, the sales technologist or director, must have the same mind-set with regard to safety. All their decisions must consider safety implications.

A top-down approach is essential to driving a positive safety culture within the organisation; the approach must be based on mutual trust and respect between employees and management. Employees must believe management have their best interest at heart with regard to safety and also understand that there is zero tolerance for unsafe behaviour. It is important for management to be able to ensure

employees that their safety comes first before schedule delivery and the profits of the organisation Chenhall (2010).

Positive safety culture indicators include the following

- Senior management must place strong emphasis on safety for risk management.
- Operational personnel and decision makers must hold a realistic view of the short- and longterm organisational activities with hazardous safety implications.
- Senior management is responsible for implementing safety measures to contain identified safety hazards.
- A climate with a positive attitude towards safety criticism, feedback and comments from the lower level of the organisation must be fostered.
- Positive employee views with regard to safety should be encouraged.
- A non-punitive working environment that tolerates legitimate errors and derives systematic safety lessons should be encouraged by senior management.
- Relevant safety awareness communication and information should be shared at all levels, within and outside the organisation.
- Relevant training should be offered to employees, ensuring full understanding of consequences of unsafe behaviour.
- Zero tolerance of at-risk behaviour should be clearly communicated, with the aim of discouraging such behaviour (Bakker, 2010).

According to Chenhall (2010), positive safety culture consists of the following:

An informed culture: Employees are provided with the opportunity to develop relevant skills, knowledge and experience to carry out their duties in a safe manner, and are encouraged to report underlying safety threats and to contribute to necessary solutions to overcome them. Management becomes responsible for fostering a culture in which employees understand the hazards and risks associated with their operations.

A learning culture: Learning is considered as a fundamental requirement for primary skills training and should be a process and not a programme. Employees are encouraged to apply their already acquired skills and also develop new skills and knowledge to enhance workplace safety. Management

constantly sends out safety reports and feedback as means of updating employees of current safety issues. Employees are also encouraged to learn relevant safety lessons from such reports and feedback.

A reporting culture: Employees and managers freely share critical safety issues and information with no threat of being punished. Employees are able to report near misses and hazards with no fear of being embarrassed.

A just culture: Even though a non-punitive environment is essential for a good reporting culture, the boundaries should be clear and employees should know what behaviour is acceptable and what is unacceptable. There should be zero tolerance for deliberate safety violations and negligence either by employees or management. The just culture recognises that there are certain circumstances that require punitive action. Employees are likely to be self-disciplined in a just culture.

Table 2.2 below summarises three different safety cultures and their related organisational responses to safety issues. The table shows a poor safety culture, a bureaucratic approach, which only achieves minimum safety requirements, and lastly a positive culture.

Table 2.2: Features of different safety cultures adapted from Guldenmund (2010).

Safety culture features	Poor	Bureaucratic	Positive
Information relating to hazards is:	Suppressed	Ignored	Actively sought
Safety messengers are:	Punished or discouraged	Tolerated	Encouraged and trained
Safety responsibility is:	Avoided	Fragmented	Shared
Distribution of safety information is:	Discouraged	Allowed, however discouraged	Rewarded
Safety failures lead to:	Cover-ups	Local fixes	Investigations and improvements

New ideas for safety are:	Crushed	Seen as new problems, not an opportunity to	Applauded
		improve	

2.7.1 Error tolerance

Error tolerance can be defined as the capability of a system to accept errors with no consequences (Gao, 2012). The organisation's attitude towards safety errors is an important dimension of positive safety culture. Employees' perception of how to respond to errors is also determined by the organisation's attitude. The „error tolerance“ concept was first discovered and applied to the ergonomic design of equipment, which compared inappropriate human acts against physical defects (Wachter & Yorio, 2014). Procedural actions such as checklists and last hazardous risk assessments cater for error tolerance, as unsafe conditions are identified before a calamity occurs. The idea of error tolerance is increasingly being extended further than job and equipment design to the organisational safety culture.

To create a positive safety culture, effective two-way communication is a fundamental requirement between the frontline leaders and management itself. The value of incident-reporting systems that provide protection to the reporter is now recognised by many organisations (Ahmad et al, 2012). The effectiveness of a reporting culture is highly dependent on the error tolerance of the organisation. Some organisations have lifesaving rules, where there is zero tolerance for individuals who breach those rules.

2.7.2 Punishment and blame

During investigations, a root cause for any occurrence is identified and it becomes evident who or what caused the event (Ahmad et al, 2012). Conventionally, punishment and blame could then be assigned. The legal requirements differ from country to country; however, it is common that during investigations more focus will be on allocating liability and assigning blame. Punishment still remains the major tool.

Theoretically, punishment is defined as an act of:

- Setting an example for fellow employees;
- Protecting employees/society from a repeat of incidents;
- Seeking revenge for breaking the rules; or
- Changing individual behaviour.

Punishment may have a huge role in correcting violations where employees disobey the „rules“. On the other hand, such acts may discourage the wrongdoer (individual who has violated the rules) and jeopardise safe operations. In principle, punishment should be given equally, irrespective of the outcome of the breach of safety violations.

In the event where an accident resulted from pure misjudgement or a technical error, it becomes impossible to assign punishment for that particular error. The only practical thing to do in such incidents would be to change the training process or to make the system more tolerant of technical errors. The only risk of increasing the error tolerance would be the likelihood of the reoccurrence of the error. Where nothing has been done to correct the situation, usually there are no reports issued related to that particular error.

Global research suggests that there is little, if any, systematic value derived from punishment with regard to accident prevention. Punishment can possibly be an option in cases where an employee deliberately violated the norms; however, for proactive response to accident prevention, organisations require more than mere punishment (Haung et al., 2015).

Most chemical industries are gaining insight into the role of punishment (Ahmad et al, 2012). There is increasing understanding of the sources of human errors. Errors are currently viewed as outcomes of circumstances or particular situations. This has resulted in managers seeking out unsafe conditions to do away with such errors. Managers have come to understand that the costs associated with safety deficiencies are much higher than the costs of punishing individuals. This realisation does not mean employees have to be complacent; there should be improvement in their behaviour after training has been provided (Tsai, 2011).

Even though many chemical industries have adopted the positive approach to safety management, there are some that are lagging behind in implementing the „non-punitive policies“.

2.7.3 Accident and incident context

Accidents and incidents occur due to certain circumstances and conditions. Such circumstances and conditions include aspects such as equipment, environmental conditions and human behaviour. At times, these factors join, such that a suitable environment for accidents is created. Effective safety management implies understanding of the background in which an accident occurred. Some of the major factors that shape the background for incidents and accidents include supporting infrastructure, equipment design, job design, cost factors, organisational culture, and cultural and human factors (Wachter et al., 2013).

2.7.4 Situational factors: Equipment design

Job and equipment design are fundamental to safe operation. The designer should be satisfied that the equipment:

- performs the task it is designed for;
- is easy to operate in a user-friendly manner; and
- has safeguards to ensure the operator is safe at all times.

The equipment designer should at all times also consider the safety of the maintenance personnel. The equipment must have adequate surrounding space to allow easy access for repairs under normal operating conditions. The equipment should also have prompting alarms to warn the maintenance personnel in case of incorrect assembly.

The equipment operator should be satisfied that the equipment can deliver as per the design specifications. Ergonomic design should serve as a safeguard to minimise the consequences/risks of error, for example access to switches. With current technological advances, most equipment is now automated. The increase in automation has somehow reduced the potential of accidents, as the equipment sends warning signals before an accident occurs (Allison, 2013). However, this has affected operator situational awareness, as the operators rely fully on the computers.

2.7.5 Human factors

Although most chemical industries have moved to high technology, accidents still occur. On average, three out of four accidents occur due to human errors, and accidents are often caused by highly qualified individuals. In the process of embracing new technology, the human component of individuals who will be operating the equipment must not be overlooked.

There are quite a number of factors influencing human errors contributing to accidents; these may be poor operating instructions, poor equipment design and procedure design, and inadequate training. Whatever the case may be, it is important to understand that human performance limitations, capabilities and behaviour in the operational background are core to understanding safety management. A spontaneous approach to human factors is no longer adequate (Chenhall, 2010).

As adaptable and flexible as the human element can be in the chemical industry, it is also defenceless to effects that can undesirably affect its performance. Inasmuch as most accidents occur from less-than-optimal human performance, it has been said they were due to human error. The word „human error“ has not been of any assistance in safety management; although it relays a message of system breakdown, it does not clarify why the accident occurred. In most cases, this term may allow for a suppression of the primary factors that must be addressed to ensure accident prevention.

In any accident prevention and investigation, contemporary safety thinking allows for human error to be the preliminary step, not the stopping point (Jiang, 2014). For an effective safety-management system, initiatives to prevent and minimise human errors that have a potential to threaten safety must be sought. This entails understanding factors and conditions that affect human performance in the workplace, refer to figure 2.2.

2.8 Factors contributing to human error

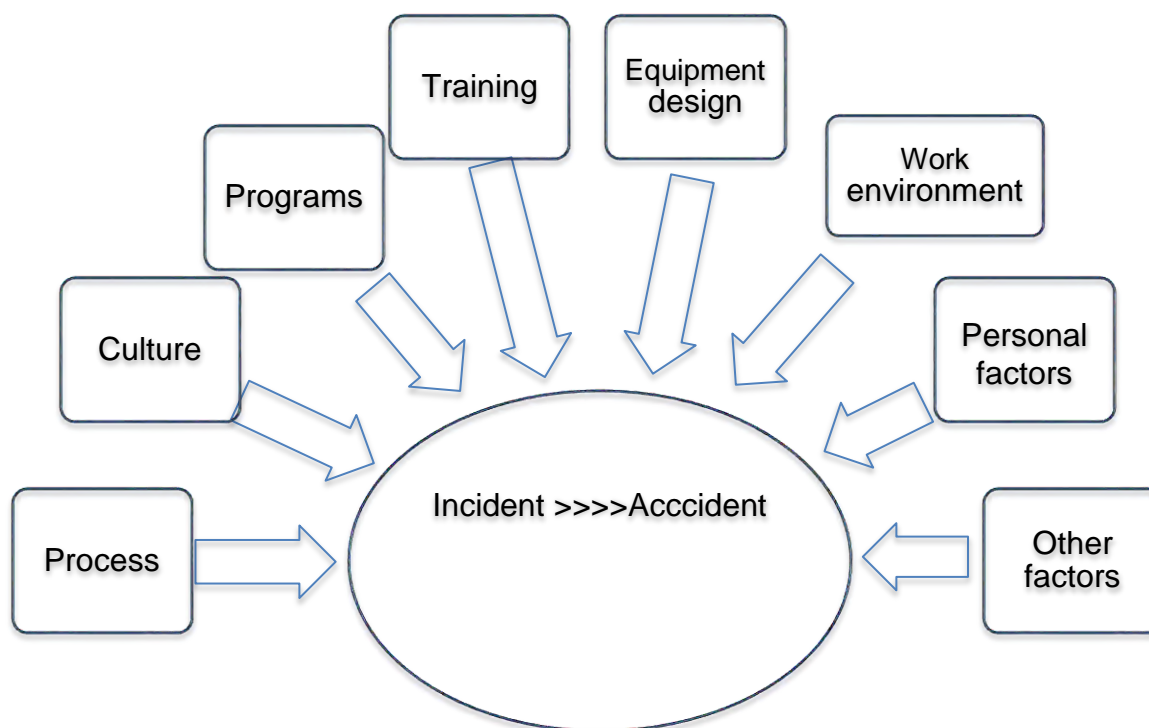


Figure 2.2: Factors and conditions that affect human safety performance in the workplace (adapted from Wachter et al., 2013)

Figure 2.2 provides a summary of factors and conditions that affect human safety performance. All these conditions and factors either negatively influence human safety performance. Good safety programs, training and processes can reduce human related errors. Positive safety culture within the organization encourages employees to perform their activities safely, paying attention to all possible hazards that can serve as barriers to safety performance. Equipment design and work environment have a big role in reducing human errors thus preventing accident. There are also personal factors that can affect human safety performance such as the employee wellbeing, hence many organizations also offer employee wellness programs to assist employees deal with their personal issues so they can have undivided attention when performing their tasks.

2.8.1 Safety- management system

An effective safety-management system involves processes, programmes, procedures and policies that have a formal function responsible for their advancement, implementation and day-to-day administration. According to Wachter et al. (2013) safety-management systems cannot be considered as a form of context contained from perceptual processes of employees such as management commitment and safety climate. Measures such as employee participation or sense of workplace justice that affect employee perception can be considered as outcomes of neutral safety-management system practices in place.

The aim of the safety-management system is to influence employee skills, knowledge, decision making, motivation, perceptions and attitudes. These systems are also designed with the aim of ensuring that the organisation gains competitive advantage through the utilisation of strategic, synergic systems of unified safety practices designed for employee safety and zero incidents. The research conducted by Foster (2013) reveals that there is a set of 10 formalised safety practices in organisations that are leaders in human performance. These practices are pre- and post-task reviews (last-minute risk assessments), employee involvement, hiring for safety, safe work procedures, organisational facilities, safety training, accident investigations, information sharing, deviation, detection and monitoring, and safe task assignment.

2.8.2 SHEL model

According to Zohar (2010), workplace safety is a combination of interrelated conditions and factors that have the potential to affect human performance. The SHEL model has been identified as a tool to visualise the interconnection between various components, especially within the aviation system. As safety is common across all industries, such a tool can also be applied within the chemical industry. This model was developed from the old-fashioned „man-machine-environment“ system. The SHEL model focuses more on humans and their interfaces with many other aviation system components. The SHEL model can be decoded as follows:

- Support, procedures and training – software (S)
- Equipment and machine – hardware (H)
- Operational boundaries and circumstances where the Live-Hardware-Software system functions – environment (E)
- Humans in the workplace – liveware (L), Zohar (2010).

2.9 Types of errors

Errors may occur at different stages of the process, either at the initial stage or at the implementation stage. Errors that occur at the initial stage often lead to mistakes, whereby operators end up following an incorrect procedure when performing their routine tasks or create an inappropriate contingency plan to deal with a new situation. It is possible to have an appropriate initial plan; however, errors may occur in the implementation phase. According to the literature, human errors in the implementation phase give clarity between lapses and slips (Nielsen, 2014). A slip can be defined as an action that did not go according to plan, and therefore it is noticeable. A lapse, on the other hand, can be defined as memory failure. Most of the time it may not be visible to any other individual except for the individual who experienced the lapse.

2.9.1 Errors in the planning phase

Whenever human beings are faced with challenges that require solutions, it is common to intuitively rely on a set of rules such as the standard operating procedures that have been applied before for a similar challenge. Errors may occur in two different ways, when a flawed rule is correctly applied or when there is inappropriate application of a certain rule for that particular situation (Nielsen, 2014).

- *Good rules misapplied:* This usually occurs when an individual is dealing with a challenge with similar features to the circumstances that the rule was proposed for, but carrying a major difference.
- *Bad rules applied:* This happens when a procedure that has been applied in the past and has been proven to work is applied with no recognition that the procedure comprises of unrecognised flaws. Past experience usually conditions individuals to have a similar approach to problem solving.

On the other hand, where there is no ready-made procedure or solution derived from past experience it is common that individuals draw from their personal experience and knowledge (Foster, 2013). Developing new solutions from personal experience inevitably requires more time than applying solutions based on standard rules simply because new solutions require a cognitive approach founded upon knowledge of basic doctrines. Fault reasoning and lack of knowledge of such cases can lead to mistakes. It tends to be a challenge to apply the knowledge-based reasoning when an individual has divided attention. This can be due to the high work load or other personal issues, which cause employees to divert their attention from the reasoning process to other issues to be dealt with. In such circumstances there is high probability of the errors occurring.

2.9.2 Errors in the implementation phase (slips and lapses)

Competent and experienced individuals tend to have highly practised and routine actions. These actions are usually carried out using the subconscious mind (automatic fashion) and may only differ for random checks on progress. The main reasons for slips and lapse are:

- *Attention slips:* This occurs when individuals fail to monitor routine action progress at critical points. This is evident when the action plan is somehow similar yet not identical to the routine procedure. If distractions occur at the critical steps where the procedure differs from

the action plan, the individual may automatically follow the procedure rather than the current action plan.

- *Memory lapse*: This occurs when an action plan item is omitted or an individual forgets the action plan.
- *Errors from perception*: These are errors from recognition, when individuals are convinced they heard or saw dissimilar information from the actual information presented (Allison, 2013).

2.9.3 Violations versus errors

Violations are different from errors, although both can lead to system failures and accidents. The only distinguishing factor is the intent. An error occurs unintentionally, while a violation is done intentionally. For example, in most refineries mobile devices (cell phones) are not allowed in the process area because they can interfere with the processes. If an individual deliberately takes his or her cell phone to the unit to receive calls, that is a pure violation, and violations should not be tolerated. On the other hand, if an individual forgets his or her cell phone in his or her pockets and go to the unit, and immediately exits the process area as soon as he or she realises the cell phone is in his or her pocket, it qualifies as an error (Foster 2013). Organisational cultures that tolerate violations and promote taking short cuts instead of following procedures have a high rate of total recordable cases.

2.9.4 Control of human error

Errors can lead to more severe consequences than just accidents. It is important to understand that human behaviour is subject to errors, therefore complete elimination of human error would be an unrealistic goal. The main challenge thereof will not be total error elimination; it would be to familiarise individuals with ways of safely managing the inevitable errors.

According to literature there are three strategies for human error management. These strategies are applicable and relevant to the chemical industry (McKenna 2010):

- *Error reduction*: This strategy allows for direct intervention in the source of the human error by method of elimination or reduction of contributing factors to the error. Any conditions that increase the risk of error are eliminated. This will include making the workplace environment as safe as possible for individuals to perform their tasks safely, in other words relating to the maintenance of machinery and the elimination of potential hazards in the work area.

- *Error capturing*: This is an assumption made that the error has already occurred, with the intention to capture the error before any undesirable consequences occur due to the error. Error capturing and reduction differ in the sense that error capturing is not directly aimed eliminating or reducing error. Error capturing comprises of crosschecking for verification of correct task completion.
- *Error tolerance*: The ability of a system to agree to take an error without severe consequences(McKenna 2010).

2.10 Accident-prevention cycle

The accident-prevention process begins with understanding the context in which accidents occur. An effective safety-management system is required for accident prevention. Figure 2.3 represents a typical required safety process for accident prevention:



Figure 2.3 Accident-prevention cycle (adapted from O'Connor et al., 2011)

The critical step in safety management is hazard identification. Evidence of hazards can be found from different sources by a number of ways such as the following:

- Incident- and hazard-reporting system
- Follow-up and investigation on reported hazards and incidents
- Analysis of trends
- Feedback from safety training
- Operational safety surveys and audits
- Monitoring of equipment and line operations
- Safety information sharing.

Every identified hazard has to be prioritised and evaluated. This involves gathering data, after which the data are assessed to examine the extent of the hazard (systematic or one of a kind). Data analysis is then done using appropriate tools (O'Connor et al., 2011). When safety deficiencies have been validated, an appropriate action to eliminate or reduce the hazard must be decided upon. It is important to ensure that the proposed solution does not introduce new hazards.

Upon implementation of the appropriate safety action, performance monitoring is essential to ensure the desired results are achieved. The accident-prevention process requires constant change.

Management must therefore be responsible for change management.

2.11 Safety leadership

Leadership is a critical aspect in ensuring that safety goals are achieved. Researchers have studied safety leadership with the aim of examining the full range model of transactional and transitional leadership behaviours in supervisors and managers. Monitoring and rewards are transactional leader behaviours. Transformational leader behaviours are fixed towards genuinely motivating and inspiring the workforce. Through transformation leadership safety behaviour or performance can be encouraged simply because the transformational leaders motivate employees to contribute more to the organisational and group goals than for immediate personal gain (Tsai et al., 2011).

According to Hersey Blanchard's leader effectiveness model, there are two dimensions with regard to relationship behaviour and task behaviour that are represented by the leadership styles of executives. These dimensions were separated into „telling, selling, participating and delegating“ (Chenhall, 2010). For leadership to be effective, it must be adaptable. According to Dollard and Bakker (2010), the multilevel model of safety climate aimed to examine the link between group-level and organisational-level factors that have an impact on climate. Management style were found to have an influence on climate and were categorised as commitment, compliance and participation; they were further classified as proactive, dynamic and declarative, which link with organisational level climate types.

According to Sun et al. (2012), at times managers claim to embrace particular values through lip service, referring to goals, strategies and philosophies; however, their actions may not be aligned with their spoken values. For instance, a manager may claim safety comes first, but neglects to apply safety policies in cases where he believes certain units may close down if productivity is not maximised. Furthermore, the same manager may reward employees for increased production volumes, paying less

attention to safety aspect. Such managers are considered to have a producer leadership style, driven by motivating employees to complete their tasks with little or no consideration of safe work practices.

Several researchers have examined the effects of safety leadership on safety climate. Wu et al. (2008:309) state that “safety leadership is the process of interaction between leaders and followers, through which leaders can exert their influence on followers to achieve organizational safety goals under circumstances of organizational and individual factors”.

Transformational leadership is believed to be future-oriented, as it focuses on future development; it has also been referred to as relationship-oriented leadership. Transactional leadership pays more attention to linking rewards with performance; it is often referred to as task-oriented leadership. Previous research by Wachter et al. (2013) focused on three dimensions of safety leadership, namely active transformational leadership, safety monitoring and safety motivation. They found that safety motivation and active management are characteristics of transformational leadership, and safety monitoring was found to be closely linked to transactional leadership. Safety motivation looks into the degree to which senior management creates clear responsibilities, missions and goals for setting high safety behaviour standards for employees or puts relevant safety systems into place to correct employee safety behaviours.

2.12 Questionnaire related to safety culture practices and values

Dejoy et al. (2010) adopted a safety culture model to learn five safety values and practices, which they believe are related to safety performance, as previously indicated by multi-studies on safety culture.

- Leadership style
- Company values
- Training programmes
- Motivation patterns
- Use of accident and incident information and communication.

Research by Hofmann (2011) and Diaz (1997) indicated that safety climate is the originator of the development of relevant questionnaires on organisational safety culture practices and values. The study examined the relationship between accident rates and safety climate for an airport groundhandling organisation. The questionnaire was administered to operators, managers, airport authorities and service companies for ground-handling in Spain. The analysis of the results revealed that there are six safety climate factors. The most important dimension of safety culture identified was company policy, which carried 38% of the safety culture variance. Emphasis placed by the organisation on productivity rather than safety accounted for 6.4% variance in safety culture. The following dimensions of climate and attitude were measured Hofmann (2011):

- Organisational policy/strategy with regard to safety matters
- Importance of productivity against that of safety
- Group safety attitudes
- Strategies related to accident prevention
- Perceived safety level in the workplace
- Perceived safety level in individual tasks performed.

There was a significant difference noted on the level of safety performance for the three companies according to $F(2.56) p < 0.1$. Ten years later, another questionnaire was administered to measure safety culture through:

- Leadership style
- Company values
- Training programmes
- Motivation strategies
- Use of accident and incident information □ Communication.

The questions were designed such that they measured beyond individual attitudes and perceptions of accident- and incident-reporting system objectives, methods for requesting feedback and the use of feedback. The questionnaire was adapted from the research of Cameron and Quinn (2014), which revealed how organisational practices such as accident- and incident-reporting systems can be approached depending on the organisational culture. To ensure compliance with procedures and policies a policy-oriented safety culture, which deals with a reporting system, can be adopted. Contrary, in a supportive environment the aim of a reporting system would be to motivate and increase safety commitment according to the type of motivation, values and safety culture.

Based on the studies and findings presented, the current study examined five independent variables relating to organisational values and practices. The TRIR, recordable lost-time injury (RLTI), firstaid injuries and fatalities served as dependent variables, which were used as a measure of safety performance. From the review of literature it is evident that most studies on safety culture are usually presented as an assessment of commitment and values relating to safety on company as well as group level. On the other hand, Diaz and Cabrera (1997) examined employee attitudes related to safety by looking at different levels in the organisation. The study compared employee safety attitude at company, management, middle-management and operator level to explore differences in safety attitudes and climate. The current study also examined the variations in safety climate by job classification and plant. According to Chenhall (2010), individuals who are mostly exposed to risk have less positive attitudes than employees who are not. A study of both situational and individual factors was done.

In most of the studies reviewed, the aim was to determine safety practices, such as safety communication and training, which result in a positive safety climate. The study by Wachter et al. (2013) revealed some of the dimensions of particular practices that relate to positive safety culture. According to Richer and Koch (2004), Many scholars have an integrative, unitary and monolithic move towards to culture. Indicators of safety performance or dependent variables for the true current study also only include TRIR, RLTI, first-aid injuries and fatalities. Company leadership style, values, safety information sharing and motivation are treated as independent variables. The culture systems discussed are the reporting culture, learning culture, just culture and informed culture.

2.13 Conceptual framework

Several culture models were selected for a conceptual framework due to the lack of empirical research differentiating between safety outcomes and corresponding types of safety culture. Most research indicates that organisational culture is shaped by certain organisational practices (Bamsteiner, 2011; Guldenmud, 2013; Hecker et al., 2014). Cabrera (2007) points out five organisational practices that are the most significant in research on safety culture. The competing values framework by Cameron and Quinn (2014:12) “can be useful in organizational analysis, in the analysis of organizational change, and in the guidance of practitioners in the execution of organizational development interventions”.

Nadler and Tushman’s organisational behaviour diagnosis (cited in Argote, 2012) and Burke/Litwin’s model of organisational performance and change (Allen & Tebbetts, 2013) emphasise culture consistency. These models served as theoretical foundation of the current study. The theoretical structure of assumptions (conceptual framework) that supported this study clarified the safety culture practices and value developments which served as diagnostic instruments to examine the current organisational safety culture state of ImproChem.

Figure 3.3 shows how different management styles impact the safety outcome such as the number of first aid injuries, the number of fatalities, and the overall total recordable incident rate. Supportive and innovative safety culture contributes positively to accidents prevention.

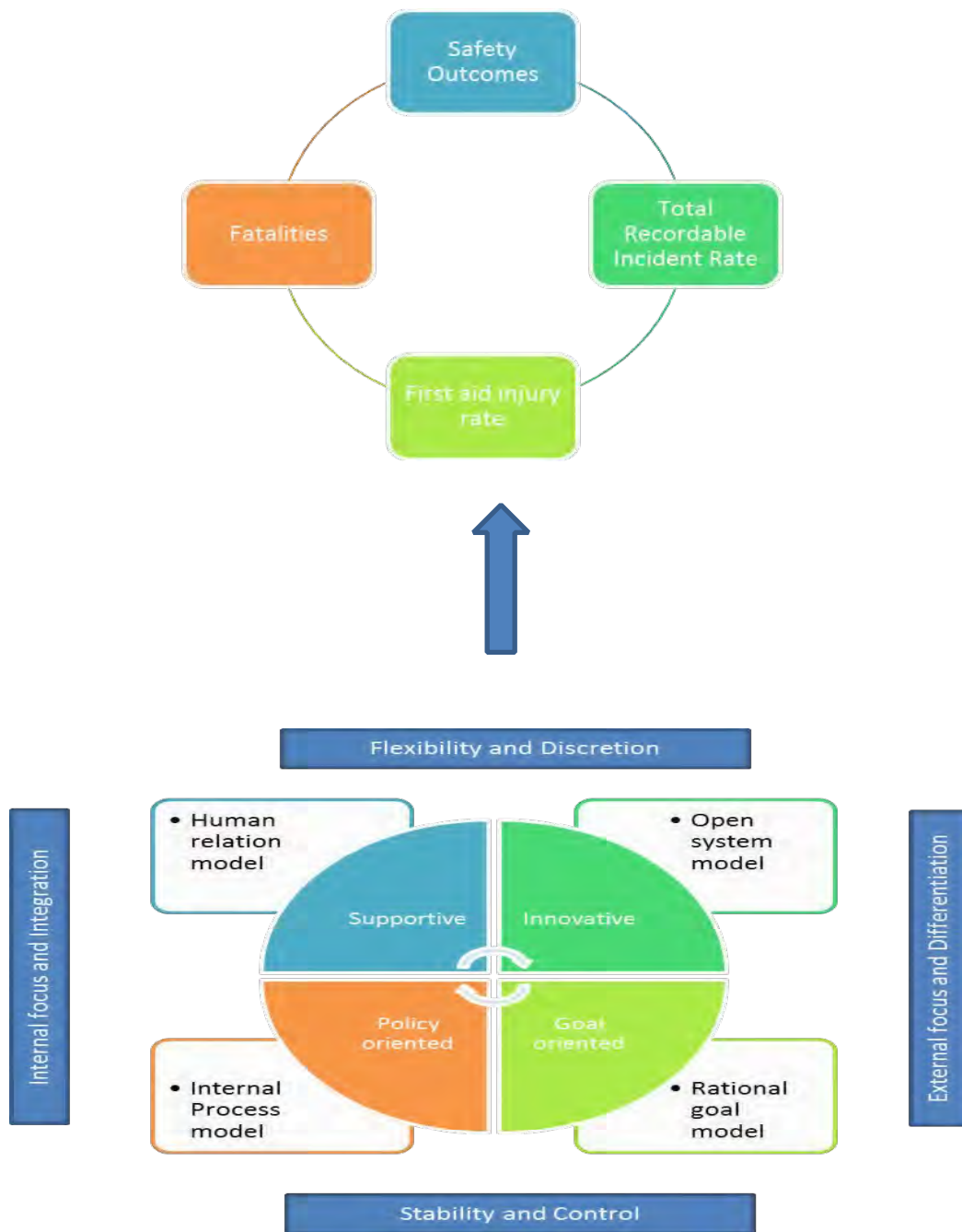


Figure 3.3: Safety culture models (Diaz et al., 2010) Adapted from Cameron & Quinn 1999.

In organisational effectiveness models there are four types of safety culture, namely supportive, innovative, goal-oriented and policy culture. Supportive culture is recognised by employee collaboration, involvement and team building as means of encouraging organisational safety commitment. A supportive culture ensures that after every incident employees together with management identify training needs to close the gap specific to that incident. An innovative safety culture is recognised by its flexibility to change, job design, reward system and work procedures to ensure safety improvement, as employees give feedback on where change is required. Goal-oriented culture is characterised by clear safety goals and expectations accompanied by relative safety rewards.

The policy-oriented culture merely evaluates the consequences of safety failures and safety performance for compliance purposes only. The study applied a similar framework to assess and measure variation in safety performance with the aim of reducing incidents and accident (Diaz et.al, 2010).

This conceptual framework can be used to point out areas of improvement after analysis of the safety profile results. Safety culture profiles adopted from the value frameworks of Cabrera et al. (2013) and Cameron and Quinn (2014) can be used to comprehend the safety culture components and identify gaps in different departments.

Organisational practices that include company values, communication, leadership style and motivation, and use of incident and accident information were used to understand culture types across the departments of ImproChem and determine whether the organisation is typified by flexibility and discretion or stability and control, as shown in Figure 3.3.

2.14 Conclusion

Scholars have not been able to reach consensus as to which safety performance measures should be used as measures of safety culture. Some researchers argue that the reduction in accident and incident rate provides the best measure of safety culture. This is due to the fact that not all employees report incidents and near misses either due to fear of punishment or because they do not want to miss out on free safety incentive gifts (Allen & Tebbetts, 2013). Therefore, incident rates cannot be treated as an accurate measure of safety performance. According to the OSH Act of 1993, it is the duty of the employee to report illnesses and injuries that are work-related before the end of each shift. However, some employees still do not report injuries and illnesses (OSH Act, 1993). Some injuries can be difficult to link with particular working conditions over a specific period of time, and as a result they are not reported.

Safety performance indicators are classified differently under the OSH Act. There are leading and lagging safety performance indicators. Leading are those proactive measures of safe behaviours that show employee engagement with workplace safety improvement, tasks and analysis of hazards. Lagging indicators are those reactive measures that indicate the number of incidents and form part of safety performance indicators. Zou et al. (2013) worked on a safety culture model for a construction organisation. The outcome variables were to increase safe behaviours through the reduction of incident rate. The model is suitable for an organisation that uses a behavioural-based safety programme to

clearly define safe and at-risk behaviours with regard to company procedures, policies and risk assessments.

It is still not been clear whether the referenced independent variables are suitable predictors of safety performance. Very little study has been done to investigate which variables are contributors to specific culture performance. Therefore, the current study explored independent variables that extend beyond procedures and policies to include individual and organisational values and practices. Based on the organisational culture theory, the study investigated the missing link between types of safety culture and safety outcome predictors. The next chapter contains the research methodology, detailed information regarding the on the population, sample size, questionnaire design will be given. Data collection method and data analysis form part of the next chapter.

Chapter 3: Research methodology

3.1 Introduction

The literature review chapter was done in order to investigate factors influencing employee participation in workplace safety programmes. Safety culture, safety climate, non-human factors and organisational culture and other dependant variables were identified as contributing factors to low employee commitment to safety improvement.

The objective of this research was to investigate the relationship between safety culture, safety climate and organisational culture, and human and non-human factors that affect employee enthusiasm to participate in workplace safety-improvement programmes. The aim was also to assess the role of these factors in safety performance indicators. A detailed description of factors influencing employee participation on safety performance was done, making this a descriptive study. According to McDonald (2014), in such a study the emphasis should be on an in-depth description of situation, group, individual and organisation.

3.2 Research design methods

According to Bamsteiner (2011), the research design is a detailed plan/blueprint of how a research study will be conducted with regard to data collection, determining the basis of hypotheses and data analysis. The research design determines the success or failure of the research. Huang (2012) states that surveys give quantitative information with regard to groups and descriptive features of individuals. He further states that the deductive approach is highly recommended, as the researcher instigates a theoretical research problem before embarking on data analysis and empirical measurements.

Chenhall (2010) mentions the debate over quantitative and qualitative methodologies for learning about organisational culture. It has been found that studies employing quantitative research have been utilised to describe and understand cultures. The limitation in utilising electronic questionnaires is the poor response rate; however, it covers a wide geographic area (Sekaran & Bougie, 2010). As the aim of the current study was to understand factors influencing employee participation in workplace safety programmes, a comparison of different dimensions of organisational practices across different departments in the organisation was essential.

3.3 Location of the study

The study was conducted at ImproChem KwaZulu-Natal (KZN), Cape Town and Johannesburg in South Africa, and Ghana, Nigeria, Kenya and Zimbabwe. The research focused on different departments within the organisation such as the energy division, production, marketing, human capital, safety, health, environment and quality (SHEQ) and ImproLogistics departments. Among these departments some have failed to achieve their SHEQ goal of no harm to anyone ever; some were able to achieve this goal based on the safety performance indicators.

3.4 Population and sample selection

The questionnaire was sent to the entire population of 395 respondents to eliminate selection and sampling bias in the survey. All 395 employees formed part of the sample size. The population of 395 employees was given an opportunity to participate in the survey. From the total of 395 participants only 124 respondents completed the questionnaire which 31% response rate and it is acceptable for an electronic survey. The survey respondents covered almost all the employees in the organisation, from individuals working in less hazardous areas to individuals who are greatly exposed to safety risk when performing their task. The production supervisors were also included, as they have the important task of driving safety culture within the production department, which has high risks exposure. The different job classifications included technicians, supervisors, line managers and directors. Each respondent has a role to play in ensuring a positive safety culture within the organisation.

3.5 Data-collection strategy

Arezes (2015) defines a questionnaire as a tool that consists of questions or open-ended and closed-ended statements to which participants are expected to react. According to Hecker et al. (2014) in a structured questionnaire, the fixed instructions and explanations must be fixed such that there is no opportunity for respondents to seek further clarification and thus wording must be clear and specific to aid in solving a carefully formulated problem. A quantitative questionnaire of 36 closed-ended questions and two open-ended questions was developed for the survey.

Data-collection strategies ensured neutrality in the current study and consisted of i) unbiased safety performance indicators that are measurable, ii) different perspective of several job classes from different departments and provinces, iii) privacy to protect the respondents, iv) data confidentiality, and v) the inclusion of every individual in the organisation, from technicians to managers. The researcher acknowledges that the data obtained from this research cannot be treated as data obtained from direct observation; however, the self-reported data aid as „conditional evidence“ of the existence

of certain safety culture types. The researcher can only trust that the respondents responded as honestly as possible, and therefore the data cannot necessarily serve as concrete reality. Dejoy et al.'s (2014) recommendations for data-collection methods were taken into consideration. Clear advantages and disadvantages of different data-collection methods were reviewed. Due to the fact that ImproChem has extended their footprint to Africa and have multiple plants, and that some employees are distributed to different customer sites, email questionnaire distribution was selected.

Management allowed for employees to spare 10 minutes of their time to complete the questionnaire during working hours. The self-administering the questionnaire was also considered, because the researcher could then clarify any questions the respondent may have had and it also permits a maximum response rate; however, due to geographic area that had to be covered, a selfadministering the questionnaire could not be the practical.

The following procedures were followed to collect the data from the respondents:

Step 1: The SHEQ manager was informed in February 2015 about the intent to conduct an SHEQ survey. The initial intention was to conduct the survey in the KZN region, due to the fact that the Umbongitwini manufacturing plant is located there, where most of the employees were easily reachable, which would have allowed the researcher to hand deliver the questionnaire to increase the response rate. However, due to the increases in incident rates within the organisation, the need to assess the safety culture at each individual location throughout Africa was noted.

Step 2: The involvement with individuals from SHEQ departments allowed the researcher to obtain several instruments of safety culture. The researcher was able to determine different dimensions to be assessed. Similar to the research conducted by Chenhall (2010), the researcher decided to administer questionnaires that assessed safety culture practices, company values, management's level of support, the work environment and also employees' commitment and level of vigilance when performing their tasks.

Step 3: The questionnaire was developed and administered electronically via email. The consent form was attached to ensure that the respondents' anonymity is well maintained. The respondents' responses were kept confidential throughout the research; the researcher did not release the responses to the employer. The respondents were also granted freedom not to participate in the survey or withdraw without any consequences. Responses to completed questionnaires were sent directly to QuestionPro, where the researcher was able to do the analysis.

3.6 Questionnaire design

The first set of questions was designed to assess to what extent the working non-human factors (work environment, work design) affect employee participation in ImproChem SHEQ programmes. The second set of questions was designed merely to test employees' level of understanding of ImproChem's SHEQ requirements and to assess their level of compliance with the SHEQ requirements. To assess employees' level of commitment and attitude towards ImproChem's safety improvements, questions on aspects such as using a questioning attitude when doing day-to-day tasks were asked.

Management's level of support was identified as the most important factor to improve safety within any organisation, and therefore questions to understand the level of support offered by management were asked. Lastly, to gain insights into different ImproChem organisational safety cultures, questions on how the overall organisation feels about hiding safety errors were asked. Regarding the improvement of ImproChem's safety, employees were asked two open-ended questions on what safety-improvement strategies are already in place and which safety-improvement strategies can be employed to improve safety at ImproChem.

For the current study, the Likert scale, which is an attitude-response scale used for measuring reactions and attitudes in business and management surveys, was used. In the Likert scale answers are placed on a scale, ranging from complete disagreement to complete agreement. An option of neutral response is also given in the centre of the scale. The questionnaire was designed to incorporate reliable and well-validated measures of employees' level of understanding of and compliance with ImproChem's SHEQ standards using an itemised rating scale. The questionnaire was more focused on questions that allowed the respondents to express their responses using a fivepoint Likert scale. The requirements for the respondents were to use a scale of 1 to 5 to score each question.

3.7 Validity and reliability

Stellmack (2009) defines validity as the extent to which the facts support that the interpretation of the data in a way in which interpretations used is correct. In short, validity is a presentation of how true and believable the results are. Validity can be tested through posing a sequence of questions and using previous research test the accuracy of the measurements.

Creswell (2003) points out that numerous threats for validity exist, giving rise to data inaccuracy issues or statistical tests or results. These threats are categorised into internal and external threats and construct validity and statistical conclusion threats. Stellmack (2009) points out that internal validity is the basic requirement to clearly understanding an instrument. Internal validity can be defined as threats encountered by the researcher such that they affect the researcher's capability to draw appropriate inferences from experimental data. Such threats are participants' experiences, treatments and experimental procedures. Inadequate procedures such as change in a tool, instrument or control group during the experiment can raise such threats.

When researchers draw incorrect inferences from the sample data, external validity threats arise. When the researcher uses inadequate definitions and from there measures variables, construct validity threats arise. Denise et al. (2010) points out that when a researcher draw inaccurate inferences, a statistic conclusion threat arises due to the violation of the assumptions used for data collection. Prior to sending the questionnaire, the testing bias was eliminated during the piloting of the questionnaire. To eliminate analysis bias, SPSS and QuestionPro were utilised, as data analysis is hereby done without the researcher's manipulation.

According to Golafshani (2003), reliability can be defined as the consistency of the results irrespective of the number of times the experiment is repeated. In quantitative research, an instrument is said to be reliable if it meets the following criteria:

- The results remain the same when exposed to the same measurement conditions.
- The dimensions remain stable although the frequency may vary.
- In a specific given time period the measurements remain similar.

The highest degree of stability shows the highest degree of reliability. Cronbach's alpha test is commonly used to measure internal consistency; it measures how the set of items is closely related as a group. The Cronbach's alpha measure for the current study was 0.836, which is an acceptable measure of reliability.

3.8 Administration of questionnaire

A total of 36 closed-ended questions and two open-ended questions were developed for the survey and the questionnaire was administered electronically. QuestionPro was used to send out the questionnaire. The safety manager administered the questionnaire to the respondents. The consent form was attached to the questionnaire to ensure that the respondents' anonymity is well maintained. The questionnaire was sent out on 21 May 2015 and the respondents were given three weeks to respond. A weekly reminder was sent to encourage the respondents to complete the survey. The respondents were also granted freedom not to participate in the survey or to withdraw without any consequences thereof. The respondents' responses were kept confidential throughout the research. The researcher's intentions were clear not to release the responses to the employer, but to share the findings and recommendations.

3.9 Data analysis

Quantitative data analysis requires a breakdown to test the hypothesis and the research questions. The method to be used for data analysis is determined by the type and quantity of analysis to be performed. Various methods of data analysis could be used; however, due to restricted access, quantitative data analysis was done using the SPSS version 20 for Windows. Frequency tables were used to describe the variables. The data were imported from QuestionPro to the SPSS program to complete the data analysis. Descriptive summary measures such as the mean and the mode were used to summarise the results. To measure the statistical significance, a p-value of < 0.05 was accepted as a valid measure.

The next chapter presents the analysis of the responses to the questionnaire. The difference across the departments was analysed using the one-way ANOVA for safety practices, values, management's level of support, employee commitment and level of vigilance. To test for the significance among the responses from 11 ImproChem departments, the Kruskal Wallis test was applied. For p-value less than 0.05, the null hypothesis was rejected and the alternative hypothesis was accepted. According to Sekaran and Bougie (2010) the Wilcoxon rank-sum W-test (Mann-Whitney U-test) is suitable for analysis of ordinal data, hence it was used in this study which contained Likert scale data.

3.10 Conclusion

The methodology utilised for the current study was outlined in this chapter. The researcher chose to utilise quantitative data-collection methods for the research due to the advantages of the quantitative

data-collection strategy. The survey population was ImproChem employees across Africa. The entire population was chosen as a sample size and the questionnaire was used as the survey instrument.

The questionnaire was designed in line with the objectives. Piloting of the questionnaire was done to ensure the questions are clear and understandable before they were administered. QuestionPro was used to administer the questionnaire, which was of benefit, as it allowed the researcher to conveniently analyse the data using SPSS software, which is interlinked to QuestionPro. The software packages provided sufficient statistical tools that allow for valuable data insight. The discussion and data presentation are contained in the next chapter.

Chapter 4: Presentation of the results

4.1 Introduction

The most important aspects of any research is data presentation and discussion, as this is the section where raw data are converted into meaningful information to address the research objectives. The interpreted research information can then add value to the purpose for which the research was conducted.

The aim of this chapter is to present and discuss the results obtained from the safety survey conducted at ImproChem. The survey participation outcomes are presented, also highlighting certain respondent statistics. The demographic information is presented. The detailed analysis of factors influencing employee participation in workplace safety improvement is provided.

4.2 Survey statistics report

A total of 395 questionnaires were distributed, but only 124 respondents completed the selfadministered questionnaire. The response rate was therefore 31% (Table 4.1). **Table 4.1: Summary report of the survey**

	Count
Number of respondents	395
Number of respondents who started the questionnaire	191
Number of respondents who completed the questionnaire	124
Drop-outs	67
Participation rate	64%
Completion rate	31%
Average time taken to complete the questionnaire	15 minutes

4.3 Demographics

The respondents' socio-demographic variables are summarised in figures 4.1 to 4.3.

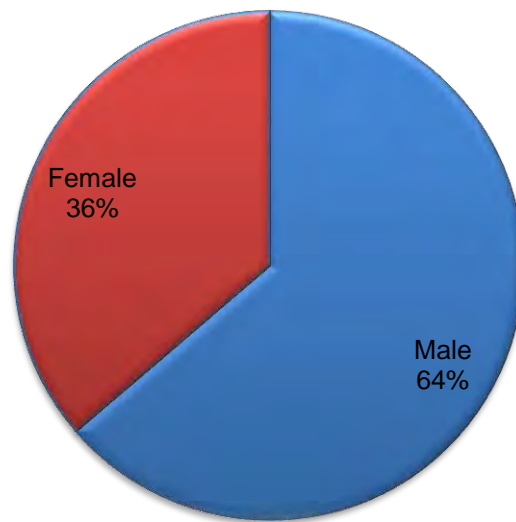


Figure 4.1: Gender distribution of respondents (n = 124)

Based on the gender distribution illustrated in Figure 4.1, approximately two-thirds (64%) of the respondents were male and 36% were female.



Figure 4.2: Age distribution of respondents

Figure 4.2 shows the age distribution of the respondents. Of these, more than two-thirds of the respondents (71%) fell within the 25–44 year age group. The majority of respondents were aged between the ages of 25 – 34 years, with 44 (35.5%) participants coming from this group. This was followed by age range 35 – 44, with 40 (32.3%) participants. The least represented group were participants between the ages of 18 and 24, with only 4 respondents coming from this group. Only 1 participant chose to withhold their age.

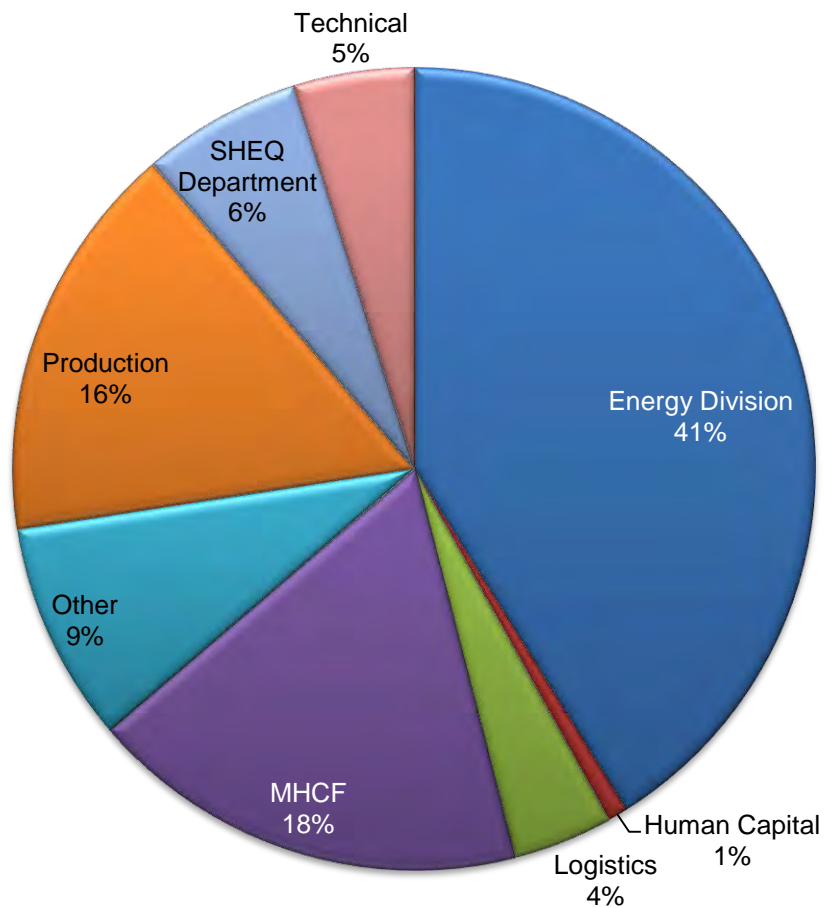


Figure 4.3: Distribution of respondents in departments (n = 124)

Of the eight departments depicted in Figure 4.3, the Energy division had the most responses relative to the other departments (41%), followed by the Marketing/Human Capital/ Finance (MHCF) department (17.64%) and the Production department (16.13%). The department that was represented the least was Human Capital with only 1% of respondents.

4.4 Objectives

In the sections that follows, the six objectives that the study set out to achieve are discussed. Each is presented with central tendency statistics, significance tests and descriptive statistics in the form of frequency distribution bar charts. Each of the constructs used to test the reliability of the study objectives (as per the questionnaire) was assessed using Cronbach's alpha. These are reflected in Table 4.2.

Table 4.2 tabulates the alphas of the six constructs used to address the objectives that the study set out to achieve. Based on Table 4.2, the combined alpha coefficient for all test statements comprising the constructs is 0.836. This indicates that taken as a whole, the reliability of the questionnaire was sufficient.

Table 4.2: Cronbach's alpha for constructs grouped together by relevant questions

Objective	Questions	Combined alpha
The extent to which non-human factors influence employee safety performance and contribute to number of accidents	1a–1e	0.836
To evaluate employees' level of understanding of ImproChem SHEQ requirements	2a–2d	
To evaluate employees' level of compliance with ImproChem SHEQ requirements	3a–3g	
The evaluate the extent to which employees take ownership of the ImproChem SHE improvement plan	4a–4h	

To evaluate management's level of support in ensuring a safe working environment	5a–5e
To evaluate how organisational culture influences employee participation in ImproChem safety measures	6a–6e

4.4.1 Objective 1: the extent to which non-human factors (working environment) influence employee safety performance and contribute to the number of accidents

Based on Table 4.3, it is evident from the medians that in four of the five statements 50% or more of the respondents felt that non-human factors were always on par, and it can be inferred that they feel these had minimal influence on carrying out their jobs safely and contributed minimally towards the number of accidents. Only on the statement “My job often leaves me with little time to think about safety” did 50% or more of the respondents reply that their job never leaves them with little time to think about safety. A more detailed discussion of the statements is given in the following paragraphs.

To test the significance in differences between ImproChem departments, the Kruskal-Wallis test was applied. For the hypothesis testing, if the p-value was less than 0.05, the null hypothesis was rejected, which resulted in the alternative hypothesis being accepted. The hypothesis for each of the statements above was as follows:

H₀: The distribution of responses to the statements 1a to 1e is the same across departments.

H₁: There is a difference in the distribution of at least one of the departments' responses to the statements 1a to 1e.

As shown in Table 4.3, the researcher failed to reject the null hypothesis is accepted on all counts, as in each statement the p-value is greater than 0.05 (i.e. significance is when $p < 0.05$). The researcher

therefore concluded that the distribution of responses across departments for statements on the extent to which non-human factors contributed to the number of accidents is similar at the 95% confidence level.

Table 4.3: The extent to which non-human factors influence employee safety performance

Statement	Median	p-value* (Department)	p-value* (Age)	p-value+ (Gender)
1a. My job often leaves me with little time to think about safety	1	0.6324	0.1928	0.2416
1b. I use tools that are in good condition	5	0.0992	0.2372	0.1576
1c. Safe working procedures are readily available for each task and machinery I use	5	0,0738	0.3088	0.3268
1d. I use machinery that is in good condition	5	0.1475	0.1201	0.3617
1e. Emergency procedures are readily available in case job-related conditions change	5	0.3697	0.2497	0.3642

*Kruskal Wallis test; +Mann-Whitney U-test

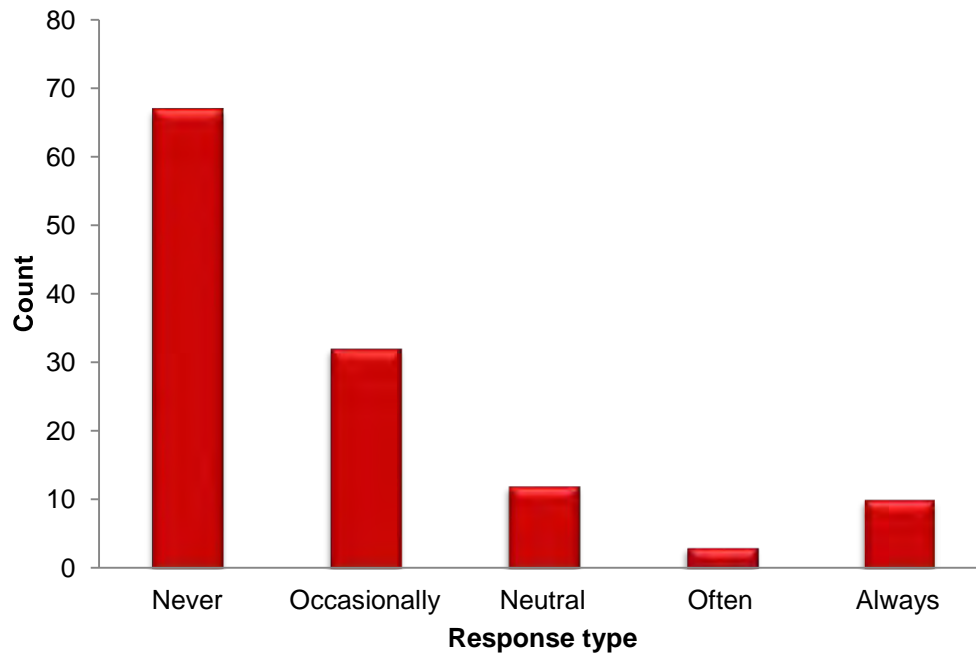


Figure 4.4: My job often leaves me with little time to think about safety

As seen in Figure 4.4, more than 50% of the respondents felt that their job gives them sufficient time to think about matters pertaining to safety. 25.8% of the respondents felt that their job occasionally left them with little time to think about safety. 8% of the respondents felt that their job always left them with little time to think about safety, 3(2.4%) participants felt that it often left them without time, and 12 (9.7%) opted to remain neutral.

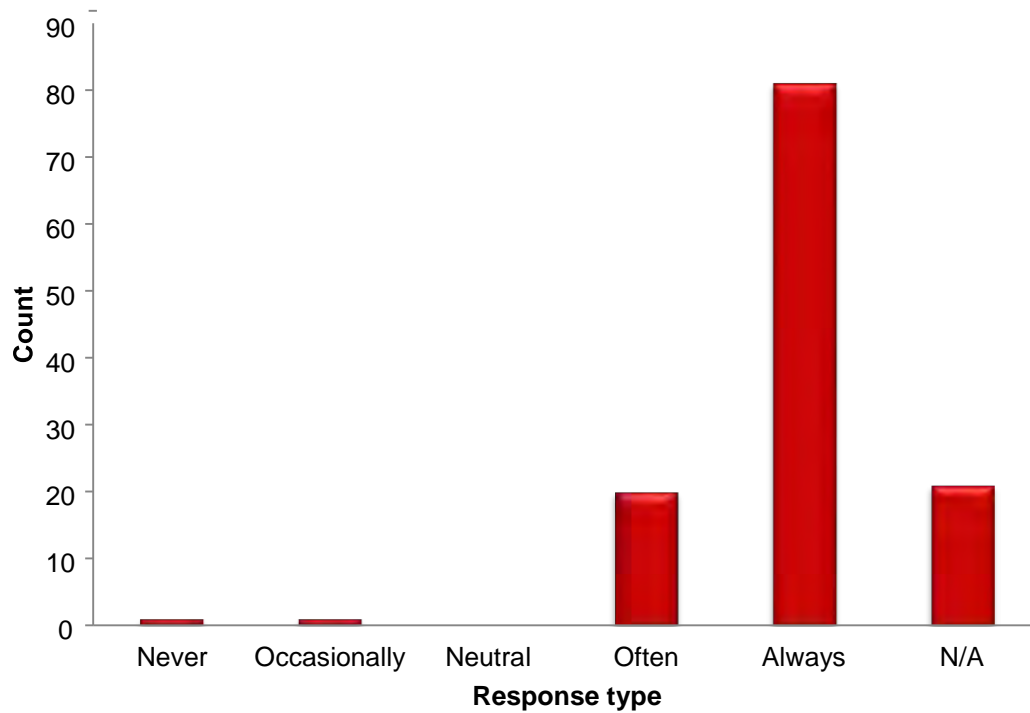


Figure 4.5: I use tools that are in good condition

Figure 4.5 illustrates the responses to the statement “I use tools that are in good condition”. More than 60% of the respondents indicated that the tools they use are always in a good state. 16% felt that the tools that they used were often in a good condition, while almost 17% were not in a position to comment. 1 participant felt that their tools were occasionally in a good condition and another felt that the tools were always in bad condition.

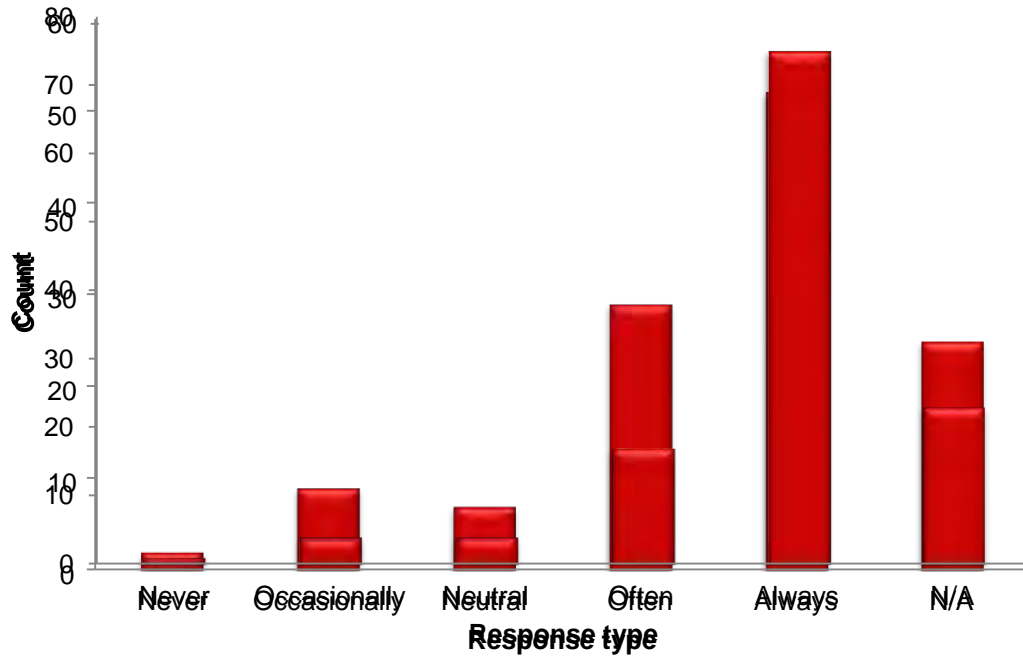


Figure 4.6: Safe working procedures are readily available for each task and machinery I use

Based on Figure 4.6, 52 (42%) respondents felt that safe working procedures are readily available for each task and machinery that they used. 23.4% felt that this was often the case, 7.2% felt that this was sometimes the case, while 2 (1.6%) participants felt that this was never the case. The remaining 7 (5.6%) participants chose to remain neutral.

Figure 4.7: I use machinery that is in good condition

Figure 4.7 shows the responses to the statement “I use machinery that is in good condition”. In response to this statement, 60% of the respondents indicated that this is always the case. 14% felt that this was often the case, 3% indicated that this was occasionally the case, and 1 participant thought that this was

never the case. 4th (3%) participants opted not to comment, while it was not possible for 19% of the participants to comment as this particular statement did not apply to them.

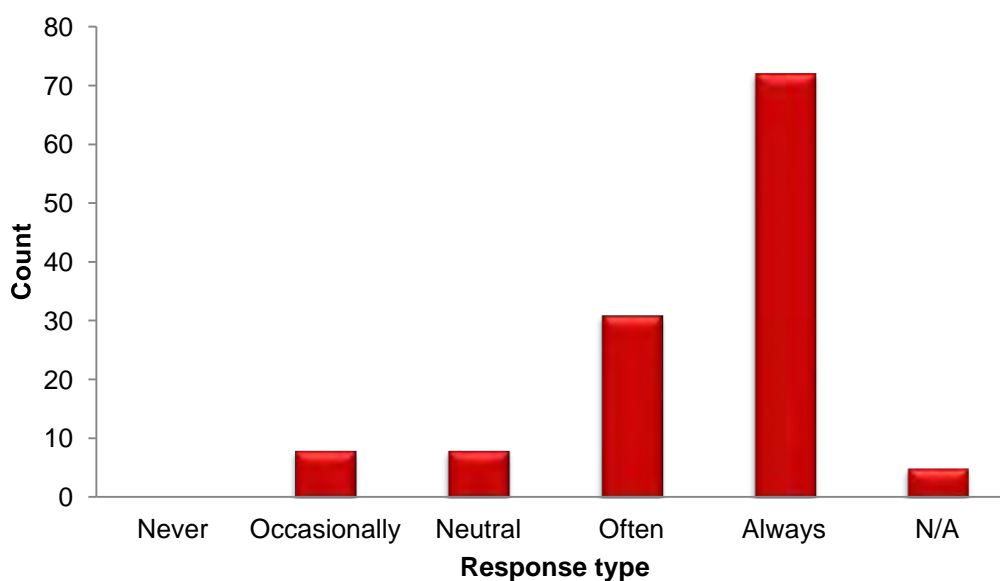


Figure 4.8: Emergency procedures are readily available in case job-related conditions change

In response to the statement “Emergency procedures are readily available in case job related conditions change”, 72 (58%) of the respondents agreed to the statement. 31 (25%) indicated that this often held true, and 8 (6.5%) participants felt that this was occasionally the case. The remaining 13 participants either opted to remain neutral (8 participants) or this statement did not apply to them (5 participants).

4.4.2 Objective 2: To evaluate employees’ level of understanding of ImproChem SHEQ requirements

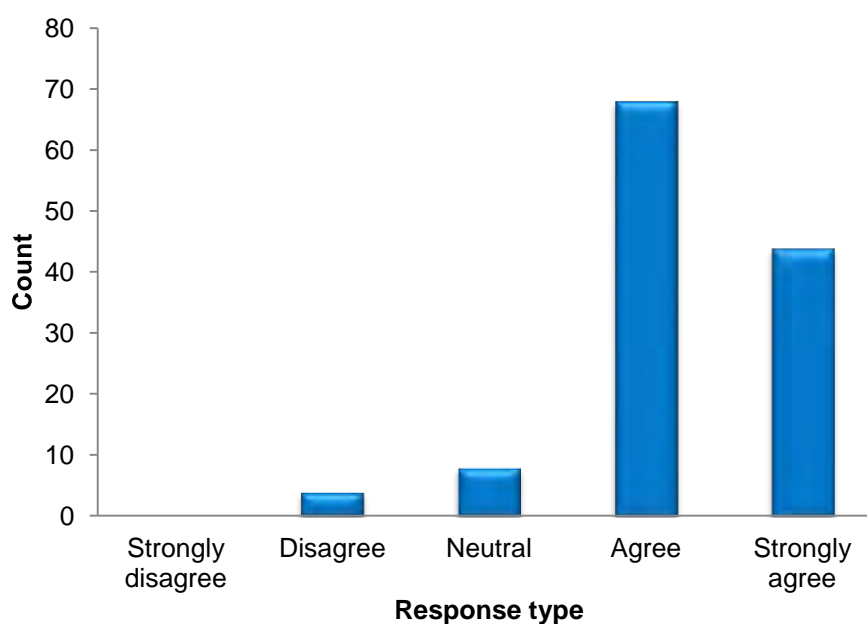
Table 4.4 shows the central tendency statistics and significance tests relating to the construct evaluating employees’ level of understanding of ImproChem’s SHEQ requirements. Based on the median responses to the above statements, it can be said that 50% or more respondents agreed to three of the four statements. On the statement “I know what to do in case of an emergency”, 50% or more respondents strongly agreed. The most frequently selected response to the first three statements was “agree”, while “strongly agree” was the most frequently selected response to the last statement: “I know what to do in case of an emergency”.

Using the Kruskal-Wallis test to detect any significant differences between the distribution of responses between the different departments, it was found that there were no statistically significant differences between departments, gender and age at the 95% confidence level.

Table 4.4: Employees' level of understanding of ImproChem's SHEQ requirements

Statement	Median	p-value* (Department)	p-value* (Age)	p-value+ (Gender)
2a. I am fully aware of all ImproChem SHEQ programmes	4	0.1049	0.5349	0.9348
2b. I have received adequate ImproChem SHE training	4	0.1984	0.3580	0.4055
2c. I follow safe working procedures when performing my tasks	4	0.8722	0.6616	0.9454
2d. I know what to do in case of an emergency	5	0.7471	0.6870	0.4348

*Kruskal Wallis test; +Mann-Whitney U-test

**Figure 4.9: I am fully aware of all ImproChem SHEQ programmes**

As shown in Figure 4.9, 35.48% of the respondents strongly agreed that they are fully aware of ImproChem's SHEQ programmes, and 55% agreed that they are fully aware of ImproChem's SHEQ programmes and 4 (3.2%) were unaware of ImproChem's SHE program. The remaining 8 participants opted for neutrality.

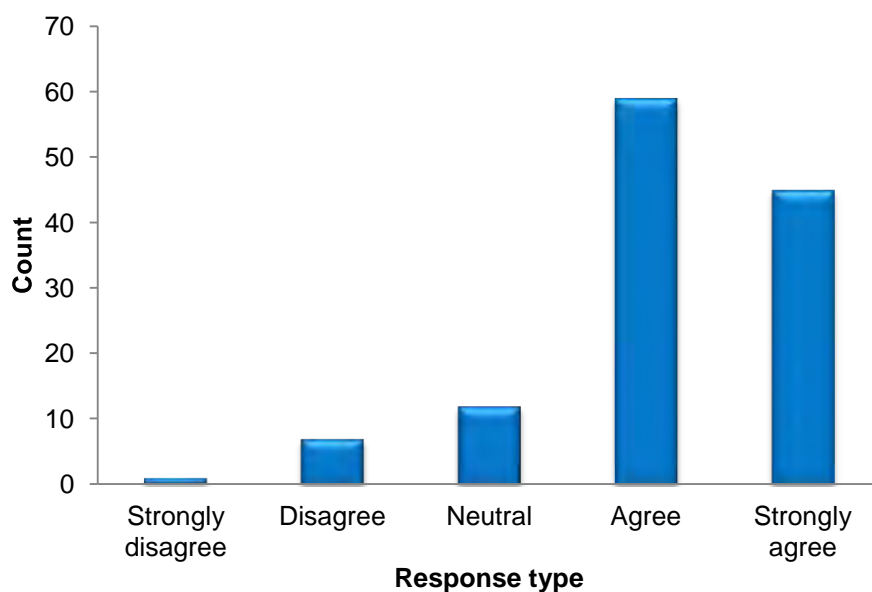


Figure 4.10: I have received adequate ImproChem SHE training

As illustrated in Figure 4.10, the majority (84%) of the respondents positively indicated that they receive adequate SHE training from ImproChem. 7 participants disagreed to this statement and one participant strongly disagreed. 12 participants remained neutral on this matter.

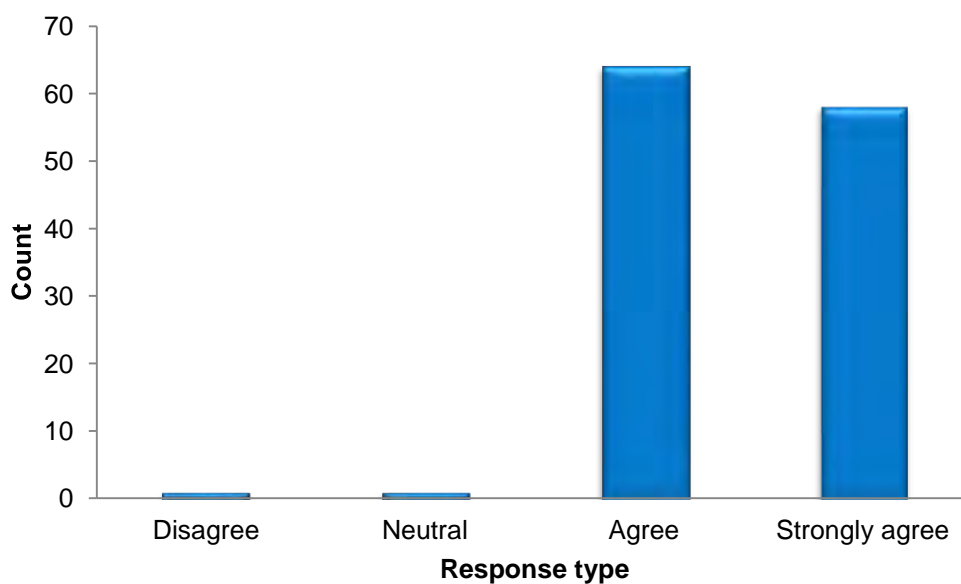


Figure 4.11: I follow safe working procedures when performing my tasks

Figure 4.11 shows that the most frequently selected responses to the statement “I follow safe working procedures when performing my tasks” were “agree” and “strongly agree”, with 98.38% of the respondents selecting these options. Only 1 participant disagreed and 1 opted to be neutral.

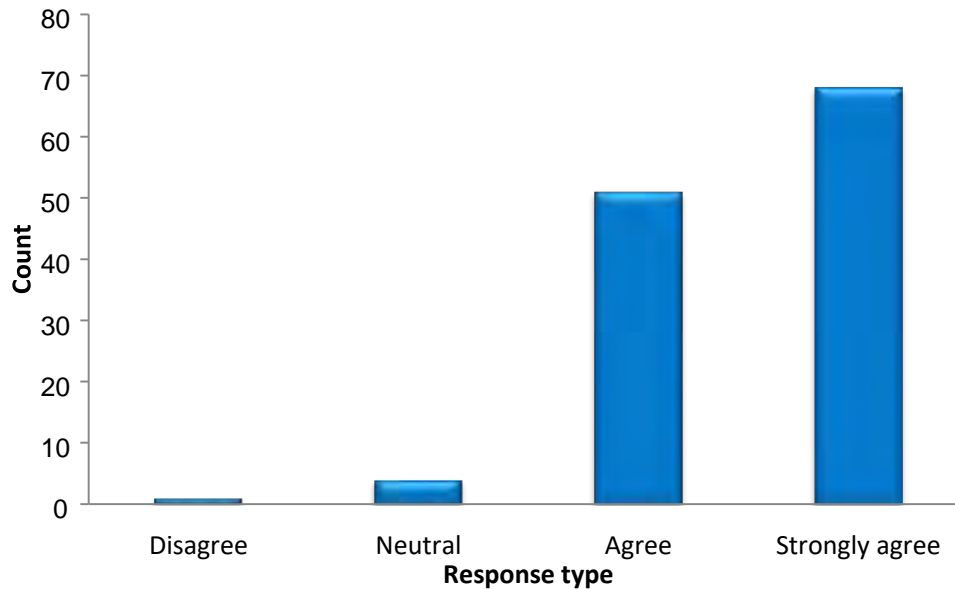


Figure 4.12: I know what to do in case of an emergency

Figure 4.12 depicts that over 95% of the respondents were confident that they know what to do in case of an emergency. Only 1 participant indicated that they did not know what to do, while 4 participants chose to remain neutral.

4.4.3 Objective 3: To evaluate employees' level of compliance with ImproChem SHEQ requirements

Based on Table 4.5, for all the statements, the median indicates that 50% or more respondents selected “always” as a response. This response is also the most frequently selected response for each statement as per the mode. No statistically significant differences were detected when comparing the distribution of responses by department for six of the seven statements constituting this construct. Statement 3a (EMPRO’s Hazard Assessment Tool booklet) and statement 3e (Site risk assessments) were the only two statements with statistically significant differences across departments at the 5% level of significance. The result showed that the median scores were not similar between male and female for statements 3a, 3c, 3d, 3e and 3f. It can therefore be concluded that differences were detected in the distribution of responses in at least one department for this particular statement at the 5% level of significance.

Table 4.5: Employee level of compliance with ImproChem SHEQ requirements

Statement	Median	p-value* (Department)	p-value* (Age)	p-value+ (Gender)
3a. Hazard Assessment Tool (HAT) booklet	4	0.0454	0.8156	0.0358
3b. PPE register	4	0.0955	0.9118	0.1014
3c. Safety data sheet letter of acceptance (LOA)	4	0.1029	0.4398	0.0107
3d. EMPRO's documented emergency plan at customer sites	4	0.1667	0.6046	0.0206
3e. Site risk assessments (SRAs)	4	0.0403	0.6400	0.0461
3f. Driver checklist	4	0.0901	0.6533	0.0157
3g. Medical assessments	4	0.3324	0.8823	0.6979

*Kruskal Wallis test; +Mann-Whitney U-test

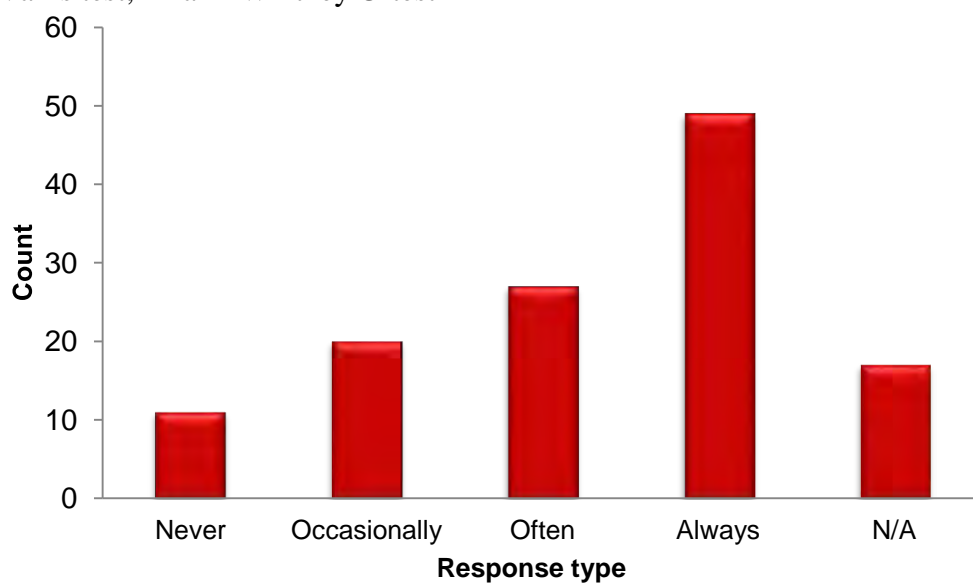


Figure 4.13: Hazard Assessment Tool (HAT) booklet

The Hazard Assessment Tool (HAT) booklet results indicate that almost 40% of the respondents felt that they are always compliant, as indicated in Figure 4.13. 17 respondents felt that this particular (safe, health and environment) SHE requirement does not apply to them, probably because of the department in which they work, as in general, the HAT booklet is applicable to individuals who work in high-risk areas. 21.7% respondents indicated that they often comply with the HAT requirement, 16% occasionally comply and only 11 respondents were never compliant.

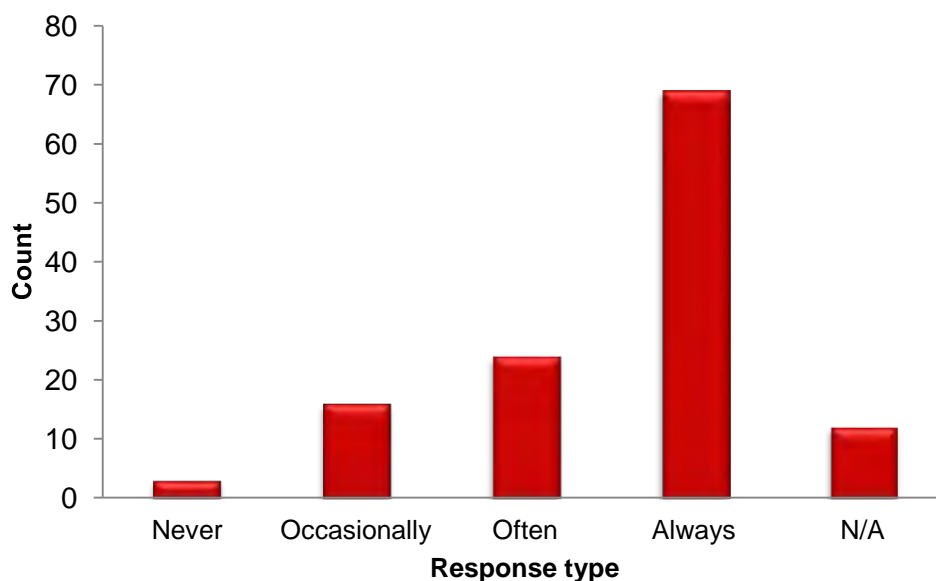


Figure 4.14: PPE register

The majority of the respondents (56%) indicated that they are always compliant with the personal protective equipment (PPE) register, as shown in Figure 4.14. 20% indicated that they were often compliant, 13% were occasionally compliant, and 2.42% indicated that they were never compliant.

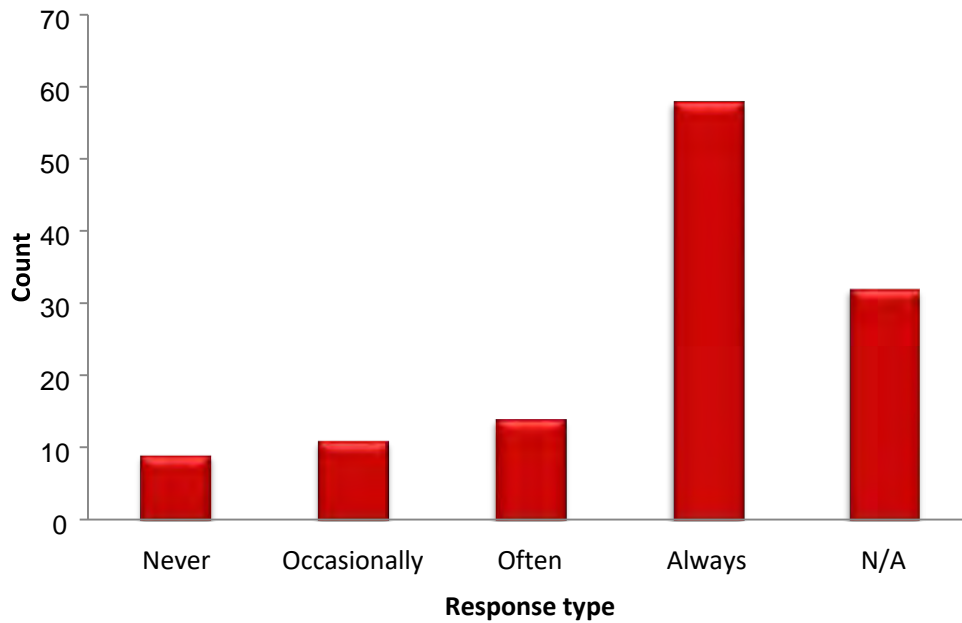


Figure 4.15: Safety data sheet letter of acceptance (LOA)

Figure 4.15 show that approximately 47% of the respondents indicated that they are always compliant with the safety data sheet letter of acceptance (LOA). 25.8% indicated that the safety data sheet LOA does not apply to them. 14 respondents indicated that they are often compliant, 11 participants are occasionally compliant and only 7% of the respondents were never compliant with the LOA requirement.

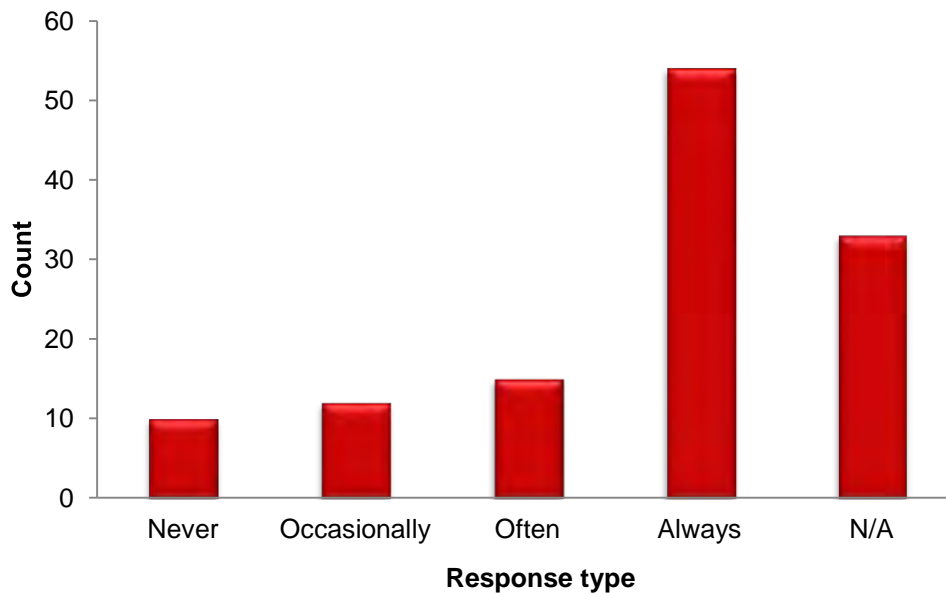


Figure 4.16: EMPRO's, documented emergency plan at customer sites

In terms of EMPRO's documented emergency plan at customer sites, 43% of respondents indicated that they are always compliant. EMPRO's emergency plan was not applicable to 27% of the respondents. 12 % of the respondents indicated that they are often compliant with 10% occasionally compliant and 8% of the respondents are never compliant.

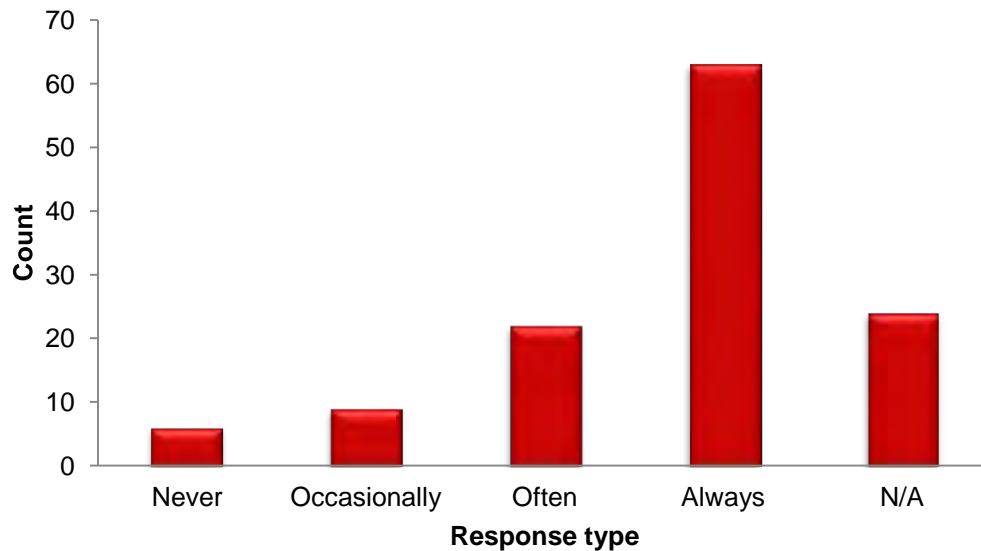


Figure 4.17: Site risk assessments (SRA)

Site risk assessment (SRA) was always complied with by a slight majority of the respondents (50.8%) as indicated in figure 4.17. Figure 4.17 also shows that almost 18% of respondents felt that they were often compliant, 7.3% were occasionally compliant, while almost 5% were never compliant. The remaining 19% indicated that this requirement did not apply to them.

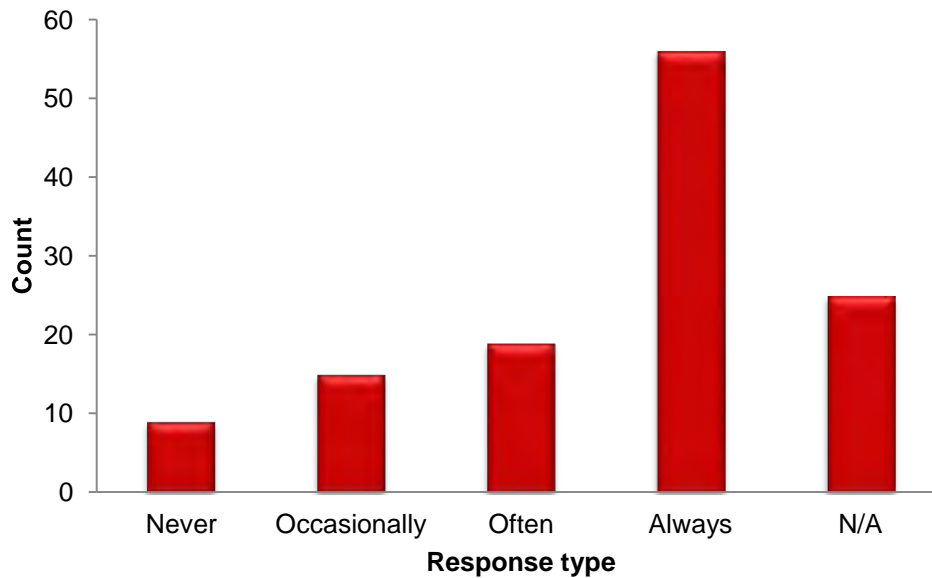


Figure 4.18: Driver checklist

Figure 4.18 show that 45% of the respondents were always compliant with the updating of driver checklists. 15% of the respondents felt that they were often compliant, 12 % felt that they were occasionally compliant and it was never the case with 7% .Driver checklist compliance did not apply to 20% of the respondents.

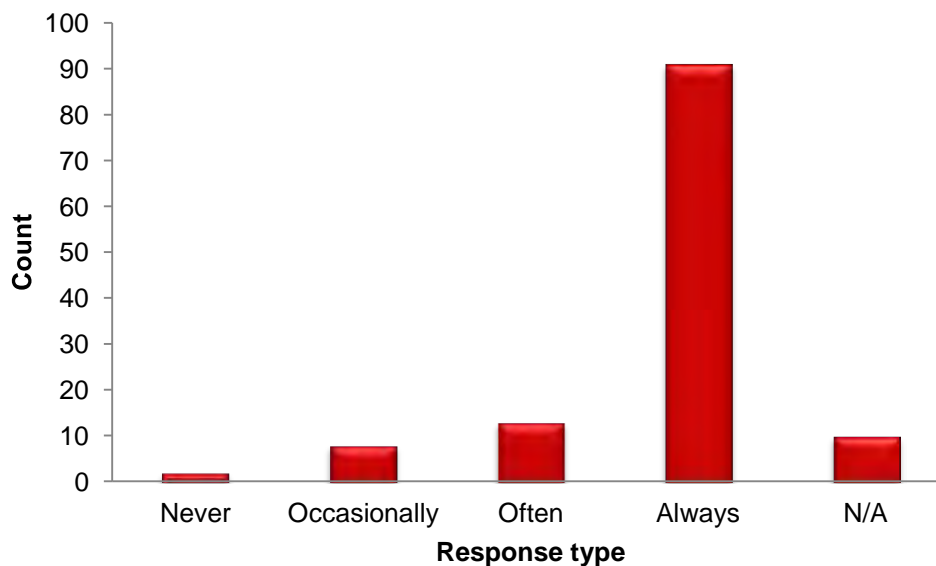


Figure 4.19: Medical assessments

Figure 4.19 illustrates that the vast majority (73.4%) of the respondents indicated that they are always compliant with medical assessments. Approximately 10.5% indicated that they were often compliant,

and almost 6.5% were occasionally compliant. 2 participants indicated that they were never compliant, while 10 participants indicated that this did not apply to them.

4.4.4 Objective 4: The evaluate the extent to which employees take ownership of the ImproChem SHE improvement plan

As tabulated in Table 4.6, 50% or more respondents indicated that they often take ownership of ImproChem's SHEQ improvement plan in three of the eight statements comprising this construct (viz. 4b, 4d and 4e) as per their medians. The median responses also indicate that for five statements (4a, 4c, 4f–4h), 50% or more respondents indicated that they always take ownership with respect to these statements. The most frequently selected response as per the mode for each statement mirrors that of the median responses in all but one statement (4e). According to the mode for statement 4e, the respondents most often indicated that they always discuss safe practices for a job, along with associated hazards, with their team. The result showed that the median scores were not similar between male and female for statements 4d, 4e and 4g.

In the testing for difference in the distribution of responses between the 11 departments, no statistically significant differences were found in seven of the eight statements tabulated above. The only statement that showed significant differences was statement 4g: "I am my brother's keeper". It can therefore be concluded that statically significant differences exist in at least one of the departments in the distribution of responses to the statement "I am my brother's keeper" at the 95% confidence level.

Table 4.6: The extent to which employees take ownership of the ImproChem SHEQ improvement plan

Statement	Median	p-value* (Department)	p-value* (Age)	p-value+ (Gender)
4a. I take immediate corrective action when I observe an unsafe act	5	0.4319	0.4782	0.0541

4b. I routinely review job procedures to make sure they are understood and followed	4	0.0728	0.7070	0.0890
4c. I use judgement and stay alert for underlying causes of unsafe acts and unsafe conditions	5	0.1408	0.7668	0.1926
4d. I use a questioning attitude on the job, asking myself what injuries could occur if the unforeseen happens	4	0.1870	0.8107	0.0269
4e. My team and I discuss safe practices required for the job and the associated hazards	4	0.1954	0.2780	0.0037
4f. I use all my senses (total observation) of the surrounding area when performing my job	5	0.1965	0.6231	0.1975
4g. I am my brother's keeper	5	0.0034	0.5350	0.0220
4h. I reinforce safe work practices	5	0.4162	0.2522	0.1045

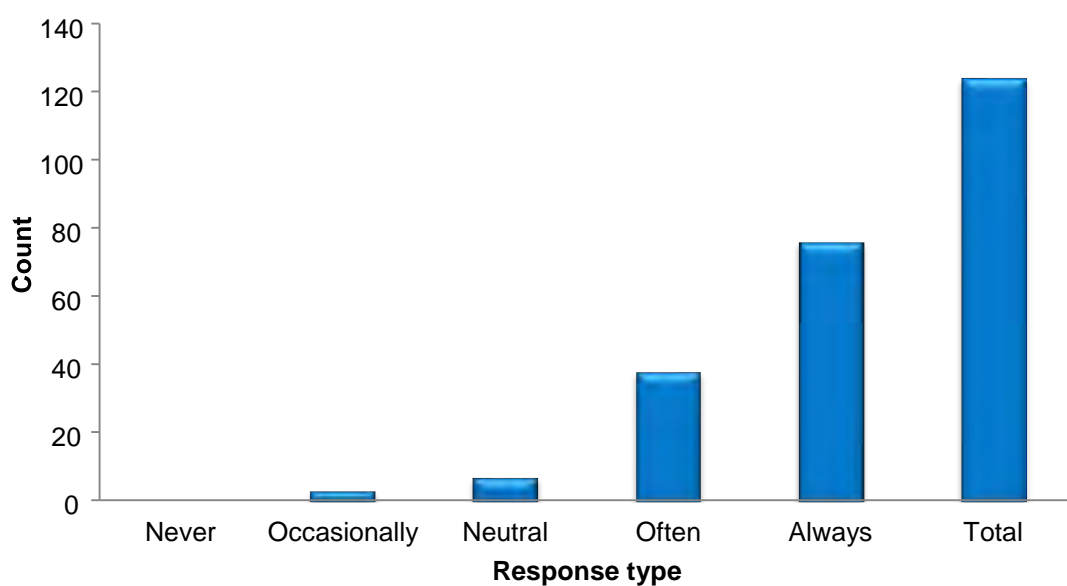


Figure 4.20: I take immediate corrective action when I observe an unsafe act

As depicted in Figure 4.20, the majority of respondents (61.3%) indicated that they always take immediate corrective action when they observe an unsafe act. This was followed by 30.7% of the respondents that indicated they are often compliant and 3 participants stated that they were occasionally compliant. 7% participants chose to remain neutral.

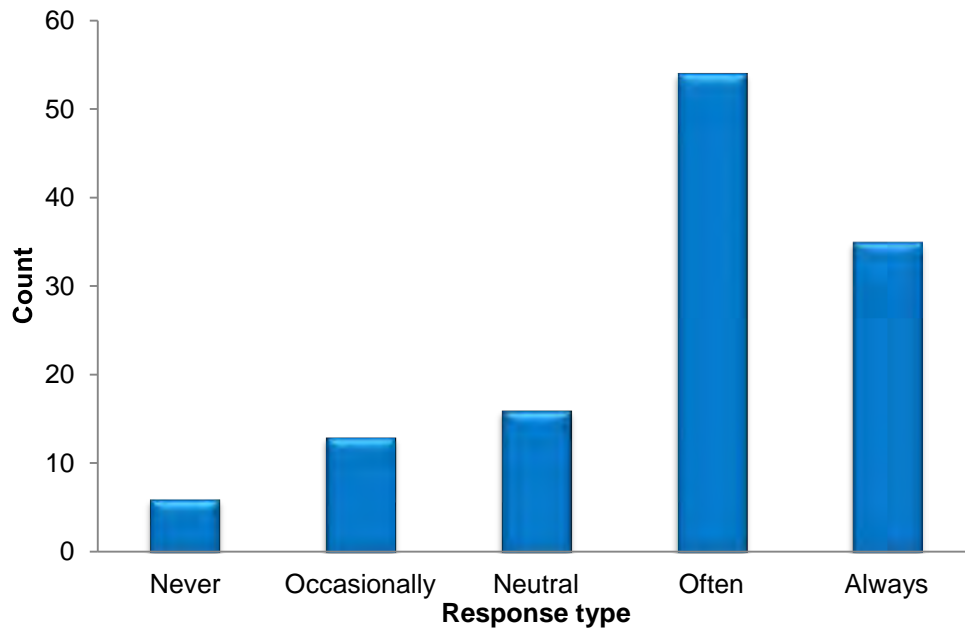


Figure 4.21: I routinely review job procedures to make sure they are understood and followed

Figure 4.21 shows that most frequently the respondents indicated that they often review job procedures to ensure that they are understood and adhered to. This is evidenced by 43.55% of the respondents selecting this option. 28.23% participants indicated that they always reviewed job procedures, 13 participants occasionally did, while 6 (4.84%) never did. The remaining 16 (12.9%) opted to remain neutral.

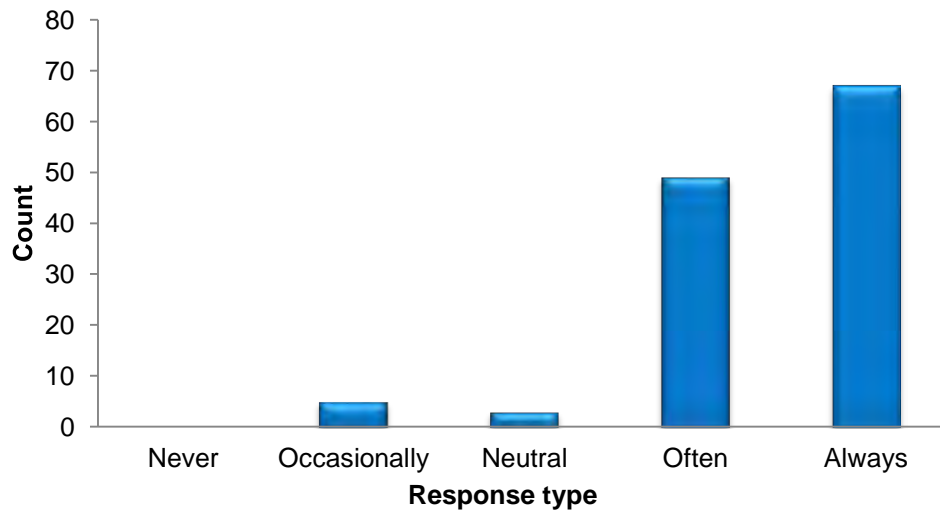


Figure 4.22: I use judgement and stay alert for underlying causes of unsafe acts and unsafe conditions

The majority of the respondents (54%) indicated that they always use judgement and stay alert for underlying causes of unsafe acts and unsafe conditions (Figure 4.22). This was followed by 40% that indicated that they were often compliant and 4% indicated that they occasionally complied. 3 participants chose to stay neutral.

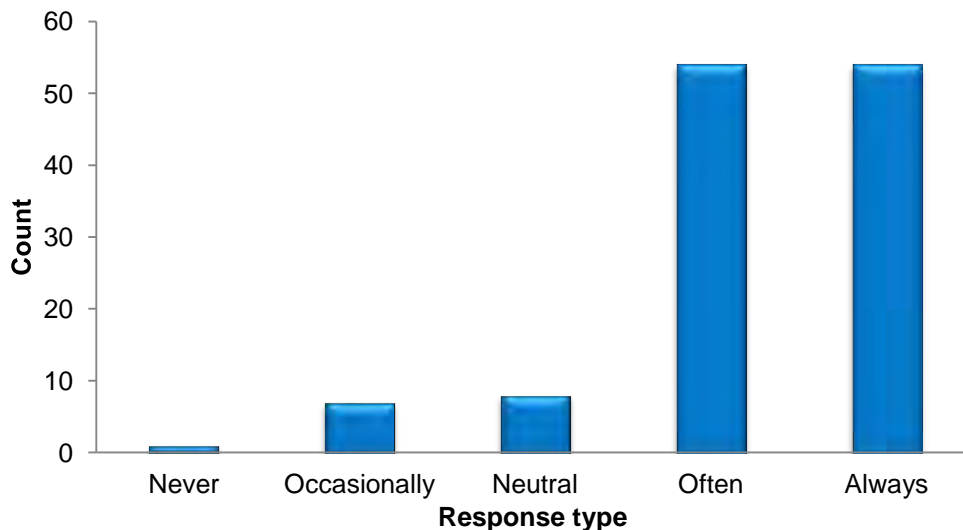


Figure 4.23: I use a questioning attitude on the job, asking myself what injuries could occur if the unforeseen happens

As can be seen in Figure 4.23, an equal number of respondents indicated that they either often or always use a questioning attitude in anticipation of unforeseen injuries. These two response categories represent 87.1% of the responses for this statement. 7 participants indicated they occasionally use a questioning attitude and 1 participant indicated that they never adopted such an attitude. The remaining 8 participants chose to remain neutral.

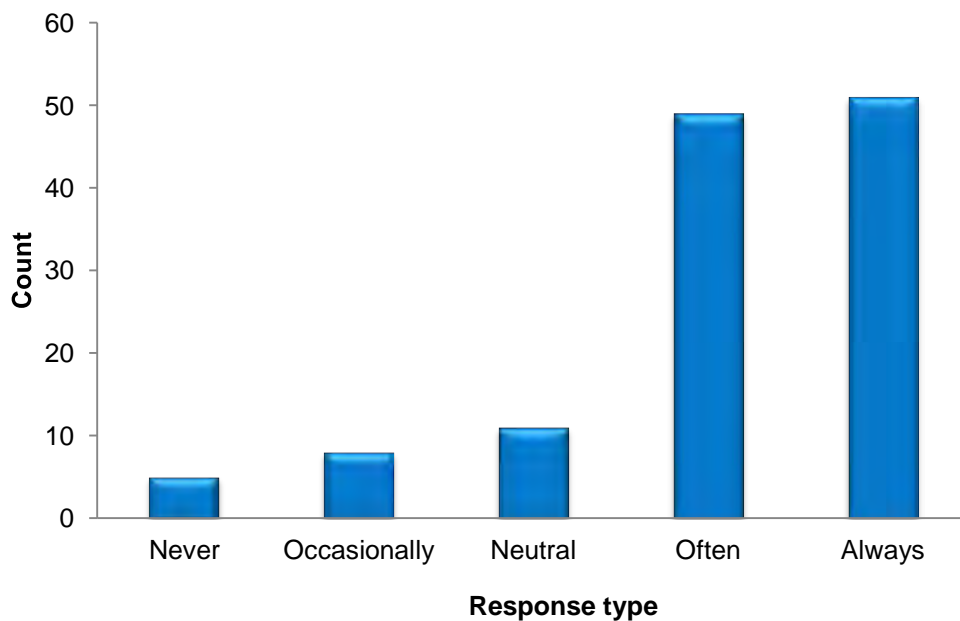


Figure 4.24: My team and I discuss safe practices required for the job and the associated hazards

Figure 4.24 shows that 80% of the respondents indicated that they discuss safe practices and associated hazards, with 6.4% respondents indicating that they occasionally did. Only 5 participants stated they never discuss safe practices and 11 participants chose to remain neutral.

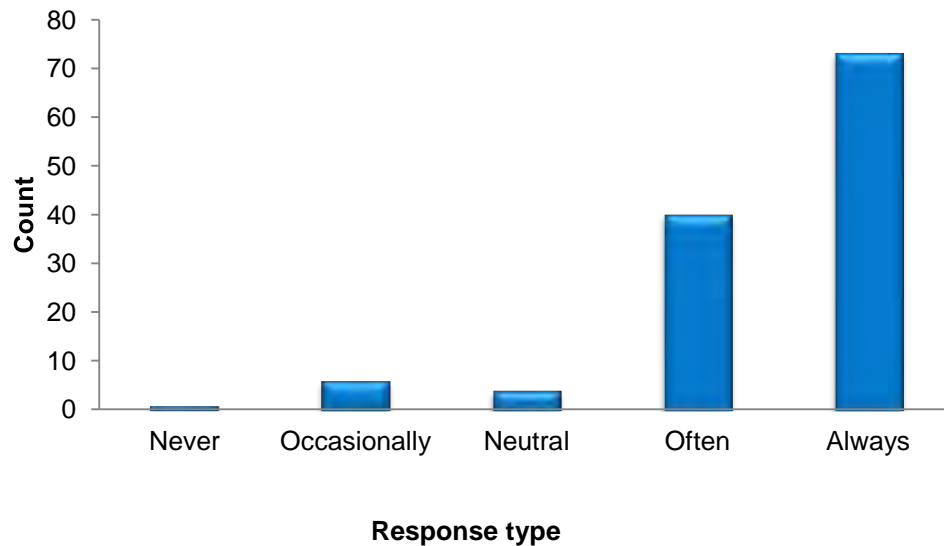


Figure 4.25: I use all my senses (total observation) of the surrounding area when performing my job.

As illustrated in Figure 4.25, the majority (58.87%) of the respondents indicated that their senses are always heightened when performing their jobs. 32% indicated that they often used all their senses with regards to their surroundings when performing their duties. 6 participants occasionally used all their senses, and 1 participant never used their senses at all. The remaining 4 participants remained neutral.

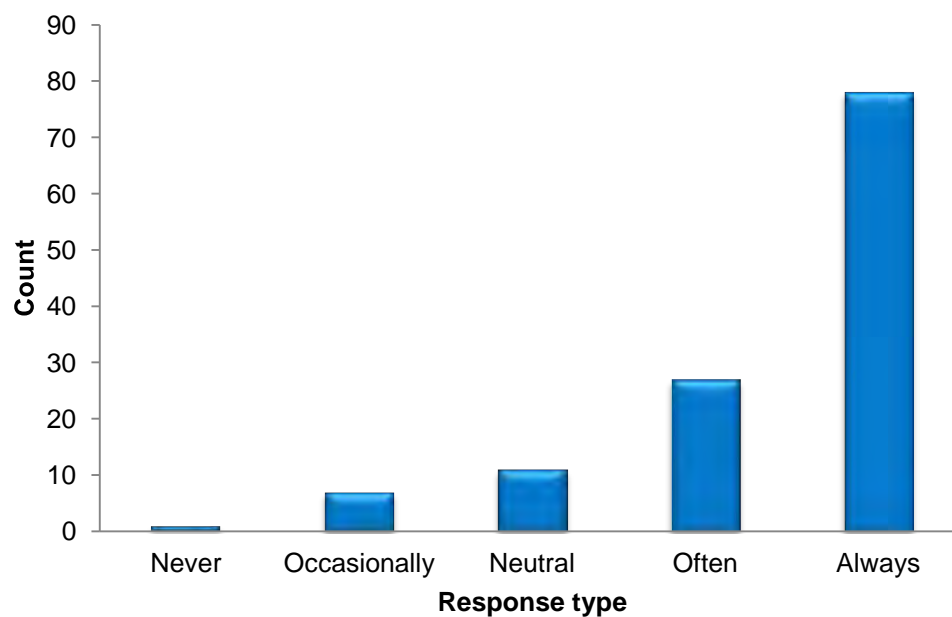


Figure 4.26: I am my brother's keeper

As shown in Figure 4.26, most respondents (62.9%) felt that they are always their brothers' keeper. 22% indicated that they were often their brother's keeper, 8.87% occasionally looked after their brothers, and while 1 participant did not. 11 participants chose to go the neutral route.

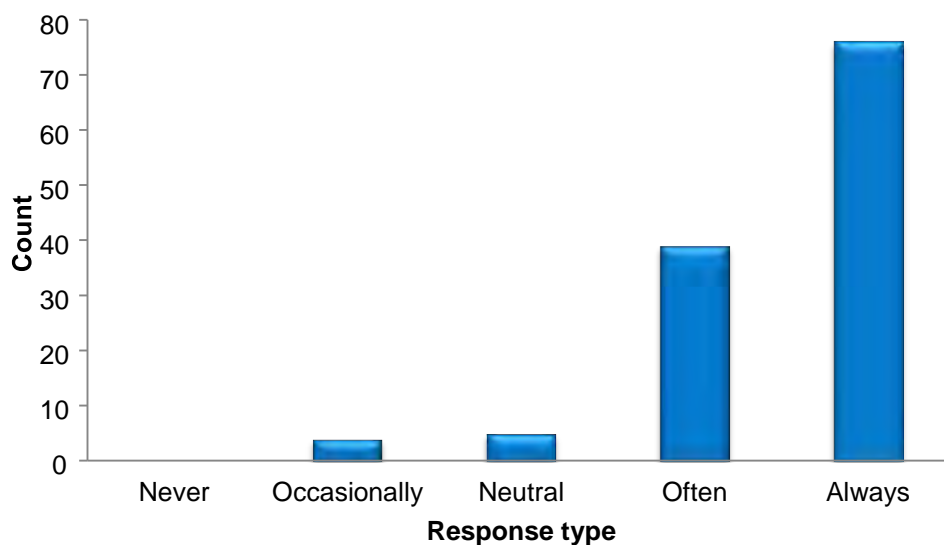


Figure 4.27: I reinforce safe work practices

Most respondents (61%) indicated that they always reinforce safe work practices and 31% indicated that they often did, and 3% indicated that they occasionally did. The remaining participants remained neutral.

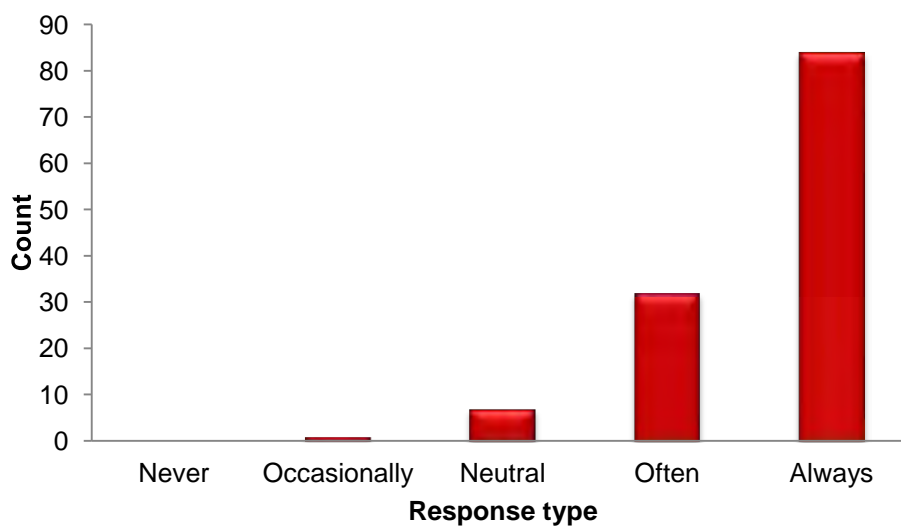
4.4.5 Objective 5: To evaluate management's level of support in ensuring a safe working environment

Based on Table 4.7, "always" was the most frequently selected response to all five statements comprising this construct, as per their modes. The medians indicate that 50% or more respondents felt that management always supports initiatives that ensure safe working conditions for four of the five tabulated statements. Statement 5d, "Remove barriers to safe working conditions", was split between 50% or more respondents feeling that management either always or often supports the removal of barriers to safe working conditions. There were also no statistically significant differences observed between the distribution of responses between departments at the 5% level of significance.

Table 4.7: Management’s level of support in ensuring a safe working environment

Statement	Median	p-value* (Department)	p-value* (Age)	p-value+ (Gender)
5a. Value employee safety above all priorities	5	0.8196	0.2461	0.1905
5b. Believe we can achieve AECI goal of “No harm to anyone ever”	5	0.5912	0.0925	0.9759
5c. Respond timely to our safety concerns	5	0.8995	0.3993	0.4737
5d. Remove barriers to safe work environment	4,5	0.9489	0.1475	0.9006
5e. Reward safety performance	3	0.2745	0.1603	0.9958

*Kruskal Wallis test; +Mann-Whitney U-test

**Figure 4.28: Value employee safety above all priorities**

As can be seen in Figure 4.28, 67.4% of the respondents felt that management always values employee safety above all else. 26% participants indicated that management often made employee safety the

number 1 priority, and 1 participant indicated that management occasionally did so. 7 participants opted to be neutral.

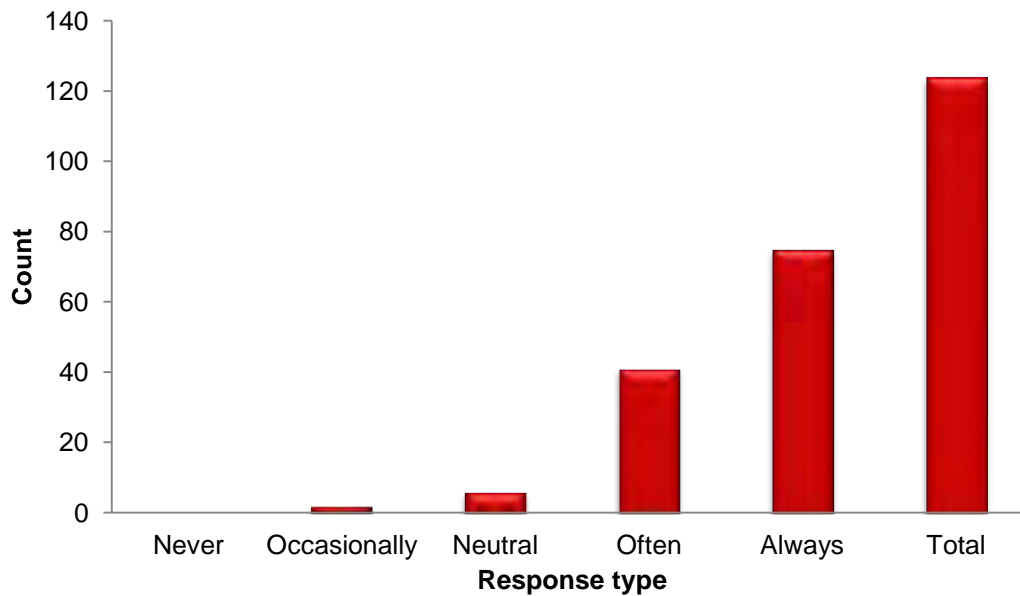


Figure 4.29: Believe we can achieve AECI goal of “No harm to anyone ever”

Figure 4.29 show that 60.48% of the respondents indicated that management always believes that they can achieve the AECI goal. 33% felt that management often believed that this goal could be achieved, while 2 participants indicated that management offered no support at all in this regard. 6 participants chose to remain neutral.

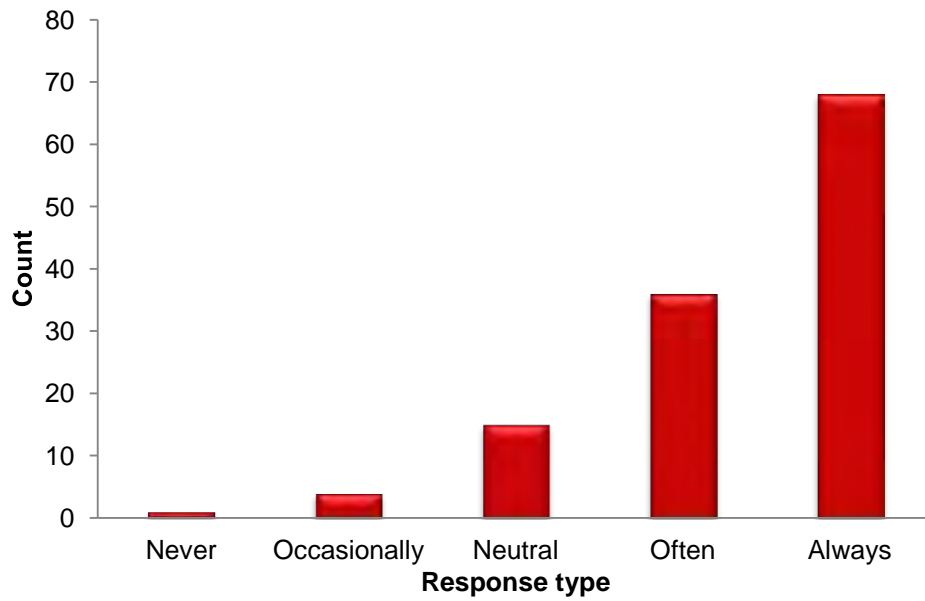


Figure 4.30: Respond timely to our safety concerns

In total, 55% of the respondents felt that management always responds timely to their safety concerns and 29% felt that management often responds timely (Figure 4.30). 4 participants indicated that management occasionally did and 1 participant felt that they never did. The remaining 15 participants remained neutral.

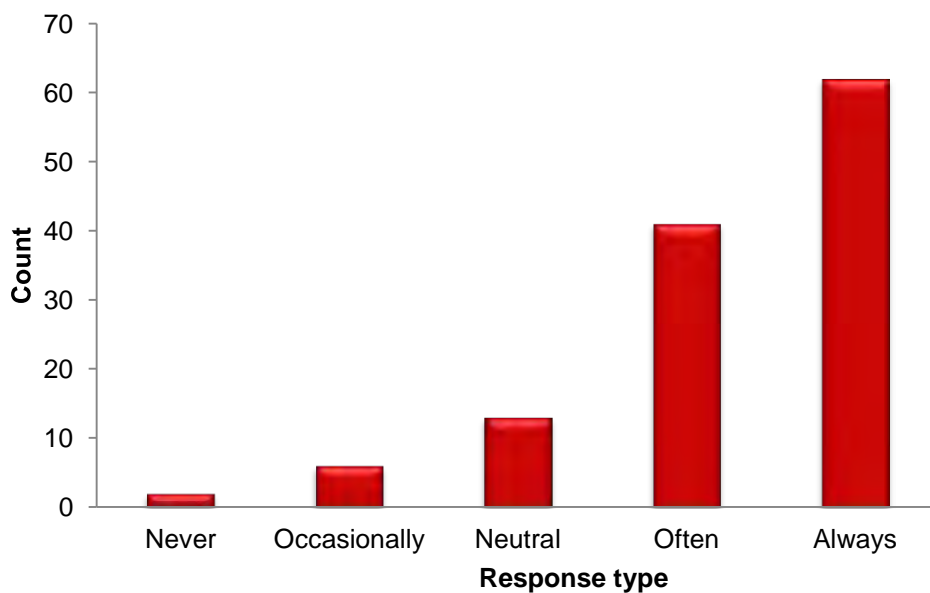


Figure 4.31: Remove barriers to safe work environment

Figure 4.31 illustrates that 50% of the respondents felt that management always removes barriers to a safe working environment. 33% of the respondents felt that management often removed such barriers and 4.84% felt that they occasionally did. 2 participants indicated that management never removed such barriers and the remaining 13 participants chose to remain neutral.

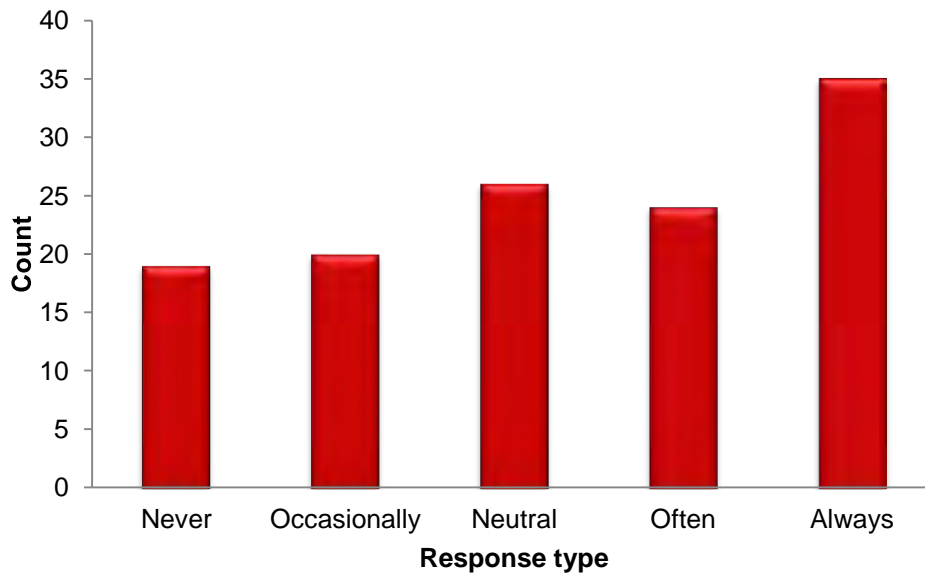


Figure 4.32: Reward safety performance

As can be seen in Figure 4.32, the statement on the rewarding of safety performance appears to be the most contested, with increased numbers of respondents being responding in the “never”, “occasionally” and “neutral” response categories, relative to previous responses. 28.23% respondents felt that management always rewarded safety performance. 19.35% indicated that management often rewarded safety performance, 16.13% participants indicating that management occasionally did; and 15.32% indicating that they never did.

4.4.6 Objective 6: To evaluate how organisational culture influences employee participation in ImproChem safety measures

Table 4.8 shows that respondents most often agreed to statements 6a, 6c and 6d. They also most often strongly agreed to statement 6e i.e. that “No job is urgent to the extent of compromising my own safety”. However, they strongly disagreed with statement 6b, indicating that they believe that there is no gain at all to be derived from covering up SHE errors. The median scores indicate that 50% or more respondents agreed to statements 6a, 6d and 6e. However, 50% or more disagreed about advantages being derived from covering up SHE errors. At least 50% of the respondents remained neutral to statement 6c, “People are recognised for their safety performance”. The result showed that the median scores for statement 6c is significantly different among different departments ($p = 0.0056$). Statistically significant differences between the distribution of department responses were detected only for statement 6c at the 5% level of significance. This indicates that differences existed in at least one of the departments’ responses to the statement “People are recognised for their safety performance”.

Table 4.8: Influence of organisational culture on employee participation in ImproChem safety measures

Statement	Median	p-value* (Department)	p-value* (Age)	p-value+ (Gender)
6a. People in the organisation are often afraid of making SHE-related errors	4	0.6613	0.8773	0.3332
6b. There are advantages to covering up SHE errors	2	0.5679	0.2315	0.2487
6c. People are recognised for their safety performance	3	0.0056	0.5380	0.5396
6d. People are encouraged to express their ideas and opinions about safety	4	0.0705	0.1747	0.4886
6e. Our motto is “No job is urgent to the extent of compromising my own personal safety”	4	0.5918	0.6387	0.1660

*Kruskal Wallis test; +Mann-Whitney U-test

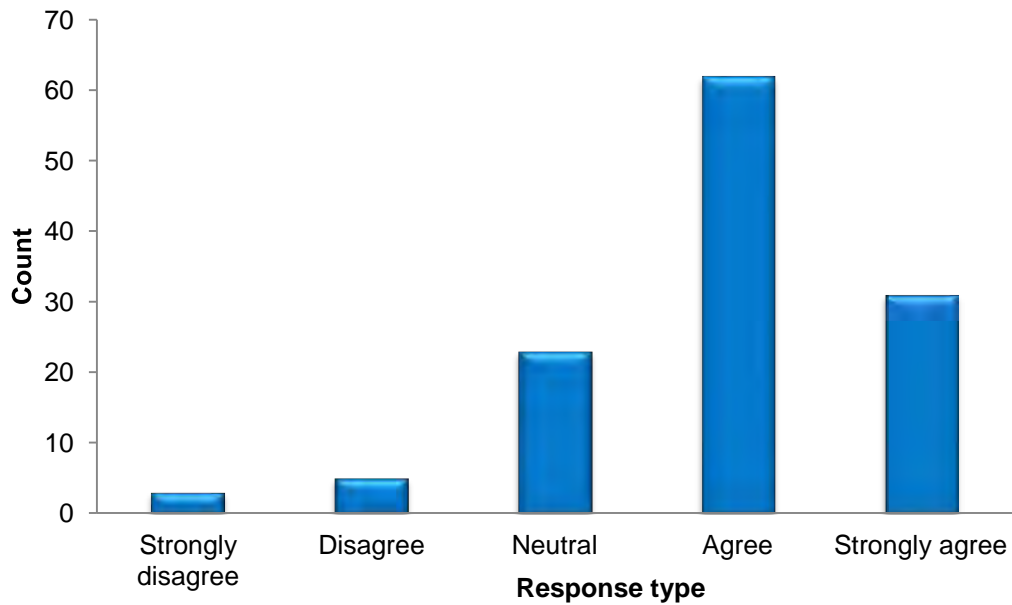


Figure 4.33: People in the organisation are often afraid of making SHEQ-related errors

Figure 4.33 illustrates that 75% of the respondents agreed that employees are afraid to make SHErelated errors. 24 % strongly agreed to this statement, 4% disagreed and 2% strongly disagreed. The remaining 19% of respondents remained neutral.

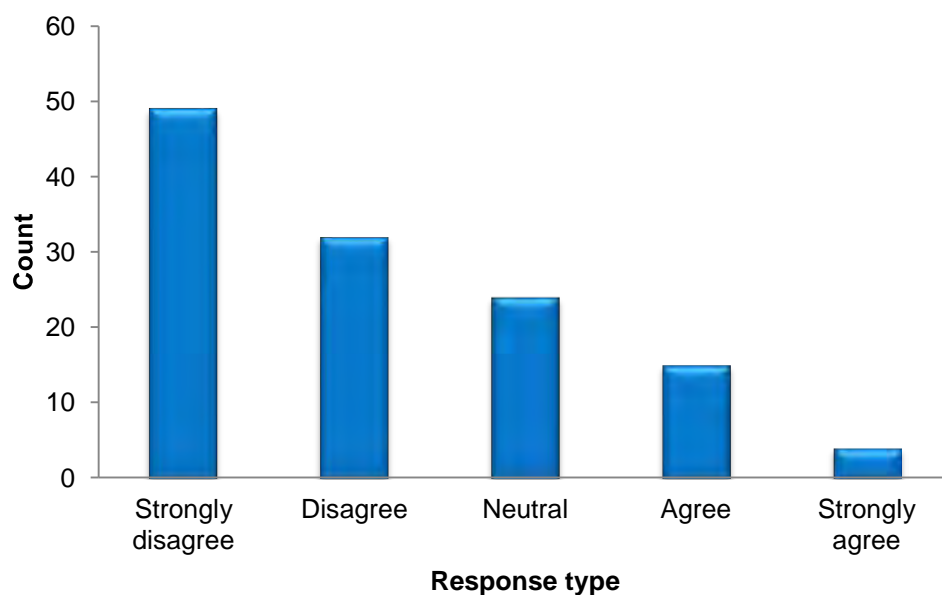


Figure 4.34: There are advantages to covering up SHE errors

Figure 4.34 shows that 65.32% of the respondents strongly disagreed that there are advantages to covering up SHE errors. A further 26% also disagreed with this statement. 12% agreed and 3% strongly agreed with this statement. The remaining 19% chose to remain neutral.

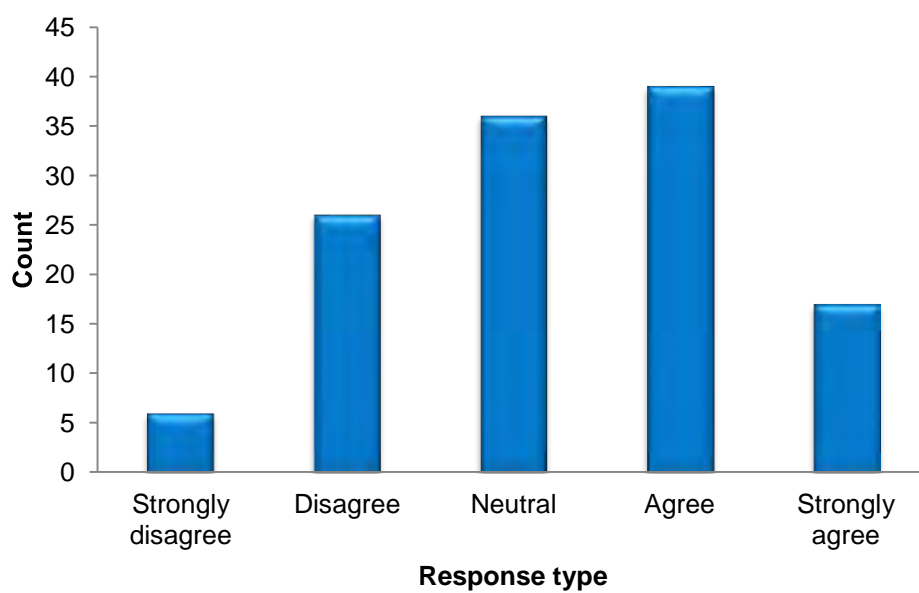


Figure 4.35: People are recognised for their safety performance

Figure 4.35 shows that only 45.16 % of the respondents agreed that people are recognised for their safety performance. 21% disagreed while 5% strongly disagreed. The remaining 29% opted to remain neutral.

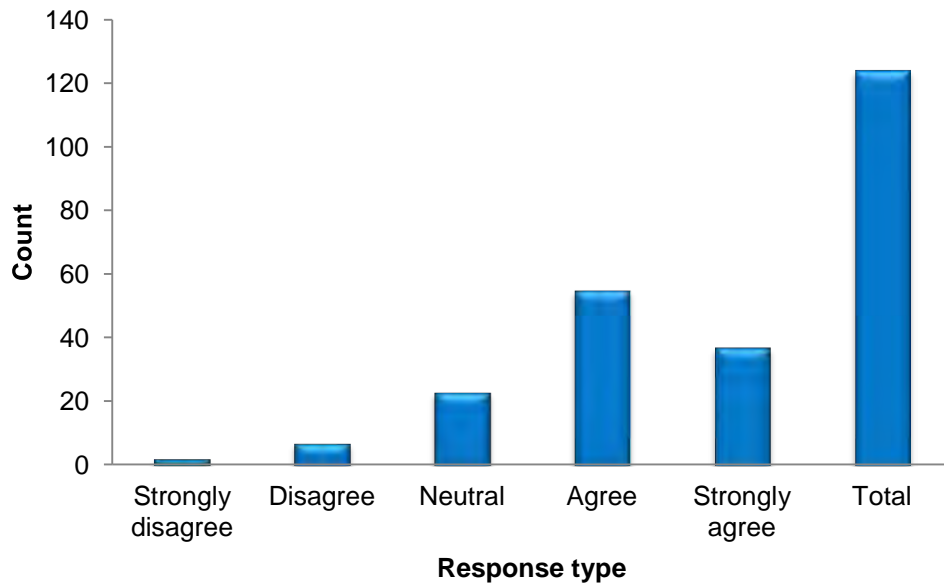


Figure 4.36: People are encouraged to express their ideas and opinions about safety

Figure 4.36 shows that most often the respondents agreed (74.19%) that people in the organisation are encouraged to express the ideas and opinions about safety. 6% disagreed and 2 participants strongly disagreed. The remaining 19% of respondents chose not to commit themselves.

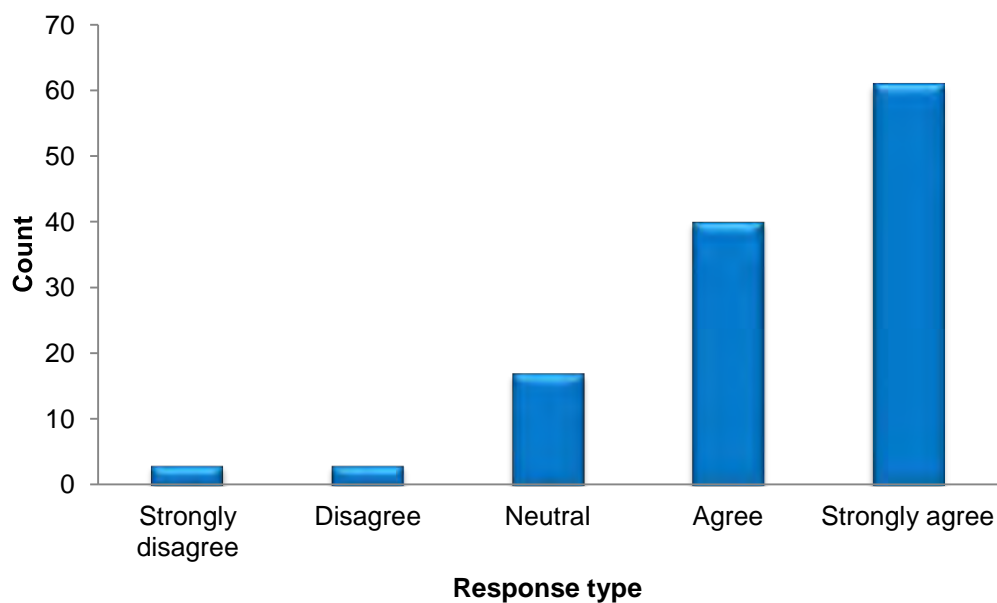


Figure 4.37: Our motto is “No job is urgent to the extent of compromising my own personal safety”

It can be deduced from Figure 4.37 that 81.45% of the respondents responded positively with regard to the fact that no job is too urgent so as to compromise their personal safety. 3 participants strongly disagreed and a further 3 disagreed with this statement. 14% of the respondents remained neutral.

The respondents were asked to indicate which safety mechanisms are in place to improve safety performance. As far as mechanisms that are in place to ensure that safety performance is improved, most often the respondents indicated that shared learning from “accident investigations”, “near-miss reporting” and “incident reports” was in place. Their responses are summarised in Table 4.9.

Table 4.9: Mechanisms in place to improve safety performance at ImproChem

Mechanism	Frequency	Percentage
7a. Collaborative safety – peer-to-peer interventions	73	59
7b. Compliance with regulatory requirements	101	81
7c. Near-miss reporting and sharing the learning	106	85
7d. Accident investigation and sharing the learning	108	87
7e. Meaningful safety performance recognition	68	55
7f. Incident reports and sharing the learning	106	85

The respondents were asked to recommend ways to improve safety performance. The most prominent suggestions were that “Leadership at all levels should drive the change in safety culture” (22.14%) and that a “No name, no blame culture” (21.89%) should be adopted (Table 4.10).

Table 4.10: Suggested mechanisms that could be added to improve safety performance

Suggested mechanisms	Frequency	Percentage
8a. Toolbox talks discussion (employees to also conduct some sessions)	66	16.42
8b. Safety performance reviews	69	17.16
8c. Enhancing employee involvement and participation in proactive initiatives	78	19.40
8d. Leadership at all levels driving the change in safety culture (leadership safety)	89	22.14
8e. Behavioural-based safety – peer to peer (No name, no blame culture)	88	21.89

4.5 Conclusion

The respondents appeared to be satisfied with their workplace environment; however, they held different views with regard to the availability of safe working and emergency procedures. The overall level of management support is good, as the respondents indicated that management responds timely to their safety concerns. However, the respondents felt that management can also benefit from the bottom-up communication approach, and not the top-down approach as applied. This kind of communication can also change the overall organisational safety culture, where employees can feel free to report safety incidents and accidents, promoting a supportive and innovative culture at ImproChem. Rewards and recognitions were also found to be different in different departments. A detailed discussion of the results is given in the next chapter.

Chapter 5: Discussion

5.1 Introduction

The study was intended to evaluate factors that influence employee participation in workplace safety programs at ImproChem and to recommend safety improvements that can be implemented to achieve the AECI goal of “No harm to anyone ever”. This study serves as a foundation for further safety studies that can be conducted within the organisation to formulate recommendations within the identified areas. The study looked at different ImproChem departments distributed across different regions in Africa.

The study was done to determine whether organisational values and practices are the predictors of safety performance. This study examined dissimilar safety culture dimensions across different departments. The competing values framework was utilised to measure safety culture strengths and congruencies across ImproChem departments as an extension of the study conducted by Chenhall (2010).

This chapter discusses the resulted presented in chapter 3 and 4 in order to answer the following research questions:

- Research question 1: Does the ImproChem workplace environment (non-human factors) affect employee safety performance?
- Research question 2: How well do ImproChem employees understand ImproChem safety, health environmental and quality (SHEQ) requirements?

- Research question 3: How well do ImproChem employees comply with ImproChem SHEQ requirements?
- Research question 4: Are the employees provided with sufficient support to reduce safety incidents?
- Research question 5: Are the employees committed to improve safety within the organisation?
- Research question 6: How does the ImproChem safety culture influence employee safety performance?

The influence of employee level of understanding and compliance with ImproChem safety standards, employee attitude and commitment to safety, leadership styles, safety culture, non-human factors (work environment) were measured through the distribution of questionnaire.

5.2 Role of the work environment (non-human factors)

The first objective was to evaluate the extent to which the work environment affects employee participation in workplace safety programmes. A 5-point likert scale ranging from never (1) to always (5) was used to assess the influence of the work environment. From the results it was found that 23% of the respondents felt that safe working procedures are often available rather than being always available for the employees to carry out their tasks in a safe manner. Of the respondents, 25% also indicated that there were times where the emergency procedures are not available. It can therefore be concluded that non-human factors have an impact on employee safety performance. That was an indication that the work environment had barriers that hinders employee participation in ensuring that their tasks are performed safely.

Lack of safe working procedures indicated that employees have limited knowledge on how to handle tools, machinery and carry out their daily activities effectively without increasing the risk of occurrence of accidents. To ensure safe task execution, standard safe working procedures for hazardous tasks need to be developed and the necessary steps should be clearly outlined. Safe working procedures provide employees with consistent and important information of what is expected of them with regard to safety. Safe working procedures have a big role in ensuring that complex tasks are carried out in a safely manner. A gap was identified at ImproChem where there are insufficient safe working procedures.

The study conducted by Zakaria et al. (2012) also found that workplace design and lack of procedures contribute to accidents in the workplace. To improve the current situation, employee involvement in the development of safe working procedures is essential. According to Golafshani (2010), this can improve employees' motivation levels with regard to taking ownership of safety. The safe working procedures can be updated at varying frequencies to ensure it is relevant to that particular task. Over and above this requirement, the procedures should be administered in the language the employee can easily understand.

5.3 Employee understanding of ImproChem SHEQ requirements

Sufficient training is the main driver to reduce incidents by empowering employees with the necessary art and science of hazard recognition and elimination. It is important to thoroughly train the employees so they can perform their tasks safely and are encouraged to participate in all SHE initiatives (Haung et al., 2015). To evaluate employee understanding of ImproChem SHEQ requirements a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5) was used.

Health and safety legislative organisations emphasise fundamental safety practices, which include safety training. The safety training is aimed at increasing employee knowledge and understanding of ImproChem SHEQ requirements and standards. Among the respondents, 3.2% indicated they were unaware of some of the ImproChem safety improvement programmes, while 7% indicated that they have not received adequate safety training. It can be concluded that the respondents felt they require additional training. On-the-job training can assist in increasing the employee safety confidence level in the field. Zakaria et al. (2012) also emphasise providing employees with the training specific to the job they do. They further state that employees should be trained in the use of equipment and be provided with training manuals specific to the tools with which they work.

According to the study conducted by Watcher (2013), safety training indicates employee perception with regard to the training programmes developed by their organisation. The quality of training can positively influence employee participation in workplace programmes to improve safety. There are substantial variations in designing and delivering safety training to employees. At ImproChem employees are provided with the basic safety training to train them to adhere to minimum compliance objectives. In addition to the basic safety training, ImproChem may consider providing on-the-job safety training. On-the-job safety training can be 20 hours per year, which can be divided into two-hour

increments to ensure that employees are empowered with necessary skills of hazard recognition, evaluation and control. In summary, the following can be done:

- All employees are provided with formal safety training specific to their job.
- Employee safety training integrates essentials of hazard recognition and avoidance.
- The intervals for formal job-specific safety training per year are increased.

5.4 Employees compliance with ImproChem SHEQ requirements

The extent to which employees adhere to safety policies, standards, legal obligations and procedures is referred to as compliance (Arenze et. al 2015). Compliance is also a reduction of incidents and accidents in the work place. Safety compliance was measured with a 5-point Likert scale ranging from never (1) to always (4). The results in chapter 4 (figure 4.13), revealed that 40% of the respondents felt that they were always compliant and 9% of employees indicated they were never compliant with regards to the HAT booklet. The HAT booklet applied only to employees who worked in high risk areas hence 17% of the respondents felt that this particular SHE requirement did not apply to them since they are less exposed to hazardous activities. Employees assess the risk using the HAT booklet and apply necessary measures to eliminate, substitute, and use engineering controls or administrative controls to reduce the risk level to allow safe job execution.

PPE is the last line of defence employees can use to ensure they are protected when performing their duties. From the respondents 20% indicated that they were often compliant, 13% were occasionally compliant, and 2.42% indicated that they were never compliant. A policy oriented culture can be applied to re-enforce the use of correct PPE when required. Application of the behavioural based safety program at ImproChem can yield positive results by changing employee mind-set in ensuring that safety is given first priority (Haung et al., 2015). Compliance with the letter of acceptance (LOA) was satisfactory. The LOA serves as a precautionary measure which informs ImproChem customers of all the ImproChem chemicals used at each particular customer sites. Only the sales team was expected to comply with this requirement since they are based at customer sites.

The same was applicable with the EMPRO's, not all employees expected update the EMPRO's. From the responses 8% of the respondents indicated that they were never compliant, these employees may

require further understanding of the importance of updated EMPRO's so they will be encouraged to comply. The sales team currently conduct site risk assessment on annual basis and majority of the sales team complied. The site risk assessments serve as a tool to measure and control risks associated with specific tasks on site (Kanentkar & Chibs 2015). Over and above the unit checks that are conducted on daily basis frequent site assessments can improve the workplace safety since conditions change timely. Increasing the frequency of risk assessment can ensure the documented unit conditions correspond with exactly what is in the unit.

The driver checklist which was only applicable to individuals who drive company vehicles revealed that 7% of the employees are still not compliant with this requirement. The checklist ensures employees assess the condition of the vehicles before they embark on a journey, over and above ImproChem provides the employees with defensive driving skills where they are trained to engage all their senses when driving on the road. The high rate of vehicle related incidents and fatalities experienced at ImproChem might have influenced the by the employees who are non-complaint with this requirement. A study conducted by Molis (2014) also indicated high rate of vehicle related incidents which were due to employee non-compliance with the company standards. To reduce the vehicle accidents, employees have to conduct proper vehicle checks and inform the employer if the vehicle requires maintenance.

Employee wellness plays a major role in ensuring employees are fully engaged with their day-to-day activities. Medical assessment and drug testing ensure the employees are physically and mentally fit for their job. This reduces potential accidents that may occur if employees were to engage in activities they are not physically fit/mentally for or if they carried out their activities under the influence of alcohol. There was a positive response regarding compliance with the medical assessments only 2 participants indicated that they are never compliant. A study conducted by Masia (2011) found that that job-related work stress has negative effect on professional welfare and professional work. Those findings were similar to the current study where some accidents were due to fatigue from working long hours without proper rest. Employee wellness programs at ImproChem were developed to reduce work related stress and ensure employees take care of their well being. Medical assessments are done on annual basis, the immediate supervisors can provide necessary support by reminding the employees when their medicals are about to expire. Developing systems that will prompt the employee when the medical assessments are due can ensure 100% employee participation and compliance.

5.5 Employees commitment to ImproChem safety programs

To measure the extent to which the employees take ownership of the ImproChem SHE programs and are committed to improve organisational safety, a 5-point likert scale ranging from never(1) to always (5) was used. As depicted in chapter 4 (figure 4.20) majority of respondents (61.3%) indicated that they always took immediate corrective action when they observed an unsafe act. Only 7% opted to remain neutral, from the analysis it is clear that employees do take necessary actions to protect their fellow colleagues. Employees who showed commitment were also compliant; commitment has positive effect on compliance with the rules and policies of the organisation. These findings were consistent with the studies conducted by (Clarke, 2010 and Chenhall, 2010). Frequent review of job procedures is essential to maintain a safe work environment. There was an increase in the number of participants who chose to remain neutral to the question of ensuring review of job procedures. 16% of the employees do not make time to review their procedures that may be due to the lack of available safe working procedures for certain activities.

The majority of participants (54%) indicated that they always used judgement and stayed alert for underlying causes of unsafe acts and unsafe conditions. Participants indicated they apply their judgement to assess the risk associated to the jobs they perform, In addition to that, ImproChem can consider offering on the job training to enhance the skills of the employees with regards to hazard recognition. An equal number of participants indicated that they either often or always used a questioning attitude in anticipation of unforeseen injuries. Employees indicated that they assess the situation adequately enough to prepare themselves for unforeseen circumstances. With sufficient emergency response procedures, the injury rate can decrease significantly.

Tool box talks are vitally important since this is where all employees are aligned with regards to the tasks that will be carried out on that particular day. Majority of the respondents indicated that they always discussed safe practices and associated hazards, than respondents who indicated that they often did. Only 4% of the respondents indicated they never did the toolbox talk, although the percentage

might be lower it might have a negative impact to the number of incidents. Departments who ensured they conduct toolbox talks every morning indicated low incident rates, these findings were similar to those of the study conducted by Tsai (2010). All the employees should take initiative to ensure toolbox talks are done prior any activity to raise the awareness of any potential hazards.

Situational analysis plays a very important role in accident prevention as employees become aware of the co-occurring activities happening around their vicinity. The results proved that employees take extra precautions by doing total observations of the surrounding area. 58.87% of the respondents indicated that they are always vigilant when doing their tasks. According to the OSHA (1996), each employee is responsible for their health and safety and the health and safety of other employees that may be affected by their activity. 62.9% of the respondents felt that they were always their brothers' keeper. An excellent safety culture has been instilled to the employees to take reasonable care of each other. Employees felt empowered enough to reinforce safe practices, such culture positively impact on employee safety.

5.6 Management level of support: Motivation and safety rewards

A total of 15.32% of the respondents indicated there are no rewards associated with achieving a good safety record, while other respondents indicated that it is rare for management to reward safety performance. There is no clear individual safety goals linked to performance incentives. Safety recognition can be done in different ways, rather than providing momentary incentives. According to Goomas (2014), a positive safety culture is enhanced through constant feedback to employees regarding their safety performance. This is often referred to as a learning culture. Hofmann (2011) points out that safety behaviour promotion reflects employees' perception about the type of rewards gained for safety behaviour and the importance of rules and procedures fulfilment. This indicates that the rewarding of safety performance can improve safety within the organisation and can motivate employees to improve organisational safety.

According to an article in ESH Today (2013), providing positive feedback to employees with regard to their safety performance is a powerful tool to improve safety performance. The article indicates that the leadership at Miliken changed their leadership style and started celebrating and recognising their employees' hard work and dedication. This was done through safety celebratory events, where safety cheerleaders deliver safety cheers to the employees as they enter the plant, which was one of the ways

management was sending a positive message to employees thanking them for their safety performance. The article indicates that safety performance results improved drastically, such that the injury rate improved by one point in a space of one year, after which the Miliken total injury indication rate was at an average of 0.63.

In the current study, the ImproChem production department respondents, which were among the 28.23% that indicated they are recognised for their safety performance, appeared to be at a level at where they take ownership of safety and show more commitment to safety performance compared to the other departments, where there are no safety incentives and recognition. ImproChem should also strive to find ways of recognising employees for their safety inputs and performance to boost the overall safety climate within the organisation.

According to the four safety cultures proposed by the competing values framework (Diaz, 2007), leadership should motivate employees to achieve safety excellence. The leadership appears to be cooperating by removing barriers and responding timely to employees' safety concerns. However, some respondents indicated that bottom-up communication rather than top-down communication approach should be practised.

5.7 Organisational safety culture: Dissimilarities in organisational safety cultures

The present study found that there are dissimilarities in ImproChem's safety culture among the departments. This was indicated by the responses to the question on safety performance recognition, where an increased number of respondents responded in the "never", "occasionally" and "neutral" response categories, relative to other responses. The comparison across all departments showed a significant difference in the safety cultures. As discussed, employees in the production department agreed that they are rewarded for safety performance, while other departments felt that there are no rewards attached to safety performance. The difference in safety culture may be due to the fact that other departments are based at customer sites, hence they are encouraged to adopt customer safety standards.

The nature of the business makes it a challenge for the safety department to clearly communicate and track safety performance throughout all the departments. The production department seems to have benefited from safety rewards and recognition, as it is based at the ImproChem manufacturing plant

where it is easier to track performance and clearly set and communicate SHEQ goals. Earlier studies by Chenhall (2010) and Kim et al., (2011) also found significant differences in safety cultures between different plants of similar organisations. In these studies, the employee levels of satisfaction and autonomy was also found to be different, which were then linked to each department's safety performance.

Department structures were also examined, and the findings indicated that some of the departments had centralised decision-making processes and closed communication (Kim et al., 2011). A similar finding was noted at ImproChem, where 15% of the respondents indicated that they see a benefit in covering up safety related errors. 70% of the respondents indicated that they are afraid of making safety related errors – this may be due to the culture of blame and punishment.

According to Sun et al. (2012), a reporting culture is a necessity for excellent safety-performing organisations. Employees should feel free to report safety incidents, knowing that they will receive the necessary support where needed. When a culture of fear exists, employees tend to lose interest in taking part in improving organisational safety. A reporting culture and a just culture can be adopted – a no name, no blame culture where employees can report incidents and near misses with the aim of learning from the incidents and avoiding the occurrence of similar incidents in the future.

A similar culture of rewarding employees for safety performance must be adopted across all departments. Over and above, management should consider rewarding near-miss reporting to encourage employees to take part in making ImproChem a company where safety is the number one priority.

5.8 Conclusion

It is important to create a culture in which employees take ownership of their own safety and the safety of their fellow employees. Employees have to be encouraged to come up with innovative ideas to improve safety in the workplace. Sufficient support from the management team is the most critical aspect in achieving safety goals. Most importantly, collaboration among all levels within the organisation would ensure that ImproChem is a safe place to work. More detailed recommendations of the study based on the findings are given in the following chapter.

Chapter 6: Conclusion and recommendations

6.1 Introduction

Safety and accident prevention have continuously been a challenge for most organisations, including ImproChem. There are many aspects that affect individual safety performance, which in turn influence overall organisational safety performance. There were latent variables that could not be clearly defined in this study due to their complexity and broadness. Many studies that have been conducted have also failed to capture safety culture and safety climate in its completeness (Chenhall (2010)). This is merely due to the fact that it is difficult to measure safety dimensions and individual attitudes through questionnaires.

6.2 Conclusion

Some respondents indicated there are inadequate safe working procedures, as some tasks are performed without safe working procedures. Safe working procedures are meant to assist employees to carry out their tasks in a stepwise, safe manner. The overall condition of machinery used appears to be good, as attested to by the majority of the employees. The respondents indicated a high level of compliance with SHEQ requirements; only a minority indicated that they occasionally comply with SHEQ requirements. Only a few of the respondents indicated they do not receive adequate safety training. The respondents appeared to have a positive attitude towards safety, as they do more than what is expected of them with regard to interventions when they notice unsafe behaviours. Sixty-two per cent indicated they take reasonable care of the health of their fellow employees.

Leadership style reflects employee perception of the behavioural style of their line managers and immediate supervisors. The respondents indicated that ImproChem management should practise more listening and motivate employees to achieve the safety goals. Most respondents indicated that there are no rewards and recognition for safety performance. From the responses it was noted that there is a significant difference in safety culture across the departments. The respondents indicated that there are

advantages of covering up safety errors, indicating that employees are afraid of making errors related to safety.

6.3 Limitations

The significant limitation was to obtain the TRIR per department in order to assess the safety performance and link it to the safety culture per department. The researcher decided to conduct a quantitative study and administered the questionnaire using QuestionPro. The limitation was the low response rate; however, a reminder was sent to the respondents until a 32% response rate was achieved, which is considered sufficient for electronic questionnaires. In addition, the researcher had to assume that the respondents provided honest responses and drew meaningful conclusions.

6.4 Recommendations

The following are recommended based on the study findings:

6.4.1. Adopt a common safety culture throughout the organisation.

Synergy in safety culture needs to exist, where the SHEQ department can clearly communicate SHE goals and track safety performance. Every employee should have clearly defined safety key performance indicators to which safety performance incentives can be linked.

6.4.2 Increase employees' motivation level by promoting employee involvement and influence

Employees should have influence on the designing of safe work procedures and programmes and safety-management system practices by being actively involved in facilitating safe behaviours and attitudes. Direct involvement in the development of safe working procedures will increase motivation levels and employees can take ownership of safety, adopt safe working practices and encourage other employees as well.

6.4.3 Improve the work environment by conducting pre- and post-task safety reviews and audits

All routine and non-routine tasks require some element of health and safe risk assessment. It is important to develop the discipline to constantly review safety considerations of non-routine and

routine tasks, as this allows for full cognitive concentration on situational awareness and task-related safety elements. Post-task reviews promote the application of lessons learned for future purposes. Continuous safety improvement is achieved.

6.4.4 Improve organisational safety culture by:

a) Hiring for safety

It is essential to hire employees who have intrinsic safety values, as this reduces the likelihood of incidents and accidents. Selective safety hiring has to be part of the recruitment process of new employees. Safety hiring can consist of elements such as a practical physical capability test, for example when an employee will be required to use man power (a suitable fitness test also needs to be done). Substance abuse testing should be part of tests conducted prior to hiring and a standardised process to instil safety values prior to hiring should be developed.

b) Improving communication and safety information sharing

Communication and information sharing are important where accident and incident reduction is the main goal. The ImproChem safety department ensures that all the employees with access to the company computers receive incident reports; however, employees with no access to ImproChem email end up not receiving the communication. To close the loop, accident and incident reports and safety newsletters can be discussed in the weekly safety meetings prior to the discussion of that week's safety focus topic. It should be supervisors' responsibility to ensure that all employees reporting to them are aware of the safety learning to ensure the safety incident does not occur again.

6.5 Implementation of recommendations to solve the research problems

ImproChem's safety-management systems have improved, such that most of the above-mentioned recommendations are already in place in some departments. To reduce the TRIR and achieve the AECI goal of "No harm to anyone ever", ImproChem should have similar safety-management systems and one culture throughout the organisation. Safety-management systems should be the uniform – a system whereby the SHEQ department is able to communicate the safety goals and track employee performance in line with the goals and objective should be developed.

A stepwise approach to the implementation of recommendations can be followed; concurrently, employee safety performance can be measured and reviewed on a monthly basis to increase safety

accountability. Organisational safety quarterly reviews should be done as a pro-active approach to correct unacceptable behaviour before the midyear or end of the year.

6.6 Recommendations for future studies

The following are recommended for future safety studies:

- The current study was focused more on the evaluation of factors that influence employee participation in ImproChem safety programmes. Safety culture theories that emerged from the literature review were then applied to assess the impact of different factors on safety performance. The study can be expanded by looking at individual psychological aspects that can be evaluated and monitored to minimise safety incidents.
- Future research can select one safety-improvement programme and evaluate the results before and after the programme has been employed.
- Future studies can evaluate the return on safety investment and propose alternatives that can ensure ImproChem reaps maximum benefits in conjunction with the safety-related investments.

6.7 Conclusion

There were few identified factors that influence employee participation in ImproChem safety programmes. The majority of the respondents are satisfied with the overall organisational culture, workplace condition and the support provided by management to ensure employee safety within the organisation. The respondents attested to a positive safety climate, although some felt that it would be of benefit to recognise and reward safety performance. Employee awareness of ImproChem's safety standards and the level of compliance were also satisfactory. More focus can be directed to increasing individual hazard recognition and elimination to ensure "No harm to anyone ever".

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Appendix A

**UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE
(HSSREC)**

APPLICATION FOR ETHICS APPROVAL

For research with human participants

INFORMED CONSENT LETTER

Note to researchers: Notwithstanding the need for scientific and legal accuracy, every effort should be made to produce a consent document that is as linguistically clear and simple as possible, without omitting important details as outlined below. Certified translated versions will be required once the original version is approved.

There are specific circumstances where witnessed verbal consent might be acceptable and circumstances where individual informed consent may be waived by HSSREC.

MBA Research Project

Researcher: Samke Mabele (0839630173)

Supervisor: Muhammad Hoque at (031 260 8690)

Research Office: Mariette Snyman 031-2603587

1.1 Information Sheet and Consent to Participate in Research

Date: 31 March 2015

Dear Respondent,

My name is Samkelisiwe Euphrasia Mabele from an MBA student, at the Graduate School of Business and Leadership, of the University of KwaZulu Natal. Email address:
samke.mabele@improchem.co.za.

You are being invited to consider participating in a study that involves research on an investigation of factors influencing employee participation in workplace safety programs, the case of ImproChem. The aim and purpose of this research is to explore and recommend specific variables, personal attitudes and non-human variables that affect employee participation in workplace (ImproChem) safety improvement.

The study is expected to enroll 395 participants from ImproChem Sales, Manufacturing Finance, Health, and Safety and Environmental department based in Durban (KwaZulu Natal). It will involve the following procedures, participating on an electronic questionnaire of 30 closed questions and 3 open questions which will be administered via email. The duration of your participation if you choose to enroll and remain in the study is expected to be four weeks.

The study may involve the risk of discomfort as the questions need to be answered as honest as possible. We hope that the study will create the following benefits, reduce non-human factors that contribute to unsafe work environment and also improve ImproChem workplace safety. Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this survey. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN. The data will be securely stored on the researcher's ImproChem laptop where only the researcher will have access.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number :HSS/0135/015M).

In the event of any problems or concerns/questions you may contact the researcher (Samke Mabele) at samke.mabele@improchem.co.za, contact number 0839630173 or my supervisor Muhammad Hoque at 031 260 8690 or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building
Private Bag X 54001
Durban
4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

The survey should take you about 20minutes to complete. I hope you will take the time to complete this survey.

MBA Research Project

Researcher: Samke Mabele (0839630173)

Supervisor: Muhammad Hoque at (031 260 8690)

CONSENT

I (Name) have been informed about the study entitled an investigation of factors influencing employee participation in workplace safety programs, the case of ImproChem by Samkelisiwe Euphrasia Mabele.

I understand the purpose and procedures of the study to explore and recommend specific variables, personal attitudes and non-human variables that affect employee participation in workplace (ImproChem) safety improvement.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at samke.mabele@improchem.co.za contact number 0839630173.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building
Private Bag X 54001

Durban
4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion YES / NO

Video-record my interview / focus group discussion YES / NO

Use of my photographs for research purposes YES / NO

Signature of Participant

Date

Signature of Witness

Date

(Where applicable)

Signature of Translator

Date

(Where applicable)

Questionnaire

Please provide your back ground information

1. Gender
 - ☐ Male
 - ☐ Female
2. What is your age

3. Which department do you work in?
 - ☐ KZN Energy ☐ KZN Middle Market ☐ ImproLogistics ☐ Production ☐ Marketing
 - ☐ Finance
 - ☐ HSE
 - ☐ Other

Please answer every question by ticking the number that best represents how you feel. There are no right or wrong answers.

Never 1 2 3 4 5 Always

My job often leaves me with little time to think about safety	1	2	3	4	5
I use tools that are in good condition	1	2	3	4	5
Procedures are readily available for each task I have to perform	1	2	3	4	5
I use machinery that is in good condition	1	2	3	4	5
Emergency procedures are readily available in case job related conditions change	1	2	3	4	5

Strongly 1 2 3 4 5 Strongly Disagree Agree

I am fully aware of all ImproChem SHEQ program	1	2	3	4	5
I have received adequate ImproChem SHEQ training	1	2	3	4	5

I follow safe working procedures when performing my tasks	1	2	3	4	5
I know what to do in case of an emergency	1	2	3	4	5

Never 1 2 3 4 5 Occasionally Often Always N/A

Hazard Assessment Tool(HAT) booklet	1	2	3	4	5
PPE register	1	2	3	4	5
Safety Data Sheet Letter of Acceptance (LOA)	1	2	3	4	5

EMPRO's (Documented emergency plan at customer sites)	1	2	3	4	5
Site Risk Assessments (SRA)	1	2	3	4	5
Driver Checklist	1	2	3	4	5
Medical Assessments	1	2	3	4	5

Never **Always**
1 2 3 4 5

I take immediate corrective action when I observe an unsafe act	1	2	3	4	5
I routinely review job procedures to make sure they are understood and followed	1	2	3	4	5
I use judgment and stay alert for underlying causes of unsafe acts and unsafe conditions	1	2	3	4	5
I use a questioning attitude on the job, asking myself what injuries could occur if the unforeseen happens.	1	2	3	4	5
Me & my team discuss safe practices required for the job and the associated hazards	1	2	3	4	5
I use all my senses (total observation) of the surrounding area when performing my job	1	2	3	4	5
I am my brother's keeper	1	2	3	4	5
I reinforce safe work practices	1	2	3	4	5

Never **Always**
1 2 3 4 5

Value employee safety above all priorities	1	2	3	4	5
Believe we can achieve AECI goal "No harm to anyone ever"	1	2	3	4	5
Respond timely to our safety concerns	1	2	3	4	5
Remove barriers to safe work environment	1	2	3	4	5
Reward safety performance	1	2	3	4	5

Strongly Disagree Strongly Agree
1 2 3 4 5

People in the organization are often afraid of making SHEQ related errors	1	2	3	4	5
There are advantages of covering up SHEQ errors	1	2	3	4	5
People are recognized for their safety performance	1	2	3	4	5
People are encouraged to express their ideas and opinions about safety	1	2	3	4	5
Our motto is "No job is urgent to the extent of compromising my own personal safety".	1	2	3	4	5

Please answer the questions below by circling the appropriate answer/s, to assist ImproChem achieve the AECI goal “No harm to anyone ever”:

What mechanisms are in place to ensure that safety performance at ImproChem is improved?

1. Collaborative safety – Peer to peer interventions
2. Compliance with regulatory requirements
3. Near miss reporting and sharing the learning
4. Accident investigation and sharing the learning
5. Meaningful safety performance recognition
6. Incident reports and sharing the learning

What mechanism should be added?

1. Toolbox talks discussion (employees to also conduct some sessions).
2. Safety performance reviews
3. Enhancing employee involvement and participation in proactive initiatives.
4. Leadership at all levels driving the change in safety culture.
5. Behavioral based safety –Peer to peer (No name, no blame culture).

