

Identifying key organisational factors influencing the safety behaviour of employees in the chrome industry

AL Ebersöhn

 **orcid.org 0000-0003-2172-0915**

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Supervisor: Dr AA le Roux

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Student number: 10671749

PREFACE AND ACKNOWLEDGEMENTS

I want to thank my Heavenly Father for the talent and opportunities that He is placing in my path stretching me to grow and learn on a daily basis. Thank you Lord for your grace and trust in me.

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ABSTRACT

Subject: Identifying key organisational factors influencing the safety behaviour of employees in the chrome industry.

Key terms: Organisational factors; safety culture; safety behaviour; zero harm; safety performance;

It is key for the mining industry to ensure that “zero harm” is targeted. Organisations will have different strategies to achieve their specific goals to achieve zero harm. The three factors identified in literature contributing to accidents and injuries can be classified as firstly the working environment the place or area in which the employee will work, and this will include all the equipment, structures and material found in the physical workplace. Secondly we have the employee (person) with a certain level of knowledge, and experience as well as a unique personality. Lastly the behaviour of the employee is mainly driven by attitude and perceptions of hazard in the workplace. All the above factors will determine the safety performance of the organisation. The safety performance is measured in different ways, and the standard measurement of lost time injuries per million man hours is used in the industry to determine the overall safety performance of an organisation. Unfortunately, this is a reactive measurement and not a proactive measurement. The aim of this study was to identify organisational factors that can be adjusted or managed to influence the safety behaviour of the employee to ensure safe behaviour in the workplace. This is a more proactive approach to ensure zero harm. Therefore, the question is: What organisational factors can positively influence safety performance or have the ability to assist management to achieve zero harm in the organisation?

This study identifies nine organisational factors and their correlations with safety behaviour in the Chrome industry. It is the responsibility of the leaders in the mining industry, representatives of organised labour and the regulating bodies to monitor, investigate, understand and commit to improve the working conditions of the worker. If management can understand the drivers behind the safety behaviour of employees, they can align their strategies to influence and control these drivers to install a positive influence on employee's safety behaviour and ultimately safety performance. This will not only reduce their losses but improve their productivity in the long run.

Questionnaires were drawn up with specific reference to the nine organisational factors and the questionnaires were sent out to the workforce. Interviews were conducted with members of the executive team to have a better understanding of the safety culture in the organisation. The responses of the employees were analysed to determine whether any correlations exist for the specific factors. The results confirmed that certain correlations do exist among some of the organisational factors that were investigated.

Out of the nine organisational factors investigated five indicated a positive relationship among each other and specifically in terms of safety behaviour. Safety leadership for the organisation is critical to drive safety commitment and compliance through the whole organisation. Communication is the key factor influencing many of the organisational factors and one needs to ensure that communication is clear and open. For the leadership team it is clear that taking care of its workers is important, showing their commitment to safety at different levels. The management team of the organisation believes in “Zero harm” and it is recommended to the leadership of the organisation to further investigate safety leadership and safety communication as key factors for safety behaviour to understand their safety culture better and to be able to manage the safety culture more effectively.

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CHAPTER 1: NATURE AND SCOPE OF THE STUDY

1.1 Introduction

On the road to “zero harm” all organisations have different strategies to achieve their specific goals to achieve zero harm to the health and safety of their employees and the environment they work in. Safety performance is measured in different ways, but what factors or drivers can positively influence safety performance or have the ability to assist management to achieve zero harm in the organisation?

According to Reada-Consulting (2014) the ICAM investigation methodologies used to investigate incidents or accidents in the workplace focus on the following three contributing factors to identify a root cause for the incident that occurred.

- Organisational factors
- Task and environmental conditions
- Individual and team actions

When the above three contributing factors have been identified the necessary organisation factors should be addressed to ensure that correct defences are put in place (Reada-Consulting, 2014). The focus of this study is to test and understand certain organisational factors and determine whether there is any relationship between them and more specifically the influence they can have on the unsafe behaviour of employees. As seen by the Figure 1-1 organisational factors form part of the defence mechanism to prevent an incident. Improving or focusing on the critical factors can contribute to a better defence mechanism for the organisation.

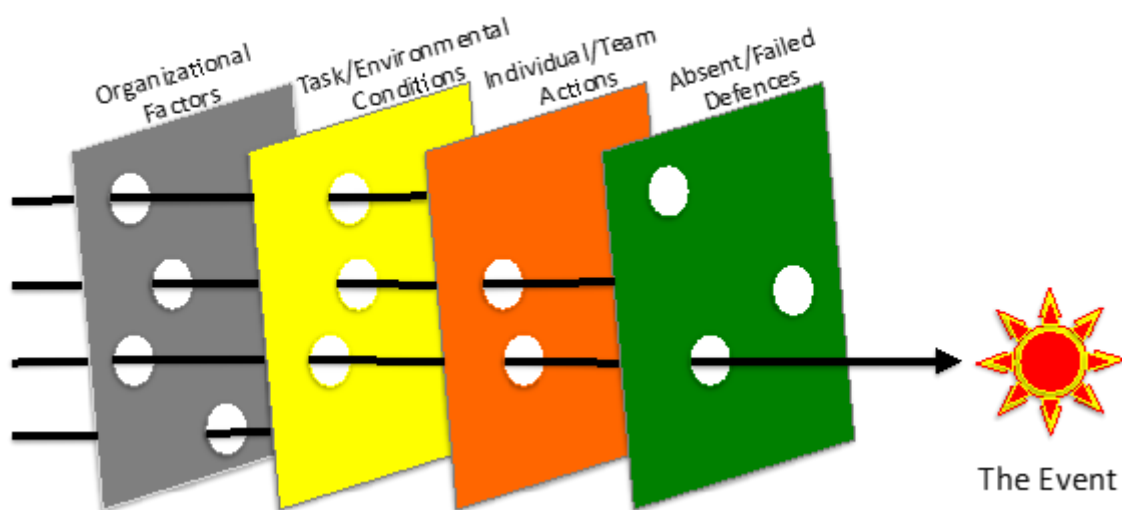


Figure 1-1: ICAM model based on Swiss Cheese model (Reada-Consulting, 2014)

1.2 Problem statement

An old proverb in the mining and metal industry states the following: “Please go home today the same way you arrived at work today.” For this proverb to be true the answer to the following statement “Zero harm – a dream or a reality” should then be a reality. Organisations across the world are facing the same challenges in their quest to achieve zero harm. Safety statistics around the world are spoilt by worrying numbers of injuries still occurring. Minister M. Zwane, the Minister of the Department of Mineral Resources also referred in his speech given during the release of the 2016 statistics on health and safety in the mining sector that it is the responsibility of all stakeholders to work “tirelessly” towards the aim of achieving zero harm. He indicated that the Mines and Health and Safety Act is a key tool that was developed out of the consultation between organised business, labour and the state and all should ensure compliance there with (Zwane, 2017).

Looking at the statistics for the mining industry presented by the Department of Mineral Resources in South Africa for the last two years, the focus was on reducing fatalities in the Mining Industry. For the year 2014, a total of 96 fatalities were recorded, a slight decrease was detected in 2015 to 77 fatalities. The fatalities reported for 2016 came to a total of 73. Looking at occupational injuries these numbers are very large from 3138 in 2015 to 2662 in 2016, although they show an improvement as a large number of these injuries in 2016 were repeat accidents (DMR, 2016). If all the stakeholders are in agreement that nobody should be injured, a decrease should be seen in the number of occupational injuries on a daily base. If the aim is to prevent injuries, why is it so difficult to achieve this objective of zero harm? Organisational roll-out safety campaigns to improve training courses and training material use technology to improve the equipment and work environment and are spending quite a lot of money to reach their safety objectives. Everyone will agree that prevention is better than cure. But still the cost of injuries far exceeds the total cost of prevention (Jørgensen, 2016:46).

The answer to the above statement is not easy to come by. The contributing factors to accident or injuries can be defined as (Moller, 2003:2):

- 1) The working environment: the place or area in which the employee will work will include all the equipment, structures and material found in the physical workplace.
- 2) The employee (person) with a certain level of knowledge, and experience as well as a unique personality.
- 3) The behaviour of the employee mainly driven by attitudes and perceptions of hazard in the workplace.

The focus of this mini-dissertation will be on the last contributing factor mentioned above, which is the safety behaviour of the employee. This is also the factor which is normally neglected by all companies.

If management can understand the drivers behind the safety behaviour of employees, they can align their strategies in order to influence and control these drivers to instil a positive influence on employees' safety behaviour and ultimately safety performance. This will not only reduce their losses but improve their productivity in the long run as discovered by Jitwasinkul and Hadikusumo (2011), Moller (2003) as well as Brown *et al.* (2000). The effect which this will have on the safety culture at the workplace will be a step in the right direction to achieve zero harm.

Literature identifies possible factors which can influence the safety behaviour of the employee. (Brown *et al.*, 2000:446) identified that employee safety behaviours are influenced by internal factors to the organization which is related to operational control. Training programmes are not necessarily influencing the behaviour of the individual compared to managerial decisions and actions taken by the manager. Jørgensen (2016:57) concludes that "We have to make safety a part of the professionalism of doing a good job, not making safety a separate issue, but an integrated part of what are the good and proper ways to do things for both the frontline workers, the supervisors as well as the top managers". This will have a big impact on the employees' safety behaviour if this culture can be established in the organisation.

According to Fleming and Lardner (2000:2) techniques can be used to modify behaviour, promoting health and safety behaviours at all levels in the work environment and not only of management and frontline staff. The success of practising these techniques depends on the implementation as well as every day support from management. The perceived safety climate, hazard level, work pressure, risk and barriers have been identified as factors that can contribute to unsafe acts. This study will aim to identify contributing organizational factors correlating with safety behaviour of the employee; therefore, influencing more than one factor can result in a positive effect on safety behaviour which can reduce unsafe acts and improve safety performance. Previous research conducted and identified certain organisational factors are not necessary applicable to the chrome industry and need to be verified. By understanding the reasons or factors which trigger the unsafe act or behaviour of employees the correct programme or actions can be recommended to improve safety behaviour in the total workplace.

1.3 Objectives of the study

1.3.1 Primary research question

Is there any correlation between the identified organizational factors influencing the employees' safety behaviour in the high-risk chrome industry?

1.3.2 Primary objective

The primary objective for the study will be to benchmark organisational factors available in literature and identify possible factors to be used in a survey and subsequently to analyse the survey results to establish whether any correlation can be found between these factors and the safety behaviour of employees in the ferrochrome plant under investigation.

The following hypothesis will be studied and determined:

- Safety commitment will have a strong correlation with safety compliance.
- Safety leadership will have a strong correlation with safety commitment.
- Communication will have good correlations with all organisational factors.
- Stress recognition will have a good correlation with safety behaviour.
- Cardinal rules will have a strong correlation with Safety Compliance.
- Rewards will have a good correlation with safety behaviour.
- The DMR will have a strong correlation with safety compliance.

1.3.3 Secondary objective

- Conduct a literature review of the topic under study.
- Draw up the methodology that will be used to draw up the questionnaires and sample size.
- Draw up the methodology that will be used for data collection.
- Present statistical results and recommendations that can be derived from the analysis.
- Build a possible model layout out of the interrelationships between the different organisational factors.

1.4 Scope of the study

The safety culture of an organisation consists of give-and-take interaction between:

- People's perceptions about safety;
- People's actual safety behaviour; and
- Safety management systems (Cooper, 2002).

The main aim of this study has been to focus on people and more specific on the safe behaviour of employees and the drivers thereof in the organisation. This study follows a quantitative and qualitative approaches. The subject field for this study can be defined as a Safety or Operations management as well as an Organisational behaviour field. The study investigates whether there is any possible relationship between the identified organisational factors in the organisation and

the safety behaviour practices of employees. Data was collected in the form of completed questionnaires obtained from the workforce to form the basis of the quantitative approach.

1.5 Research methodology

The primary objective for the study was to benchmark organisational factors available in literature and identify possible factors used in the survey, and subsequently to analyse the survey results to establish whether any correlation can be found between these factors and the safety behaviour of employees in the ferrochrome plant under investigation.

1.5.1 Literature/theoretical study

Similar literature studies were studied to analyse for possible relationships between different organisational factors based on similar focus areas or objectives referred to in this study. Organisational factors influencing safety performance as well as safety behaviour and culture are investigated. The main search engine used to gather information for this research was through the NWU Library's search engine. The home page for the library can be found on www.nwu.ac.za/library. The following search engines were used to find articles and books and information on the topic.

- EbscoHost
- ScienceDirect
- SAE Publications
- Google student

Key search words used on search engines were:

- Safety behaviour, zero harm, safety leadership, safety management, safety culture, safety management, safety rewards, safety communication, safety performance.

Using the Ferdinand Postma Library search engine ensured that the articles and information gathered in the process were scientifically sound. Articles ten years and younger were focused on initially. But it was clear that key researchers in the field of safety behaviour did important work found in articles older than ten years which were referred to in studies younger than ten years. A few of these key concepts were also considered in the literature study.

1.5.2 Empirical study

Research design

The research design according to Welman *et al.* (2011:52) means drawing up a plan on how the researcher will gather the information and from whom the information will be sourced. The focus of the research was to establish whether there was a relationship or correlation between the dependent variable (safety behaviour) and the independent variables (the organisational factors). The organisation factors define the safety culture of the organisation. Therefore, it is important to understand safety culture as a concept.

The problem statement is clearly identified at the beginning of this chapter. According to Welman *et al.* (2011) a research problem can be born out of practical problems, previous research studies or theories. A theory can be seen as a statement that is made to describe the relationship of variables explaining a certain occurrence. This study will investigate the “How” describing the different variables influencing safety culture and the “Why” explaining the different relationships between the variables but also the “Predict” using the information to understand the incidence of safety behaviour better.

Interviews were conducted with key personnel to understand their values which will influence the safety culture of the organization and ultimately the safety behaviour of the employees. A questionnaire was handed out to the employees to reflect on their perspective of certain key factors or elements found in the organization under review. The study is defined as a non-experimental field survey using the correlational design to determine the relationship between different variables. Only when key elements have been identified further studies can be conducted. The main focus of this study is to investigate possible key factors which will have an impact on an employee safety behaviour and their correlation with each other.

Population and data collections

The sample (n) was made up of employees from different departments in the company as well as onsite contractors with three-year term contracts. The population (N) consisted of 600 permanent employees and 400 contract workers. The target sample size for the population for the study consisted of 278 questionnaires with a margin of error of 5% and a confidence level of 95% which is typical for a quantitative study. Taking a response rate of 60% into account the number of questionnaires sent out had to be 463 or rounded off 500 questionnaires in total. This would be a 27.8% sample representation of the population.

The population demographics included the following specific information, viz. gender, age, education levels and all races. The following work-related information was also requested: department currently working in, discipline of work namely production, engineering or admin-related. The employee's current post-level and work experience, expressed in years spent working at the company for that specific employee, were also included.

Data analysis

The following test was considered for analysis:

- Correlations:
 - Pearson correlation
 - Spearman rank order correlation
- Reliability
 - Cronbach's alpha
- Frequency distributions
- Descriptive statistics

Assistance was asked from the NWU Statistical Consultation Services (SCS) to effectively analyse the data. Current knowledge on possible programmes used was discussed with the NWU SCS.

The classification for this research can be defined as descriptive.

1.6 Limitation of the study

The interrelationship of the different factors is quite complex and there is the possibility that different factors not studied in this study might have a better correlation to safety behaviour and culture. The study only focused on safety performance dependent on safety behaviour, and no reference is made to ineffective systems or unsafe work environments which also contribute to the safety performance of an organisation. The study was only conducted on one mine in the chrome industry and therefore cannot be seen as a representative sample for the entire chrome industry. The sample size for this study was targeted at 500 respondents. For it to be a representative sample for the whole chrome industry the sample should have been more than 5000 respondents. A further limitation to this study is that only the smelter production units and service departments like HR, IT, Safety and Administration were approached for this specific mine to complete the questionnaires. The mining section was not approached due to new appointments that were made at the underground mining section because the mine had been closed for a two-year period and only "Care and Maintenance" was conducted at the mine. It was the discretion of

the researcher that the new employees would not share the same beliefs and values currently shared by the other workers and therefore not understanding the current safety culture. This would only skew the outcome of the dataset.

1.7 Layout of the study

1.7.1 Chapter one: Nature and scope of the study

This chapter focuses on the problem statement and the objectives to be obtained in this study. The methodology to be followed is also described in this chapter.

1.7.2 Chapter two: Literature review of safety culture and safety behaviour in the global industry with the objective of achieving zero harm

The analysis of safety performance and the drivers influencing this performance is discussed and compared to different studies conducted on similar studies. Specific focus was on safety - leadership, commitment, compliance, communication, behaviour as well as stress recognition, cardinal rules, safety rewards and the influence of the Department of Minerals and Resources.

1.7.3 Chapter three: Empirical study

The methodology that was followed as well as the discussion and analysis of the results obtained from the survey and feedback from the interviews.

1.7.4 Chapter four: Conclusions and Recommendations

The conclusion was formulated out of the results obtained from the empirical study compared to the findings that were made in previous research as well as recommendations that can be made to improve the safety behaviour for the company under research.

CHAPTER 2: LITERATURE REVIEW OF SAFETY CULTURE AND SAFETY BEHAVIOUR IN THE GLOBAL INDUSTRY

2.1 Introduction

The focus for this study is to understand the following organisational behaviours and their possible relationships and their dependence on each other. Safety Leadership, Safety Commitment, Safety Compliance, Safety Behaviour, Stress recognition, Cardinal rules, Safety Rewards, Safety Communications and the Department of Mineral resources are all factors determined by interviews and discussions with the management team of the organisation. This literature review focused on the above nine factors and the roles they play in the safety culture of organisation and how they can influence the safety behaviour of the employee.

According to Cooper (2002:5) the organisation's culture is developed by merging the organisation's goals and management decisions using inputs in terms of safety values, beliefs, behaviours and systems. In Figure 2-1 this can be seen as the transformation process, the output of this process can be defined as the beginning of a Safety Culture for the organisation. The outcome of the process can be seen in the effort and commitment of employees and management striving for compliance and continued improvement in their safety performance.

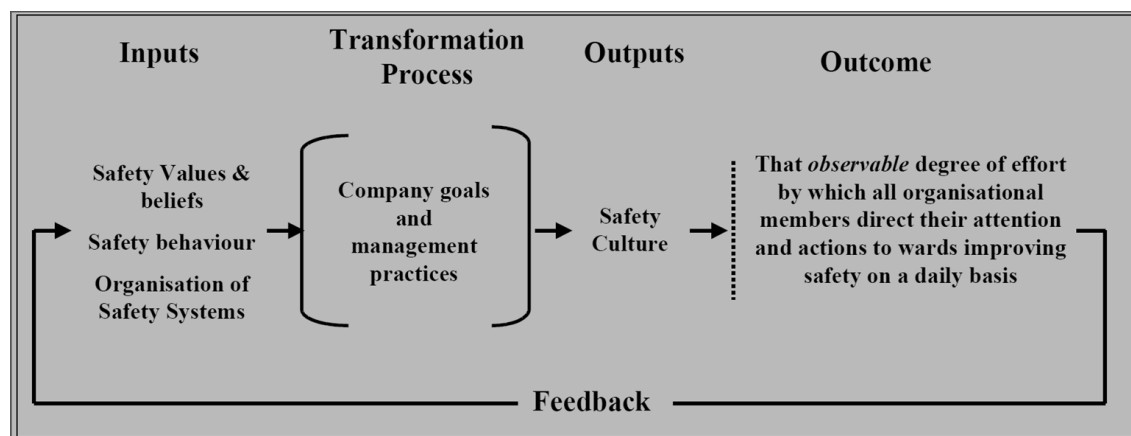


Figure 2-1: Business Process Model of Safety Culture (Cooper, 2002)

To comprehend how disaster sometimes arises, one must first recognize how success is achieved and how people study and familiarize themselves to create safety in a world troubled by cracks, dangers, trade-offs and different goals (Woods & Cook, 1999). If the above statement is dissected the outcome of creating safety in this world will be an effective risk management program for the world in this case the organisation. The aim of the risk management programs will be to prevent injuries and occupational illnesses in the workplace while striving to achieve “zero harm”. Effective risk management is dependent not only on human behaviour by the individuals who are involved

in the accidents, but also include everyone's behaviour contribution to the safety or culture of that specific workplace therefore the whole team has a contribution (Fleming & Lardner, 2000; Smith & Wadsworth, 2009). It is of utmost importance how every workplace transforms its safety culture out of the inputs from the organisation and the workers, for this will underline those unwritten rules of how we do things around here. Will we do our work according to the rules, procedures and policies of the organisation or according to our own experiences? Ultimately the safety culture is formed by the workers' attitudes, values and beliefs (Smith & Wadsworth, 2009:10).

Organisational factors can be defined as those structural factors in the work environment or organisation that can influence directly or indirectly the incidence of accidents or the safety behaviour of the employee (Salminen *et al.*, 1993:352). The safety culture and safety climate of an organisation are the foundation to improve the organisation's safety performance. The organisational factors being studied are all key component in the safety culture of any organisation and therefore understanding that their influence and antecedents are key for success (Carroll, 1998; Cooper, 2000; Neal & Griffin, 2002; Smith & Wadsworth, 2009).

2.2 Safety culture

According to Smith and Wadsworth (2009) the preventing of work-related accidents and injuries including health related illnesses can effectively be achieved based on risk management. Risk management can be influenced by behavioural influences of the workforce. The behaviour of workers is strongly dependent on the safety culture that exists in the organisation (Smith & Wadsworth, 2009).

In a study of the Thailand construction industry seven operational factors were identified which can positively influence the safety behaviour of construction workers (Jitwasinkul & Hadikusumo, 2011). These seven factors are the following:

- Communication,
- Culture,
- Management commitment,
- Leadership,
- Organisational learning,
- Empowerment and
- A reward system.

All these factors showed that they can be influential in addressing at-risk behaviours. Different factors will influence different levels in the organisation and these levels can be defined as the

individual level, the workgroup level and the top level. Certain factors which will be driven by the top level can influence or motivate the other two levels (Jitwasinkul & Hadikusumo, 2011:526).

To achieve zero harm, the solution lies not only in designing and engineering safer machines and equipment. The focus should also be on building the knowledge and the skills of the workers looking at their attitude safety behaviour and morale. At Visakhapatnam steel plant the aim was to implement a behaviour-based safety programme to enhance their safety culture (Arunagirinathan, 2013). The main question that needs to be answered is whether Behaviour-Based Safety will achieve the outcome that was targeted when it was implemented in the work environment. The question also needs to be asked as to how it changes the worker's mind-set, as well as whether their behaviour to prevent risks or high-risk behaviours will not be conducted? The first step to zero harm will be for management to partner with the workforce to change the safety management system to achieve zero harm which will benefit both parties. "Behaviour turns systems and procedures into reality" (Arunagirinathan, 2013).

There are two types of safety behaviour, safety compliance and safety participation. According to Cooper the safety culture of an organisation can be measured in the following three ways:

- Psychological (how do people feel about safety and systems);
- Behavioural (what people do); and
- Situational (what the organisation has put together as systems (Cooper, 2000:117).

A different approach to relate to safety culture will be something the organisation is – the values and beliefs of the workforce, which can be measured by their attitude as well as something the organisation has – its policies, procedures and its systems and controls (Smith & Wadsworth, 2009:13). In short the safety culture can be described by the words "The way we do things around here" (Smith & Wadsworth, 2009).

The following figure (Figure 2-2) also supports the safety culture model as described by Cooper. According to Guldenmund (2010:1470) the organisational culture cannot be separated from the person, environment and behaviour but includes all three aspects. It will be inappropriate to only focus on one aspect and expect improvement, as all three aspects will need to be incorporated into the Safety management system of the organisation, although for this study the focus will remain on the behaviour component influencing the safety culture.



Figure 2-2: Total safety culture factors (Geller & Scott, 2001)

The following concepts are defined for clarity and when referencing to them specifically in the rest of the document. If safety culture is a combination of values, attitudes and common goals that the organisation believes in and strives to achieve, transforming and enforcing these values and beliefs into the rules, policies and pattern of this is how we do things around here, then the safety climate can be seen as a “Snapshot of the state of safety” of the organisation (Smith & Wadsworth, 2009). The safety climate is almost the measurement or the indication of this is where we are at this point in time with our safety culture. Safety performance in the past was mainly measured as a reactive measurement, for example accident statistics in the organisation. This is a poor reflection of the true picture for incidents can be hidden. The focus should change to measure success instead of failure. It should then be possible to be pro-active or predictive zooming in on areas which are not performing (Smith & Wadsworth, 2009).

In the following section the different organisational factors that were discussed with members of the organisation’s executive team will be discussed individually to understand how they fit into the safety culture of the organisation and ultimately influence safety behaviour and safety performance.

2.3 Safety leadership

Cooper (2015) defined safety leadership as follows: “The process of defining the desired state, setting up the team to succeed and engaging in the discretionary efforts that drive the safety value”. Safety leadership is the key ingredient for creating a positive safety culture in any organisation. The executive leadership is responsible for creating planning and keeping the organisation on the road to success. This is done by the four simple steps of management:

- Planning (set the strategic vision, organise, communicate and ensure all resources are in place to achieve the vision)

- Leading (set the example by building trust and understanding with the employees ensuring that the alignment is correct from the boardroom to the work floor)
- Controlling (constantly follow up and measure the performance)
- And communicating the results to the organisation and if needed realign the workforce if the results are not according to the plan (HSE, 2008).

Safety management does not stop at the executive management team but must be rolled out to all managers, supervisors and safety practitioners. Active safety management also influences the organisation's bottom-line - financially the organisation benefits due to saving on medical costs and effective time utilisation by its managers and employees which will be involved during incident investigations. Safety management will make a major benefit to the productivity of the organisation. Employees' behaviours and attitudes and work ethic will be positively transformed (Fernández-Muñiz *et al.*, 2009).

According to Cooper (2015) the working environment consists of positional leaders and inspirational leaders. For effective safety leadership the organisation must focus on inspirational leaders who are driven by values and beliefs that they are passionate about in terms of what they want to achieve and how they want to achieve it. They will inspire the employees to join them in implementing their vision for the future. Safety leaders can be categorized into three typical leadership styles:

2.3.1 Transformational

The key drivers for transformational leaders can be summarised as vision, communication and actions. Transformational leaders are very good leaders, changing the organisational vision and strategy to ensure a better fit in the business environment. The question should be asked whether it can be seen as change agents paving the way for the next dimension for the organisation to enter into (McShane & Von Glinow, 2010).

2.3.2 Transactional

Very effective leadership styles are needed to implement safety standards. Linking job performances ensure that resources are available and reward employees if these are achieved. These types of leaders motivate their employees to work hard to reach the vision that was created. They draw up a strategy to ensure measurable key performance indicators as set and measured. Transactional leaders are very good managers (Cooper, 2015; McShane & Von Glinow, 2010).

2.3.3 Servant

Servant leaders are setting people up to be successful (Cooper, 2015). This investment in people's potential displays a very supportive environment to increase interaction arising from the employees trusting the leader and participating in his dream or vision for the organisation. Leaders that are serving their employees by stewarding, coaching and facilitating (McShane & Von Glinow, 2010).

Relationships were found by different research teams that effective leadership can improve safety performance in the organisation (Caravello, 2011; Fernández-Muñiz *et al.*, 2009; Smith & Wadsworth, 2009:63).

Hypothesis 1: Safety leadership will have a strong correlation with safety commitment.

If the leader is not committed to safety, why will his subordinates be committed to safety? The next discussion point will deal with the term safety commitment in more detail.

2.4 Safety commitment

"Unless commitment is made, there are only promises and hopes but no plans" as avowed by Peter F. Drucker (Nehmeh, 2009). Commitment can be defined as the identification of the employee with the values, profession, leader, or some goal set by the organisation. The employee will show willingness to support and conduct certain behaviour to achieve the supported strategy. The employees have made a commitment to the vision to be taken and the objectives to be achieved (Nehmeh, 2009).

Commitment has been found to impact positively on compliance with the company's roles, regulations and policies, which also implies a positive impact on safety compliance.

Committed employees were found to identify with the organisation and commit to its goals. In the study by Cooper and Phillips organisational culture are defined as the outcome of various actions among three key components, namely people, their jobs and their working environments. The interaction between these components is driven by set targets or goals. If these targets are safety based, a safety culture will be created based on the outcome of these interactions (Cooper, 2002).

The measurement of how this outcome is driven can be seen as the visible overall input from all employees of the organisation towards the common goal or target to enhance the safety of the organisation on a day to day level. If all employees of the organisation strive for this purpose to make a change, they are truly committed to the change towards a positive safety culture. Safety commitment will only be sustainable if this commitment towards safety are visible in all levels of

the organisation. The cooperative amount of visible drive expended in the quest for world-class safety performances by the organisation summarises the recognisable commitment of all employees on a daily base (Cooper, 2002).

The importance of co-workers' commitment to ensure a positive safety performance is critical for the organisation at all levels - horizontal and vertical trust relationships are needed. Figure 2-3 illustrates the relationship from top management safety commitment towards supervisor safety commitment and co-worker's safety commitment on the outcome of safety compliance and safety participation (Schwatka & Rosecrance, 2016).

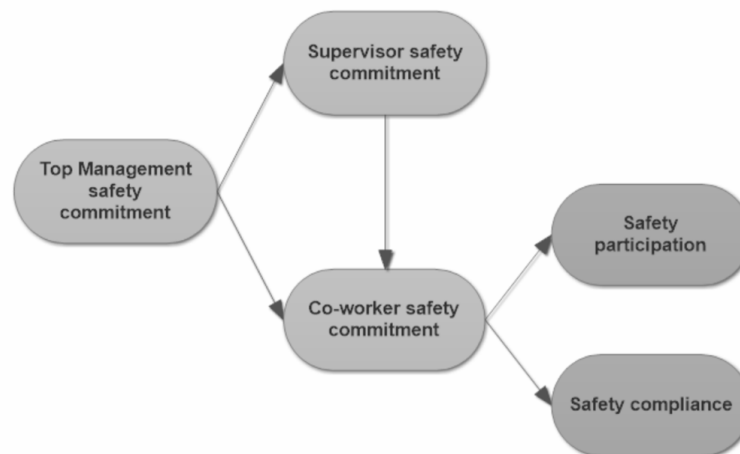


Figure 2-3: Hypothesised model of the effect of safety climate on safety behaviours (Schwatka & Rosecrance, 2016)

According to Skeepers and Mbohwa (2015:12) safety performance must be driven from top management and their leadership will influence the safety culture of the organisation. This in itself indicates that management's own commitment is critical for the workforce to comply. As seen in Figure 2-3, commitment is the antecedent for compliance and participation of the workforce.

Hypothesis 2: Safety commitment will have a strong correlation with safety compliance

The next focus area to be discussed is safety compliance as it flows out of safety commitment as indicated by Schwatka and Rosecrance (2016).

2.5 Safety compliance

For the mining industry compliance with the Mine Health and Safety Act (No. 29 of 1996) is critical for continuous operations of the mine. If non-compliance with the Act continuously occurs, the rights to a mining licence issued by the Department of Mineral Resources can be withdrawn. The objective of the Act can be summarised as follows (quoted from the Act):

“To provide for protection of the health and safety of employees and other persons at mines and, for that purpose-

- to promote a culture of health and safety;
- to provide for the enforcement of health and safety measures;
- to provide for appropriate systems of employee, employer and state participation in health and safety matters;
- to establish representative tripartite institutions to review legislation, promote health and enhance properly targeted research;
- to provide for effective monitoring systems and inspections, investigations and inquiries to improve health and safety;
- to promote training and human resources development;
- to regulate employers' and employees' duties to identify hazards and eliminate, control and minimise the risk to health and safety;
- to entrench the right to refuse to work in dangerous conditions; and
- to give effect to the public international law obligations of the Republic relating to mining health and safety; and to provide for matters connected therewith” (MHSA, 1996).

Safety compliance can be defined in terms of how well the employees are following the safety rules and regulations of the organisation (Neal *et al.*, 2000). They also identified that safety compliance is determined by safety knowledge and safety motivation, both driven from the angle of the safety climate of the organisation. A strong relationship was found between safety behaviour and safety compliance which ultimately drives safety performance. These aspects as discussed by Neal and Griffin (2002) support the objectives as described by the MHSA (1996). A theoretical model drawn up by Masia (2010) indicated the relationships between work stress job insecurity to job satisfaction and organisational commitment resulting from safety compliance. Analysing the Masia (2010) study it is clear that safety compliance has a definite influence on workplace accident and injury frequency. Figure 2-4 indicates the inter-dependencies between the different organisational factors investigated that were identified by Masia (2010).

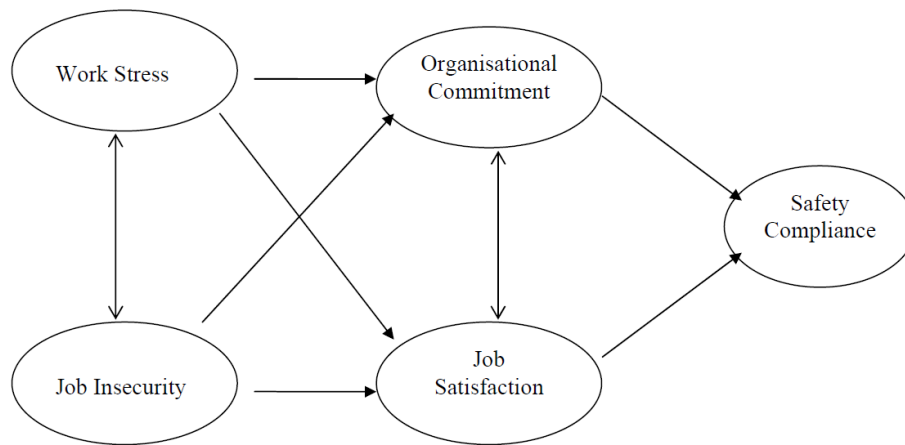


Figure 2-4: A Theoretical Model of relationships of Work stress and Job Insecurity to Workplace Safety Compliance, Job Satisfaction and Commitment (Masia, 2010)

All efforts to influence and motivate employees to enhance safety commitment and compliance will have to flow from the top management to the worker on the floor and this vehicle is most likely one of the most important factors for success to ensure “making it happen”. This factor is *communication* which will be discussed as the next topic.

2.6 Communication

“It is not only important that you speak to be understood, but that you speak so as not to be misunderstood” (Anonymous). Communication is critical for any organisation to succeed - not only operationally, but also to improve safety performance. A few researchers have pointed out the importance of communication in the organisation to improve the safety culture of the organisation. This includes Cooper (2000); Kruger (2016); Neal *et al.* (2000); Zohar and Polachek (2014) to name but a few.

Constructive interaction between employees and their supervisors can relate to injury-free shifts. If the shared vision between the teams regarding the financial results and the operational goals is properly communicated, the same vision for basic safety principles policies and procedures should be communicated (Kruger, 2016). In a study conducted by Newnam *et al.* (2016) they highlighted three types of safety communications that can occur in the organisation:

- Task communication which deals with the daily work that needs to be defined as productivity and efficiency.
- Compliance with safety communication includes the core safety activities that need to be in place before the task can start.

- Value safety communication reflects on the concern the supervisor or leader has for the wellbeing of the worker.

Out of the study it is concluded that 58% of all communications were task based and 13% compliance and value safety based (the other 19% was normal human interaction). Out of the 13%, the portion which represented compliance was 3%. The rest was value-related safety communication (10%). From the above research it is clear that supervisors do not spend enough time on compliance-based communication, ensuring safety policies are understood and safety procedures are enforced. Supervisors have to improve their compliance and value-based safety communication which is critical to develop a leader-member exchange in their teams. This leader-member exchange relationship is a key strategic component for improving the workplace safety performance (Newnam *et al.*, 2016).

The CEO of Mondelez, Irene Rosenfeld, said that “A big part of any leader’s job is to communicate clearly and communicate often, particularly in times of change” therefore communication is a critical piece which, if missing, the organisational ladder to success will collapse.

Hypothesis 3: Communication will have a good correlation with all organisational factors.

2.7 Safety behaviour

Safety behaviour is one of the outcomes that every organisation expects from its employees. A study conducted by Didla *et al.* (2009) found that a positive safety culture was an antecedent for positive safety citizenship behaviour. This resulted in proactively improving the risk management of the organisation. Figure 2-5 refers to safety behaviour, which consists of two components namely safety compliance and safety participation. The antecedent for safety behaviour is the safety climate of the organisation. The individual difference in performance output is based on employee knowledge and skills, as well as motivation. These components predict safety behaviour (Neal & Griffin, 2002).

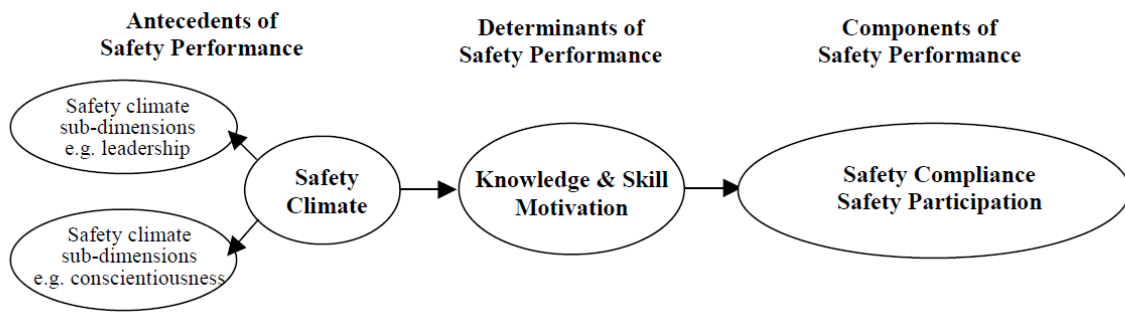


Figure 2-5: Summary of Relationships among Antecedents, Determinants and Components of Safety Performance (Neal & Griffin, 2002)

2.8 Stress recognition

Nahrgang *et al.* (2011) identified the following factors found in the workplace that can contribute to the build-up of stress influencing the safety performance of the employee.

- Job demands in which the physical strength needed to conduct a task is very strenuous.
- Administrative work requested but without supplying the necessary resources.
- Emotional manipulations by co-workers and management.
- Overwhelming job load given by management.

All the above factors can lead to burnout, which later influences performance and lead to possible employee absenteeism. In high risk environments these stress drivers will result in poor safety performance (Nahrgang *et al.*, 2011). In Figure 2-6 a theoretical model is reflected describing the possible relationship between job demands and job resources to safety outcomes.

It is clear that job demands can result in burnout which can be a serious safety concern in the organisation.

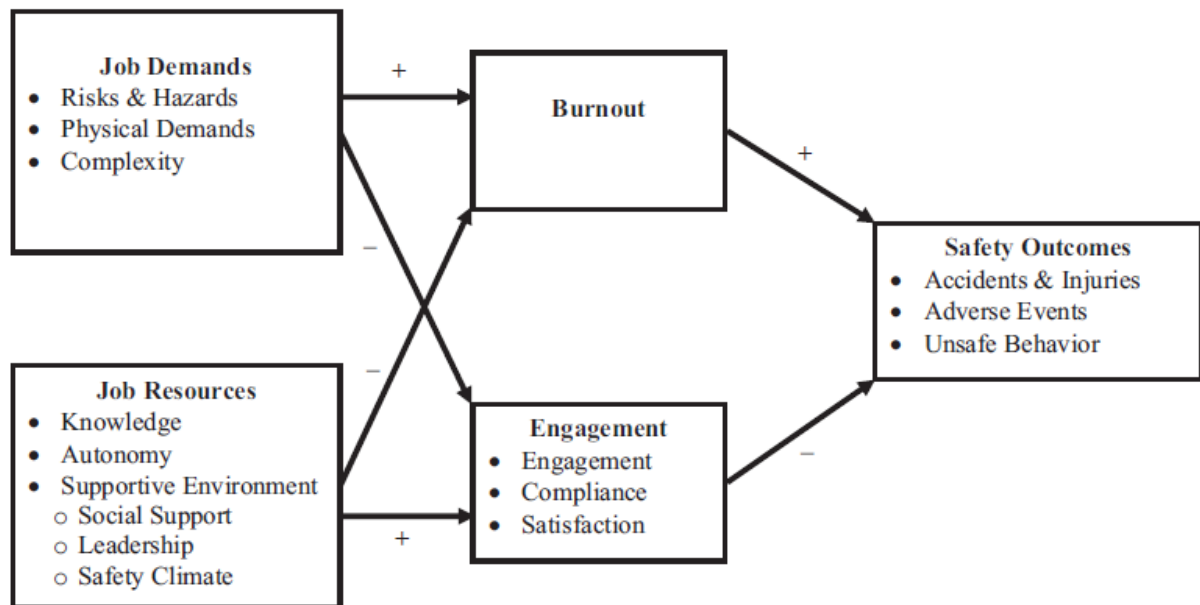


Figure 2-6: Job demand-job resources model of workplace safety (Nahrgang et al., 2011)

Out of the theoretical model it is clear that stress factors can influence safety behaviour negatively. Out of the above model the following hypothesis is drawn.

Hypothesis 4: Stress recognition will have a good correlation with safety behaviour.

2.9 Cardinal rules

Larger companies in the mining industry have developed certain rules that were developed over time based on incidents and in some cases fatalities in the organisations. One of these companies is Anglo-American, who call their cardinal rules the “Safety Golden Rules”. Anglo-American claims that more than 80% of their fatalities have happened in the context of these Golden rules. The Safety Golden Rules are non-negotiable. If you want to be a worker of Anglo-American, you must adhere to these rules at all times. The safety Golden rules apply to everyone entering the gates of the mine or smelter (Anglo-American, 2008).

Organisations should ensure that the role of cardinal rules will not subsequently have a negative effect on employees’ perceptions of cardinal rule compliance (Chauke, 2011). According to Eskom a definition for cardinal rules is that if these rules are not complied with, it can result in very serious injuries to people or loss of life (Terblanche, 2008). The viewpoint of most industries like Mittal, Eskom, Anglo-American and JLL (to mention a few) are the same cardinal rules and are important components to comply with for improving the organisation’s’ safety performance.

The following Cardinal 13 rules have been rolled out at the Organisation in 2012 (Manager 2, 2017)

- Zero alcohol and drugs
- Personal protective equipment
- Support
- Ventilation
- Gases
- Moving machinery
- Competence
- Isolation
- Confined spaces
- Working at heights
- Environment
- Reporting of all incidents
- Lifting and rigging

According to the interview with Manager 2 (2017), the cardinal rules were established to ensure that all employees understand the risk in their working environments and to ensure that no shortcuts will be taken when working or interacting with these rules on a day-to-day basis in the workplace.

Hypothesis 5: Cardinal rules will have a strong correlation with Safety Compliance.

2.10 Department of Mineral Resources (DMR)

The Department of Mineral Resources is an important partner in the safety culture and climate of organisations operating in the mining sector. In South Africa all mines in the possession of mining rights fall under this regulator to ensure the implementation and enforcement of the Mine Health and Safety Act No. 29 of 1996 are complied with. The then state President Nelson Mandela understood the challenges in the mining industry and instructed a commission to investigate the shortcomings of the current regulation as set then in 1991. The commission was chaired by Judge Roman Nigel Leon and was referred to as the Leon Commission. The outcome of the commission was the Mine Health and Safety Act No 29 of 1996 as we know it today (MHSC, 2013).

The drive of the DMR is through the Mine Health and Safety Committee (MHSC) and the tripartite alliances to draw up action plans to achieve the common goal of “zero harm” for the mining industry in South Africa. Zero harm has two sides to it, namely an immediate effect on employees to prevent any harm or injury to the worker, but also a long-term health effect due to certain

exposures in the workplace resulting in a health-related illness (later on in the career of the employer or even after retirement). It is important for the DMR that the employees are educated to understand how to take care of their own safety on the mine. It is also the industry's responsibility to take ownership of this "zero harm" drive and not only wait for the DMR to conduct inspections on the mine but to do self-inspections to ensure compliance with the Act and the realisation of "zero harm" in the mining industry (MHSC, 2013). Very limited research has been conducted on the influence the DMR has on the safety performance and behaviour of mining houses. The following hypotheses are made based on compliance with the Act that is enforced by the DMR:

Hypothesis 6: The DMR will have a strong correlation with safety compliance.

2.11 Safety rewards

Rewards or incentives for workers are an additional method that can be used to encourage compliance with safety rules in the workplace, but it can have positive and negative influences on the workforce. Rewards are normally issued based on the following reasons:

- Reward outstanding performances of individuals who contributed to health and safety in the company.
- Reward those who showed specific safe behaviours, safety participation, supported the safety culture and those following safety procedures (HSE, 2012).

Goodrum and Gangwar (2004) conducted a study of incentives in the workplace. The study indicated that both positive and negative perceptions are formed based on incentive programmes in the workplace. The five key points that need to be questioned why rewards or incentive programmes are initiated:

- Can rewards reduce recordable incidents?
- Can rewards influence the total value of the organisation's incentive programme?
- Can rewards influence positive changes on worker behaviour?
- Can rewards increase safety awareness?
- Can rewards achieve results in long-term safety improvements?

They also found that management perceptions of the five key points are lower than those of the workers. They found in their study that a rewards system can influence the safety performance positively. It was also mentioned that due to the rewards, employees will not report all incidents due to the awaiting of month-end bonus payments and this can have a negative effect on behaviour (Goodrum & Gangwar, 2004).

In the study conducted by Hinze (2002), he found that some companies without safety reward systems have outperformed the companies with safety reward systems. Companies implementing lower value rewards but issuing them more frequently showed better results compared to the other options of higher value rewards. Companies which rewarded groups or crews were also more successful than companies only rewarding individuals. Rewards were based on two criteria: The first and most commonly used was the injury frequencies and secondly based on safe behaviour practices by the team or individual. Hinze (2002) also recommends that workplace safety performance should be considered for job-related raises. The focus must remain on the safe behaviour having a lasting effect on safety performance.

Hypothesis 7: Rewards will have a good correlation with safety behaviour.

2.12 Summary

Literature has indicated a number of factors influencing the safety culture of organisations in different industries. These factors do have a positive influence on the safety performance of organisations and ultimately in the safety behaviour of their employees. The nine factors investigated during this study were also found to have a positive effect on the safety behaviour in the global industry as found in the literature under study. It is also clear that certain factors act as antecedents and influence the next factor which will ultimately influence the safety behaviour of the employee. Safety leadership is one of these key antecedents which surface in every industry as critical (Caravello, 2011; Cooper, 2015; Fernández-Muñoz *et al.*, 2009; HSE, 2008).

Out of the literature seven hypotheses were drawn up and tested on a chrome smelter and mine. The results are discussed in chapter three for validity and possible application in the chrome industry.

CHAPTER 3: EMPIRICAL STUDY

3.1 Introduction

A quantitative approach was followed in this study. This study was conducted by handing out questionnaires to the employees and contractors of a large Ferrochrome smelter. The questionnaires focus on eight key organisational factors which can impact on the safety behaviour of employees. Semi-structured interviews were also conducted with four members of the executive team as well as a Senior Contactor manager responsible for the largest number of contract workers working on a daily base on site. The positions interviewed were the following:

- General Manager Mining
- General Manager Alloys
- Head of Safety and Sustainable Development
- Plant Manager of the biggest contacting companies on site.

The purpose of the interviews was to get a better understanding of how management sees safety culture and safety behaviour and their perspectives on what is driving these principles. The five people who were selected were informed beforehand and asked if they would take part in an interview the confidentiality of which was discussed and that their participation was voluntary and they could pull out of the interview at any time if they were not comfortable with the discussion or questions asked. The main discussion points were sent to the persons ahead of time to give them a chance to prepare themselves for the interview.

The question and time per discussion point were estimated to be 60 minutes per interviewee - the first interview was used as baseline for the following interviews and if needed any changes would be considered after the first interview.

The interview times were recorded as follows:

- Manager 1 - 56 min
- Manager 2 – 53min
- Manager 3 – 58min
- Manager 4 – 36min

The following questionnaires were studied and modified to draw up a questionnaire used for the data gathering in this study.

- NSW government formulated questionnaires based on safety culture in the workplace. (www.workcover.nsw.gov.au)

- Questionnaire measuring safety culture developed by Prof J Reason. (www.tc.gc.ca/CivilAviation/SMS/menu.htm)
- Questionnaire used by Arunagirinathan (2013) in his D.Phil-study.

The final questionnaire (Annexure B) used a 4-point Likert scale measuring responses from Strongly disagree (1) to strongly agree (4) and an additional option was added as Not Applicable (5) if the employee felt that as he was never exposed to the specific statement he could indicate it as not being applicable to him or her.

3.2 Gathering of data

A total of 500 questionnaires were printed and handed out to individual supervisors of different departments covering production, engineering and administrative disciplines. Initially the mine, works and administrative department were considered as sources for data-capturing but it was decided to only focus on the works and administrative department mainly due to the fact that the mining section had recruited an immense number of new employees which would most likely skew the current safety factors under investigation due to the fact that they are new to the company and have not experienced the safety culture of the company and have not made it their own. Therefore, only works and administration departments were focused on for the data collection to ensure a true reflection of the company's current organisational factors will be recorded. The following sections were covered:

- Furnace production and engineering
- Sinter plant production and engineering
- Ore beneficiation plant production and engineering
- Chrome recovery plant production and engineering
- Raw material
- Final product
- Plant laboratory
- Human resources
- Key contractors on site
- Union committee members
- Safety, security and development

The method of distribution was through the supervisors per department. The researcher explained to the supervisors the background of the study and how to complete the questionnaires. It was requested of the supervisors to discuss the questionnaires in the morning and shift meetings with the employees and give them 10-20 min to complete the questionnaires after the meeting. The

researcher attended some of the meetings to oversee the process and assist if needed. A total of 500 questionnaires were handed out of which 235 were received back and seven discarded due to lack of information on the returned questionnaires. This brings the response rate to 47% on questionnaires received back. One of the main reasons for the relatively low response rate can be related to high levels of planned shutdown work that occurred during the period of data gathering and this can also be seen as one of the things learned this study. Supervisors were mainly focused on the shutdown work and not necessarily concerned about the feedback on the questionnaires. This still compared fairly well with the original target sample size that was set at 278 completed questionnaires.

3.3 Results and discussion

3.3.1 Frequency distributions on demographics and plant-specific breakdowns

Table 3-1: Department

Department	Frequency	Valid percentage
OB Plant	13	5.8%
Sinter Plant	23	10.2%
Furnace	97	43.1%
CRP	6	2.7%
Services – Lab	1	0.4%
Services - Raw materials	19	8.4%
Service – Workshop	7	3.1%
Contractor	14	6.2%
Other	19	8.4%
SSD	5	2.2%
Finance	1	0.4%
Procurement and stores	14	6.2%
Human resources	6	2.7%

The top three departments that took part in the survey were the Furnace, the Sinter and the Service – Raw materials departments.

Table 3-2: Discipline

Discipline	Frequency	Valid percentage
Production	1	50%
Engineering	2	32%
Admin	3	12%
Other	4	6%

The highest discipline taking part in the survey was Production, followed by Engineering and lastly Administration.

Table 3-3: Gender

Gender	Frequency	Valid percentage
Male	1	79.9%
Female	2	20.1%

The males taking part of the survey was 80% and the females 20%

Table 3-4: Education

Your educational qualification	Frequency	Valid percentage
Degree	1	5.3%
Post-matric	2	24.4%
Matric	3	64.1%
Lower than matric	4	5.7%

Most participants had matric as a qualification, followed by a post-matric qualification. Participants with lower than matric education were more than participants with a degree.

Table 3-5: Age

Your age group	Frequency	Valid percentage
<20	1	0.0%
20-29	2	21.3%
30-39	3	45.7%
40-49	4	24.0%
50-59	5	8.6%
>60	6	0.5%

The ages of the participants made a very good bell curve distribution with almost half of the participants between the ages of 30-39 years

Table 3-6: Post levels

Your post Level	Frequency	Valid percentage
B1-B7	1	33.1%
C	2	31.3%
D	3	7.4%
E	4	1.2%
Other	5	20.2%
Not declare	6	6.7%

The participants from post grades B and C were the highest with both levels exceeding 30% of the total participants.

Table 3-7: Race

Race	Frequency	Valid percentage
Black	1	76.1%
Asian	2	0.0%
Indian	3	0.5%
Coloured	4	1.4%
White	5	22.1%
Other	6	0.0%

Only four race groups took part in the survey with Black African the highest at 76%

Table 3-8: Years working for the company

Years working for company	Frequency	Valid percentage
< 1yr	1	17.3%
1-4 yrs	4	27.7%
5-9 yrs	2	25.0%
10-14 yrs	3	21.8%
15-20 yrs	5	3.2%
>20 yrs	6	5.0%

The most representatives for this sample group were from the 1-4 years working for the company group. For this study sample the working years more than five years represented 55% of the sample. The newcomers with less than one working year represented 17.3% of the sample.

3.3.2 Safety commitment

It can be concluded that safety does take priority over production at this company with a total of 76% responding positively (agree and strongly agree) with this statement. If safety does not take priority over production the possibility of performance pressures on the employee result in short

cuts been taken to achieve output targets resulting in non-compliance with procedures and policies (Barling & Frone, 2004). Safety Commitment from management was rated at 79% positive and from employees rated at 89% positive which is extremely high but taking into consideration that 60% of the total questionnaires were completed by employees with post-levels under supervision or management levels. The overall perception was positive on Safety Commitment from the organisation at all levels. The mean for this factor was 3.146 out of a four-point scale and a standard deviation of 0.797.

Table 3-9: Safety commitment

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	Safety takes priority over production at our company.	0%	6%	18%	44%	32%
2	Our leaders/supervisors visibly demonstrate an interest in the safety and health of their employees.	0%	5%	16%	50%	29%
3	All the required PPEs like overalls, safety shoes, hard hats, goggles, gloves, etc. for my job are always available.	0%	3%	6%	40%	51%
4	The safety inspections of my section are conducted at regular intervals.	0%	2%	9%	54%	35%
5	My shift or team is committed to safety at all times	1%	2%	8%	53%	36%
6	All incidents are investigated and corrective actions are put in place to prevent recurrence of similar incidents.	1%	4%	11%	54%	30%
7	I have the opportunity to raise safety issues and discuss specific problems regarding safety at any time.	0%	4%	12%	54%	31%

3.3.3 Safety compliance

Out of the results it is clear that the organisation is compliance-driven with an average of 2.932 out of a four-point scale and a standard deviation of 0.868. Work environment is of some concern for the employees resulting in 48% negative (disagree and strongly disagree) perceptions from employees. This can also reflect more on management and leadership caring for employees and their work environment, also taking into consideration that this is a mining and smelting environment resulting in exposure to dust, heat, gases and high levels of noise. Meetings, housekeeping, incident reporting, permit to work, risk assessment, plan task observations and SOP management all were rated above 80%, indicating a positive result (agree and strongly agree) overall for safety compliance.

Table 3-10: Safety compliance

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	Safety Committee meetings are held every month in my department.	0%	6%	13%	50%	31%
2	All workplace incidents / accidents and near misses in my department are reported.	0%	3%	12%	52%	34%
3	I am happy with the housekeeping in my working area.	0%	4%	19%	49%	28%
4	I am comfortable with the work environment (noise, dust, heat and vibration) in my workplace.	1%	19%	28%	40%	12%
5	The permit-to-work and risk assessment system in my work area is followed correctly.	0%	4%	13%	56%	27%
6	My supervisor often observes my work practices and my working environment for the purpose of protecting my safety and health (PTOs)	0%	5%	13%	56%	24%
7	Safe operating procedures (SOP) for using equipment / machines and doing my work safely are discussed with all concerned, reviewed and revised as necessary.	2%	4%	9%	62%	23%
8	Management is consistent with respect to disciplinary action against employees who did not follow the safety rules	2%	12%	14%	54%	20%

3.3.4 Safety communication

All the statements made on safety communication had a positive result of 80% and above (agree and strongly agree). The standard deviation on this factor was also the lowest of all the factor indicating that the participants' perceptions on all statements were the same. The average calculated to 3.215 out of a four-point scale. No specific relationship or concern can be raised out of the results presented.

Table 3-11: Safety communication

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	The health and safety policy of my company is clearly understood by me.	1%	3%	4%	59%	34%
2	I have been informed about what to do in case of an emergency like fire and gas leakage, etc. in my work area	0%	2%	1%	52%	44%
3	I understand the company's BBS (Behaviour Base Safety) drive.	0%	3%	7%	57%	32%
4	I always know what is expected of me regarding safe behaviour.	0%	2%	3%	56%	39%
5	The discussion of safety and health issues in our department is not only to please management but to solve our H&S problems	0%	4%	9%	60%	27%
6	I understand what the company wants to achieve regarding safety, health and environmental issues.	0%	2%	4%	65%	29%
7	All incidents that occurred in the company have been communicated to me	0%	4%	7%	62%	26%

3.3.5 Safety behaviour

The average result for this factor was the highest outcome compared to all other factors with a standard deviation of 0.718. On the statement: "If I saw another employee committing an unsafe practice, I would say something directly to him or her to stop the unsafe practice." The perception of employees was overwhelmingly positive with 95% agreeing to this statement (47% agreeing and 48% strongly agreeing). This is very positive in the drive to zero harm, incident prevention and high safety performance outcomes. All other statements were also positive with results above 80% and higher results.

Table 3-12: Safety behaviour

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	Safety and Health is a very high priority for me when I am performing my job responsibilities.	0%	2%	1%	46%	50%
2	I feel that observing both the safe / unsafe behaviours of individuals and giving them feedback will improve safety at work.	1%	1%	3%	47%	48%
3	If I saw another employee committing an unsafe practice, I would say something directly to him or her to stop the unsafe practice.	0%	0%	3%	44%	53%
4	I report every workplace injury or illness to my supervisor that I sustain, regardless of its severity.	0%	1%	6%	52%	41%
5	Staff / workers will freely speak up if they see something that may negatively affect health and safety at work.	0%	7%	11%	56%	25%
6	I always follow the safety rules.	0%	0%	5%	50%	44%
7	When no one is looking, I will still obey all the cardinal rules.	0%	2%	4%	45%	48%
8	There is a positive change in the behaviour of the workforce with respect to safety practices	0%	2%	10%	61%	28%
9	In my department / section, we discuss ways to prevent errors / mistakes from happening again. (Including incidents that occurred in other companies)	0%	4%	8%	50%	38%

3.3.6 Stress recognition

Out of the perception of the participants it can be concluded that they are exposed to stress or work-related pressure, but they are also positive that they can safely complete their work even under stress-related conditions. Time pressure was highlighted as a possible factor for incidents or accidents that had occurred in the organisation.

Table 3-13: Stress recognition

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	I feel my department is able to adjust work assignments according to employee safety considerations.	1%	4%	11%	61%	24%
2	Sometimes, I work “under crisis / under pressure” when trying to do more work too quickly.	0%	4%	20%	48%	28%
3	During the past, I had been injured or felt unwell as a result of work-related stresses.	1%	15%	38%	27%	19%
4	I am able to take scheduled rest breaks and still complete my assigned work in time.	2%	5%	17%	58%	19%
5	The job expectations or targets are reasonable or practicable at my workplace.	2%	5%	15%	61%	18%
6	As per my knowledge, time pressure has been a factor in an incident / accident or near miss in some cases.	2%	3%	10%	53%	33%

3.3.7 Cardinal rules

The perception of the influence of cardinal rules on the behaviour of the employees is positive and the reasons for following the rules can be summarised as follows:

- One due to fear or consequences was 83% and

Out of knowledge and agreement 93%. The overall perception was positive.

Table 3-14: Cardinal rules

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	The cardinal rules have a positive influence on my attitude towards safety.	2%	2%	5%	48%	45%
2	I do feel offended / uncomfortable by the breathalyser test.	0%	23%	39%	17%	19%
3	Hooking up at heights should be done without question.	1%	15%	18%	37%	29%
4	I understand the five metre rules regarding cardinal rules no. 6	1%	2%	3%	46%	49%
5	I obey the cardinal rules because the consequences of not obeying are too harsh.	0%	7%	10%	51%	32%
6	I obey the cardinal rules because they make sense to me.	0%	2%	3%	44%	51%
7	Since the introduction of the cardinal rules there has been a perceived positive influence on the workforce's behaviour towards safety.	0%	3%	4%	58%	35%
8	Isolating and testing before any work on equipment can start, can save your life	0%	3%	3%	31%	64%

3.3.8 Department of Mineral Resources (DMR)

The overall spread in terms of the statement in this section was more average - not necessarily positive or negative with an average of 2.75 out of a four-point scale and a standard deviation higher than the other factors of 1.02. Out of the results it can be concluded with certain statements there are different perceptions from among employees. The overall perception was that the DMR would contribute to the safety performance of the organisation. On the first question as to whether the DMR contributed positively to the company's safety standard, 87% of the participants indicated that they agreed or strongly agreed.

Table 3-15: Department of Mineral Resources

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	I think the DMR contributes positively to the overall safety standard of the company	0%	5%	9%	38%	49%
2	I think the DMR costs the company money on less serious issues raised by them	0%	27%	32%	18%	21%
3	The DMR understands our business	2%	6%	13%	45%	35%
4	When an inspector asks me a question I will be calm and will answer his questions without delay.	1%	1%	6%	55%	38%
5	I will not be afraid to assist with any investigation requested by the DMR	0%	2%	9%	51%	37%
6	Employees' knowledge on Mine Health and Safety Act is poor.	1%	15%	41%	33%	10%
7	I know when an inspector is on site	1%	8%	20%	50%	20%
8	People are being hidden when the DMR is on site	2%	18%	34%	25%	22%
9	Incidents are being hidden from the DMR	1%	23%	43%	19%	12%
10	DMR inspectors misuse their status and power	2%	29%	34%	20%	15%
11	Sections 54 and 55 do contribute to improving the safety at the company	3%	7%	6%	52%	35%

3.3.9 Safety rewards

Out of the results it can be indicated that safety rewards do have an influence on the improvement of safety behaviour. According to the employees' perceptions they are in agreement that the company's current safety reward strategy is effective with a 71% positive feedback on this statement.

Table 3-16: Safety rewards

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	Rewards for safe behaviour are a good way to increase safety awareness levels.	0%	3%	5%	53%	39%
2	A safety incentive programme would force employees to work more safely.	0%	4%	10%	51%	35%
3	The company has an incentive programme that encourages incident reporting?	0%	5%	20%	51%	20%
4	I have nominated some of my co-workers or subordinates for safety awards.	4%	6%	38%	40%	9%

3.3.10 Safety leadership

The average score for Safety Leadership was 2.94 out of a four-point scale with a standard deviation of 0.84. The employees responded positively to all the statements in this section. The only two statements reflecting some negative response were:

- Supervisors are good listeners, with a 38% negative response.
- Managers or supervisors mean what they say and do what they say in safety matters, with a 35% negative response.

On the statement “Safety is a high priority for our company” 87% of employees responded positively to this statement, indicating a very positive safety climate for the organisation.

Table 3-17: Safety leadership

No:	Statement	Not applicable	Strongly disagree	Disagree	Agree	Strongly agree
1	My department's workforce understands their leadership's safety vision.	7%	3%	14%	58%	24%
2	The company's leadership is honest in their intentions regarding safety.	0%	8%	12%	55%	24%
3	The company's leadership is contributing towards the formation and development of an improved Safety Culture	0%	5%	11%	59%	25%
4	Management shows a deep concern for the safety of its workforce.	0%	6%	13%	55%	26%
5	Supervisors are good listeners.	0%	15%	23%	47%	14%
6	Management always gets involved in safety issues	1%	4%	13%	57%	25%
7	Managers seem to understand what we and they should do regarding safety	1%	5%	15%	59%	21%
8	Safety is a high priority for our company	0%	4%	8%	47%	40%
9	Managers or supervisors mean what they say and do what they say in safety matters.	0%	11%	24%	46%	18%
10	I feel that my health and safety are important for the management team	1%	7%	12%	50%	30%
11	The behaviour of leadership towards safety is above standard.	0%	7%	19%	54%	20%

3.4 Reliability

The reliability test used is based on the Cronbach's Alpha test. Positive results above 0.7 were achieved on most of the factors - the only factors not achieving this were the following:

- Stress recognition
- Cardinal rules
- DMR
- Safety rewards

Refer to Table 3-18 for all the results. Reliability can be defined as the consistency when measuring a certain concept. The Cronbach's Alpha test was used to measure the internal consistency. The test determines the consistency of how the responses to a question in the specific questionnaire response to other questions it can be selected to include all the questions or a sub-group of questions in the questionnaire. A score above 0.8 indicates an acceptable level or score for measuring the internal reliability (Welman *et al.*, 2011:38).

Table 3-18: Reliability

Organisational factors	Cronbach's Alpha	Cronbach's Alpha based on standardized Items	N of Items
Safety commitment	0.813	0.815	7
Safety compliance	0.801	0.808	8
Safety communication	0.866	0.868	7
Safety behaviour	0.857	0.862	9
Stress recognition	0.492	0.498	6
Cardinal rules	0.577	0.659	8
DMR	0.424	0.453	11
Safety rewards	0.639	0.639	4
Safety leadership	0.934	0.935	11

The following two factors will not be considered when conducting correlation analysis due to the low Cronbach's alpha scores. Stress recognition and the DMR will not be considered for the Pearson and Spearman analyses.

3.5 Correlations

To measure the strength of a linear relationship between variables a correlation coefficient is calculated to quantify this relationship.(Saunders *et al.*, 2009)

Table 3-19: Correlations - Pearson

Correlations – Pearson								
		Safety_ commitment	Safety_ compliance	Safety_ communication	Safety_ behaviour	Cardinal_ rules	Safety_ rewards	Safety_ leadership
Safety commitment	Pearson Correlation	1	.759	.735	.689	.506	.343	.589
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	228	228	228	227	228	226	227
Safety compliance	Pearson Correlation	.759	1	.746	.650	.470	.472	.696
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000
	N	228	228	228	227	228	226	227
Safety_ communication	Pearson Correlation	.735	.746	1	.704	.645	.359	.587
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000	0.000
	N	228	228	228	227	228	226	227
Safety behaviour	Pearson Correlation	.689	.650	.704	1	.671	.380	.524
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000	0.000
	N	227	227	227	227	227	225	226
Cardinal rules	Pearson Correlation	.506	.470	.645	.671	1	.348	.359
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.000
	N	228	228	228	227	228	226	227
Safety rewards	Pearson Correlation	.343	.472	.359	.380	.348	1	.414
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		0.000
	N	226	226	226	225	226	226	226
Safety leadership	Pearson Correlation	.589	.696	.587	.524	.359	.414	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	
	N	227	227	227	226	227	226	227

Table 3-20: Correlations - Spearman

Correlations – Spearman								
		Safety_ commitment	Safety_ compliance	Safety_ communication	Safety_ behaviour	Cardinal_ rules	Safety_ rewards	Safety_ leadership
Safety commitment	Correlation Coefficient	1.000	.725	.666	.632	.416	.269	.633
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	228	228	228	227	228	226	227
Safety compliance	Correlation Coefficient	.725	1.000	.680	.594	.343	.393	.725
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000
	N	228	228	228	227	228	226	227
Safety_ communication	Correlation Coefficient	.666	.680	1.000	.643	.531	.271	.614
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000	0.000
	N	228	228	228	227	228	226	227
Safety behaviour	Correlation Coefficient	.632	.594	.643	1.000	.606	.305	.551
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000	0.000
	N	227	227	227	227	227	225	226
Cardinal rules	Correlation Coefficient	.416	.343	.531	.606	1.000	.285	.360
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.000
	N	228	228	228	227	228	226	227
Safety rewards	Correlation Coefficient	.269	.393	.271	.305	.285	1.000	.384
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		0.000
	N	226	226	226	225	226	226	226
Safety_leadership+A42	Correlation Coefficient	.633	.725	.614	.551	.360	.384	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	
	N	227	227	227	226	227	226	227

The following relationships stood out and it is worth mentioning that all correlation values above 0.6 listed in Table 3-21:

Table 3-21: Relationships

Variable 1	Variable 2	R-value	p-value
Safety commitment	Safety compliance	0.725	<0.000001
Safety commitment	Safety communication	0.666	<0.000001
Safety commitment	Safety behaviour	0.632	<0.000001
Safety commitment	Safety leadership	0.633	<0.000001
Safety compliance	Safety communication	0.68	<0.000001
Safety compliance	Safety leadership	0.725	<0.000001
Safety communication	Safety behaviour	0.643	<0.000001
Safety communication	Safety leadership	0.614	<0.000001
Cardinal rules	Safety behaviour	0.606	<0.000001

Strong relationships were established between safety commitment and safety compliance as well as safety compliance and safety leadership. The following relationships with safety behaviour were recorded as medium to strong:

- Safety commitment,
- Safety communication,
- Cardinal rules.

3.6 Correlation differences between employees and supervisors/management

The sample was divided into three groups - the first group did not indicate their post levels and the second group which represents the employees will be all persons in the group B1-7. The 2nd group will represent management from C-level up to F-level. It was found that the employees and management did not see eye to eye regarding certain factors which may influence safety performance.

The following results were obtained:

Figure 3-1: Comparison graphs between Spearman relationships for employee post levels and supervisory post level groups



Out of the above results there is a visible trend in the graphs which indicates an overall agreement or perception between supervisors / managers and employees. The following correlations do stand out and need to be highlighted:

- The correlation between safety rewards and safety leadership: The supervisors indicated a low average level of correlation (0.461) compared with the employees which was very low (0.199).
- The correlation between safety commitment and cardinal rules also indicated the same relationship with a high average value (0.603) for the supervisor group and a low value (0.275) for the employees.
- The same trend realised between safety commitment and safety behaviour the supervisor group realised 0.742 and the employees 0.482.

The following table summarises the results for all the hypotheses that were formulated in Chapter 2.

Table 3-22: Hypothesis outcomes

Hypothesis	Value	Proved
Hypothesis 1: Safety leadership has a strong correlation with safety commitment.	0.633	Confirmed
Hypothesis 2: Safety commitment has a strong correlation with safety compliance.	0.725	Confirmed
Hypothesis 3: Communication will have correlations with all organisational factors as discussed in this study. • Safety commitment • Safety compliance • Safety behaviour • Safety leadership	0.666 0.680 0.643 0.614	Confirmed but not with all only 50%
Hypothesis 4: Stress recognition will have a correlation with safety behaviour.	Did not measure	Did not prove correlation
Hypothesis 5: Cardinal rules will have a correlation with safety compliance.	0.343	Poor correlation
Hypothesis 6: The DMR will have a correlation with safety compliance	Did not measure	Did not proof correlation
Hypothesis 7: Rewards will have a good correlation with safety behaviour.	0.305	Poor correlation

3.7 Summary

The research study was undertaken to determine whether any relationships exist between certain organisational factors and the safety behaviour of employees for the organisation in question. The results obtained confirmed a strong to medium linear relationship between the different organisational factors tested. Table 3-21 indicates all the significant relationships that were found. Safety commitment and safety communication both have four significant relationships, safety communication and safety leadership and safety behaviour have three significant relationships. Cardinal rules do show a lesser relationship with safety leadership. The influences of the DMR and Stress recognition were ignored due to a poor Cronbach's Alpha coefficient that was realised for these two factors.

CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS

4.1 Introduction

Organisational factors do prove that they have different correlations with each other (Cooper, 2002; Neal & Griffin, 2002; Smith & Wadsworth, 2009; Zohar & Polachek, 2014). It is also confirmed by previous studies in the field of safety culture and safety behaviour that these factors do influence safety behaviour and ultimately influence the safety performance of the organisation. For this study nine organisational factors were selected, questionnaires were sent out to the workforce and interviews were conducted with members of the executive team. The responses of the employees were analysed to determine whether any correlations do exist for the specific factors as mentioned above. The results did confirm that certain correlations were determined between some of the organisational factors that were investigated.

In this chapter conclusions will be made comparing the theoretical review with the actual empirical results found in chapter 3. Recommendations to the organisation to improve the safety behaviour of employees are suggested. Limitations of this study are also discussed as well as possible future research proposals.

4.2 Conclusions

It is clear from the literature that the safety culture is formed by the organisational factors that are practised, enforced or lived by in an organisation (Neal & Griffin, 2002). Out of the theory and interviews some logical conclusions are presented by the researcher which look at a possible 'ABC' (Antecedent, Behaviour and Consequences) model for the factors investigated. Antecedents resulting in a certain Behaviour following by Consequences (Fleming & Lardner, 2000). The 'ABC' model can be used to investigate the reasons why people act in different ways.

- Antecedents normally are factors that trigger a certain behaviour, something that prompts someone to act in a certain manner. Antecedents can communicate information; it can be a person or thing. Out of this study it was leadership, communication, cardinal rules, the DMR or rewards.
- Behaviour, the act or thing that someone is doing. Out of this study we refer to: Compliance, Commitment and Stress Recognition.
- The consequences are the outcome of that behaviour (the result). This can be the improvement of the safety performance or "zero harm". This outcome can be short or long term based. For the study the outcome was safety behaviour.

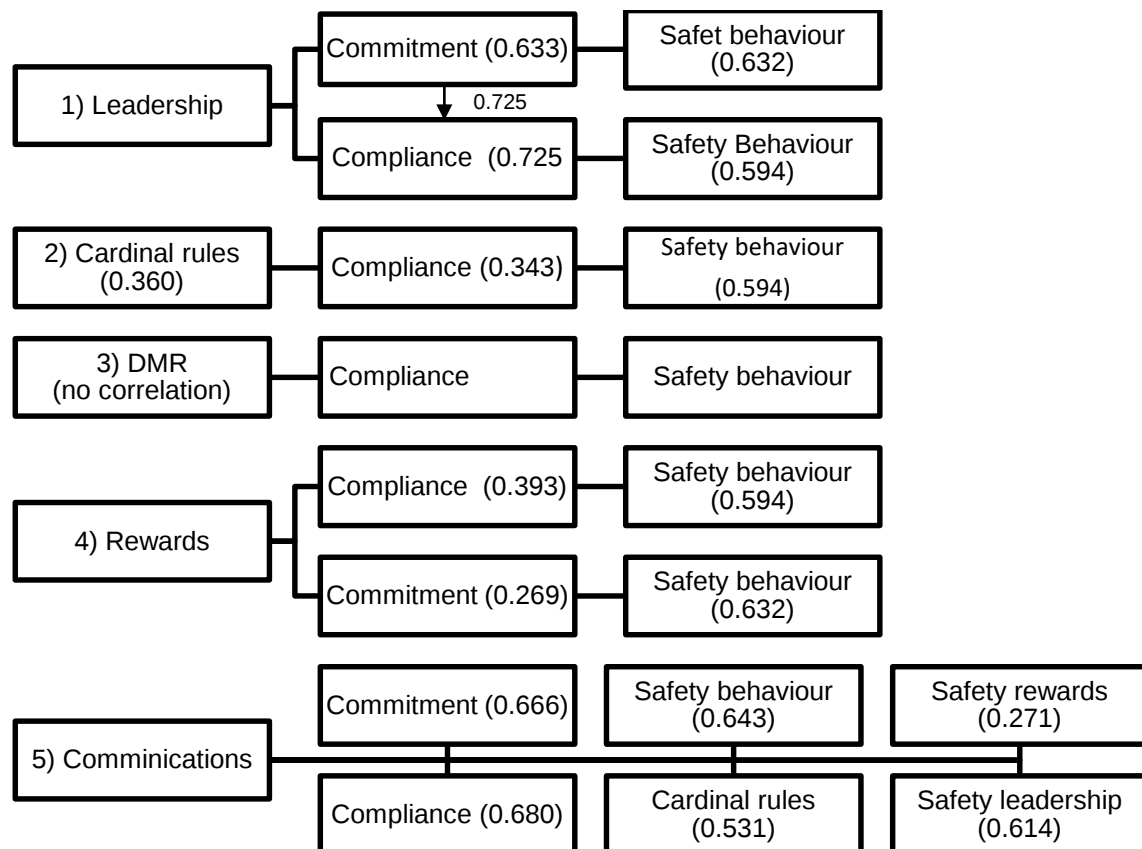


Figure 4.1: Correlations - finding between factors analysed

With reference to Figure 4-1 and using the ABC model, the following can be concluded based on the results that were obtained.

- 1st tree:

Leadership was found to be an antecedent towards commitment as well as compliance both these factors are behavioural and the outcome for this behaviour will be safety behaviour which is defined as the consequence referring to the ABC model.

The following correlations were achieved.

Leadership and Compliance = 0.725 good relationship

Leadership and Commitment = 0.633 good relationship

Compliance and Safety Behaviour = 0.594 average relationship

Commitment and Safety Behaviour = 0.632 good relationship

- 2nd tree:

Cardinal rules as the antecedent followed by compliance as behaviour and the outcome is safe behaviour but unfortunately the correlations in this tree were found to be very low. This tree is disregarded for any recommendation.

- 3rd tree:

This tree as presented was not measured due to a very low Cronbach Alpha that was calculated from the DMR data points. But the expectation was to determine a correlation between the DMR and safety compliance followed by safety behaviour.

- 4th tree:

Indicating rewards as the antecedent and commitment and compliance as behaviours and safety behaviour as consequences. The correlation for the 4th tree was also low and therefore not reliable.

- 5th tree:

Communication proved to have correlations with most of the factors as indicated in Figure 4-1. For this study the 1st tree and the 5th tree will be used for recommendations to the organisation.

It is concluded that Hypothesis 1 was confirmed with a good relationship between safety leadership and safety commitment that was found in the study. Hypothesis 2 was confirmed with a very good relationship between safety commitment and safety compliance. Communication which is seen as the golden thread through the culture of an organisation was confirmed to have good correlations with commitment, compliance, and safety behaviour and safety leadership (Hypothesis 3). Stress recognition had a very low Cronbach Alpha value and therefore no correlation with safety behaviour was calculated. Therefore, hypothesis 4 was not confirmed. Hypothesis 5 stated that Cardinal rules will have a correlation with compliance and this hypothesis was rejected due to very low values that were achieved. The correlation between the DMR and compliance was not recorded due to a low Cronbach Alpha value. Hypothesis 7 was rejected because a very poor correlation between rewards and safety behaviour was recorded. Out of the nine organisational factors investigated five indicated a positive relationship among each other and towards safety behaviour. Communication was the strongest factor indicating relationships with six of the organisational factors investigated in the study.

4.3 Recommendations

Leadership have to set a vision and objectives for the organisation including specific safety objectives - this will drive and create the safety culture. Out of the results recorded for this study it became clear that Leadership can drive compliance and commitment and therefore the focus of the company should be on developing their safety leadership to improve the safety behaviour of the employees. The second recommendation is to focus on the communication channels throughout the organisations as it is proven that communication has a positive correlation with all the factors investigated in the study. Focusing on the above two recommendations can have a major influence on the safety performance of the company. With taking the above findings in consideration it can be concluded that enough evidence was found in the empirical data supporting the theories and correlations presented in the literature about organisational factors influencing safety behaviour.

4.4 Achievements of the objectives of the study

The primary objective for the research study was to identify possible organisational factors that can influence safety behaviour of the employee. The benchmark organisational factors available in literature and factors identified by managers were limited to nine factors. These factors were surveyed and analysed for correlation between these factors and safety behaviour of employees for the ferrochrome plant under investigation. Organisational factors identified during this study was proven to have a significant relationship with Safety behaviour. These factors were Cardinal rules (0.606), Safety commitment (0.632), Safety communication (0.643), Safety compliance (0.594), Leadership (0.551) and Safety rewards (0.305). The outcome of the hypotheses investigated was summarised in Table 3-22 indicating that two hypotheses were proven, one was partially proven, two were poorly proofed and two were not proven at all. All secondary objectives were also achieved as described in Chapter 1.

4.5 Recommendations for future research

It is recommended that these and additional factors should also be considered for further studies assisting the mining industry in improving their safety performance but most important to ensure the safety of the individual working on the mine. It is also recommended to expand the investigation to other Ferrochrome mines and smelters to investigate if any correlation can be found between the different plants as well. The following factors also surfaced in this study but were not investigated: Training, Caring, Overload of information (training), systems and inconsistent application of rules and procedures (Manager 1, 2017; Manager 2, 2017; Manager 3, 2017). It is recommended that these factors will also be considered in future research.

It can also be recommended that the safety culture as a whole can be research. This will be a very good indication on the safety behaviour of the employees in the organisation. Organisational factors will create a certain safety culture. Research can identify the key factors influencing a positive safety culture. Safety commitment had a very strong correlation with compliance further research can investigate how do the organisation germinate safety commitment in employees.

4.6 Summary

The biggest impact on the road to zero harm for this organisation will be to focus on two organisational factors, namely safety leadership and communication. Safety leadership for the organisation is critical to drive commitment and compliance through the whole organisation. Communication is the key factor influencing many of the organisational factors and need to ensure communication is clear and open. For the leadership team it is clear that taking care of its workers is important for them, showing their commitment to safety on different levels. They believe in “zero harm” and it is recommended to the leadership of the organisation to further investigate the drivers for safety behaviour to understand their safety culture better and to be able to manage the safety culture more effectively.

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ANNEXURE A: APPROVAL FROM EXECUTIVE TEAM OF COMPANY TO CONDUCT STUDY AT HERNIC FERROCHROME

ANNEXURE A

27 February 2017

TO WHOM THIS MAY CONCERN:

We, the undersigned,

Mr J Swanepoel / W. Reyneke

In our capacity as Joint Acting Chief Executive Officer of Hernic Ferrochrome (HFC), herewith gives permission to A.L. Ebersohn (student number 10671749) to conduct research at this organisation relating to his mini-dissertation to be submitted for the partial fulfilment of the Master's degree in Business Administration at the Potchefstroom Campus of the North-West University.

The title of the mini-dissertation is:

"Zero harm" – A dream or a reality. Identifying key organisational factors influencing the safety behaviour of employees in the chrome industry.

Questionnaires and Interviews pertaining to the above constructs can be distributed or conducted to HFC employees. Research to be conducted during 2017.



J. Swanepoel
Joint Acting CEO
Hernic Ferrochrome



W. Reyneke
Joint Acting CEO
Hernic Ferrochrome

ANNEXURE B: QUESTIONNAIRE

Dear Participant

I would want to invite you to participate in a research study which is in partial fulfilment of the requirements for my Master's Degree in Business Administration at the North West University. The objective for this research is to examining the relationship between **safety behaviour** and **organisational factors in the workplace**. Please take note your participation in this study will be **voluntary** and participations will remain **anonymous**.

Approval was given by the Executive team of Hernic Ferrochrome to carry out this research at Hernic and the information which will be obtained from this data will be treated with strict confidentiality.

Please note that the confidentiality and anonymity will be ensured, and that the research will be conducted purely for academic purposes.

If you have any queries regarding this study, please contact me at andries.ebersohn@hernic.co.za or on 0823004407.

Thank you for taking part in this research.

Andries Ebersohn

Supervisor: Dr B le Roux

Make a cross on the information which apply to you. X			
Personal Information			
I am working at	1. Plant	2. Admin	3. Mining
The area I am working in (Department)	1.OB Plant	12.SSD	19.Morula
	2.Sinter Plant	13.Finance	20.Bokone
	3.Furnace	14.Procurement & Stores	10.Contractor
	4.CRP	15.Marketing	11.Other
	5.Services - Lab	16.Internal Audit	
	6.Services - Final Product	17.Information technology	
	7.Services - Raw material	18.Human resources	
	8.Service - Workshop	10.Contractor	
	9.S&B	11.Other	
	10.Contractor		
	11.Other		
21.Do not want to declare			
Category	1. Production		
	2. Engineering		

	3. Admin		
	4. Other		
Your Gender	1. Male	2. Female	
Your Educational Qualification	1. Degree	2. Post Matric qualification Diploma	
	3. Matric	4. Lower than matric	
Your Age group	1. < 20	2. 20-29.	3. 30-39.
	4. 40-49	5. 50-59	6. >60
Your Post Level	1. B1-B7	2. C Band	5. Other
	3. D Band	4. E band and up	6. Do not want to declare
Race	1. Black	2. Asian	3. Indian
	4. Coloured	5. White	6. Other
Years working for company	1. < 1 year	2. 5-9 years	3. 10-14 years
	4. 1-4 years	5. 15-20 years	6. > 20 years

Use the following scale to indicate your level of agreement or disagreement with each statement:

1 = Strongly disagree

2 = Disagree

3 = Agree

4 = Strongly agree

5 = Not applicable

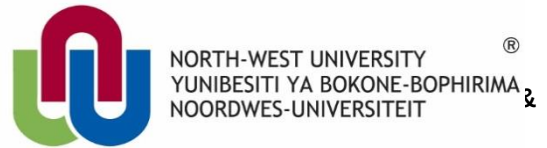
Make a cross in the box related to the statement given. X

		1 - Strongly disagree	2 - Disagree	3 - Agree	4 - Strongly agree	5 - Not applicable
1. Safety commitment						
1	Safety takes priority over production at our company.					
2	Our leaders/supervisors visibly demonstrates an interest in the safety and health of their employees.					
3	All the required PPEs like overalls, safety shoes, hard hats, goggles, gloves, etc. for my job are always available.					
4	The Safety inspections of my section are conducted at regular intervals.					
5	My shift or team are committed to safety at all times					
6	All incidents are investigated and corrective actions are put in place to prevent recurrence of similar incidents.					
7	I have the opportunity to raise safety issues and discuss specific problems regarding safety at any time.					
2. Safety compliance						
1	Safety Committee meetings are held every month in my department.					
2	All workplace incidents / accidents and near misses in my department are reported.					
3	I am happy with the housekeeping in my working area.					
4	I am comfortable with the work environment (noise, dust, heat and vibration) in my workplace.					
5	The permit-to-work and risk assessment system in my work area is followed correctly.					
6	My supervisor often observes my work practices and my working environment for the purpose of protecting my safety and health. (PTO's)					
7	Safe operating procedures (SOP) for using equipment / machines and doing my work safely are discussed with all concerned, reviewed and revised as necessary.					
8	Management is consistent with respect to disciplinary action against employees who did not followed the safety rules					
3. Safety communication						
1	The health and safety policy of my company is clearly understood by me.					
2	I have been informed about what to do in case of an emergency like fire and gas leakage etc. in my work area					
3	I understand the companies BBS (Behaviour Based Safety) drive.					
4	I always know what is expected of me regarding safe behaviour.					

		1 - Strongly disagree	2 - Disagree	3 - Agree	4 - Strongly agree	5 - Not applicable
5	The discussion on safety and health issues in our department is not only to please management but to solve our H&S problems					
6	I understand what the company want to achieve regarding Safety, health and environmental issues.					
7	All incidents that occurred in the company have been communicated to me					
4. Safety behaviour						
1	Safety and Health is a very high priority for me when I am performing my job responsibilities.					
2	I feel that observing both the safe / unsafe behaviours of individuals and giving them feedback will improve safety at work.					
3	If I saw another employee committing an unsafe practice, I would say something directly to him or her to stop the unsafe practice.					
4	I report every workplace injury or illness to my supervisor that I sustain, regardless of its severity.					
5	Staff / workers will freely speak up if they see something that may negatively affect health and safety at work.					
6	I always follow the safety rules.					
7	When no one is looking, I will still obey all the cardinal rules.					
8	There is a positive change in the behaviour of the workforce with respect to safety practices					
9	In my department / section, we discuss ways to prevent errors / mistakes from happening again. (Including incidents that occurred in other company's)					
5. Stress recognition						
1	I feel my department is able to adjust work assignments according to employee safety considerations.					
2	Sometimes, I work "under crisis / under pressure" when trying to do more work too quickly.					
3	During the past, I had been injured or felt unwell as a result of the Work related stresses.					
4	I am able to take scheduled rest breaks and still complete my assigned work in time.					
5	The job expectations or targets are reasonable or practicable at my workplace.					
6	As per my knowledge, time pressure has been a factor in an incident / accident or near miss in some cases.					
6. Cardinal rules survey						
1	The cardinal rules have a positive influence on my attitude towards safety.					
2	I do feel offended / uncomfortable by the breathalyser test.					
3	Hooking up at heights should be done without question.					
4	I understand the 5 meter rules regarding cardinal rules no. 6					
5	I obey the cardinal rules because the consequences of not obeying are too harsh.					
6	I obey the cardinal rules because they make sense to me.					

		1 - Strongly disagree	2 - Disagree	3 - Agree	4 - Strongly agree	5 - Not applicable
7	Since the introduction of the cardinal rules there has been a perceived positive influence on the workforce's behaviour towards safety.					
8	Isolate and test before any work on equipment can start, can save your life					
7. DMR (Department of Mineral Resources)						
1	I think the DMR contribute positively to the overall safety standard of the company					
2	I think the DMR cost the company money on less serious issues raised by them					
3	The DMR understands our business					
4	When an inspector ask me a question I will be calm and will answer his questions without delay.					
5	I will not be afraid to assist with any investigation requested by the DMR					
6	Employees' knowledge on the Mine health and safety act are poor.					
7	I know when an inspector is on site					
8	People are been hidden when the DMR are on site					
9	Incidents are been hidden from the DMR					
10	DMR inspectors misuse their status and power					
11	Section 54 and 55 do contribute to improve the safety at the company					
8. Safety rewards						
1	Rewards for safe behaviour are a good way to increase safety awareness levels.					
2	A safety incentive programme would force employees to work more safely.					
3	The company have an incentive programme that encourages incident reporting?					
4	I have nominated some of my co-workers or subordinates for safety awards.					
9. Safety Leadership						
1	My department's workforce understand their leadership's safety vision.					
2	The company's leadership is honest in their intensions regarding safety.					
3	The companies leadership is contributing towards the development of an improved Safety Culture					
4	Management shows a deep concern for the safety of its workforce.					
5	Supervisors are good listeners.					
6	Management always gets involved in safety issues					
7	Managers seem to understand what we and they should do regarding safety					
8	Safety is a high priority for our company					
9	Managers or supervisors mean what they say and do what they say in safety matters.					
10	I feel that my health and safety is important for the management team					
11	The behaviour of leadership towards safety is above standard.					

ANNEXURE C: ETHICAL CLEARANCE LETTER



10671749

EBERSOHN, AL MR

North-West University

Private Bag X6001, Potchefstroom

South Africa 2520

Prof CJ Botha

Tel: (018) 299 1672

Email: christoff.botha@nwu.ac.za

16 March 2017

ETHICAL CLEARANCE

This letter serves to confirm that the research project of **EBERSOHN, AL** has undergone ethical review. The proposal was presented at a Faculty Research Meeting and accepted. The Faculty Research Meeting assigned the project number **EMSPBS17/03/06-01/33**. This acceptance deems the proposed research as being of minimal risk, granted that all requirements of anonymity, confidentiality and informed consent are met. This letter should form part of your dissertation manuscript submitted for examination purposes.

Yours sincerely

A handwritten signature in black ink, appearing to read 'CJ Botha'.

Prof CJ Botha

Manager: Research - NWU Potchefstroom Business School

Original details: Wilma Pretorius(12090298) C:\Documents and Settings\Administrator\My Documents\Briewe MBA\2017\

ANNEXURE D: INTERVIEWS WITH MANAGEMENT

Interviewer: A.L. Ebersohn (AE)

Interviewed: Manager 1 (M1)

All semi structured question indicated in bold.

AE: Do you think zero harm is possible and how can the company achieve zero harm?

M1: That is probably one of the hardest questions to answer. I think zero harm is possible if we can get the employees up to a certain level of literacy. We have different races working together and they all have different cultures outside the workplace. We can try to foster a safety culture in the workplace which will not be in line with their living culture and environment outside the gates of the plant. What are they going home to at night and what do they see that I have never seen? To change their living conditions will be difficult. We are asking a certain behaviour at work that is in contrast / conflict with their culture and their environment at home. To put my perspective on the table: I have 74 employees in my section who cannot read or write.

We conduct a screening before appointing anyone to ensure we have the right person for the job. All mining houses need to stand together, including the government, and we need to solve basic education to resolve the issues going forward. Education makes a person more rounded and mature.

AE: One article referred to management commitment, supervisor commitment and co-worker commitment. If the team can show co-worker commitment the team members will look out for each other, overcoming the language barrier or written instruction barrier because some cannot read. We need to close the gaps between the different literate levels.

M1: We over-inspect everything, we put all the procedures in place but the actual doing of the task is still a problem. You can take a horse to water but you cannot make it drink. The employee must want to drink. Zero harm is possible but not now for our industry - it will take time to overcome the historical problem of poor education for certain race groups.

AE: So you are saying you need to address certain key aspects and education is one of them?

If we can solve that at school level the impact may be very positive on the plant safety in the long run.

AE: What do you think are the top three factors contributing to accidents, injuries, damage or loss?

M1: 1) Screening of potential employees needs to fit the criteria! Screening outcomes should require at least a grade 12 certificate and a driver's licence. Driving a R3mil worth vehicle we have the perception that the person knows the basic road rules, but they drive it without a public road licence.

2) Overload of information or training materials. Why do the employees have to fill in a risk assessment every day for driving the same vehicle? Completing prestart checklists and tele log sheets, PDS/VDS

acknowledgements, all the safety controls contribute to a system overload and the system is not user-friendly. The drivers are part of the system but they do not know how the system works.

3) Management of change. The mine is changing continuously - it is never the same therefore change should be monitored correctly. For example, the new break floor was implemented without inviting us to the MOC. The change already occurred but it was not properly communicated to everyone involved. Not aware of any MOC that was done. Communication was not properly conducted.

AE: How will you define a safety culture?

M1: Where the employees are at a mature level and everything is in its place. It will not be necessary to do over-inspection on everyone. Bonus systems should not be necessary. Everyone should work properly and effectively and safely. A way of living - I will look after you and you will look after me.

AE: What is driving the safety culture?

M1:

- Management and commitment
- Care
- This is how we do things here.
- Are we there yet, not this is how we do our procedures
- Unions are not assisting - they need to buy in
- People know we need to comply instead of them thinking we care they only think we comply
- Do not think we care but we do it for the DMR
- If not commitment, we can still comply

AE: Why will you act safe? What factors are driving the culture, why will we do the right thing every time? What is driving safety behaviour? Safe behaviour is not driven by compliance but commitment?

M1: Before I started the employees were forced to comply. I want you to comply because it is the right thing to do. You must comply because you want to comply. Take the checklist away

AE: What will come out of commitment is taking part of the process. Not only being at work.

M1: It all started with commitment.

AE: What do you think are the top three key drivers that will change the safety culture of the organisation?

M1: Transparency - everything must be above board, with better communication. True and honest care from managers. Doing VFL to check compliance, not showing we care it is a compliance thing. There is a change in the employees showing accountability and saying I made a mistake and be honest and fix it.



AE: What do you think are the top three key drivers that will change the safety behaviour of the employee?

AE: We said drivers for safety culture are transparency, communication, care value drive, show that you care not only comply, accountability. What must I drive to change behaviour of an employee?

M1: If they just take a moment to think before they do it. Driving a vehicle, thinking of where I want to be but not with what I am busy. Do not think of the kids who are in the yard I think of what I must still do instead of what I am busy with. If we can get them to stop and think. SLAM and SHEEP be more alert. We need to show them we care in a bigger, not only to comply.

AE: Why will they not look after themselves?

M1: The overload of stuff they need to think of is so intense and it gets cluttered. If the situation is not normal the normal practice will not work. The big one is still care and respect for themselves and their work.

AE: Can we classify this under Safety leadership?

M1: Yes, under the previous regime that managed out of fear - autocratically. I believe in an inclusive style for - example our slag loading went from 50 000 tons of slag to 80 000 tons but did not change anything, still using same machine. The only difference was to involve the operators - same level same treatment saying hallo to everyone, respecting them and they respecting me.

AE: How will you rate your department's safety behaviour and why?

M1: I lot of effort goes into it. I think good, above average, the effort and the behaviour are good, employees making me and the supervisors aware of a lot of things, the interaction is really good. Do not need to go out and do inspection - they call me if they want to make a suggestion, they will inform us. They will come to us, therefore their behaviour is good

AE: Do you think you will need to change the employees' safety behaviour before you will be able to change the culture of the organisation? Or do you think you will need to change the culture before you can change their behaviour?

M1: Behaviour needs to be changed before the culture is changed. This is a difficult one. If we set the culture or vision of the company this is the direction we want to take, everyone will jump on board. Then I think the culture should change first.

AE: Did the implementation of the cardinal rules influence anything on the safety behaviour of the employees?

M1: I do believe cardinal rules play a role - they set the rules. Is the consequence across the board the same for everyone if you transgress that cardinal rule? That I am not so sure off? I was told in an investigation that a person needs to be disciplined but do not always agree with it.

OB has a Marula belt no CV 12 get TLB to go and clean plant on shutdown without anyone noticing the plant was started without notifying the driver. The plant was started without notifying the driver. Rocks fell on the machine and broke the windscreen. I was called into an investigation and I was told to discipline the driver for working under a belt which was discharging. The employees asked what about the plant side which did not communicate again. I think cardinal rules do play a role - it is just how it is managed. How does it gets inforce? Lack of communication also played a role, poor lockout driver was supposed to lock out the conveyor but the driver does not work on plant equipment only – he operates his machine and then the plant operator must inform him. Cardinal rules did contribute to the company's overall safety performance.

AE: Are the management of the company committed to safety and why?

M1: Yes, I think there is a commitment. Monitoring outstanding action and doing VFLs. On site management is committed. Top management do ask a lot of questions to find out what went wrong and try and improve the process.

AE: OB plant not doing the basic paperwork. What are the rules of the game, who assists in ensuring the rules are followed? But can we then say management is committed?

M1: When managers make a commitment it needs to be something concrete. It should not be smoke and mirrors. If it is smoke and mirrors the employees will not buy in. They will say management does not care about the workers and are only worried about what the DMR inspector will find.

AE: Can we say that managers do not have enough experience to understand the role they play in safety commitment?

M1: I agree, I think a person at a certain level must have a holistic view and not everyone has this point of view. Do not make dust - do not screen waiting for the DMR inspector. Do we have management commitment if this is the case? Old school is reluctant to change. In a position to impress but easier ways to impress is making money. Do not have the full scope what is wrong and what is right. If the plant is running the rest is in place. CRP 7 months ago CRP really quite but how many things have regressed if we do an investigation now? CRP running like a clock - we think everything is right. This comes down to complacency.

AE: Is safety communication effective in the company and why?



M1: No – It is a bit of a rush - we used to have a safety communication on a monthly base which is not happening anymore. Why did it stop? I think how and who is doing the communication?

If we have a FVL the feedback is not given in the area therefore I need to give the feedback later to the employees. If I do not care, then the message will be different from the original message. If I ask my supervisors and production managers to communicate with the workers, I follow up the next day and ask the workers what was communicated and I sometimes find that the message was not communicated as my original message was. If I did not go back and checked they would have properly done it the wrong way, which could have resulted in an accident. Communication is a big problem and now I have 74 workers who cannot read and write.

AE: Will safety rewards change safety behaviour? If yes, is this sustainable? If yes, why?

M1: Yes, it will change their behaviour, but is it sustainable? No. You cannot give more and more. If I keep on doing my work correctly, what will you give me?

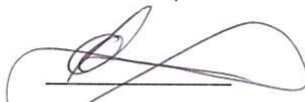
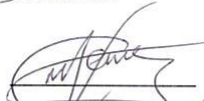
AE: Do I comply because I get something or do I comply because I am committed?

M1: We give people rewards to do their work properly.

AE: Are you happy with your current workforce's safety performance and your drive to zero harm?

M1: I am aware of some workers who are not on board and I need to interact with them. Overall I am happy. I want to know my people.

- Do you know your work?
- Are you committed to what you're doing
- Instil pride on what you are doing and for who you are working for.


Interviewer
Interviewee

Interviewer: A.L. Ebersohn (AE)

Interviewee: Manager 2 (M2)

All semi-structured questions indicated in bold

AE: Do you think zero harm is possible and how can your company achieve zero harm?

M2: In what context is the question asked - only for safety or all the components?

AE: The question is asked in the broad sense of all components of SHEQ (safety, health, environment and quality)

M2: To answer this question we need to define "Harm". Let's start with sustainable development, during the industrial revolution so much harm was done to the environment and to the health of the people. History has a few major incidents to prove this statement like the Chernobyl and Bopal incidents. Out of these incidents the concept of sustainable development was developed. There will always be a portion of destruction to make production possible but it should happen in such manner that future generations must be able to achieve the same production from the same environment and society. That said, I think Zero harm is possible.

I do not think the definition will be literally zero harm because if that is the definition then no, it is not possible to produce anything without having any impact on the environment or society. But within the framework of sustainable development I do think zero harm is possible.

AE: What do you think is the DMR definition of zero harm?

M2: The concept, Sustainable Development, was born out of the Brundtland commission in 1987 followed by the Rio convention and representatives from South Africa took part in drafting these plans. When the Constitution of SA was written the sustainable development principles was included into our constitution. If you take that into consideration all our safety and environmental laws should be based on those principles. Out of my experience this is not how people understand this concept at all. In government you will also find both ways of thinking. My viewpoint of zero harm is based on the sustainable development principles. That being said, people cannot lose their lives and people cannot have permanent injuries, but I do not think it is possible to operate this kind of plant without a single first aid incident. Some companies claim to operate without any injuries for quite a long time. But my perception on that is there is something wrong because it is not possible; they most likely have a reporting issue for minor injuries. This is when you suddenly just have a fatal incident. You cannot have no injuries and then suddenly a fatal but if you have a lot of LTI's you can expect a fatality.

AE: Looking at some feedback and information in the industry it seems if we have people factors, working environment factors and then a system factors. These are the three factors I have come across



in my study. Do you agree these are the three things that make up the package that needs to be managed out of a safety concept?

M2: When I look at the question; "What are the three top factors contributing to injuries?", then I would agree with the three items you have mentioned. In my experience, incidents are caused by unsafe behaviour, unsafe conditions and risks not being identified (indicating system faults).

AE: What do you think are the top three factors contributing to accidents, injuries, damage or loss? But more specifically on the people behaviour factor.

M2: In my experience I have identified two types of behaviour that cause injuries and we have developed two characters to relate these type of behaviours to; you have your Newbie and you have Zombie behaviour. Usually it is either the new or naïve person (Newby), who is not very well experienced or well-trained that gets injured. These employees usually, unknowingly, get themselves into trouble by doing the wrong thing. The other type of employee that gets injured, is the experienced person who has been working for the company for a long time (Zombie); they are well experienced and well-trained but they deliberately take chances, normally because they want to push production. For instance, they would bypass a safety device on a conveyor belt or toggle an interlock to make production target. This type of person will then get injured because they deliberately take chances.

The third character that we have developed is the model employee (who we call Harris), and they do not get injured unless there is an unsafe or upset condition. To cover the Newbies and the Zombies you need a lot of controls in place to ensure they do not get injured. But the important focus will be to change their mind-sets.

Systematic solutions all start with a baseline risk assessment which is used to develop SOP's (Safe Operating Procedures) which people are train on, followed by monitoring programmes. These programmes include inspections, BBS (Behaviour Based Safety), PTO's (Planned Task Observations); all information should be recorded and trended so that you can react on the information you are receiving; and the process must be a close loop, starting over and over.

AE: Do you agree for your process as described you need teamwork, communication, training?

M2: How will you encourage Newbie not to get injured?

Need to train him need to PTO him. To get this right you need to focus on your Supervisors to ensure they do it correctly. We know we struggle with discipline in our supervisory level as well but our supervisors do not always know how to talk to their teams; they also need communication skills or training. We need to get the right people to do the correct PTO on the Newbies. And then you need to monitor the person by doing inspections, using the BBS program and take action to correct the



Newbie behaviour if possible. You can also ask the Newbie employees to wear something to identify them, like a light blue hard hat, and you can give him a buddy for his first six months on the job. Then everyone sees the new person and they understand they need to look after this person as well.

How do you get your Zombies not to get injured?

Training is in place but for the Zombie you need to get involved in the beginning. They will be the person you need to pull in when you conduct or review your baseline risk assessment because they are the people who knows what the gaps are because they are likely taking them.

AE: So you agree this is participation.

M2: Yes, you need to get the Zombie employees to help you improve your system. If you can make the lives of the Zombies easier, like asking the question "what is the thing that you bypass anyway every time?" and you remove this issue for them, then you will change the behaviour of the Zombie back to a Harris by getting their cooperation. Discipline is also critical for a Zombie; he must know the carrot is smaller than the stick.

AE: Can we connect discipline with leadership?

M2: Yes

How will you define a safety culture?

M2: If you look at a comic strip and you take into consideration everything that you see in front of you, and at the end you get a total picture of this story; that is how I will define a culture. You will not be able to determine the culture of an operation if you are an outsider. You will only understand the culture of an operation by looking at all the information you can receive and by using it to inform an overall feeling of the organisation. To get this done, you need a system that can consolidate all your data and provide you with trends. I call it a feeling because it is quite a lot of information and it's not always possible to put your finger on exactly what informs your gut feel. Currently our culture feels like we are on the wrong track, it feels unsafe. Maybe my description is a bit abstract but I do not have another way of explaining it.

AE: The simple definition can be that this is not necessary how we work here, but how do we want to work here. If the data does not correspond to the 'this is how we want to do things here', then I can understand this is that uncomfortable feeling you are describing because it's not according to the plan. We know the plan for safety then we have a lot of measuring points which monitor this plan and the results we are getting from this is our culture; and the word that can be used for this current result in time is the safety climate.

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M2: Therefore, a safety climate is the current information I have which describe the culture as we stand now. The culture is, what the collective behaviour of all employees is; what behaviour is acceptable for them. The climate will be the outcome of that behaviour.

AE: It is possible to have sub-cultures in the same organisation? Also in our company?

M2: I agree this is possible but not if you have a very strong top leadership then you will not see these sub-cultures. I think our problem is that our organisational structure allows it. I think a culture takes three years to develop. I think these sub-cultures are a risk for the organisation.

AE: What do you think are the top three key drivers that will change the safety culture of the organisation?

M2: I think leadership, systems and communication

AE: Do you think commitment is an important factor on the leader side and the employee side.

We need a leader with a vision and a plan. Will we get the safety performance sorted out if we have this leader, or do we need commitment at all levels in the organisation?

M2: If you understand what drives people, what is important to them; and you can implement this in your organisation; therefore, if your values are the same as their values - then commitment will follow. You will not get commitment by only having a strong leader. Do not show me how much you know; show me how much you care. Find out what is important for them; it can be honesty or being purpose driven or outcome driven; maybe their leave days are very important to them, some people are very family orientated. A good leader should identify between what is important for my people. How does an orchestra play in harmony? The conductor stands in front and controls every person playing in the orchestra by making sure they all have "shining eyes". The team members must want to be there. If the player's eyes are not shining, if it is not nice for them to be in the team; then the leader must work on that member and find out what is wrong. The workplace is the same as an orchestra. I know a previous manager I worked for which will take a day in his week and only spend it on the floor talking to the people. He makes time to understand his people.

AE: What do you think are the top three key drivers that will change the safety behaviour of the employee? The pervious question was based on the safety culture will this be the same answer for safety behaviour?

AE: Lets summaries the previous discussion – The leader need to give a shared vision or values to the team. The leader set these values and we need to have proper communication as a method to inform the people of the vision. The commitment of the employee will only take place if they agree or can associate himself with these values.



M2: It is important that the values of the leader also represent the values of the organisation.

AE: The leaders must "care" by knowing their people. "Shiny eyes". With this in mind, do you think driving culture and behaviour you will have the same drivers or factors to control?

M2: I think behaviour is a driver for culture. If you do not want to change the culture, if you just want to leave everything to happen by itself, then the behaviour will create the culture.

If you specifically only focus on behaviour you need to understand what the issues are for the people. And every department will have its own issues, you need to understand what you want to change. And it can be different from department to department. You also have this different cultural groups in the workforce therefore different issues are raised and you need to understand that issues. The solution will be different from department to department.

AE: How will you rate your department's safety behaviour and why?

M2: In relation with the industry or zero harm? Let's use zero harm in 2015 - it was very poor because the system was disorganised. We then focused to get the system organised but this resulted in a lot of changes which also resulted in some disorganisation. This led to people getting frustrated with the systems. Currently we have a cumbersome system and some people are frustrated. Some departments are using the system and others are not. We have different pockets of people in our organisation. We have some rebels who know what to do but they don't want to do it. Our systems must comply with a lot of variables that include regulations, the mine, the plant and Mitsubishi to name a few. If we need to keep everyone happy, it will not be possible. We need to get the discipline right to get everyone aligned in using the system; no questions asked. Let's take an example of a specific foreman that has not been following the system and has to start using it now. This will require strong leadership in that section. Especially if the department struggles to perform; then it makes it even more difficult for them to change their ways. We will only get these sections to become a part of the team if we solve their day to day issues, before they will change the way in which they do things to be in line with the safety system.

AE: Do you think you will need to change the employee's safety behaviour before you will be able to change the culture of the organisation. Or do you think you will need to change the culture before you can change their behaviour?

M2: Safe behaviour must change to change safety culture. But if you have a new employee then the culture will influence his behaviour.



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M2: Safe behaviour must change to change safety culture. But if you have a new employee then the culture will influence his behaviour.



AE: Did the implementation of the Cardinal rules influence anything on the safety behaviour of the employees?

M2: It is possible only if the cardinal rules align with the organisation's values. And only if the leaders enforce the cardinal rules.

Cardinal rules can result in compliance but it will not be sustainable in itself. It must be driven from commitment to the organisational values and therefore we will comply to the rules.

AE: Are the management of the company committed to safety and why?

M2: Yes, they are committed and some live it daily. If you put all team members of management in a line, there are some of the members who are not completely committed because they are concerned about the implications it can have on production.

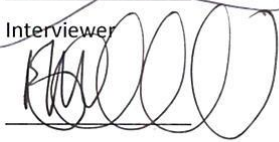
AE: Is safety communication effective in the company and why?

M2: I will always say that it can improve. But you cannot make any changes or improvements without proper communication.

AE: Will safety rewards change safety behaviour? If yes, is this sustainable? If yes, why?

M2: In the beginning yes but it is not sustainable. In my experience, it works in the beginning and then it stops. You cannot please everyone with a reward; there will always be someone who will not be happy.


Interviewer


Interviewee

Interviewer: A.L. Ebersohn (AE)

Interviewee: Manager 3 (M3)

All semi-structured questions indicated in bold.

AE: Do you think zero harm is possible and how can your company achieve zero harm?

M3: My first take on this is what the definition of zero harm is? What do we mean by zero harm? What is the relation to our industry? Do we mean that no scratch or major incidents or fatalities can be seen as zero harm?

AE: What do you think zero harm is from the regulator's point of view.

M3: From the regulator's point of view I think it is to eliminate all incidents. In my view, in our industry and looking at the geographical layout especially in the mine. Looking at the working arrangement in and around a mine total zero harm is not realistic but is something we can work towards.

AE: Let's summarise what you are saying - to avoid permanent harm something that one will not be able to repair or replace is possible. But incidents like a scratches or cuts or brushes will happen due to the working environment we are working in.

M3: Agree

AE: What do you think are the top three factors contributing to accidents, injuries, damage or loss? But more specifically on the people behavioural factor.

M3: It is inconsistent application of rules and procedures, because sometime we are selective. If we accept something today which is not correct it becomes the standard for tomorrow. If you are reprimanding me for not stopping at the stop sign and tomorrow, you treat the stop street as a yield sign you are inconsistent in the application of the rules and then a stop sign will become a yield sign. I think inconsistent application of standards and inconsistent leadership contribute to accidents and injuries. Leadership struggles to enforce compliance but we are very quick to make changes to create comfort. Compliance cannot be based on comfort because if tomorrow I am injured and out of panic changes are made instead of asking why the original rules were not followed or enforced. We need to differentiate between something which is not working and something that is not enforced.

AE: Therefore, there is a rule but we change the rule because we are not following that rule basically just making another rule. Instead of just following the rules in the first place.

M3: We are trying to create comfort to please people. I have seen people designing around comfort instead of compliance.

AE: In the industry they say there are three components which contribute to injuries, people, work environment and systems. In the 1980's the industry focused on the working environment and



equipment ensuring that the environment was safe and the equipment was safe. After this step everyone focused on safety systems to measure and trend information and to act on negative trends and trying to be proactive. But the question remained: how can we change the behaviour of the employee to be safe? The picture you are presenting is that basically, if we have an inconsistent leadership style, we can expect red lights. If we stick to the right leadership style we can positively change the safety behaviour of our employees.

AE: How will you define a safety culture?

M2: It is a lifestyle and it's a way of doing things, it is not a once-off thing. It is not something we enforce to get compliance out of convenience. It is the way we live. Compliance should be part of our DNA

AE: Where do you think compliance starts?

M3: From leadership. Let me give you an example. Have a look at pay day - even our managers are in a hurry to knock off. If I knock off at 11 what will the operator do who is watching you? People are like children - they do not do what is said to them but what they see - that is what they will do.

AE: Are you saying the way you are operating sets the standard for your employees?

M3: Yes, as leadership we need to be fair and flexible. Rules are there due to history - we cannot ignore them because they were created out of pain and blood. Rules are there for a reason and with consistent application and enforcement they become a way of life.

AE: What do you think are the top three key drivers that will change the safety culture of the organisation?

M2: I think it's consistent leadership, and consistent applications of rules and standards. We as leaders not only need to walk the talk, but in our communication we need to give people room to lead upwards as well and to listen when they do respond. Make the situation conducive to leading upwards. Make it interactive so that we all can understand each other's world because sometimes as an operator and a manager we need to align ourselves. If I do not give myself the opportunity to see things the way an operator sees it I will never understand his rules and will always come with irrelevant rules or procedures. If you give the operator some room to give input or suggestions, it is not me telling you what to do but it is us deciding what to do to achieve what we want to achieve.

M3: We were doing a VFL at the lab and the people were complaining about the shift patterns. The supervisor said we had tried everything. I told the supervisor to listen to the people - they said the reason for being off-sick is fatigue - just give them a platform to voice themselves. But you need to understand them and they must understand your point as well.



I will have to stay in his office until we come to agreement therefore if I tell my people what to do I will say I want you do to the following and not the CEO.

AE: Do you think you will need to change the employees' safety behaviour before you will be able to change the culture of the organisation? Or do you think you will need to change the culture before you can change their behaviour?

M3: We did cover this question - we need to start with the culture to change the behaviour.

AE: Did the implementation of the Cardinal rules influence anything on the safety behaviour of the employees?

M3: Rules cardinal rules do create awareness which is a good thing but because we inconsistently applying them we do not get the benefit. I drive my bakkie to the mine but I do not put stop blocks - tomorrow I want to take on somebody for not putting stop blocks but I am not doing it. Safety culture is a way of life, not looking at who is checking me. The impact of complying or not complying with cardinal rules are the same.

AE: how do you think we need to address these issues?

M3: I do think we are not honest with ourselves. Ackerman said he wanted to be on the shop floor level to get the actual truth, not the boardroom truth. We need to have that actual truth discussion and act on that. We need to have this discussion with maturity.

AE: Will the people really discuss the actual truth or will they only give us the boardroom truth for our company?

M3: People will say what they think you want to hear. Maybe they are afraid. I worked for a person who became my mentor. He said do not criticize your boss in public - you can always do it in private.

AE: Is the management of the company committed to safety and why?

M3: Yes, I strongly believe so. Our VFL is a good example. Looking at improvement. Stop and Fix system, Section 23 books, the bulldog's inspection. But the bulldog inspection was not properly communicated so people think it is someone looking for problems and not seeking someone to come and help.

AE: Is safety communication effective in the company and why?

M2: Yes, all incidents are reported, WhatsApp groups, but we do not have a close-up asking what was communicated. There is no hidden communication but there is always room to improve it. We can for example have a TV screen in the lamp room for everyone who passes the area and then have



AE: Can this be poor communication?

M3: Yes, it can.

AE: What do you think are the top three key drivers that will change the safety behaviour of the employee? The previous question was based on the safety culture. Will this be the same answer for safety behaviour?

M3: I think it is a marriage we cannot separate them as two different packages.

AE: Which one is first, culture or behaviour?

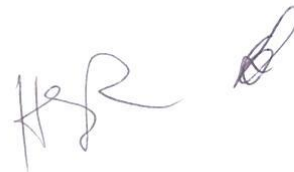
M3: I honestly think it is the culture. If you fix the culture the behaviour will change.

AE: And any other drivers for safety behaviour? How do we rate commitment?

M3: The commitment is there but sometimes it is not aligned with the effort. I have tried this when I was a shift supervisor. All of us has a family photo in our office. Why do we have their photos? Because it gives you inspiration and meaning. I said to my team that in our green area I would like to see a photo of everyone's family. Because when we get there or leave this will inspire me and give me a reason to carry on. Some did it but some did not. But I think the other driver to safety can be shock treatment if I want to have a discussion on Aids and HIV prevention then we need to give them the real pictures, the scare photos, not only a story but a visual. At my previous work we were busy creating an underground training centre and we had an electrical panel one on standard and one sub-standard so that when an accident happened we showed them the difference and this is the result. We simulate a fall of ground with a person losing his leg. Someone died showing how their family must cope without him. The workforce sometime think that they do the manager a favour. It is bigger than me or the company - the company will say even when you lose a leg the mine will continue but will your life be the same? Shock and reality sometimes also make people aware that it is about me and is not for the company or the manager.

AE: How will you rate your department's safety behaviour and why?

M3: At the mine it is difficult. Employees are unionizing safety but it is not a bargaining tool. A person will report the supervisor to the union because the supervisor is trying to enforce compliance. And then they try to create a situation that the supervisor is ill-treating the employee. Knowledge and understanding play a role. The education level does play a role. A safe person sits under a rock if they know the rock can fall and it can injure me – so why will I sit under the rock? The supervisor will say the manager said we must do it, taking no responsibility and there is no ownership. And ownership is driven by leadership. IF I leave the CEO's office I am in agreement on what we must do if I do not agree

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messages displayed. Most of the employees are more comfortable speaking with the unions and not to managers.

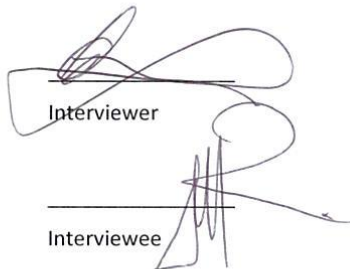
AE: Will safety rewards change safety behaviour? If yes is this sustainable? If yes, why?

M3: I do not think so - it will only influence the person in real need of money. Life is a greater gift than money and should be a bigger motivation.

AE: Therefore, we need leadership, effort, ownership, consistent application of rules, commitment from management all will influence safe behaviour but rewards most properly not.

M3: At Impala they did creative solutions if someone came with a good idea they would investigate it and then you will share in the saving. If people can be applying their minds without thinking "I am doing someone a favour". Then will we have creativity to get to a solution. We need to get the union on board - it is like the ZCC persons who believe what they have in one man, nothing else and you cannot change their minds. It's like the union - they have influence over people and if they can take safety as part of their responsibility if someone gets injured they will look at where management failed. The need will be there and make it your own, and so should the safety officer do as well. If I complain to the union about my supervisor due to safety issues the union should stop that person and just say this is a safety issue and you must comply, no questions asked.

I really think the unions have a very big role to play.



Interviewer

Interviewee

Interviewer: A.L. Ebersohn (AE)

Interviewed: Manager 4 (M2)

All semi-structured questions are indicated in bold.

AE: Do you think zero harm is possible and how can your company achieve zero harm?

M4: I do not think it is 100% possible it will depend on the people and the systems that are in place. The balance between safety and production is also important - we can have 100% safety performance and 0% production. A person can still bump his foot against something. It all depends on the people and people are not robots. You can have all the systems in place but you need to determine where to draw the line how far do you drive it. It almost feels like of you want to obtain zero harm you need to monitor everyone.

AE: The other viewpoint is what is the definition of zero harm? And the focus should be to stop permanent harm. What do you think is the definition for zero harm to the DMR?

M4: I do not think that the DMR definition for zero harm involves all incidents because they only investigate lost time injuries. If it was everything then they will most likely come to site for every incident.

AE: What do you think are the top three factors contributing to accidents, injuries, damage or loss? But more specific on the people behaviour factor.

M4: Number one is absolutely complacency, I do not think anyone come to work and decide today I am going to injure myself. I will say a person was doing his work and he lost focus. The second think I will say comes back to the saying a person will not do what right or wrong is but what the easiest is to do. Let's look at equipment and policies. If it was easy to climb a ladder, then you will climb the ladder but now you need a safety harness. Now you do not have a harness the harness is lying in the store. Now you decide it is just quickly up and down and you climb the ladder. But if there was a cage with a safety harness inside it will make it easier for everyone to comply with the policy. The third thing I will say is attitude / respect. A happy worker is a safe worker. If the worker is not happy then his attitude will not be right and this worker will get injured easier compared to a happy worker. A negative person compared to a positive person.

AE: How will you define a safety culture?

M4: The behaviour and attitude of the people complying with the current system.

AE: Can I summarize behaviour and attitude as safety commitment?

M4: Yes you can.

AE: Will you agree if you have safety commitment, you will have compliance?

M4: For sure, but then you need real commitment – it should not be lip service.

AE: You can also have compliance based on the DMR and cardinal rules enforcing it.



M4: I call this commitment by force. Not commitment out of free will. Commitment by force will only result in the employee doing the minimum to comply.

AE: What do you think are the top three key drivers that will change the safety culture of the organisation?

M4: Coaching is important to change the culture. We are not here for safety but to manage the shareholders interest but safety is part of that package. To change this, you need rigid systems and the consequent enforcement of discipline. In other parts of the world, more specifically in Europe, the plant has cameras monitoring everything on site and they control the worker's efficiency and safety on the cameras. Before the surveillance camera the company had quite a lot of damage to their vehicles but after the camera installation it all stopped. Yes, it cost a lot of money to install and someone to managed the cameras but the payback was very big.

AE: Can we say coaching falls under leadership and where do we fit in communication in this package?

M4: Yes, we can say it falls under leadership. It all comes back to planning, organisation, leading and controlling. Nobody can work without communication. Communication is one of the biggest legs keeping everything together if it is safety or production or finance or anything it is the key ingredient keeping everything together.

AE: What do you think are the top three key drivers that will change the safety behaviour of the employee? The pervious question was based on the safety culture will this be the same answer for safety behaviour?

M4: Is this not the same drivers as already discussed. The behaviour creates the culture. It all depends on the maturity phase of the company. If the company is older the culture drives the behaviour. But in a new company there is not really a culture then the behaviour will form the culture.

AE: How will you rate your departments safety behaviour and why?

M4: We are under world standards and the industry standard is three and we have achieved around one therefore we are performing quite well compared to the rest of the word. The old story is if you do not measure it you cannot control it. Therefore, for our measurement we are doing well.

AE: Do you think you will need to change the employee's safety behaviour before you will be able to change the culture of the organisation? Or do you think you will need to change the culture before you can change their behaviour?

M4: I think we have already answered this one.

AE: I agree

AE: Did the implementation of the Cardinal rules influence anything on the safety behaviour of the employees?

M4: You need to have a system; safety should be a way of life - it's like brushing teeth. You just do it because it makes sense. But I do not think cardinal rules will make a difference. But if you have nothing or no system driving safety then it makes sense to have cardinal rules and drive them to improve your workers' knowledge.



AE: Are the management of the company committed to safety and why?

M2: Yes, I think so but it is also possible that it can be forced commitment. A good example is the PDS system - if we were not forced to install the PDS or VDS then nobody will install them.

AE: Is this not the problem that we have too many systems?

M4: This is true we can be safe with less systems. Australia is called the nanny country. You do not have to think they have already thought of everything indicating with signs do not enter here do not put your fingers in here and they will install guards to prevent you from entering. You cannot get injured and you just need to stop thinking. It is overwhelming. It like the PDS - the situation is worse for nobody is thinking now relying on the PDS instead of ensuring you think what can go wrong and what control do I have to implement. If your system has a gap it will result in an injury because nobody is thinking anymore.

AE: Is safety communication effective in the company and why?

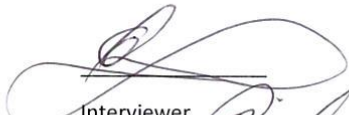
M2: The question I would like to ask is does everyone know the rules? I do think so. I think the communication is good and all the ways communication take place. Communication is a circle and it needs to be completed to ensure that effective communications take place. I am not convinced that that we close the loop. Communication can always improve.

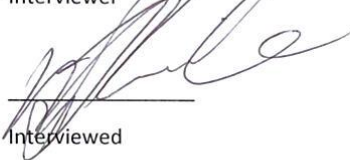
AE: Will safety rewards change safety behaviour? If yes is this sustainable? If yes, why?

M2: Rewards drive behaviour especially if it is a financial reward but it is difficult to do a fair allocation of the rewards for everyone does not share the same risks but they get the same reward.

AE: Leadership, communication, commitment, compliance, rewards - which is the important one to drive safety behaviour?

M4: If leadership is not effective the rest will not fall into place. Leadership is the starting point to address safety behaviour.


Interviewer


Interviewed