



**BINDURA UNIVERISTY OF SCIENCE EDUCATION**



**DEPARTMENT OF ENVIRONMENTAL SCIENCE**

***Challenges in re-establishing a safety culture after a period of mine  
closure: Shamva mine, Zimbabwe***

**BY**

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## **DISCLOSURE**

This dissertation presents original research conducted by the author. I acknowledge insights from industry stakeholders and their input, through interviews and surveys but the research design, analysis, conclusions and recommendation remain the author's work

## **ABSTRACT**

The re-establishment of a robust safety culture within a mining operation presents unique and significant challenges, particularly after a prolonged period of closure. This dissertation investigates the multifaceted difficulties encountered by Shamva Mine during its efforts to revitalize its safety culture following a period of closure. Preliminary findings indicate that challenges include: the erosion of safety knowledge and practices among returning and newly hired personnel; the ingrained perception of safety as a secondary concern due to production pressures; the loss of experienced safety leadership and mentorship; the psychological impact of job insecurity on safety compliance; and the difficulty in fostering trust and communication between management and the workforce regarding safety initiatives. Furthermore, the study explores the practical implications of resource constraints and the legacy of past safety performance on current efforts. This research aims to provide an understanding of these challenges, offering actionable recommendations for mining companies globally on best practices for effectively re-establishing and sustaining a strong safety culture in a post-closure environment, thereby contributing to enhanced worker well-being and operational efficiency.

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## **CHAPTER 1: INTRODUCTION**

### **1.1 Background of the study**

Safety culture remains a vital focus in mining due to the sector's inherently high-risk operations. Owoeye-Lawal (2021) noted that mining records one of the highest global fatal injury rates, emphasizing the need for a strong safety culture. Tear et al. (2018) defined safety culture as the shared values, attitudes, competencies, and behaviors that shape an organization's commitment to safety. Developing such a culture not only supports regulatory compliance but also promotes workforce well-being and operational success. According to Kaczmarek et al. (2022), safety culture is increasingly seen as a competitive advantage, shaped by organizational systems and shared management values. Thus, fostering a robust safety culture is essential for sustainability in mining operations.

Recent studies have produced various models and theories to understand and improve safety culture in mining. Despite these advances, more research is needed to examine how organisational systems and human capital affect long-term safety culture. Tetzlaff (2020) highlighted key elements such as attitudes, competence, and norms as critical to occupational safety. However, existing frameworks often lack the breadth needed to fully address safety challenges in mining. This calls for more comprehensive approaches to enhance and sustain safety culture in varied operational contexts.

Rebuilding safety culture after mine closures poses specific challenges that are not yet fully addressed in current literature. Periods of closure can erode safety norms, institutional memory, and workforce cohesion, increasing risks upon reopening (Tear et al., 2018; Owoeye-Lawal., 2021; Kaczmarek et al., 2022). The role of leadership, continuous training, and employee engagement in restoring safety standards have been stressed (Tear et al., 2018; Owoeye-Lawal., 2021; Kaczmarek et al., 2022). Shifts in workforce composition and operational complacency further complicate the process. Therefore, this study seeks to develop a practical framework for re-establishing safety culture at Shamva

mine in Zimbabwe, contributing to a deeper understanding of safety dynamics post- closure in the mining sector.

## **1.2 Problem statement**

Between 2019 and 2024, Shamva mine experienced a decline in safety culture, resulting in four fatal accidents and a rise in lost-time injuries to an average of four annually, compared to just one during safer operational periods. Solmaz (2019) emphasised that a strong safety culture is essential for reducing occupational risks and enhancing workplace safety. This study examines the processes employed to rebuild safety culture at Shamva mine after its reopening, addressing a critical gap in post-closure safety management. have studied Safety culture has been studied in active mines (e.g., Griffin and Curcuruto, 2016; Nævestad et al., 2018). However, little research exists on restoring it after closures. The lack of systematic frameworks for post-closure safety culture re-establishment is a significant limitation. Musingwini (2016) points out that Zimbabwean mines face resource shortages and regulatory gaps, compounding these challenges. This study provides evidence-based insights into the factors behind Shamva mine's safety culture decline and the hurdles in restoring it. It also proposes a practical framework to guide similar efforts in comparable contexts.

## **1.3 Aim and Objectives**

### **1.3.1 Aim**

To determine challenges faced by Shamva mine in re-establishing a safety culture after re-opening, following ceasing mining activities.

### **1.3.2 Objectives**

- i. To establish the safety performance of the mine two years (2017 and 2018) prior to closure.
- ii. To determine safety practices of employees when mining operations resumed after a year of mine closure.
- iii. To determine challenges that were faced in re-establishing a safety

culture at Shamva mine.

- iv. To develop a framework for re-establishing a safety culture upon resuming operations after mine closure.

#### **1.4 Significance of the study**

The study offers valuable insights for regulatory authorities and policymakers by identifying safety challenges and proposing context-specific strategies for post-closure mining operations. These findings can inform the development of more robust, practical safety regulations and targeted policies, enhancing compliance, reducing accidents, and promoting sustainable mining practices. For local communities, the research highlights the mine's commitment to safety, fostering trust, reducing risk exposure, and encouraging collaborative engagement between the mine and surrounding populations. The case study contributes to industry-wide learning, offering practical strategies and promoting the development of standardized protocols for similar contexts. Academically, the findings enrich the literature on safety culture in post-closure mining scenarios and open new avenues for research in occupational safety, organizational behavior, and mining sector governance, thus bridging theory and practice.

#### **1.5 Study questions**

- i. What was the safety performance of Shamva Mine in 2017 and 2018 prior to its closure?
- ii. What are the safety attitudes and practices of employees when mining operations resumed after a year of closure?
- iii. What challenges were faced in re-establishing a safety culture at Shamva Mine after its reopening?
- iv. What framework can be developed for re-establishing a safety culture upon resuming mining operations after a brief closure?

#### **1.6 Assumptions**

- All sampled employees will participate in the survey.

- Employee perceptions towards safety culture vary based on their experiences.
- Research instruments would be reliable to measure safety culture.

### **1.7 Limitations**

- Potential for limited or insufficient historic data.
- Subjectivity and bias in self-reported data.
- Attitude and practice toward safety may be influenced by personal experiences.
- Generalisability of findings to other areas.
- Establishing cause-effect relationships.

### **1.8 Delimitations**

- Current employees of Shamva mine, once employed there before mine closure.
- Study time 2 years before mine closure and current resumption of mining operations.
- Employee attitude and practice toward safety culture.

## **CHAPTER 2: REVIEW OF LITERATURE**

### **2. Review of literature**

#### **2.1 Introduction**

Chapter 2 provides a comprehensive literature review on safety culture, covering key themes such as conceptualizing safety culture across industries, the establishment and benefits of safety culture, mining safety culture knowledge and practice, procedures for implementation, challenges faced in establishing a safety culture, re-establishing safety culture after mine closures, and the development of a framework for safety culture.

#### **2.2 The importance of safety culture in the mining industry**

The mining industry inherently involves significant risks, making a robust safety culture paramount. It goes beyond mere compliance with regulations, but fostering a shared commitment among all employees to prioritize safety in every task and decision. An effective safety culture not only protects lives but also contributes significantly to operational efficiency and business sustainability. It transforms safety from a set of rules into a core value, leading to a demonstrable reduction in incidents, injuries, and fatalities. Facets of a strong safety culture involve open communication about hazards, proactive risk assessment.

and continuous training, ensuring that everyone, from the newest recruit to the most experienced manager, understands their role in preventing accidents and promoting a healthy work environment.

Mining companies with strong safety records often experience lower insurance premiums, reduced downtime due to accidents, and a better reputation within the industry and the wider community. Investing in a comprehensive safety culture is therefore a strategic investment aimed at yielding returns in terms of human well-being, financial performance, and long-term viability for mining operations.

#### **2.3 Knowledge of mining safety culture**

The concept of safety culture in the mining sector has been extensively examined in recent literature, highlighting its critical role in reducing workplace incidents and enhancing operational efficiency. Kines et al. (2020) emphasize that organizations with a robust safety culture report significantly fewer accidents, which correlates with an increase in overall productivity. Alruqi et al. (2021) discuss the importance of effective communication and

continuous training as essential components for disseminating safety knowledge among employees, thereby ensuring that safety protocols are well understood and consistently implemented. Zohar (2020) further notes that leadership commitment is vital in shaping safety culture, as leaders who prioritize safety, create environments conducive to open dialogue and adherence to safety practices. Research by Jameel (2024) supports this by indicating that visible leadership commitment fosters a culture of accountability and encourages employees to engage proactively with safety initiatives.

## **2.4 Procedures in establishing a safety culture in the mining sector**

Literature on the procedures for establishing a safety culture in the mining sector emphasizes systematic approaches that embed safety into organizational frameworks. Conducting comprehensive safety audits is frequently cited as a crucial first step to assessing existing practices and identify areas for improvement (Bahn, 2021). This audit should involve employee feedback to ensure a holistic evaluation of safety practices. Following this assessment, organizations are advised to develop tailored training programs that address specific safety concerns relevant to the mining context (Khan et al., 2023). Arshad et al. (2022) highlight that fostering transparent communication is essential for building trust and encouraging employees to report unsafe conditions without fear of repercussions.

Effective communication is thus recognized as a critical procedural element in establishing a safety culture. Ismail (2024) points out that open dialogue is vital for identifying potential hazards and proactively addressing them. Furthermore, Zohar and Luria (2020) assert that leadership commitment is a foundational component of this process; leaders must model safe behaviors and advocate for safety consistently throughout the organization. By systematically implementing these procedures and fostering a culture of continuous improvement, mining companies can create a sustainable safety culture that thrives despite the inherent challenges of the industry. This comprehensive approach is essential for mitigating risks and enhancing safety performance across organizational operations.

## **2.5 Challenges in establishing a safety culture in the mining sector**

Despite the recognized importance of safety culture, several challenges hinder its establishment within the mining sector. One significant barrier is employee resistance to change, often arising from entrenched practices and beliefs that do not prioritize safety (Bahn, 2021). Research by McGowan et al. (2020) indicates that deeply ingrained attitudes toward risk can obstruct the acceptance of new safety protocols. Kines et al. (2020) emphasize that fostering a culture of open communication about safety issues can help overcome resistance and promote a proactive approach to safety practices. Hu et al. (2022) note that many mining companies encounter budget limitations that restrict their capacity to invest in comprehensive safety training and infrastructure improvements. This lack of resources can lead to a fragmented approach to safety, where initiatives are sporadic and lack sustained support. Zohar (2020) further argues that without adequate financial and organizational commitment, even well-designed safety programs may fail to yield the desired outcomes. To address these challenges, literature advocates for prioritizing safety in strategic planning and ensuring the allocation of appropriate. Table 1 below summaries findings from research conducted at mines in developing countries

**Table 1 Studies on Challenges on Safety Culture from mines in developing countries**

| Country (mine)                                               | Description of study                                                                                                       | Challenges in safety culture                                                                                                                                                                                                                                                                                                           | Reference                    |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Zambia                                                       | Examination of occupational health and safety systems in selected mining companies on the Copperbelt province of Zambia    | Lack of visible felt commitment from Management as well as lack of training was attributed to accident and incident occurrence in most Zambian Mines                                                                                                                                                                                   | Cynthia Sikana(2020)         |
| Kenya -Osiri artisanal and small-scale gold mining operation | Risk factors for the number of sustained injuries in artisanal and small-scale mining operations                           | The current state of Artisanal and Small-Scale Mining conditions is attributed to illegal operations, unsafe acts, and poor. safety culture, as well as lack of mine owners' or companies' commitment to health and safety                                                                                                             | Ajith 2020                   |
| Philippines                                                  | Developing a Safety Culture in developing countries                                                                        | People in developing countries are more exposed to occupational hazards than in developed countries                                                                                                                                                                                                                                    | Muhammad Irfan Khan (2015)   |
| South African Mining Industry                                | A systemic study of mining accident causality                                                                              | Routine violations are the main unsafe acts leading to accidents. The physical environment is the most common workplace factor Leadership and systemic factors were also identified in most accidents                                                                                                                                  | Bonsu et al (2017)           |
| Ghana                                                        | Investigating the Maturity of Incident Investigations of the Ghanaian Mining Industry and Its Effect on Safety Performance | A strong negative correlation exists between incidence rates and safety culture maturity, suggesting that a more mature safety culture can be a factor in reducing incidents.                                                                                                                                                          | Eric Stemm et al (2019)      |
| Ghana                                                        | Occupational Health and Safety and Organizational Commitment: Evidence from the Ghanaian Mining Industry                   | There is a moderate positive relationship between occupational health and safety management and affective commitment. Likewise, regression analysis show that occupational health and safety management has a significant impact on affective commitment.                                                                              | Kwesi Amponsah-Tawiah (2016) |
| Zimbabwe                                                     | Improving Workers Safety and Health in Zimbabwean Mining and Quarrying                                                     | Zimbabwe's Mining and quarrying industry contributed 20% of the workplace deaths in year 2014 compared with 10% the previous year (NSSA, 2014). However, year 2014 had a 300% increase in mining fatalities compared to previous year (NSSA, 2014). Key factors include disregard of safety rules and erosion of safety culture due to | Benard Mabika (2018)         |

| Country (mine)            | Description of study                                                                                                                     | Challenges in safety culture                                                                                                                                                       | Reference                       |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
|                           |                                                                                                                                          | production demands                                                                                                                                                                 |                                 |
| Namibia                   | An Integrated Safety Framework for the diamond mines: A case study from Namibia                                                          | Safety performance improvement approaches tend to adopt a reactive approach which includes tracking lagging metrics.                                                               | Elonya Coetzee et al., (2022)   |
| Youga Mine (Burkina Faso) | Prevalence and Associated Factors of Occupational Stress in the Mining Sector: The Case Study of the Youga Mine at Zabre in Burkina Faso | Workers are under increased pressure to meet the demands of modern working life characterized by industrialization of companies with the main objective of increasing productivity | Antoine V. Hinson et al.,(2021) |

## **2.6 Re-establishing a safety culture after ceasing mining operations**

Literature emphasizes the importance of reassessing and reinforcing safety protocols when operations resume to address any lapses in safety awareness that may have occurred during the closure period. Pungki (2022) suggests that conducting refresher training and comprehensive safety audits can effectively reintegrate safety practices into the workforce. This proactive approach not only reinstates safety standards but also reinforces the organization's commitment to employee well-being and operational integrity. McGowan et al. (2020) further argue that involving employees in these processes fosters a sense of ownership and responsibility toward safety practices.

Engaging employees in the re-establishment process is frequently identified as essential for renewing commitment to safety. Ismail (2024) highlights that involving workers in safety discussions and decision-making enhances their sense of ownership regarding safety practices. This engagement is critical, as employees who feel valued and included are more likely to actively contribute to a culture of safety. Research by Jameel (2024) supports this assertion, indicating that visible leadership commitment to safety during transitional phases significantly influences employee perceptions and behaviors. By fostering an inclusive environment where employees feel heard and respected, organizations can effectively re-establish a strong safety culture post-closure, ensuring that safety remains a primary concern moving forward.

## **2.7 Developing a framework for re-establishing a safety culture**

Developing a structured framework for re-establishing a safety culture in the mining sector necessitates several critical components to ensure a systematic approach to safety management. Literature suggests that organizations should conduct a thorough assessment of existing safety practices and employee perceptions to identify gaps and formulate actionable strategies for improvement (Nahrgang et al., 2019). This assessment is crucial for guiding the establishment of clear safety policies and objectives that provide direction and accountability for all

employees (Alruqi et al., 2021). Research by Hu et al. (2022) emphasizes that clarity in safety objectives helps align organizational goals with safety initiatives, fostering a unified approach to safety management.

The framework should also prioritize leadership involvement and employee engagement as central elements. O'Neill et al. (2021) stresses the importance of leaders actively participating in safety training and discussions, as this involvement fosters a culture of safety from the top down. Furthermore, implementing continuous monitoring and feedback mechanisms is essential for evaluating the effectiveness of safety culture initiatives and making necessary adjustments over time (Khan et al., 2023). By adopting a comprehensive framework that integrates these elements, mining organizations can effectively re-establish and sustain a positive safety culture.

## **2.8 Theoretical framework**

This dissertation's theoretical framework is anchored in Cultural Change Theory and further refined by Kotter's 8-Step Change Model. Cultural Change Theory provides the understanding that cultures are dynamic and can be deliberately shifted, especially in response to significant events like a mine's closure and subsequent re-opening. It acknowledges that existing beliefs, values, and practices will exert resistance, requiring a strategic approach to cultivate new safety norms. Kotter's (1996) 8-Step Change Model offers a practical and widely recognized framework for managing this cultural transformation by providing a structured and sequential approach. Kotter's model informs the study by identifying key phases and potential pitfalls in the process of re-establishing a robust safety culture. This integrated framework allows for a systematic analysis of the challenges faced by Shamva Mine, pinpointing where the change process may falter and suggesting targeted interventions to promote a sustainable safety culture. These theories were tested, for example, at Carmel Copper Corporation in Philippines (Roumel et al., 2021).

## **2.9 Summary**

In summary, this chapter discusses the main themes of safety culture, including its conceptualization across industries, the establishment and benefits within mining, knowledge and practices specific to this sector, the procedures necessary for implementation, the challenges encountered, the process of re-establishing safety culture after ceasing operations, and the theoretical frameworks that support these initiatives.

## **CHAPTER 3: METHODS AND MATERIAL**

### **3.Methods and materials**

#### **3.1 Description of the study area**

The research was conducted at Shamva Mine, an operation under Kuvimba Mining House. Located in Shamva District, Mashonaland Central Province, Zimbabwe, the mine is situated approximately 90 kilometers northeast of Harare, the capital city of Zimbabwe. Its proximity to the capital allows for efficient logistical support and access to mining resources. Shamva district's landscape features a blend of communal farming lands, artisanal mining sites, and natural vegetation.

Shamva Mine has a long-standing history in gold production, having contributed significantly to Zimbabwe's mining sector. After periods of closure, the mine reopened under Kuvimba Mining House with renewed policies emphasizing operational efficiency and safety culture. Re-establishing safety culture in post-closure mines has been identified as a critical challenge globally, with scholars like Sofian and Ismail (2019) emphasizing the role of leadership and continuous safety training in fostering a resilient workforce.

This study further considers the behavioral and situational aspects of safety culture, aligning with Guldenmund's (2000) framework that underscores the psychological and organizational dimensions affecting safety performance in mining. Additionally, empirical evidence from van Niekerk (2019) highlights the importance of community engagement and proactive risk management in ensuring sustainable mining practices.

The unique combination of historical significance, socio-economic importance, and contemporary challenges makes Shamva Mine an ideal case study for understanding the dynamics of safety culture restoration following prolonged closure periods.

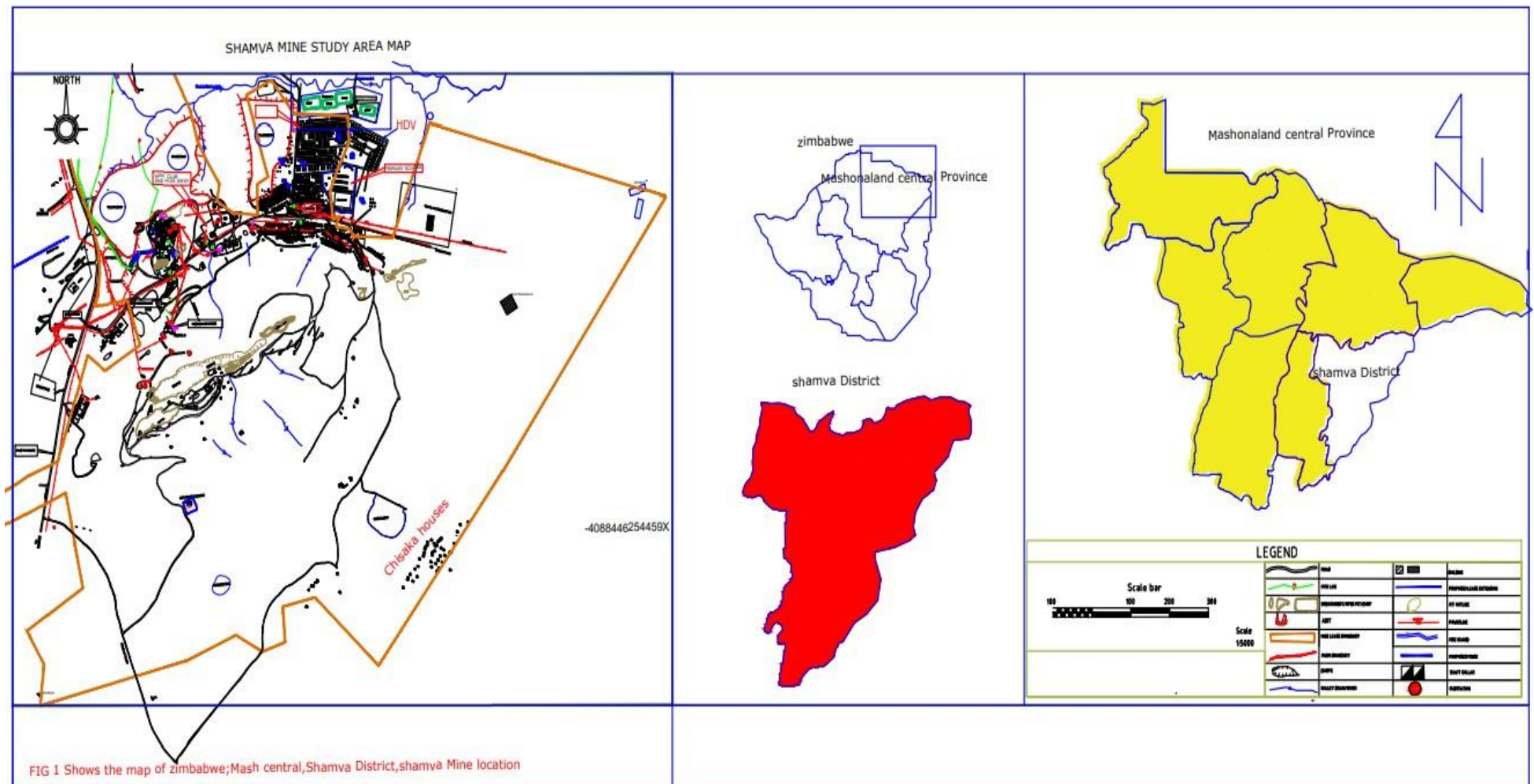


Figure 1 Zimbabwe map showing location of Shamva mine (source: Shamva mine CPR document ) Map shows surrounding communities, High density village, Dumps and Rivers

### 3.2 Research design

This study employed a mixed methods design, specifically a case study approach, integrating both qualitative and quantitative techniques. This design was chosen for its effectiveness in addressing the research objectives and exploring the challenges of establishing safety culture. An employee perception questionnaire was utilized to collect quantitative data, while qualitative methods provided deeper contextual insights. The mixed methods approach allows for cross-validation of findings, enhancing overall validity, as previous studies have demonstrated its utility in safety culture research (Creswell, 2014). This design facilitated a comprehensive analysis of historical safety performance and employee attitudes towards re-establishing safety culture.

### 3.3 Determination of sample size and recruitment of participants

The sample size for this study was determined using the Taro Yamane formula (Yamane, 1967). This formula is particularly well-suited for finite populations because it provides an efficient method to calculate sample size while ensuring statistical reliability and precision. Its simplicity makes it widely applicable in research studies, especially in scenarios with limited resources or clearly defined population parameters.

$$n = \frac{N}{1 + N \cdot e^2}$$

Where:

n = sample size

N = population size (500 employees) e = margin of error (5% or 0.05)

Substituting the values:

$$n = \frac{500}{(1 + 500(0.05)^2)}$$

n= 222.22

The sample size for this study was initially calculated to be 222. To account for potential non-responses, the final adjusted sample size was determined using the formula  $(n / r)$ , where  $(r)$  represents the expected response rate (e.g., 80%). Applying this formula, the adjusted sample size was:

$$[ 223 / 0.8 = 279]$$

This adjustment ensures that the study retains sufficient statistical power while maintaining reliability, with a 95% confidence level and a 5% margin of error.

Participants were recruited using simple random sampling (briefly describe HOW?) from seven key departments at Shamva mine: Engineering, Geology, Human Resources, Health and Safety, Mining Operations, Security, and Administration. The sampling frame was derived from the register of employees maintained by the mine's Human Resources department. These employees were eligible for inclusion based on their employment status, i.e., permanent or fixed term contracts before the mine's closure and their continued employment after its reopening.

Simple random sampling was chosen for its suitability in homogeneous populations, such as employees who share similar operational conditions and exposure to safety standards. This method ensures unbiased representation by giving each individual in the sampling frame an equal chance of selection, as described by Etikan et al. (2016).

To ensure representativeness across all departments, the sample size of 279 was proportionally distributed based on the population size of each department. Table 2 below shows distribution of sample size for the study

**Table 2. Sample size for the study**

| Department         | Population (N) | Sample (n) | Sampling intensity (%) |
|--------------------|----------------|------------|------------------------|
| Mining             | 213            | X          | Y                      |
| Engineering        | 83             | X          | Y                      |
| Technical Services | 81             | X          | Y                      |
| Finance            | 48             | X          | Y                      |
| Human Resources    | 45             | X          | Y                      |
| SHEQ               | 11             | X          | Y                      |
| Security           | 19             | X          | Y                      |
| <b>Total</b>       | <b>500</b>     | <b>279</b> | <b>55.8</b>            |

### **3.3 Research instruments**

#### **3.4.1 Structures Questionnaire**

The research employed a structured questionnaire (Appendix A), developed based on a thorough review of relevant literature (Griffin and Curcuruto, 2016; Nævestad et al., 2018).

The questionnaire was designed to capture employees' safety attitudes, practices, and perceptions of safety performance, both before and after the mine closure. By using closed-ended questions with a five-point Likert scale, the questionnaire enabled straightforward analysis and comparability of responses as alluded to by EK Amaoko et al (2024)

The questionnaire was pre-tested to 20 employees (approximately 7%) from a similar mining environment not included in the main study. This pretesting phase helped identify ambiguities and improve clarity, as recommended by Bryman (2016). In total the questionnaire has 11 questions which are two-fold effectively making them 22. On average it took 8 minutes to administer the questionnaire

#### **3.4.2 In-depth interviews**

In-depth interviews were conducted to collect qualitative data on the challenges of re-establishing a safety culture and employees' experiences with safety practices. An interview guide (Appendix B) was designed from literature (Nielsen et al., 2017; Hasle et al., 2019; FK

Opuko et al., 2020). The interviews were semi-structured, allowing flexibility to delve into emerging themes while staying aligned with the study's objectives (reference). Pretesting of the tool was conducted with five employees. Face-to-face interviews were chosen to establish rapport with participants and encourage open communication (FK Opuko et al., (2020). While time-intensive, the depth of qualitative data collected provided a nuanced understanding of safety culture challenges. Similar methods have been employed successfully in previous studies (Tappura et al., 2017; Provan et al., 2018). Face to face interviews took about 35 minutes for the 8 interview questions. Key informants were randomly selected from Senior Managers and employees in supervisory positions.

### **3.4.3 Historical records**

Historical records from Shamva mine, including safety performance reports, incident logs, and compliance audits from 2017 and 2018, were analysed to evaluate the mine's safety performance prior to its closure. These records were sourced directly from Shamva mine's archives and the mine's SHEQ Intranet system.

The analysis focused on extracting key metrics, such as accident rates, near-miss incidents, and records of safety training programs. This approach was selected for its ability to provide objective and reliable insights into past safety performance. To address potential gaps or inconsistencies in the historical data, multiple sources were cross-referenced, i.e, information from the safety questionnaires (Appendix 1 and 2) was used to establish relationships as well and or deviations in findings from historical data.

Descriptive statistics were applied to summarize the data, and trend analysis was used to identify patterns, such as improvements or deteriorations in safety performance over time.

## **3.5 Ethical consideration**

Ethical principles were central to this study to protect the dignity, autonomy, and well-being of participants. The framework followed guidance from Bryman and Bell (2019) and Saunders et al. (2019), emphasizing informed consent, confidentiality, and minimizing harm.

Participants were provided with written informed consent forms detailing the study's objectives, procedures, and their rights, including voluntary participation and the right to withdraw without consequences. To safeguard anonymity, all identifying information was removed from the data, ensuring responses were reported in aggregate form. Special care was taken to minimize psychological distress by carefully wording questions and offering counseling information during debriefing. This approach ensured the study met ethical standards while respecting the sensitivities of the research context.

### **3.6 Data collection**

The questionnaire, developed using validated frameworks, included 25 Likert-scale items. The questionnaires were distributed in April 2025 across seven departments at Shamva mine, with proportional allocation based on departmental size: Mining (93), Engineering (38), Technical Services (36), Finance (22), Human Resources (20), SHEQ (5), and Security (8). The questionnaires were self-administered with the researcher on-site to provide clarification and collect completed forms. Interviews were conducted face-to-face in offices at Shamva mine in May 2025, lasting approximately 35 minutes each. In total face to face interviews were 15.

In developing a framework on the contributing factors to safety culture in the mining industry, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology was employed. The PRISMA approach was chosen as it provides a comprehensive and structured framework for conducting systematic reviews and ensures transparency and reproducibility of the review process (Hizam-Hanafiah et al., 2020). The review process followed the PRISMA guidelines, which include the following steps: identification, screening, eligibility, and inclusion (Talukder et al., 2021). By following the PRISMA methodology, thematic material topics on the contributing factors of safety culture in the mining industry were identified. A draft framework was then designed from the literature review and field data. The draft was then refined through iterative revisions, incorporating

feedback from industry experts, such as the Mine's SHEQ Manager and Mining Manager, amongst other available resource persons at the mine as well as line supervisors, ensuring its practicality and relevance to the mining context. This process was completed by May 2025.

### **3.7 Data management and Analysis**

Data cleaning and management were initially conducted using Microsoft Excel. Responses from the structured questionnaire (Appendix A) were entered into spreadsheets and systematically inspected for missing values, duplicate entries, and inconsistent or ambiguous responses. Erroneous responses were either corrected or excluded according to predefined criteria to ensure reliability. Graphical representations, including bar graphs, pie charts, and line charts, were constructed to visualize departmental distributions, frequency of responses, and temporal trends in safety-related behaviors. All data files were securely stored in password-protected folders accessible only to the research team.

Quantitative analysis was performed using the Statistical Package for the Social Sciences (SPSS, Version 27). Cleaned Excel data were imported into SPSS and subjected to preliminary screening for outliers and missing values through descriptive summaries. Descriptive statistics such as means, standard deviations, and frequencies were used to summarize employee attitudes, safety practices, and risk perceptions across departments. To test for statistically significant differences in safety attitudes across the seven operational departments, a one-way Analysis of Variance (ANOVA) was conducted. The dependent variable was safety attitudes and the independent variable was departmental affiliation. Post hoc comparisons using Tukey's HSD test were applied to identify specific group differences where the ANOVA indicated statistical significance. These inferential techniques enabled the researcher to evaluate both general trends and specific intergroup variances in safety-related perspectives.

Qualitative data analysis was guided by Braun and Clarke's six-phase framework for thematic analysis (2006). Audio recordings from the semi-structured interviews were transcribed verbatim and reviewed for accuracy through repeated reading and comparison with field notes. Manual coding followed an open coding approach, whereby initial codes were derived inductively from the data without imposing predefined categories. A provisional codebook (provided in Appendix B) was developed to capture emerging patterns, including themes such as leadership accountability, knowledge fragmentation, and barriers to safety communication. Subsequent axial coding was used to explore connections between themes. For example, participants frequently linked unclear safety leadership with delayed policy dissemination. The thematic analysis process included familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. This rigorous approach ensured transparency and consistency in interpreting safety culture dynamics from qualitative accounts.

## CHAPTER 4: PRESENTATION OF RESULTS

### 4.Results

#### 4.1 Demographic characteristics of respondents

##### 4.1.1 Questionnaire

Table 3 shows the demographic characteristics of participants. Results indicate that most respondents were men and this was expected since the mining industry is male dominated. Participants in the age groups of between 18 and 40 years provided the most responses. Most of the employees in this age group formed the mine's labour force and witnessed the transition, from the time the mine closed and re-opened.

**Table 4.1 Demographic characteristics of respondents**

| Characteristic          | Category         | n   | %     |
|-------------------------|------------------|-----|-------|
| Gender                  | Male             | 136 | 68.0  |
|                         | Female           | 64  | 34.0  |
| Age group (years)       | 18 – 30          | 42  | 21.0  |
|                         | 31 – 40          | 79  | 39.5  |
|                         | 41 – 50          | 51  | 25.5  |
|                         | Above 51         | 28  | 14.0  |
| Nature of employment    | Permanent        | 113 | 56.5  |
|                         | Contractor       | 58  | 29.0  |
|                         | Casual/Temporary | 29  | 14.5  |
| Work experience (years) | Less than 5      | 39  | 19.5  |
|                         | 5 - 10           | 72  | 36.0  |
|                         | 11 - 15          | 51  | 25.5% |
|                         | More than 15     | 38  | 19.0% |

##### 4.1.2 In-depth interviews respondents

Table 4.2 shows demographic characteristics of participants who participated in the in-depth interview. The trend on all variables shows a near similar pattern as in the data presented in table 4.1 the reason being the industry is male dominated as explained above. Employees

with more than 5 years' experience represent individuals who have accumulated significant experience. Naturally, workers in group are in supervisory positions and their insight is valuable for this study

**Table 4.2 Demographic Characteristics of Interview Participants (n = 15)**

| <b>Characteristic</b>      | <b>Categories</b>                           | <b>Frequency</b> | <b>Percentage</b> |
|----------------------------|---------------------------------------------|------------------|-------------------|
| <b>Age</b>                 | 21–30 years                                 | 3                | 20.0%             |
|                            | 31–40 years                                 | 6                | 40.0%             |
|                            | 41–50 years                                 | 4                | 26.7%             |
|                            | 51+ years                                   | 2                | 13.3%             |
| <b>Gender</b>              | Male                                        | 9                | 60.0%             |
|                            | Female                                      | 6                | 40.0%             |
| <b>Department</b>          | Underground Operations                      | 4                | 26.7%             |
|                            | SHEQ (Safety, Health, Environment, Quality) | 3                | 20.0%             |
|                            | Processing/Plant Operations                 | 2                | 13.3%             |
|                            | Maintenance/Engineering                     | 2                | 13.3%             |
|                            | Administration/HR/Procurement               | 2                | 13.3%             |
|                            | Transport & Logistics                       | 2                | 13.3%             |
| <b>Employment Type</b>     | Permanent                                   | 8                | 53.3%             |
|                            | Contractor                                  | 4                | 26.7%             |
|                            | Casual/Intern                               | 3                | 20.0%             |
| <b>Years of Experience</b> | Less than 5 years                           | 3                | 20.0%             |
|                            | 5 to 10 years                               | 5                | 33.3%             |
|                            | 11 to 15 years                              | 4                | 26.7%             |
|                            | More than 15 years                          | 3                | 20.0%             |

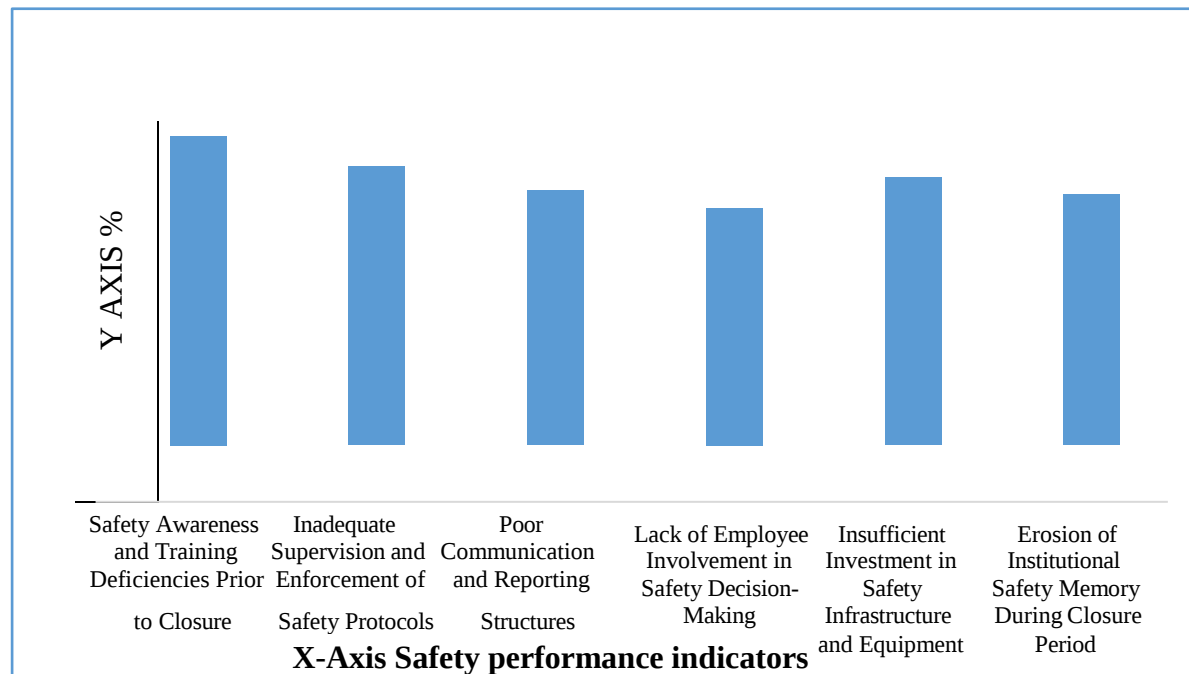
*Source: Researcher (2025)*

## **4.2 Safety performance at the mine**

### **4.2.1 Prior to mine closure**

Fig. 4.1 The graph evaluates the mine's safety performance in the two years preceding its closure specifically 2017 and 2018. This retrospective assessment is essential for understanding the

foundational weaknesses that may have contributed to systemic safety lapses. Safety shortcomings prior to closure included deficiencies in safety training, inadequate supervision and poor communication structures. Insufficient investment in infrastructure also contributed to systemic safety lapse.

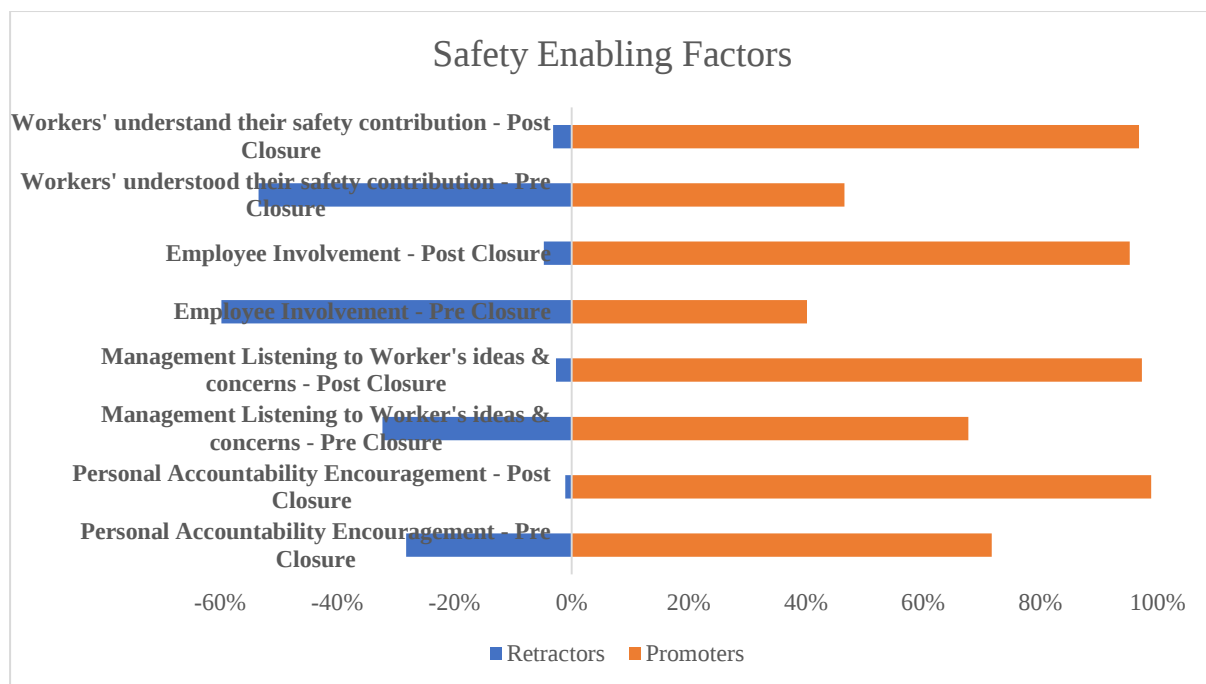


**Figure 4.1 Safety performance of the mine two years (2017 and 2018) prior to closure**

Responses from the questionnaire were used to determine the means which were then manipulated and presented as a percentage as highlighted in figure 4.1

#### **4.2.2 Post resuming mining operations**

The figure in 4.4.2 below is a comparison of responses from the questionnaire to understand participants perceptions on safety enabling factors pre-closure and post closure. It presents data as a percentage. Results show that most respondents agreed that workers did not understand their safety contribution, pre-closure. The participants however agree that post closure, everyone understood their contribution. Participants also agreed that employee involvement was on the lower side pre-closure as compared to their involvement post closure. All participants were in agreement on the positive trajectory recorded on personal accountability and management involvement with employees post closure



**Figure 4.2.2 Safety enabling factors**

### 4.3 Safety practices among employees after resuming mining operations

The table below shows practices and employee behaviours after resumption of operations. Results indicate a commendable return to foundational safety behaviours, with resumption of safe work practices and procedural compliance earning the highest mean agreement score of 4.4. Similarly, there was a strong consensus around the increased use of PPE and safety gear (mean = 4.2), suggesting heightened awareness of personal protection. Nevertheless, several moderate concerns emerged, such as gaps in hazard identification, complacency among returning workers, and fragmented understanding of updated policies, all scoring between 3.6 and 3.8. These findings signal that while core safety practices were re-established, there remain underlying behavioural and knowledge-based gaps that could compromise long-term safety performance if not addressed systematically.

**Table 4.3 Safety practices after mining resumption**

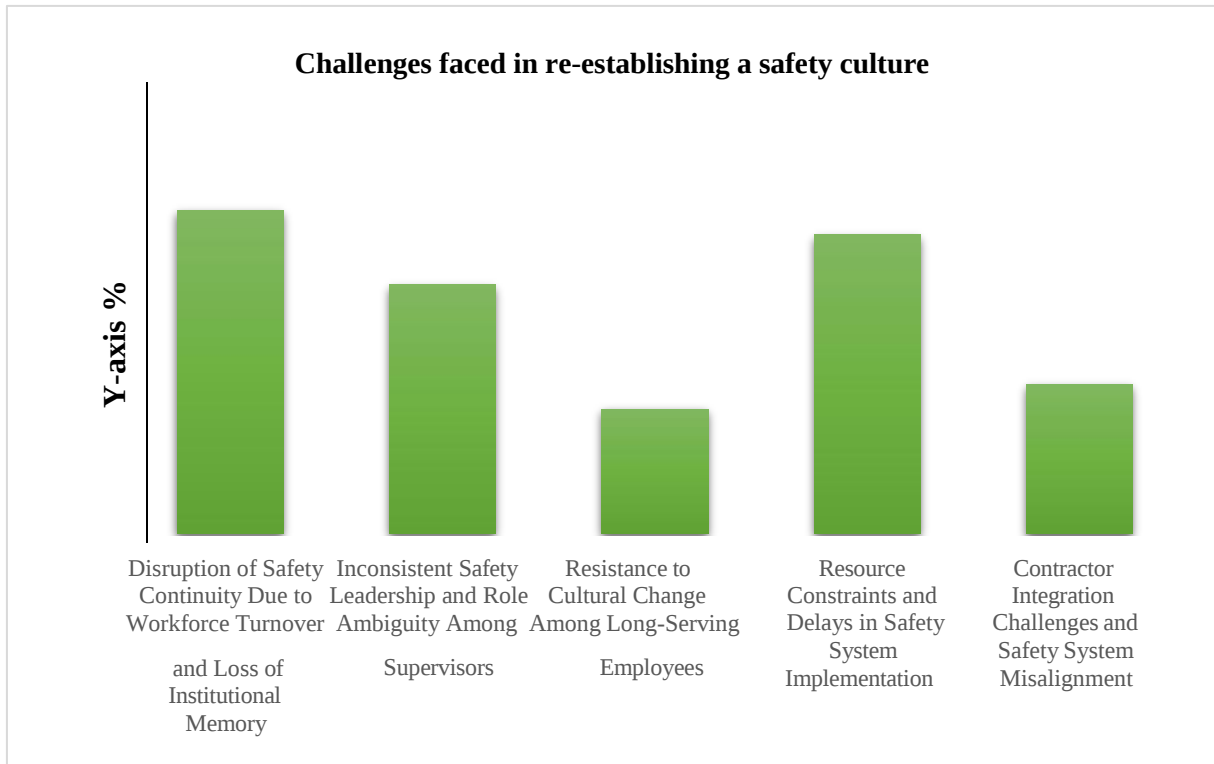
| Practice                                           | n (%) | Mean Score |
|----------------------------------------------------|-------|------------|
| Heightened use of Personal Protective Equipment    | 65    | 4.2        |
| Compliance with newly established procedures       | 69    | 4.4        |
| Complacency and risk normalization among returning | 56    | 3.7        |

|                                                                |      |     |
|----------------------------------------------------------------|------|-----|
| workers                                                        |      |     |
| Gaps in hazard identification and risk assessment              | 59.5 | 3.8 |
| Limited peer to peer accountability                            | 54   | 3.6 |
| Fragmented knowledge of updated safety procedures and policies | 58   | 3.7 |

#### 4.4 Challenges faced in re-establishing a safety culture

##### 4.4.1 Questionnaire data

Fig. 4.4 shows a graphical presentation of what questionnaire respondents perceived to be challenges faced in re-establishing safety culture. Results indicate that work turnover and resource constraints, an element of inconsistency in safety leadership and delays in implementing the BEMS management system ranked high in issues that posed challenges in re-establishing safety culture.



**Figure 4.4 Challenges faced in re-establishing Safety Culture**

##### 4.4.2 Face-to-face interview data

Figure 4.4.1 below shows a graphical representation of responses from the in-depth questionnaires. Five thematic areas were analyzed and these, included communication, legacy mindset, a deficiency of resources, trust gaps as well as leadership commitment.



**Figure 4.4.1 Face-to-face interview data**

**Table 4.4**

| Theme                   | Manifestation                                                  | Impact                                | Responses<br>% |
|-------------------------|----------------------------------------------------------------|---------------------------------------|----------------|
| Communication Breakdown | Language barrier, literacy                                     | Failure to follow protocol            | 60%            |
| Legacy Mindset          | Normalisation of substandard practices                         | Delay in cultural shift               | 73%            |
| Resource deficiencies   | Aging equipment                                                | Near Misses injuries                  | 100%           |
| Leadership leverage     | Peer led initiatives, VFL                                      | Improved accountability and inclusion | 73%            |
| Trust gaps              | Employee exclusion in decision making, Skeptism from employees | Resistance to new protocols           | 87%            |

60 % of the response on the thematic area of communication agreed that communication breakdown resulted to some extent in employees failing to follow protocol. 73% blamed legacy mindset on the delay in cultural shift and all participants concurred that resources deficiency was attributable to a decay in safety culture. Trust gaps and leadership commitment all scored above 70%, to indicate that participants felt these elements has indeed a bearing on safety culture establishment and maintenance

#### 4.5 Framework for re-establishing safety culture after cessation of mining operations

A framework for the re-establishment of safety culture for Shamva mine looked at five important elements, which included the re-establishment of leadership commitment and authority restoring trust, provision of resources, looking at changing the legacy mindset and encouraging the spirit of accountability. Table 4.5 below looks at some of the action items as well as assign responsibility to ensure effective implementation of proposed action

**Table 4.5 Safety Culture re-establishment framework**

| <b>Component</b>         | <b>Action</b>                                                                                                               | <b>Responsibility</b>           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Leadership Resuscitation | -Visible Felt Walks<br>-SHEQ Stand down<br>- Monthly SHEQ Committee meeting                                                 | Senior Management               |
| Trust restoration        | Joint Management and workers inspections<br>-Safety Amnesty sessions                                                        | Human Resources and Workers     |
| Resources provision      | -Preparation and funding of Capital and Operational Expenditure budget<br>-Maintenance of insurance stock<br>Resource audit | Planned Maintenance and Finance |
| Legacy mindset           | -Awareness campaigns<br>-Development of core values                                                                         | SHEQ and Human Resources        |
| Accountability           | -Introduction of SHEQ initiatives such as brother's keep<br>-Incentivize SHEQ performance, both positively and negatively   | SHEQ and Human Resources        |

Evaluation of the framework looked at each component. For leadership resuscitation, Head of departments were assigned Key performance Indicators and these formed part of their presentation at the EXCO meeting every week. For example, they were and are expected to report on VFL inspections, reported breaches and or any positive or negative incentive. A database is maintained and forms part of the Board committee meeting presentation on SHEQ. The mine SHEQ Committee meeting was resuscitated and a tripartite forum of management, the employee representatives as well as SHEQ representative sit every month. Like in the case of the HODs, they also are assigned KPIs that they report on as a form of evaluation, every month. The mine stores now have consignment stock to ensure resource availability and weekly stock takes are done to check on stock levels. Trainings are evaluated for adequacy and both the trainer and trainees are evaluated to check on effectiveness of trainings.

## **CHAPTER 5: DISCUSSION**

### **5.1 Introduction**

This chapter discusses the findings presented in chapter 4 and examines the challenges encountered during the re-establishment of a safety culture at Shamva Mine. The discussion aims to interpret key themes. The chapter also seeks to provide some insight into effective strategies for fostering a sustainable safety culture in the context of mine re-opening

### **5.2 Demographic characteristics of participants**

The demographic profile of questionnaire respondents revealed a workforce with very experienced male employees as indicated by the statistic that 66% were males with 80% of respondents aged above 30. Respondents within the age group 31-40 constituted the largest cohort, making up 39.5% of the sample and usually representing mid-career professionals, commonly having operational responsibilities or supervisory roles. A total of 56.5% respondents were permanently employed and hence their insights would be probably based on long exposures to pre-closure and post-closure safety systems. Interestingly almost 30% were contractors, emphasizing the need for strategic integration of contractors in all safety transformation initiatives.

The variety of employment types and experience levels was another dimension in understanding qualitative data. Of the participants, 46.7% have more than 10 years working experience in the industry, and 53.3% hold permanent jobs, thus providing the study with the dimension of rich institutional knowledge. In addition, newer or casual workers offered fresh perspectives on the gaps that exist in boarding and behavior expectations after reopening. This mix thus provided a richly textured understanding of both historical safety practices and the challenges faced in trying to re-establish a cohesive safety culture after operational disruption

### **5.3 Safety performance at the mine**

#### **5.3.1 Prior Mine Closure**

Safety and awareness deficiency became an issue pre-closure. 71% of respondents opined that adequate safety awareness and training was an issue of concern during the 2017-2018 period. The rating given to this issue on the used five-point Likert scale was 4.3, thus portraying a strong agreement from the respondents. In contrast to Australia, where safety training is embedded in certification and licensing systems (Clarke, 2024), the approach taken by Shamva Mine, prior to its closure, was more of a reactive nature than proactive. Inadequate supervision and enforcement of safety protocols rated 4.1 out of 5. As stated by Damu (2022), absence from supervision and inadequate enforcement of safety rules ranked among the keys in accident prevalence, especially in the underground and transportation departments.

Of the 200 respondents surveyed, 109 individuals (54.5%) reported that they were not meaningfully involved in safety-related decision-making during the period of 2017–2018. The issue received an average Likert scale rating of 3.9 out of 5, which indicates somewhere between a moderate to strong agreement. Gwatidzo and Moyo (2023) argue that where employees are involved in making safety decisions, they naturally accept ownership and compliance, as well as injecting innovation. In Zambia, worker-led safety audits in copper mines led to a 22% reduction in reportable incidents over a period of three years (Mwansa & Chileshe, 2024). Insufficient investment in infrastructure and erosion of institutional safety memory also ranked high among the challenges at re-establishing safety culture

### **5.0.2 Safety practices of employees after resuming operations**

The survey revealed that, among the two hundred responses, 138 individuals (69%) felt that the employees adhered better to safety procedures after closure of operations. On the high end of the Likert scale, a score of 4.4 out of 5 indicates substantial agreement with the subject. This indicate a marked commitment to procedural compliance and safe work practices in the post-closure phase as a result of organizational developments and increased awareness on the part of the workers. Of the 200 respondents surveyed, 112 individuals (56%) indicated that some employees exhibited complacency and a tendency to normalize risk after the mine was reopened. The average rating given for this issue on the Likert scale was somewhat moderate at about 3.7 out of 5. Participant 4 said, "Some of the older workers went back to their old habits — skipping steps or taking shortcuts." Participant 7 added, "There was a sense that

because nothing bad had happened yet, people could relax." In contrast, Participant 13 stated, "New safety rules were in place, but not everyone took them seriously — especially those who had worked at the mine before closure." These comments seem to suggest that to some extent while formal safety systems may have been improved, behaviorally there dwelled an element of complacency that remained an issue, especially with those returning to site who may have been desensitized to risk.

#### **5.4. Challenges faced in re-establishing a safety culture**

Disruption of Safety Continuity Due to Workforce Turnover and Loss of Institutional Memory. Out of the total respondents to a survey of 200 people, 121 (60.5%) report high staff turnover and loss of skilled persons as critical hurdles for readopting a safety culture after the mine's reopening, according to the Likert scale, with an aggregate rating of 4.0 out of 5, implying strong agreement. According to the Zimbabwe Chamber of Mines (2024), there is a tendency across mines that experienced an extended period of shutdown to lose a 40-50% share of institutional safety knowledge due to the attrition of staff and poor documentation practices. Gwatidzo and Moyo (2023) affirm that safety culture is embedded within systems in implied knowledge and shared experiences of employees who have worked for long periods.

Resistance to cultural change among long-serving employees was one of the most critical challenges to re-establishing a safety culture at Shamva Mine. Banda and Chikowore (2025) suggest inclusive processes of change, which recognize the experiences of old workers while slowly bringing them in line with new expectations. According to Hopkins (2021), safety reforms get a risk warning of superficial adoption when they are not accompanied by protagonists addressing the emotional and identity-related aspects in change. Other challenges include resource constraints with a mean likert scale of 3.9 out of 5, inconsistent leadership and role ambiguity amongst supervisors and Contractor Integration Challenges and Safety System Misalignment.

#### **5.5 Framework for re-establishing safety culture after cessation of mining operations**

In terms of practical application, the safety culture framework was to help employees recognize and understand the trajectory the safety culture of the organisation was taking. Through the framework, employees understood that management cared for their safety and health. To an extent, mutual trust between the employer and the employee grew. Management

involvement in SHEQ activities, such as VFLs, SHEQ Committee gatherings and SHEQ stand downs, helped in eroding and shifting the legacy mindset to the benefit of Shamva Mine. Tiffany M. Brisbey et al (2021) asserted that the intangible abstract aspects of safety culture were seen as augmenting the tangible concrete aspects of a fully implemented safety management system, thus ensuring safe operations for the organisation.

Employees became more and more accountable for their own safety aided by the mine's mantra of "My Safety, My Responsibility". It became important for everyone at the mine to own safety and this helped cultivate and nurture the culture of safety that was brewing.

## **5.6 Limitations**

The researcher could not get the targeted population as had been indicated in Chapter 3. The mine underwent a labour rationalization exercise culminating in the laying off of some potential participants.

## **5.7 Summary**

This chapter presented and discussed the findings of this study. It is crucial to understand that the data presented and analysed in this section was obtained from questionnaires, in-depth interviews and documentary analysis. Also, the findings were guided by the research objectives.

As reflected by statistical presentation, the predominant safety shortcomings prior to closure included deficiencies in safety awareness and training (mean = 4.3), inadequate supervision (4.1), and poor communication structures (4.0) all rated as significant issues. Additionally, erosion of institutional safety memory during the closure period (mean = 4.2) further compounded the mine's challenges. Although employee exclusion from safety decision-making was rated moderately (3.9), it still suggests a disconnect between frontline workers and strategic safety planning. Collectively, these findings highlight a fragile safety framework that lacked both structural support and employee engagement, factors that likely undermined overall operational safety leading up to the mine's shutdown.

## **CHAPTER 6: CONCLUSION AND RECOMMENDATIONS**

### **6. Conclusion and recommendations**

#### **6.1 Conclusion**

The re-establishment of a safety culture at Shamva Mine faced numerous pitfalls of operational, behavioural, and structural significance. The major viable of concern was the dilution of institutional memory caused by employee turnover. Safety leadership and lack of clarity in supervisory roles, juxtaposed against cultural resistance from senior employees, compounded the dilemma. Resourcing, and legacy safety behaviours and norms all contributed in the challenges the mine faced in attempting to re-establish safety culture

Management commitment is a key variable in ensuring workplace safety. Learnings from this study can be used to assist other mines that seek to establish safety culture, especially those mine that would have gone through a period of closure,

Further research should focus on the evolution of safety culture over several closure-reopening cycles in the mining industry of Zimbabwe. This would present deeper clarity into resistance, institutional memory, and behavioural transformation through the years.

#### **6.2 Recommendations**

- Mine leadership should synchronize capital safety investments with operational restart timelines: These delays on resources at Shamva undermined the morale and execution of safety programmes. Timely allocation of funds for PPE, risk tools, and training guarantees that the reforms are sustainable and do not lose credibility among the staff
- The National Social Security Authority (NSSA) could introduce behavioral safety auditing into OHS regulatory inspections. Complacency and peer accountability issues continued after reopening. Integration of behavioral observations into audits will reveal risk-normalizing habits that conventional inspections miss.

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## APPENDICES

### Appendix A: Questionnaire



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Tel. (263) 712 842 712-4  
066 210 6505



Researcher: Ncube G: Shamva Mine Senior SHEQ

Officer, Shamva E-mail: gncube@shamvagold.co.zw

Cell:0776172091

Supervisor: Dr. A. Kanda: Department of Environmental

Science, Bindura E-mail: akanda@buse.ac.zw

Cell:0772773560 **OCCUPATIONAL**

#### **HEALTH AND SAFETY: SAFETY CULTURE**

#### **Introduction**

My name is Gole Ncube. I am a final year student at Bindura University of Science Education (Registration No.: B220142B), studying towards obtaining a BSc (Hons) degree in Safety, Health and Environmental Management (SHEM). I am also SHEQ Officer stationed at Shamva Mine. As part of my curriculum requirements I am undertaking research entitled “Challenges in re-establishing a safety culture after a period of mine closure: case study Shamva mine, Zimbabwe” Findings from the study will assist the mine to proactively manage its business risks and prevent accidents at the workplace. I invite you to assist me with some information on this matter, provided you are willing to take part in the study.

#### **Ethical statement**

The study has been cleared by Bindura University of Science Education through the department of Environmental Science. Confidentiality and anonymity of shared information are guaranteed. By voluntarily participating in the study it implies that you understood its purpose and how you will be involved. This also means that you have provided your informed consent. If you feel that you wish to discontinue in the survey, please feel free to indicate it. It will take about 10 minutes of your time.

Signature:.....Date:..... /2025.

## SECTION A: Background Information

Please tick [✓] appropriate answer

**What is your gender?**

1. Male ☐

2. Female ☐

1) What is your age?

Below 20 ☐

21-35 ☐

36-50 ☐

51 and above ☐

2)What is your grade

1. 1-10 ☐

11-13 ☐

14+ ☐

3) How many years have you been at Shamva Mine?

Less than 1 year ☐

1-3 years ☐

3-5 years ☐

6-10 years ☐

Above 10 years ☐

## SECTION B: Organization key areas of stakeholder feedback Likert Scale:

**1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree**

| NO  | STATEMENT                                                                                                                                                                            | Strongly Agree | 1 | Agree | 2 | Neutral | 3 | Disagree | 4 | Strongly Disagree |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---|-------|---|---------|---|----------|---|-------------------|
| 1.0 | Mine Management encourages personal accountability in relation to safety                                                                                                             |                |   |       |   |         |   |          |   |                   |
| 1.1 | <i>Before and in the period leading to closure, Mine Management encouraged personal accountability in relation to safety</i>                                                         |                |   |       |   |         |   |          |   |                   |
| 2.0 | Currently, Management listens to workers' ideas and concerns about safety and have created a conducive environment for the establishment and maintenance of a desired safety culture |                |   |       |   |         |   |          |   |                   |

2.1 *Before and in the period leading to closure, Management would listen to workers' ideas and concerns about safety and continued to maintain a desired culture of safety*

3.0 The re-introduction and implementation of BEMS (ISO 14001:2015, ISO 45001:2018, ISO 9001:2015) improved the safety

culture when the mine resumed operations

3.1 *Failure to maintain and implement BEMS (ISO 14001:2015, ISO 45001:2018, ISO 9001:2015) in the period leading to closure impacted negatively on safety culture*

4.0 The mine is adequately resourced and materials required for the safe execution of tasks is available

4.1 *Before and in the period leading to closure, the operation was adequately resourced and materials required to safely carry out tasks was available*

5.0 There is an element of pressure and mismatching workloads since the mine resumed operations

5.1 *Before and in the period leading to closure, there was an element of pressure and mismatching workloads*

6.0 Employees are more involved in SHEQ and other programs that aim to maintain and enhance the culture of safety at the mine

6.1 *Before and in the period leading to closure, there was a notable decline in employee involvement in SHEQ and other programs aimed at maintaining and enhancing the culture of safety at the mine*

safety obligations on the basis of impacted trainings.

8.1 *Before and in the period leading to closure, employees were competent and understood their job demands on the basis of impacted training*

9.0 Employees at Shamva Mine value safety and understand their contribution to the creation of a healthy culture of safety

9.1 *Before and in the period leading to closure, Shamva Mine employees did not value safety and did not understand their contribution to the creation of a healthy safety culture*

10.0 Employees attitudes towards safety greatly improved after the mine resumed operations

10.1 Employees attitudes towards safety significantly dropped in the period leading to and before closure

11.0 Monitoring of Occupational Safety and Health indicators which is currently being done , helped in re-stabbling a safety culture post closure

11.1 Failure to monitor Occupational Safety and Health indicators in the period leading to closure impacted negatively on the safety culture pre-closure

7.0 Mine Management currently involves the employees in programs to support the maintenance of existing culture of safety

7.1 *Before and in the period leading to closure, employees were not involved in any programs to support safety culture*

8.0 Employees are competent and understand their job demands and

**END OF QUESTIONNAIRE**

**THANK YOU VERY MUCH FOR YOUR TIME.**

## Appendix B: Interview Guide



BINDURA UNIVERSITY OF SCIENCE EDUCATION

P. BAG 1020  
Bindura,

Zimbabwe

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Signature:.....Date:..... /2025

Questions:

1. What specific challenges did you encounter in communicating safety protocols to employees after the mine's reopening?
  - Follow-up: How did these communication issues impact employees' understanding of safety practices?
2. Can you describe any resistance you faced from employees regarding new safety measures implemented after the mine reopened?
  - Follow-up: What do you believe contributed to this resistance?
3. What resources (training, equipment, etc.) were lacking during the re-establishment of the safety culture, and how did this affect safety compliance?
  - Follow-up: Were there any specific incidents that highlighted these resource gaps?
4. How did the previous culture of safety (or lack thereof) before the mine's closure influence the current efforts to rebuild a safety culture?
  - Follow-up: Can you provide examples of how past experiences shaped current practices?
5. What key elements do you believe should be included in a framework for re-establishing a safety culture after a mine closure?
  - Follow-up: Why do you consider these elements essential?
6. Can you describe any successful initiatives or practices that were implemented after the mine reopened that contributed positively to the safety culture?
  - Follow-up: How can these initiatives be incorporated into a broader safety framework?

7. In your opinion, what role does leadership play in establishing and maintaining a safety culture following a mine's reopening?
  - Follow-up: Can you provide examples of effective leadership practices observed during this transition?
8. What recommendations would you make for future mines facing similar challenges in re-establishing a safety culture after a closure?
  - Follow-up: How can these recommendations be operationalized to ensure effectiveness?

**END OF INTERVIEW: THANK YOU VERY MUCH FOR YOUR TIME**

20 March 2025

The Director

Department of Environmental Science

Bindura University of Science Education

P. Bag 1020

Bindura

Attention: Mr. T. Nyamugure,

**RE: REQUEST TO COLLECT DATA FOR RESEARCH PROJECT: GOLE NCUBE (B220I42B)  
PART 4 STUDENT**

We refer to your letter dated 4 December 2024, in respect of the above request on behalf of your student, Gole Ncube, to carry out research project titled *“Challenges in re-establishing a safety culture after a period of mine closure: case study Shamva mine, Zimbabwe”* where your student seeks to use Shamva Mine as the focus for the research.

We carefully considered your request and are pleased to inform you of our approval under the following terms and conditions:

**The University and your student will:**

1. Ensure that any information provided or obtained during and after the research, whether or not classified as confidential, is protected against loss and against unauthorised access, use, modification or disclosure and against other misuse;
2. Not disclose such information to any third party even if it is already in the public domain;
3. Immediately notify the Company if the information provided or obtained is lost, stolen, misused or illegally accessed;
4. Ensure that the data/information provided or obtained must not be used for any other purpose other than for the purposes of the research.
5. Acknowledge and agree that by virtue of granting this permission the Company has not transferred, relinquished, surrendered any of its intellectual property rights of ownership of any of its data/information;

Shamva Mining Company

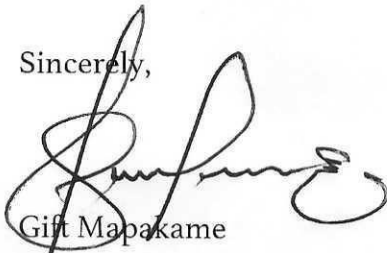
Reg No.: 9219/2012

Directors: S. Chinyemba (Chairman), G.T. Mapakame (General Manager), P. Maseva-Shayawabaya,  
I. Rukweza.

6. Agree that the results of the research must be shared with the Company before they are published;
  7. Agree that the name of the Company shall be anonymous in the research documentations and final project report/dissertation.
  8. Provide a summary of the research results/findings, using a format, language and concepts that are non-technical for consideration and comment.
  9. Provide the company with a draft copy of any publication relating to the research, for comment and consideration, at least three weeks prior to submission to the university.
  10. Agree that the Company retains the right to request reasonable amendments or alterations be made to his research results/findings prior to submission and agree to make those amendments or alterations.
- II. Provide the Company with the final publication for its library.

If you have any questions regarding this letter of approval, please do not hesitate to contact the undersigned or the Human Resources Manager.

Sincerely,



Gift Mapakame  
General Manager

**Shamva Mining Company**

Reg No.: 9219/2012

Directors: S. Chinyemba (Chairman), G.T. Mapakame (General Manager), P. Maseva-Shayawabaya,  
I. Rukweza.