The Impact of Mining Activities on Local People and Environment. A Case Study of Zimbabwe Mining Development Corporation Operations in Chiadzwa, Marange

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A dissertation submitted in partial fulfilment of a Master’s Degree in Business Administration

2015

Graduate School of Management

University of Zimbabwe

Supervisor: Mr. A.M. Chidakwa
DECLARATION

I, Gumisai Aaron Makoni do hereby declare that this dissertation is the result of my own investigation and research, except to the extent indicated in the Acknowledgements, References and by comments included in the body of the report, and that it has not been submitted in part or in full for any other degree to any other university.

__________________________  ___________
Student signature                  Date
DEDICATION

This research study is dedicated to my son Kutenda who endured 23 days in Intensive Care Unit whilst I was working on this project.
ACKNOWLEDGEMENTS

I give thanks be to Lord Almighty who made it possible for me to undertake this project successfully.

It would be impossible to acknowledge, name by name, all those people and institutions who contributed in various ways to the success of this study. However, it is again impossible not to acknowledge the contributions made by the following people to the research study.

Firstly, I wish to thank my supervisor, Mr. Arnold Chidakwa, for his guidance, encouragement, helpful incites and suggestions, comments and advice throughout my work on this thesis.

Special appreciation goes to my family for being there for me in time of need and also for the love and care throughout my research study. Worth mentioning is my son Kutenda who was born in the middle of the research study. His long detention in hospital made me appreciate life from a different and practical perspective and that helped a lot on the research.

Appreciation also goes to my work mates Polite Masvaure, Edmore Chandakasarira, Tapiwa Goronga, Walter Busangavanye, Omen Dube, Grace Nhau, Charles Dube and Wilson Mujuru who contributed positively in various capacities towards the successful completion of the project.

I also would like to thank all the people who made time to complete my questionnaires. Special thank goes to assistant to headman Chiadzwa, Mr Chipise who made time taking me around the entire Chiadzwa community and facilitating meetings with the people from the community.

Appreciation also goes to our class representative Forget Toruvanda who always reminded us there was work to be done.

Gratitude goes to Graduate School of Management’s head, Doctor Nyasha Kaseke and his entire team for taking me through this life enhancing process. I am not yet done with you University of Zimbabwe, I will see you again soon.
Lastly, I wish to acknowledge the authors of several books and articles as well as administrators of several websites which were consulted during the research and are listed in the references.
**ABSTRACT**

Mining is indispensable to the economic development of countries endowed with mineral resources. At the same time the effects the mining activities on the local people and the environment have also been wide spread in these economies. While the contributions of mining in Zimbabwe is adequately appreciated, the impact of mining activities has also received its fair share of criticism especially from the general public.

The research investigates the impact of ZMDC mining activities on the people of Chiadzwa as well as the environment. The research adopted a case study model that covered the entire Chiadzwa community. Seven villages and two ZMDC companies were covered for data required for the study. A total of seventy respondents were contacted for relevant data through questionnaire administration. The researcher also carried out field observations in order to verify and supplement the data collected from questionnaires.

The research encountered some challenges. Among the constraints faced included the perceived sensitiveness given to diamond data and information. Data collection problems included bias and reluctance to complete questionnaires. The research supplemented data collection through use of field observations which also worked as a way to mitigate data collection problems.

The research revealed that mining activities negatively impact the environment as well as the social footprint of the Chiadzwa people.

Environment effects emanating from the mining activities include land degradation and pollution. Vast tracks of land which were original meant for farming have now been cleared and made bare as part of the mining process thereby affecting food production in the area. Pollution on the other hand affected mainly the water bodies in the area with Save river being the worst polluted.

Mining activities were also found to be a source of social discontent in the Chiadzwa community. Some of the problems included appropriation of land belonging to the local people which severely affected food security within the community. Mining have also impacted negatively on health, altered social relations, created unemployment as well as promoting social ills that included prostitution and crime.
The ZMDC companies have reacted to the noted effects of their mining activities on the local people and the environment. Their initiatives included reforestation, providing alternative sources of water, employing people from the local community as well as relocating some of the affected people. The initiatives were however considered unsatisfactory, ineffective and inadequate especially given the benefits these companies are deriving from diamond mining.

In view of the above, it has been recommended that ZMDC companies should engage the community on issues affecting them in order to come up with more effective ways of solving the problems being caused by mining activities. It is also recommended that companies should honour various promises made to the community that acted as licences to mine. Companies should also ensure that all affected people are relocated to designated areas as well as ensuring that the community benefits from their infrastructure for example electricity.
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<td>African Consolidated Resources</td>
</tr>
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<td>CSO</td>
<td>Central Statistical Office</td>
</tr>
<tr>
<td>CRD</td>
<td>Centre for Research and Development</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>DIY</td>
<td>Do It Yourself</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EMA</td>
<td>Environmental Management Agency</td>
</tr>
<tr>
<td>ERRC</td>
<td>Eliminate Raise Reduce Eliminate</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GNI</td>
<td>Gross National Income</td>
</tr>
<tr>
<td>HDI</td>
<td>Human Development Index</td>
</tr>
<tr>
<td>ICMM</td>
<td>International Council on Mining and Minerals</td>
</tr>
<tr>
<td>MMCZ</td>
<td>Minerals Marketing Corporation of Zimbabwe</td>
</tr>
<tr>
<td>PGE</td>
<td>Platinum Group Element</td>
</tr>
<tr>
<td>PGM</td>
<td>Platinum Group Metal</td>
</tr>
<tr>
<td>RBZ</td>
<td>Reserve Bank of Zimbabwe</td>
</tr>
<tr>
<td>SADC</td>
<td>Southern African Development Community</td>
</tr>
<tr>
<td>TBL</td>
<td>Triple Bottom Line</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>ZISCO</td>
<td>Zimbabwe Iron and Steel Company</td>
</tr>
<tr>
<td>ZMDC</td>
<td>Zimbabwe Mining Development Corporation</td>
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CHAPTER 1 INTRODUCTION AND BACKGROUND OF STUDY

“In our culture, survival meant sharing. If someone came into our territory and they were hungry and we had food, we would share. It’s confusing when Industry comes into our territory and is not prepared to share. We have had to learn new skills to negotiate with Industry but even today it is hard to negotiate when our culture is based on the principles of sharing, without having to ask. Industry must stop seeing us as a cost of doing business and recognise and understand our culture and our view of sharing the benefits from our territory.” (A quotation by Charlie Okeese Eabametoong, First Nation cited in (International Council of Mining and Metals, 2010).

1.1 INTRODUCTION

The extraction and processing of minerals to provide goods and services that are essential for the day to day human needs is as old as human civilisation itself. Minerals have brought numerous benefits to societies. In today’s world, population growth, urbanisation, social and economic development and, even demands for a green economy are all contributing to an increase in the demand for minerals. However meeting that demand and achieving the benefits comes at a cost (International Council on Mining and Metals, 2012).

In many countries, mining activities are effectively and efficiently managed to ensure that a positive overall benefit is achieved. The benefit is assumed to be enjoyed by all the people in countries where the mining activities take place. However, in some of the countries, resources have been misused, fuelling conflict, poverty and, political unrest. There have been disputes over land use, property rights and environmental damage, moral decadency, concerns about revenue transparency and corruption and a growing debate about the distribution of the benefits of mineral wealth. Tensions within communities have often been the result. Blood diamond is a new phrase that is becoming popular in the modern economies that mine diamonds mostly as a result of the perceived curse that come with mining such a mineral.
However, on the other hand it has been found out that mining is a key contributor to economic growth and improved standard of living of many people. Mining’s long time horizon, its need for both skilled and unskilled labour, its links to local and regional infrastructure as well as the importance of the products that it produces, means that it can make a unique and huge contribution to sustainable development. With adequate public and private management, the mining industry can contribute to poverty alleviation across the world while maintaining ecosystem integrity.

In order to ensure that mining related policy development, decision-making and, on-the-ground performance is conducted to the highest standard possible, a good understanding of mining’s contribution to sustainable development is crucial. This will not only be for industry technocrats, government policy makers and regulators, but also for the general public. This requires consideration of both the opportunities and benefits achieved through the extraction, processing, and use of minerals as well as an assessment of the economic, social and environmental costs and risks of doing so. Most importantly, the duties and responsibilities of each relevant stakeholders i.e. governments, civil societies, communities and companies must be considered. Society’s expectations of the mining sector’s performance cannot be over emphasised and continue to increase. This is mainly because mining is carried out within their communities This reveals itself in pressures for higher standards of social and environmental performance, greater transparency, and more participation in decision-making by stakeholders that have traditionally played only a marginal role. At the same time, the nature and impartiality on the distribution of the benefits and costs from mining’s operations is being challenged. Clearly, the industry’s operating environment is always changing and the challenge for all stakeholders in the industry is to stay on top of this evolution.

1.1.1 World Mining

The mining industry has been key to the development of civilization. In 2001, the mining industry produced over 6 billion tons of raw product valued at several trillion dollars. Downstream beneficiation and minerals processing of these raw materials adds further value
as other raw materials and products are created to serve all aspects of industry and commerce worldwide (Mbendi, 2015).

The last decade of the twentieth century saw the creation of mega-commodity corporations that increasingly moved downstream into the beneficiation area, leaving exploration for new mineral deposits increasingly to small junior mining companies. Application of new technology has led to productivity gains across the whole value chain. (Mbendi, 2015).

Apart from Antarctica which has a treaty in place preventing short to medium term exploitation and exploration of minerals, mining takes place in all of the world’s continents. Traditional mining countries such as the USA, Canada, Australia, South Africa and Chile dominate the global mining scene. These countries have become the traditional leaders in mining and exploration methods and technology. Exploration and development funding has changed over the past few years with emphasis shifting to areas that have been poorly explored or have had poor access for reasons of politics, infrastructure or legislation. Gold, base metal, diamonds and platinum group elements (PGE’s) are the most important commodities explored for and developed globally (Mbendi, 2015).

Mining capital investments worldwide increased from $US 16 billion in 2001 to nearly $US 80 billion in 2011. In 2011, major investments were made by Vale (US$ 22 billion), Rio Tinto (US$ 12 billion) and BHP Billiton (US$ 10 billion) (Encarta, 2005).

In 2013, the South African mining sector accounted for 8.3% of GDP directly, on a nominal basis (2012: 8.6%). Although this is a downward trend from the industry’s peak some decades ago (from 21% contribution to GDP in 1970), the mining industry nevertheless continues to make a valuable contribution to the South African economy, most notably in terms of foreign exchange earnings, employment and economic activity. Nominal mining GDP of R279.7 billion was recorded in 2013, up from R270.2 billion in 2012.

South African’s mining sector real fixed investment, which has shown signs of recovery from the global financial recession since 2011, dipped to -5.5% in 2010 and only grew by 1.7% in 2013, down from a 4.3% growth in 2012. In addition to a slump in commodity prices, other country-specific factors such as regulatory uncertainty, infrastructure constraints and other issues affected investment by mining companies (Chamber of Mines, 2014).

Australia is estimated to be the world’s third largest producer of commodities in the world. Australia’s mineral industry acts as an important catalyst to the economic growth of the country. Minerals contributed 6.5% towards Australia’s GDP which was approximately $US 360 billion in 1997. Australia is the world’s largest bauxite, diamond, ilmenite and zircon producer, and is also a substantial producer of coal, iron ore, gold, uranium, zinc, lead and silver. Australia is fortunate in being nearly self-sufficient in most commodities (Mbendi, 2015).

The country is often referred to as being a “quarry” based on the fact that only a small proportion of its mineral production is refined in the country, with the remainder being exported. The minerals industry accounts for nearly 60% of Australia’s export earnings (Mbendi, 2015).

### 1.1.2 Mining in Zimbabwe

The mining sector in Zimbabwe accounts for 65% of exports, up from 50% in 2009 and accounts for a third of imports. (The Chamber of Mines of Zimbabwe, 2013). Zimbabwe’s mining industry is focused on a diverse range of small to medium mining operations. The most important minerals produced by Zimbabwe include gold, diamonds, asbestos, chromite, coal and base metals. The mining industry contributes approximately 8% towards the country’s GDP (Mbendi, 2015).

The mining sector has to date been the most dynamic sector of the Zimbabwean economy, leading the 2009-2011 economic rebound with average annualised growth of 35%. (Chamber of Mines, 2014).
Table 1:1  Contribution to total mineral exports

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>57.3</td>
<td>24.2</td>
<td>26.90%</td>
</tr>
<tr>
<td>HCF</td>
<td>20</td>
<td>10.7</td>
<td>8.60%</td>
</tr>
<tr>
<td>Nickel</td>
<td>15.1</td>
<td>11</td>
<td>0.7</td>
</tr>
<tr>
<td>PGMS*</td>
<td>2.3</td>
<td>46.1</td>
<td>27.20%</td>
</tr>
<tr>
<td>Diamonds</td>
<td>0.8</td>
<td>6.7</td>
<td>26.10%</td>
</tr>
<tr>
<td>Others</td>
<td>6.80%</td>
<td>1.30%</td>
<td>10.50%</td>
</tr>
</tbody>
</table>

Source: (Chamber of Mines, 2014)

In terms of mineral output, there have been significant increases in production over the period 2012 to 2013 as shown on the Table 1.2 below.

Table 1:2  Mineral Output Performance

<table>
<thead>
<tr>
<th>Mineral</th>
<th>2012 Actual</th>
<th>2013 Jan-June Actual</th>
<th>2013 Projection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold (kgs)</td>
<td>14,742</td>
<td>6,727.36</td>
<td>17,000</td>
</tr>
<tr>
<td>Coal (tons)</td>
<td>1,784,763</td>
<td>955,086.00</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Nickel (metric tons)</td>
<td>7,899</td>
<td>4,887.33</td>
<td>10,000</td>
</tr>
<tr>
<td>Platinum (kgs)</td>
<td>10,524</td>
<td>6,599.49</td>
<td>12,500</td>
</tr>
<tr>
<td>Chrome Ore (tons)</td>
<td>408,475</td>
<td>92,073</td>
<td>282,000</td>
</tr>
<tr>
<td>Palladium (kgs)</td>
<td>8,136</td>
<td>5,068.54</td>
<td>10,000</td>
</tr>
<tr>
<td>Diamonds (tons)</td>
<td>12,014,802</td>
<td>-</td>
<td>16,900,000</td>
</tr>
</tbody>
</table>

Source: Chamber of Mines (2014)

1.1.3  History of Zimbabwe Mining Industry

The Zimbabwe Geological Survey (1990) identifies more than 500 individual deposits of base metal and industrial minerals in Zimbabwe. It describes Zimbabwe as an important producer of gold, chrome, lithium asbestos and cesium, as well as high-quality emeralds. Modern mining began in 1892 and by 1990 over 40 minerals were being exploited. Over the first 100
years of modern mining activity, the two most valuable products by far were gold and asbestos but this has changed with the emergence of nickel and ferrochrome as major exports and, very recently, the exploitation of platinum group metals – platinum, palladium and rhodium. (Mbendi, 2015).

Most mineral production is from the ancient Archaean core of the country where most deposits are concentrated in the greenstone belts that contain gold, copper, tungsten, antimony and arsenic. Nickel with its by-products of copper and cobalt is also mined in the greenstone belts, while asbestos deposits are found in the serpentized ultramafic intrusions. There are known huge deposit of chromite and platinum along the Great Dyke that runs through the centre of the country from north-east to south-west (Mbendi, 2015).

Initially mining in Zimbabwe centred on the exploration and exploitation of gold deposits almost all of which were known from ancient workings. Subsequently, world class deposits of chromite and chrysotile asbestos were developed, along with Hwange coal. The Zimbabwe Iron and Steel Company (ZISCO) was built to produce iron, steel and coke, while two major ferrochrome projects were developed, Zimbabwe Alloys, producing low carbon ferrochrome and Zimasco, which manufactures high carbon ferrochrome. Subsequently, an ammonium nitrate plant was opened at ZISCO to produce oxygen-refined steel, while a large open-cast coal mine was developed at Hwange for coking coal and for steam coal to fire the Hwange Thermal Power Station (Mbendi, 2015).

The Zimbabwe Geological Survey (1990) lists no fewer than 66 base and industrial mineral deposits found in Zimbabwe but in recent years production has become increasingly concentrated to the point where in 2006 seven products accounted for 98 percent of total value. In part, this growing concentration reflects price movements – the boom in gold and platinum prices – along with a shift in the composition of output towards higher value and value-added minerals, such as PGMs and ferrochrome (Mbendi, 2015).

1.1.3.1 Output History

The official volume of production index compiled by the Central Statistical Office depicts a stagnant industry with the volume of mining output peaking in 1998. After averaging 108 during the 1990s, the volume index (1990 = 100) declined to average 100 between 2001 and
2004. Mining production stagnated over the entire period (1980–2004) growing just 0.32 percent annually, but because prices as measured by the unit value index grew 47 percent a year, the Zimbabwe dollar value of production increased dramatically, driven by currency devaluation, particularly since 2000 (Mbendi, 2015).

**Figure 1:1  Mining Production 1980-2004**

*(Index 1990 = 100)*

![Mining Production Volume Index](image)

*Source: Mbendi (2015)*

### 1.1.3.2 Employment

The mining sector has employed an average of 56,000 people since independence in 1980. The figure fluctuated, picking at 73,970 in 2006. The lowest recorded figure was 41,120 in the year 2000. (Mbendi, 2015).

The table below shows the employment trend in the mining industry from 1980 to 2006.
### Table 1.3 Employment in Mining Sector

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Total Employment</strong></td>
<td>59,675</td>
<td>49,320</td>
<td>47,943</td>
<td>41,120</td>
<td>66,415</td>
<td>73,970</td>
</tr>
</tbody>
</table>

**Source:** Chamber of Mines (2014).

#### 1.1.3.3 Exporting History

Mining’s chief contribution to the economy, especially in recent years, has been its capacity to generate foreign exchange, even with falling output. Since independence in 1980, mining has accounted for almost 40 percent of total exports, dominated by gold, with the other important contributors being ferrochrome, nickel and latterly platinum, which will shortly become the country’s major export (Mbendi, 2015).

#### 1.1.4 Study Area

The study area is the Chiadzwa diamond fields usually referred to as Marange diamond fields. The organisations under study shall be ZMDC joint venture companies in Chiadzwa whilst the community is the Chiadzwa community under Headman Chiadzwa and Chief Marange.

#### 1.1.4.1 Chiadzwa/ Marange Diamond Fields

The Marange concession was held by the world’s main diamond producing company, De Beers from the early 1980s through until 2006 when an Exclusive Prospecting Order was awarded to a British company, African Consolidated Resources (ACR). The day after trial mining began in December 2006 by ACR, the government ordered the company to close and handed control to the state-owned Zimbabwe Mining Development Corporation (ZMDC) (Hawkins, 2009).

#### 1.1.4.2 Organisations under study

As of February 2014, the diamond fields are operated by seven private entities all of which are partnered with the Zimbabwe government under the affiliate Zimbabwe Mining Development Corporation (ZMDC). The seven companies currently operating are: Marange Resources, Anjin Investments Ltd., Diamond Mining Company, Gye Nyame Resources, Jinan Mining Ltd., Kusena Diamonds, and Mbada Diamonds (Wikipedia, 2015).
All the seven companies are joint venture companies with the Government of Zimbabwe through its parastatal ZMDC owning 50% of the company whilst the other 50% are owned by seven different foreign investors. ZMDC equity contribution is made up of the concessions or the land to mine whilst the foreign investors’ components are cash injection.

Since ZMDC represents the interest of the country through ownership of the land to mine, it became the subject matter in the study.

For the sake of this study, the seven companies formed through partnership with ZMDC shall be the ones under investigation and will be referred to as the ZMDC companies.

1.1.4.3 Location of Chiadzwa

The Marange diamond fields are an area of widespread small-scale diamond production in Chiadzwa, Mutare South, Zimbabwe. The area is under Chief Marange and Headman Chiadzwa.

The area in which Headman Chiadzwa has authority over is enclosed between Agoni Stream to Singwizi River, from Save River and Chisawe stream to Odzi River down to its confluence with Save River. Headman Chiadzwa exercises authority over more than ten villages which are presided over by village heads.

The figure below shows the location of Marange fields on the Zimbabwean map.
However mining activities affects the environmental and the people living in the surrounding communities. The impacts emanate mainly from the methods of operation used by the mining companies. The negative impacts on the surrounding people and the environment are often considered to outweigh the benefits gained.

The gains from the mining sector in the form of increased investment, job creation and increased exports are being achieved at great environmental and social costs to the people, recording series of public outcry against the mining companies operating in Zimbabwe.

1.2 RESEARCH PROBLEM

Zimbabwe has a variety of mineral resources and mining activities dating back well into the pre-colonial times. Production of diamonds is predominantly in the Marange fields with the
other players being Murowa Diamonds and River Ranch. The two main types of diamonds mined are alluvial and conglomerate diamonds. Alluvial mining is dominantly surface mining whilst conglomerate mining can both be surface and underground mining. The surface mining method involves removing the top soil to a level lower which bears the diamond. Heavy machines are used for this purpose. Concessions are therefore made bare and devoid of any vegetation.

*Figure 1:3 Heavy machinery at work*

![Heavy machinery at work](image_url)

*Source: Photography: Researcher (2015)*

The use of heavy machines and chemicals underground do not only cause instability within the earth crust but also affect underground water which serves as source of water to various water bodies in the area. In addition, dynamites are used to blast the large rocks to aid excavation of the area where diamond is extracted. The loud noise and the vibrations from the blasts have affected people within the surrounding. Buildings belonging to the local people have cracked. *Figure 1.4 shows an image of a cracked house belonging to a local resident in Chiadzwa area.*
These environmental and social effects of mining activities have been attracting attention recently, hence, need to be addressed. Although, the mining companies are believed to have made steps to avert the extent of the damage within the surrounding communities, the extent to which these efforts are reducing the negative impacts is yet to be established. In an attempt to suppress dust levels, a bowser is seen on figure 1.5 below spraying water on roads used by other mining machinery.

As required by law, the Environmental Management Agency examines the Environmental Impact Assessment (EIA) of the companies. Notwithstanding these, the public is yet to acknowledge the extent to which these stakeholder organisations are contributing to the reduction of adverse environmental and social effects of mining activities. Environmental and social issues relating to mining activities are matters of concern within the public domain. In spite of the above, a thorough research into the current effects, on the social welfare as well as on the environmental (both positive and negative) of Zimbabwe Mining Development Corporation mining operations in Chiadzwa is therefore a necessity.

The purpose of this study is to assess the impact of mining activities on the social footprint of the local people and on the environment as well as assessing the effectiveness of the various interventions by the ZMDC companies to curtail the negative impacts.
1.3 RESEARCH OBJECTIVES

The main objectives are to:

1. Examine the methods of diamond mining operations.
2. Explore the impact of mining activities on the social welfare of the Chiadzwa community.
3. Explore the impact of the methods of mining on the environment
4. Assess the effectiveness of the interventions by ZMDC companies reducing the impact of their activities on the people and the environment
5. Make recommendations and point out policy directives which can be implemented to ensure that sustainable mining is achieved in Chiadzwa.

1.4 RESEARCH QUESTIONS

1. What methods of mining and ore extraction are employed by ZMDC companies operating in Chiadzwa?
2. What are effects of mining activities on the social welfare of Chiadzwa community?
3. What are the effects of mining methods on the environment?
4. What measures have been put in place by ZMDC companies to reduce or curtail the negatives effects of its operations on the surrounding people and the environment?
5. What policy directives can be implemented to ensure sustainable mining is achieved in Chiadzwa.

1.5 PROPOSITION

Diamond mining operations in Chiadzwa have a negative effect on both the social footprint and the environment within the community.

1.6 JUSTIFICATION OF RESEARCH

Mining activities are essential in the economic development of countries endowed with mineral resources. This is due to the economic benefits that are realised. The benefits include creation of employment, promotion of local industries, and revenue generation as well as earning foreign exchange for the countries.
Whilst acknowledging the economic contributions of mining, however, several economies lost sight of the inherent effects of mining being the environmental and social effects. Researches undertaken in recent years to look into the environmental and social effects of mining have found mining activities to be curse to economic development rather than a blessing. Accordingly, several mining companies in the country claim to have responded to this by instituting and implementing several measures to reduce the negative effects of their activities on the people. For example some local people from Chiadzwa were relocated to Arda Transau in Odzi as shown on Figure 1.4 below.

*Figure 1:6 Houses for relocating Chiadzwa people located in Odzi*

![Houses for relocating Chiadzwa people located in Odzi](image)

*Source: Photography: Researcher (2015)*

Whether some of these measures have or are capable of reducing the negative impacts of mining on the surrounding communities is a matter of great concern.

The significance of this research work lies in the fact that it seeks to undertake a thorough and broader outlook into the environmental and social effects of mining on Chiadzwa communities, both negative and positive, and recommend policy directives to improve the
already instituted policies by the ZMDC companies. Findings and recommendations will serve as guide to the government and other mining companies in the country.

1.7 RESEARCH OUTLINE

The structure of this research pursues the following outline:

Chapter one as presented above involves the introduction to the research topic, the research objectives and research questions, the research proposition, scope, delimitations, justification and chapter summary. The second chapter covers the literature review and presents available literature that is related to the topic of study. Chapter three presents the methodology and the methods used in the collection of empirical data. In Chapter four, the empirical findings from the research on the field are presented and analysed in the light of the conceptual framework that is outlined in the literature review. In Chapter five, conclusions are drawn and recommendations are made.

1.8 SCOPE OF RESEARCH

The research focuses on investigating and analysing the impact of mining activities on the environment and on people living in the Chidzwa area in Manicaland province. However, the study does not attempt to bring change on the way mining is being carried within the area in light of the impacts on the surrounding people and the environment.

The research is a case study of mining activities in Chidzwa and its effects on the environment as well as on the people living in the surrounding communities. It covers the period from the onset of formal diamond mining in 2009 to 2013 when diamond mining took a slump. Data will mainly be gathered from the ZMDC companies, Chidzwa community, The Chamber of Mines of Zimbabwe, Ministry of Mines and Mining Development, Zimbabwe Statistics, Reserve Bank of Zimbabwe, Environment Management Agency, Mutare Rural District Councils, World Bank, among others.

1.9 CHAPTER SUMMARY

The chapter looked at mining as a concept as well as mining as an activity. The contribution of mining in the development of economies was considered whilst at the same time the impacts emanating from the mining activities were also looked at. The researcher is guided by the research objectives from which research questions were developed. A proposition for the
research was also developed upon which all the research work will be centred on. The researcher will go ahead and analyse existing literature on the impacts of mining activities on the local communities and the environment.
CHAPTER 2  LITERATURE REVIEW

2.1  INTRODUCTION

Several studies have been conducted on mining activities and their effects as well as contributions to economic development of countries that engage in mining as an economic activity. Whilst other researches highlight the benefits of mining to economic development, others focused on negative impacts of mining activities on the development of economies.

This chapter reviews what has been researched and documented regarding mining as a concept, processes involved in mining and the methods employed in ore extraction. It further the effects on mining on both the social footprint and the environment will be reviewed.

Finally, the TBL principle is reviewed in relation to various interventions that have been employed to minimize the impact of mining on the environment as well as on people living within the locality of the mining activities.

2.2  DEFINITIONS, PROCESSES AND METHODS OF MINING

Mining is the extraction of valuable minerals or other geological materials from the earth from an orebody, lode, vein, seam, or reef, which forms the mineralized package of economic interest to the miner (Wikipedia, 2015). The Encarta encyclopaedia also defines mining as the selective recovery of minerals and materials, other than recently formed organic materials from the crust of the earth (Encarta, 2005).

The oldest known mine on archaeological record is the "Lion Cave" in Swaziland, which radiocarbon dating shows to be about 43,000 years old. At this site Paleolithic humans mined hematite to make the red pigment ochre. Mines of a similar age in Hungary are believed to be sites where Neanderthals may have mined flint for weapons and tools (Wikipedia, 2015).
Available literature indicates that basically, there are five major steps to mining process as shown on Figure 2.1 below.

**Figure 2:1  Mining Life Cycle**

![Mining Life Cycle Diagram](image)

*Source: International Council of Mining and Metals (2010)*

Mining methods are of four basic types.

1. **Surface mining:** On this method materials are mined from surface mines, open pits, quarries, or other diggings open to the atmosphere. Most mines in the world take this form.
2. Underground mines: Under this method materials are extracted through shafts or tunnels.

3. There is the recovery of minerals and fuels through boreholes.

4. Finally, there is underwater mining or dredging, which is now extending to the potential mining of the deep oceans (International Council of Mining and Metals, 2010).

2.3 MINING ACTIVITIES AND THE SOCIAL WELFARE

The social impacts of mining activities and projects have received increasing attention in recent years. Though it has been argued that mining can be a vital economic propellant for most countries especially the developing ones because it can facilitate industrialisation along with the promises of wealth and jobs, on the contrary, it can also be a source of social discontent, civil unrest and other high social cost (Gualnam, 2008, p. 2).

In fact, the social cost of mining interacts with other cultural and environmental issues that call for concerted efforts in addressing them. There is no doubt that mining appropriates land belonging to the local communities, impacts health, alter social relationship, destruct the forms of community subsistence and life, cause social disintegration by radical and abrupt changes in regional cultures, displace other present or future local economic activities and the working conditions in mines are hazardous and unhealthy (Gualnam, 2008).

2.3.1 Mining and Health

Health can be defined as a state of complete physical, mental and social well-being of an individual, and not merely the absence of disease and infirmity (World Health Organisation, 2006). The definition has not been altered since 1948. An alteration in the living cells of the body which jeopardizes survival in the environment results in diseases. Health problems arise from a variety of man’s activities including industrialisation, farming, mining and migration.

Available literature examines the impact of mining on the health of both mine workers and the people within the surrounding communities of the mines. According to Stephen & Ahern (2001), mining remains one of the most perilous occupations in the world, both in terms of short term injuries and fatalities, but also due to long term impacts such as cancers and...
respiratory conditions such as silicosis, asbestosis and pneumoconiosis. Studies of mining and health by type of mine process are divided into underground and open cast mines. Underground mines produce severe harms for employees in terms of their risks of high blood pressure; heat exhaustion; myocardial infarction and nervous system disorders. Studies of surface mining focus on coal, diamond, granite and rock mining and health risks related to dust breathing. In all levels of mining health risks occur with dust exposure (Stephen & Ahern, 2001).

Respiratory impacts are the most studied of all health impacts for mine workers. Injuries have declined in importance but continue to be an important safety issue in mines. Long-term effects include cancers, mental health impacts and some proof of impacts on genetic integrity of workers. The heated discussion on the impact of the mining and minerals sector on both worker and community health is polarized. On the one hand the industry tends to underscore the supposed benefits of the sector, whilst on the other, community groups and NGOs suggest that the sector is injurious to health and sustainable development (Stephen & Ahern, 2001).

Further, the mining sector has been affected by the world-wide epidemic of HIV/AIDS, and this is apparent in the studies of South African mines. Several studies Jochelson, et al. (1991); Campbell (1997); Williams and Campbell (1998); Campbell & Williams (1999); Campbell (2000); Corbett, et al. (2000) have focused on the condition of the gold mines of South Africa.

Moreover, Stephen & Ahern (2001) stress that scientific evaluation of long-term impacts has grown. Employees have been able to use scientific evidence for improved hazard visibility and for shifts in health and safety legislation. However, much of the small-scale mining sector falls outside formal legislative shield or scientific analysis. Companies have provided a range of community initiatives including vaccination programmes and health services. These have mixed results. Companies have seldom addressed the community claims for damage made against them internationally. Communities have worked with scientists to understand some of the impacts associated with living near mines. Unions have scarcely played an overt role in support for community claims (Stephen & Ahern, 2001).
2.3.2 Mining and Cultural and Tradition Values

Some research has been done on effects of mining activities on the culture and traditional values of the local people. Chimonyo, et al. (2012) on their research on the social and economic implications of mining pointed how mining can affect culture. They argue that the opening up of the Ushonje Range for mining disrupted the social and cultural value of Chiadzwa with a long lasting imprint. The sacredness of the Ushonje Range is demonstrated by many mysteries that take place in the mountain. Traditionally there are many activities that culture and tradition forbid to take place in that mountain. For example, the use of foul language to describe fruits and other observations is forbidden. Sexual misconduct and cutting down of trees that are deemed sacred were classified as forms of spiritual disobedience. Perpetrators would be punished and their families receiving a curse.

Stephen & Ahern (2001) in their study captured the views of the local community in respect of their implications on their culture and traditions. Both villagers and the traditional leaders pointed out that they were aware of the wealth in the Ushonje Range. Through the local spirit medium they were meant to understand that the wealth was for the Chiadzwa community only. The influx of illegal miners and dealers was a violation of cultural belief. (Chimonyo, et al., 2012).

2.3.3 Breakdown in Family Structures and Values

Studies have also been carried out to establish how mining operations in communities have impacted on their family structures and values. Chimonyo, et al. (2012) pointed out that the immediate effect of diamond mining was changing family wealth and welfare as shown by the improved food supply situation and asset acquisition. The illegal diamond mining transformed Chiadzwa from an unknown poverty stricken village to a village that was connected to Mutare with commuter transport and a large number of locals owning their own vehicles. It seized to be a sleepy village to one bustling with night life, which involved both entertainment and income generating activities, including diamond mining. Diamond mining had established new set of family chores that were dictated by mining activities and the need to, share in the income that the diamonds were bringing to households.

The study further revealed that household power relations in most families shifted in favour of children and women whose earnings from panning were higher. This was particularly in cases
where wives remained in the village and husbands were employed in the city, the women now commanded a higher income. As a result, the husband’s authority in the family was undermined as the wives became decision makers and championed more family development issues (Chimonyo, et al., 2012).

2.3.4 The Social Implications of Relocation

As a result of the onset of new mining operations, communities often face relocation to pave way for mining activities. In Zimbabwe several studies were carried to reveal how relocations affected the way of life for the affected communities. Kusena (2015), Chimonyo, et al. (2012) and CRD (2013) all looked at how the standard of living of the local communities were affected as a result of being moved out of mining areas. Chimonyo, et al. (2012) argued that formalisation of mining in Chiadzwa meant that the whole area had to have a single land use that is diamond mining. This meant that all families residing in the diamond mining area and indeed close to the diamond fields had to be relocated for security reasons. The families were going to be resettled on Arda Transau Farm at Odzi. The relocation of the villagers brought with it a plethora of challenges. These included food security, loss of livelihood, disruption of education, inadequate pasture. While families were happy with the accommodation provided, the families registered their reservation with the absence of a compensation scheme for their displacement. (Chimonyo, et al., 2012).

2.4 MINING AND THE ENVIRONMENT

The adverse environmental impact of mining activities on the environment is well documented (Heath, et al., 1993); (Veiga & Beinhoff, 1997); (Warhurst, 1999); (Warhurst, 1994). Particular attention has been directed towards the impacts of large scale and small-scale gold mining activities on environmental contamination. While the land degradation caused by the gold mining is pronounced, chemical contamination from the gold extraction process imposes a double burden on the environment, with harmful health implications for mining communities and people residing in close proximity to such activities (Yelpaala, 2004)

Most studies involve small numbers and are thus susceptible to predisposition, but some attempt more rigorous design. For example, in one site in the Philippines a study of 102
workers (occupationally Hg burdened ball-millers and amalgam-smelters), 63 other inhabitants (exposed from the environment), 100 persons living downstream of the mine, and 42 inhabitants of another site (serving as controls) was undertaken. Bio-monitors and medical scores for both workers and the surrounding communities were taken. The authors report that by this method, 0% of the controls, 38% downstream, 27% from Mt. Diwata non-occupational exposed and 71.6% of the workers were classified as Hg intoxicated (Drasch, et al., 2001).

In Zimbabwe several studies, researches and surveys in mining communities have revealed that environmental problems such as land degradation, pollution and others are associated with mining activities. Some of these are enumerated below.

2.4.1 Deforestation

According to Chimonyo, et al. (2012) in their study of deforestation in Chiadzwa pointed out that extensive areas of land and vegetation in Chiadzwa have been cleared to make way for surface mining activities. Firstly there was an increased use of fuel wood because of the influx of people into the area with no other source of energy. The miners especially needed a lot of fire wood since they lived in rudimentary shelters. Secondly the need for fuel wood for cooking increased as a large number of people became involved in food vending to feed the miners and there was also establishment of new homes as people speculated on the future. The greatest deforestation however was caused by the mining companies as they effectively cleared large tracks of land in order to expose the diamond ore. Villagers lamented the loss of fruit trees such as the baobab tree (*Adansonia digitata*) which were removed without thought of the social and economic role the tree played in the community. One wonders under such circumstances and in the absence to enforced rehabilitation of the mines, environmentally what is the future of Chiadzwa (Chimonyo, et al., 2012).

2.4.2 Land degradation

Land degradation was covered in the study carried out by Chimonyo, et al. (2012). The following extract summed up the level of land degradation in Zimbabwe as said by the Deputy Minister of Environment when he visited Chiadzwa in 2007. “The environment has been ruined. If we allow panning to continue the country cannot afford its reclamation ... What I have seen is land destruction at its worst. Who will be responsible for filling these shafts? The
extent of the plunder is shocking. It is as if these people were using motorized machinery like grders when they were using picks and shovels ... (Reported in Manica Post 16 June 2007 and cited in (Chimonyo, et al., 2012)

2.3 Water Pollution

Zimbabwe Environmental Law Association (2012) in their study of water pollution looked at how mining activities contribute to water pollution. Many underground mines have an active programme to reduce the water table or divert major watercourses away from the mines. This exercise has disruptive outcomes for the quality and availability of surface and ground water. Diamond mining, especially for alluvial diamonds, thrives along old river channels. The concentration of mining operations in Chiadzwa has been a chief cause of both surface and groundwater pollution. (Zimbabwe Environmental Law Association, 2012).

The studies carried out in Chiadzwa by Zimbabwe Environmental Law Association (2012) also looked at how communities’ programmes were affected by mining activities. Communities in the Marange/Odzi region of Manicaland (Chimanimani, Marange, Buhera and Chipinge) have for long relied on the Odzi and Save Rivers for potable water, domestic chores, bathing, fishing and other ecosystem services such as reeds used for the basket making industry. Irrigation schemes that draw water from the Odzi and Save Rivers in the Nyanyadzi, Tonhorai and Birchenough areas have been key to the sustenance of livelihoods of local communities (Zimbabwe Environmental Law Association, 2012).

2.4.4 Air Pollution

Boulanger & Gorman (2004) pointed out that mercury emitted as air pollution can travel hundreds, even thousands of mines in the air. Mining activities and mining support companies discharge particulate matter into the ambient air. The grievances of the affected communities on air quality have been the airborne particulate matter, emissions of black smoke, noise and vibration. Studies on impacts of mining in Chiadzwa noted that airborne particulates of major concern within the area include respirable dust. The activities that produce this particulate matter include site clearance and road building, open-pit drilling and blasting, loading and haulage, vehicular movement, ore and waste rock handling. All fine dust at a high level of
exposure has the potential to cause respiratory diseases and disorders and can exacerbate the condition of people with asthma and arthritis.

Studies on measures to prevent pollution was carried out by Zimbabwe Environmental Law Association (2012). The studies stated that mining companies have not laid down adequate measures to prevent harmful emissions of dust into the ambient air. Measures to reduce dust emission are restricted to occasional spraying of roads within the premises of the mining concessions. This seems to be a misplaced effort because road dust does not appear to be the main source of dust pollution. Furthermore, Environmental Management Agency acknowledged that dust suppression on the haulage roads is ineffective and the frequency of spraying is inadequate. Black smoke from fuel burning make up additional sources of airborne pollutants in the Chiadzwa mining area (Zimbabwe Environmental Law Association, 2012).

2.4.5 Noise and Vibration

The sources of noise and vibration in the area comprise mobile equipment, air blasts and vibration from blasting and other machinery. The impact of high-pitched and other noises is known to include damage to the auditory system, cracks in buildings, stress and discomfort (Akabzaa & Darimani, 2001). These noises can also terrify animals, hinder their mating processes and also cause abortions, therefore adversely affecting the animal population (Chimonyo, et al., 2012)

2.4.6 Impact on biodiversity

Chimonyo, et al. (2012) researched on the impact on mining activities on biodiversity. The change in both the aquatic and terrestrial habitats would have a profound effect on biodiversity, an issue that needs further investigation. The mining operations have drastically changed habitats in addition to increasing human population. Wild life seems to have been squeezed out by the human population while the mining operations created an environment unsuitable for the survival of many biological species (Chimonyo, et al., 2012).
2.5 THE TRIPLE BOTTOM LINE

Referred to as “a brilliant and far-reaching metaphor” Henriques (2007), the TBL construct was coined by Elkington in 1997. Prior to the late 1990s, the term was not significantly known. In essence, TBL is another construct that expresses the expansion of the environmental agenda in a way that integrates the economic and social lines (Elkington, 1997). TBL provides a framework for measuring the performance of the business and the success of the organization using the economic, social, and environmental lines (Goel, 2010). The term has also been referred to as the practical framework of sustainability (Rogers & Hudson, 2011). Targeted toward corporations, the TBL agenda puts a consistent and balanced focus on the economic, social, and environmental value provided by the organizations.

2.5.1 Economic Line

The economic line of TBL framework refers to the impact of the organization’s business practices on the economic system (Elkington, 1997). It pertains to the capability of the economy as one of the subsystems of sustainability to survive and evolve into the future in order to support future generations (Spangenberg, 2005). The economic line ties the growth of the organization to the growth of the economy and how well it contributes to support it. In other words, it focuses on the economic value provided by the organization to the surrounding system in a way that prospers it and promotes for its capability to support future generations.

2.5.2 Social Line

The social line of TBL refers to conducting beneficial and fair business practices to the labour, human capital, and to the community (Elkington, 1997). The idea is that these practices provide value to the society and “give back” to the community. Examples of these practices may include fair wages and providing health care coverage. Aside from the moral aspect of being “good” to the society, disregarding social responsibility can affect the performance and sustainability of the business. Recent examples in the industries have revealed that there are economic costs associated with ignoring social responsibility. For instance, during the 2002 civic elections in the Bay area of California, the public voted against the establishment of a Home Depot due to their perception of its negative residential impact as a neighbour (Dhiman, 2008). The social performance focuses on the interaction between the community and the
organization and addresses issues related to community involvement, employee relations, and fair wages (Goel, 2010).

2.5.3 Environmental Line

The environmental line of TBL refers to engaging in practices that do not compromise the environmental resources for future generations. It pertains to the efficient use of energy recourses, reducing greenhouse gas emissions, and minimizing the ecological footprint, among other things. (Goel, 2010). Similar to the social aspect of TBL, environmental initiatives impact the business sustainability of the organizations.

2.5.4 TBL in the Literature

There is considerably less empirical research on TBL. The focus of the studies in the relevant literature varied from accounting/finance to organizational behaviour. For example, Hidayati (2011) conducted a qualitative study to understand the extent of utilizing the TBL approach in executing CSR programs in the organization. Moreover, Ho & Taylor (2007) conducted another empirical analysis on TBL reporting using a quantitative approach. The purpose of the study was to examine the extent of TBL reporting and to evaluate how economic, social, and environmental issues are reported. Another empirical research on TBL was done by (Goel, 2010). The objectives of Goel’s qualitative study were to study the construct of TBL and its benefits, analyse the link between TBL and sustainable development, as well as develop a comparison between the TBL indicators and the sustainable reporting indicators. Despite the lack of significant research on TBL, the studies found have all referred to the economic, social, and environmental aspects simultaneously.

A critical assessment of the literature under review showed that much of the negative environmental and social effects of mining activities have been documented. In addition, most of the literatures reviewed were focused mainly on mining and economic development. Hence, these presented less findings on environmental, social and health impacts of mining activities on surrounding communities. This research work therefore intends to undertake a thorough and broader outlook into the environmental and social implications of mining on surrounding communities, both negative and positive, and recommend policy directives to improve the already instituted health policies by the ZMDC companies.
2.6 CONCEPTUAL FRAMEWORK

Most business challenges have remained unresolved because organisation or people failed to come up with adequate solutions to resolve them. In most cases a single strategy is implemented when in fact the problem might be requiring a multifaceted approach. Thinking through a problem from every angle possible is likely to result in a breakthrough.

The above has been conceptualised by Kim & Mauborgne (2005) and they referred to the multifaceted approach as the 4 Action Framework. The concept found its relevance in the Blue Ocean strategy and most companies have implemented the framework successfully.

The Blue Ocean Strategy Four Actions Framework (also called Eliminate Reduce Raise Create Grid – ERRC Grid) is a complementary tool to the strategy canvas. The framework basically consists in 4 questions that the practitioner has to answer to challenge the current business logic:

1. Which factors should be eliminated?
2. Which factors should be reduced well below the industry’s standard?
3. Which factors should be raised well above expectations?
4. Which factors should be created that has never offered?

For the purpose of this research study, the researcher adopted the 4 Fours Framework models. The model recognises that there are challenges in respect of mining activities and their effects as well as initiative by the ZMDC companies to mitigate the negative impacts.
Conceptually, the researcher represented this model below:

*Figure 2:1 4 Action Strategy*


Based on the objectives of the research study the following elements can be identified;

1. Elements should be eliminated and these could have direct adverse effects on the health of the local community which come as a result of the methods of mining being used.
2. Elements which should be created that never offered and this could be the involvement of the local community on Corporate Social Responsibility initiatives
3. Elements that can be raised and these could be relocation of all directly affected people
4. Elements that could be reduced which were overdone.

The researcher decided to apply this model and its basic premises to the mining situation in Chiadzwa. Particularly of much importance would be the need to identify various factors at play in respect of the mining activities as well as their impacts and then classify them in accordance with the four facets of 4 Action Framework.

Attention would then be placed on what needs to be done on each factor. Once implemented successfully, the challenges are likely to be managed successfully

2.7 CHAPTER SUMMARY

The chapter looked at existing literature that looked at mining process as well as relations between mining and the social footprint as well as mining and the environment. Several researches have been done on the topics but the researcher found out that the topics were not adequately covered in Zimbabwe hence the need for this research study.

The next chapter will look at research methodology.
3.1 INTRODUCTION

Research is a process of gaining a better understanding of the complexities of human experience. The goal of research is to describe and understand a field, practice or activity (Brown & Dowling, 2011). McMillan & Schumacher (2001) regard educational research to be imperative as it provides valid information, knowledge and principles to guide the decision-making, thinking and discussion process in education.

The chapter takes a look at how the field research was conducted. The main areas of concentration are the research design, research philosophy, target population, the sampling procedure and the survey instrument used. Further discussion is made in respect of the data collection methods adopted and reasons for rejecting other alternatives. The chapter concludes by describing the data analysis procedure.

3.2 RESEARCH DESIGN

The main focus of research design is to ensure that the data collected and analysed is helpful in answering the research questions. McMillan & Schumacher (1989) say that the goal of sound research design is to provide results that are judged to be credible. Credibility is improved when the research design takes into account potential sources of bias and try to eliminate or minimise these.

Validity is another important aspect of research design. Validity refers to the truth or falsity of propositions generated by research (McMillan & Schumacher, 1989). Saunders, et al. (2009) further argue that validity is concerned with whether the findings are really about what they appear to be about. The concepts of credibility and validity form the basis of the research study and all other concepts revolve around these two.

3.2.1 Research philosophy

Research philosophy is defined by Saunders, et al. (2009) as the development of knowledge and the nature of that knowledge. Saunders, et al. (2009) further argue that when embarking on any form of research, the researcher is precisely embarking on the development of
knowledge in a particular field. The knowledge development a researcher embarks on may not be as dramatic as a new theory of human motivation.

Saunders, et al. (2009) further assert that the research philosophy adopted by the researcher will harbour essential assumptions about the way in which the researcher views the world, of which the adopted assumptions will further underpin the research strategy and the methods that the researcher will choose as part of the research strategy. Additionally, in part, the philosophy which the researcher will adopt will be influenced by some practical considerations (Saunders, et al., 2009).

Saunders, et al. (2009) discuss four research philosophies which are Positivism, Realism, Interpretivism and Pragmatism. They further explore ways on how each of the four philosophies relates to the three ways of thinking about research philosophy; the three ways being Ontology, Epistemology and Axiology.

The four research philosophies, namely Positivism, Realism, Interpretivism and Pragmatism and how each of the four philosophies relates to the three ways of thinking about research philosophy; namely Ontology, Epistemology and Axiology are summarized in Table 3.1.
### Table 3:1 Comparison of research philosophies

<table>
<thead>
<tr>
<th></th>
<th>Positivism</th>
<th>Realism</th>
<th>Interpretivism</th>
<th>Pragmatism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontology</strong></td>
<td>External, objective and independent of social factors</td>
<td>Is objective</td>
<td>Socially constructed and subjective</td>
<td>External, multiple</td>
</tr>
<tr>
<td><strong>Epistemology</strong></td>
<td>Only observable phenomena can provide credible data and facts</td>
<td>Observable phenomena can provide credible data and facts</td>
<td>Subjective meanings and social phenomena</td>
<td>Either or both observable phenomena and Subjective meanings provide acceptable knowledge</td>
</tr>
<tr>
<td><strong>Axiology</strong></td>
<td>Research is carried out in a value free way</td>
<td>Research is value laden</td>
<td>Research is value bound</td>
<td>Values play a significant role in interpreting results</td>
</tr>
<tr>
<td><strong>Data collection techniques most often used</strong></td>
<td>Highly structured, large samples, measurement, quantitative, but can use qualitative</td>
<td>Methods chosen must fit the subject matter, quantitative or qualitative</td>
<td>Small samples, in-depth investigations, qualitative</td>
<td>Mixed or multiple method designs, quantitative and qualitative</td>
</tr>
</tbody>
</table>

**Source:** Saunders, et al. (2009).

#### Research philosophy for this study

This study adopted an Interpretivism research philosophy. The ontological view of this research is that what the researcher views as the nature of reality in as far as impacts of mining activities are concerned is socially constructed and subjective.

The research is value bound (demonstrating the researcher’s axiological position) in that the researcher is part of what is being researched and so will be subjective. Most importantly, the interpretivism stance has been adopted because of the flexibility it offers in data collection techniques. The methods chosen for data collection in this study are centred on the need to fit
the subject matter being mining activities and their impacts on surrounding communities and the environment.

3.2.2 Research Method

The method of conducting research can be classified into two categories which are qualitative and quantitative method. The two methods are summarised below;

Table 3:2 Qualitative and Quantitative Research

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Qualitative</th>
<th>Quantitative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a systematic subjective approach used to describe life experiences and give them meaning</td>
<td>a formal, objective, systematic process for obtaining information about the world. A method used to describe, test relationships, and examine cause and effect relationships.</td>
</tr>
<tr>
<td>Goals</td>
<td>To gain insight; explore the depth, richness, and complexity inherent in the phenomenon.</td>
<td>To test relationships, describe, examine cause and effect relations</td>
</tr>
<tr>
<td>Characteristics</td>
<td>• Soft science • Focus: complex &amp; broad • Holistic • Subjective • Dialectic, inductive reasoning • Basis of knowing: meaning &amp; discovery • Develops theory • Shared interpretation • Communication &amp; observation • Basic element of analysis: words • Individual interpretation • Uniqueness</td>
<td>□ Hard science □ Focus: concise &amp; narrow □ Reductionistic □ Objective □ Logistic, deductive reasoning □ Basis of knowing: cause &amp; effect, relationships □ Tests theory □ Control □ Instruments □ Basic element of analysis: numbers □ Statistical analysis □ Generalization</td>
</tr>
</tbody>
</table>


In this research study, the qualitative method of research was used mainly because of the following some reasons.

1. This research study is mainly theoretical based where at first theory is formulated and after that the theory is established by analysing collected data. There will not be used any kinds of numerical data or statistics but for interpreting qualitative data, graphs and charts are used by the researcher.
2. The method is useful for studying a limited number of cases in depth. In this research study, a single case of the Chiadzwa community was considered.

3. It provides understanding and description of people’s personal experiences of phenomena and in this study people gave accounts of how mining activities directly affected their lives and their environment.

4. Data can be collected in naturalistic settings.

5. Qualitative approaches are especially receptive to local situations, conditions, and stakeholders’ needs.

The following drawbacks of the qualitative approach were always at the researcher’s dashboard to ensure that their impacts were minimised.

1. Knowledge produced from the data might not generalise to other people or other settings that is findings might be unique to the relatively few people included in the research study.

2. Data collection is often longer especially when compared to quantitative research.

3. Data analysis is often laborious and time consuming.

4. The results can easily be influenced by the researcher’s personal biases.

### 3.2.3 Research approaches

Saunders, et al. (2009) highlighted that research approaches are categorized into either a deductive approach or inductive approach.

The deductive approach involves the development of a theory that is subjected to a rigorous testing. As such, it is the dominant research approach in the natural sciences, where laws present the basis of explanation, allow the anticipation of phenomena, predict their occurrence and therefore permit them to be controlled (Collis & Hussey, 2003).

An alternative approach to conducting research is DIY (Do It Yourself). For example to understand a shop employee absenteeism would, require one to go on to the shop floor and interview a sample of the employees and their supervisors about the experience of working at the store. The purpose here would be to get a feel of what was going on, so as to understand
better the nature of the problem. The alternative approach has been termed the inductive approach (Saunders, et al., 2009).

This research is more inclined towards the inductive approach in that it seeks get a feel of what was going on, so as to understand better the nature of the problem. Induction has been adopted insofar as guiding the sampling decision of residence of Chiadzwa to which questionnaires were sent with the aim of establishing how their day today lives have been affected by mining activities. The researcher’s task then was to make sense of the collected data by critically analysing it. The result of the analysis was therefore formulation of theory discussed in the findings section of this report, drawn from the perceived implications of mining activities on the surrounding people and the environment.

3.2.4 Research purpose

The research purpose is a statement of "why" the study is being conducted, or the goal of the study. Saunders, et al. (2009) argue that the purpose of a research is as a result of the questions that the researcher wishes to answer and the objectives of the research.

The classification of research purpose that is most often used is the threefold one of exploratory, descriptive and explanatory studies (Saunders, et al., 2009). However, research questions can be both descriptive and explanatory, implying that a research project may have more than one purpose (Saunders, et al., 2009).

The purpose of this research study was exploratory, with elements of explanatory research coming out as both part of the research and an extension of the study.

The study was exploratory because it seeks to establish how local communities and their environment have been affected by mining activities. The explanatory nature of the study emerges as this research study also sought to assess how the initiatives by ZMDC companies have helped in minimising the impacts of their activities on the environment and living standards of the surrounding communities.

3.2.5 Research Design

Research design provides a framework for the collection and analysis of data (Bryman, 2008). The design will in turn influence and determine the researcher’s choice of the methods to be used in the collection of data. Bryman (2008) outlined five prominent designs and these
involve the experimental design, cross-sectional design also known as survey research, longitudinal design, case study and comparative design. For this research, the case study design was employed mainly because it involves looking at the impacts of mining activities on the environment and on social footprint for a specific society which is Chiadzwa and taking the activities of the diamond mining companies (ZMDC companies) as a single case to study.

Other reasons which support the use of case study strategy in the study are discussed below.

1. Using such a single case study of an area would mean that as per the principles of qualitative research strategy, the issue of generalization would be limited to the context of the study.
2. The case study strategy also has considerable ability to generate answers to the question ‘why?’ as well as the ‘what?’ and ‘how?’ questions, although ‘what?’ and ‘how?’ questions tend to be more the concern of the survey strategy (Saunders, et al., 2009).
3. The study uses different data collection techniques within one study in order to ensure data validity and reliability. The research used field observation as well as questionnaires for data collection.
4. Case studies allow a lot of detail to be collected that would not normally be easily obtained by other research designs. The data collected is normally a lot richer and of greater depth than can be found through other experimental designs.

3.2.6 Time horizons for the study

Research studies can either be snapshots taken at a particular time, or they can be in the form of a diary or a series of snapshots representing events over a period of time (Saunders, et al., 2009). Saunders, et al. (2009) refer to the snapshot time horizon as cross-sectional studies whereas the series of snapshots time horizon is called longitudinal studies.

Studies of a particular phenomenon or phenomena at a particular time usually take the form of cross-sectional studies.

Longitudinal studies have the strengths of enhanced capacity to study change and development. Adams and Schvaneveldt (1991) as cited by Saunders, et al. (2009) argue that in observing people or events over time, the researcher is able to exercise a measure of control.
over variables under study, on condition that the variables will not be affected by the research process itself.

The research on the impact of mining activities on the Chiadzwa people and the environment was conducted using a longitudinal approach. The approach was found to be suitable as it seeks to explore the impact of mining activities on surrounding communities and the environment over a period of time.

The justification for choosing the longitudinal approach is that the researcher is able to exercise a measure of control over variables being studied, provided that they are not affected by the research process itself. The research was also guided by Saunders, et al. (2009) (Saunders, et al., 2009) when they argued that the main strength of longitudinal research is the capacity that it has to study change and development.

Thus the study was carried out on the mining activities and their impacts on the social footprint and the environment of Chiadzwa community over the period 2009 to 2013.

3.3 TARGET POPULATION

(Mupambireyi, 2001) defines a population as a whole list of the observations under consideration. A population is also defined by Saunders, et al. (2009) as the full set of cases from which a sample is taken. When data is collected and analysed from every possible case or group member, it will be termed a census (Saunders, et al., 2009).

For purposes of this research the target population were all the residence of Chiadzwa under headman Chiadzwa as well as all employees of ZMDC companies operating in Chiadzwa.

3.4 SAMPLING

Typically, the population is very large, making a census or a complete enumeration of all the values in the population impractical or impossible. The sample usually represents a subset of manageable size. Samples are collected and statistics are calculated from the samples so that one can make inferences or extrapolations from the sample to the population. This process of collecting information from a sample is referred to as sampling. The data sample may be drawn from a population without replacement, in which case it is a subset of a population; or with replacement, in which case it is a multiset (Wikipedia, 2015).

Thus Saunders, et al. (2009) argue that sampling provides a valid option to a census when:
1. surveying the entire population would be impracticable;
2. budget constraints prevent the researcher from surveying the whole population;
3. time constraints prevent the researcher from surveying the whole population; and
4. The researcher would have collected all the data but research results are needed quickly.

The researcher could not work with the entire population given the limitations stated above, therefore sampling was done to represent the entire population as highlighted on Section 3.4.1 below.

**Sample size for this study**

In determining an optimal sample size for the research topic, reference was made to both existing formulae and guidelines on how the exercise could be done.

Saunders, et al. (2009) pointed out that statisticians have demonstrated that ‘…a sample size of 30 or more will usually result in a sampling distribution for the mean that is very close to a normal distribution’. For this reason, Stutely (2003), as quoted by Saunders, et al. (2009) recommended that a minimum number of 30 samples for adequate statistical analyses and inferences to be made about the population.

Based on the forgoing discussions, the researcher used judgment and personal experience to decide on the sample size. A sample of 70 people was chosen from the entire population. The sample was made up of 40 units from the local community as well as 30 units from the ZMDC companies. More units were chosen from the local people as the research seeks to establish how those people were affected by mining activities.

**3.4.1 Sampling techniques and sampling procedures**

Saunders, et al. (2009) highlighted that sampling techniques available to a researcher can be divided into two types:

1. probability or representative sampling;
2. Non-probability or judgmental sampling.

**Sampling method for the study**

For this study a combination of simple random, stratified, snowball and purposive sampling were used. The reason for this was that the data included different variables of the target
population in terms of place of work, distance from the mines, socio-economic circumstances of the sample units and differences in perception towards mining activities and its effects on the surrounding people and the environment.

Initially, the population was dived into two strata and these were employees from the ZMDC companies as well as local people from the Chiadzwa community. The researcher wanted to assess the different views from both the companies who are carrying out the mining activities as well as from the residences who are being affected by the mining activities.

Then from the local people strata, the researcher purposively selected the study villages based on their proximity to the researcher’s place of work. Since villages are under their respective village heads, the researcher started with village heads who would then recommend suitable candidates who would assist in the study hence the use of the snow ball method. 40 people were selected for the administration of interviewer administered questionnaires.

The researcher also purposively selected two companies Jinan Mining and Anlin Investments from which a sample of 30 employees was randomly selected.

The justification of the sample size lies in the fact that time and resources available to the researcher were not enough to cover the entire area with a population of about 12 000 people from approximately 4 300 families. Altogether, there are 10 villages are Headman Chiadzwa which makes up the target population together with the 7 ZMDC companies operating within the area. This divides the total population into approximately, 1200 people per village. 7 villages were chosen based on their relative proximity to researcher’s place of work.

40 respondents were sampled for questionnaire administration at each of the 7 villages located on average 0.5-10 km away from researcher’s location. The other 30 respondents were sampled from the 7 companies operating within the area. The distribution gives a total of seventy (70) respondents. Since the 7 communities and 2 companies chosen for this survey were not concentrated at one area but were scattered across the area, the views gathered from the total sample of 70 respondents effectively represented the views of the entire population. Table 3.3 gives details of the sample.
### Table 3.3  Distribution of Sample (Local Community)

<table>
<thead>
<tr>
<th>Village</th>
<th>Distance From The Mine Site</th>
<th>Number of Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonhorai</td>
<td>1-3km</td>
<td>10</td>
<td>25%</td>
</tr>
<tr>
<td>Dzoma</td>
<td>1-4km</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>Chirasika</td>
<td>1-4km</td>
<td>10</td>
<td>25%</td>
</tr>
<tr>
<td>Chiadzwa</td>
<td>1-10km</td>
<td>6</td>
<td>15%</td>
</tr>
<tr>
<td>Gamunorwa</td>
<td>1-7km</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Mwapamba</td>
<td>1-7km</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Dziwande</td>
<td>1-7km</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>40</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

#### 3.5 TYPES OF DATA

The data collected included background data on respondents, awareness, perception and effects of mining within the surrounding communities, health status of residents in the surrounding communities, food security and the status of health facilities available to the residents in the surrounding communities of the mines.

In addition, data on the methods of ZMDC companies’ mining activities were collected. Similarly, data on the effects of ZMDC companies’ mine operations on the environment were collected and analysed.

Moreover, data on interventional measures by ZMDC companies such as those dealing with the environment as well as the safety health measures being put in place by the companies were collected and analysed. Last but not the least, data on activities of agencies and organizations such as the Environmental Management Agency (EMA) in regulating mining activities in the country were collected.

#### 3.5.1 Sources of Data and Methods of Data Collection

Data for this study were from primary and secondary sources. Primary data included data obtained by way of administering questionnaires in the field to residents of surrounding communities of Chiadzwa and some mine workers of Jinan Mining, and Anjin Investments. It also included data which was collected by way of observation by the researcher.
The interviewer administered questionnaires allowed the researcher to capture non-verbal communication as well as probing more data especially from local leadership as well as from senior managers from the diamond companies.

Secondary data were culled from company websites, company policies, books, relevant articles from journals and reports of researches conducted on the effects of mining operations on the surrounding communities. These were obtained from the companies, libraries, the internet and other sources.

3.5.2 Data Collection Methods

Various data collection methods were available for use when carrying out research. Some of the data collection methods that could be used are;

1. Observations
2. Interviews
3. Questionnaires

For the purpose of this study, the researcher made use of questionnaires and field observations.

3.5.2.1 The questionnaire

Saunders, et al. (2009) argued that the questionnaire’s greatest use with business and management research is made with the survey research strategy, although they also note that both the experiment and case study research strategies can employ the questionnaire approach.

The questionnaire is defined by deVaus (2009), as quoted by Saunders, et al. (2009) as a general term to include all techniques of collecting data in which each person is asked to respond to the same set of questions in a predetermined order.

The questionnaire can be administered in various ways, broadly categorized into self-administered questionnaires and interviewer administered questionnaires. Self-administered questionnaires can be distributed via the internet and intranet media, posted to the respondents or delivered and collected by the researcher in person. On the other hand interviewer administered questionnaires usually take the form of asking questions over the phone or can be administered by way of structured interviews.
Saunders, et al. (2009) further argue that the choice of a questionnaire as a research instrument is usually affected by a variety of factors related to any research’s questions and objectives. These factors include:

1. the characteristics of the sample from which data will be collected;
2. the essence of reaching particular respondents;
3. the importance of the respondents’ responses not being distorted
4. the size of the sample, in relation to the likely response rate, and
5. the nature and number of questions that the researcher would need to ask to collect the desired data.

**Advantages of using a questionnaire as a research instrument**

Questionnaires are used because of the following advantages that are proffered by Saunders, et al. (2009):

1. With questionnaires, respondents are given room to respond to questions at the time convenient to them. Respondents have the flexibility of completing the questionnaires at home, during weekends or during the spare time they may create, and this enables collection of meaningful and thoughtful data.
2. Questionnaires also enable respondents to provide answers without bias that often arise when engaging in face-to-face conversations.
3. The use of questionnaires also enable the researcher to cover a large proportion of the sample within a short period of time since no time is spent asking questions to respondents as in face to face interviews or through observing respondents.

**Disadvantages of using a questionnaire as a research instrument**

Despite being the main instrument used in research, the questionnaire comes with its own weaknesses that affect the results of the research. These weaknesses are summed up by Saunders, et al. (2009) as:

1. There is possibility that some questions will be left unanswered as the researcher will not be present at the time of completion of the questionnaire to verify if all questions have been completed.
2. Questionnaires do not allow for further probing as is the case with face to face interviews. Thus the researcher may not seek clarification of issues at the time when respondents were completing the questionnaire.

3. Distribution of questionnaires may prove to be a costly exercise from printing to the distribution of the questionnaires.

4. The other limitation of questionnaire is that spaces provided on the questionnaire may not be enough for the respondents to put all their detailed responses, resulting in collection of partial responses.

**Qualities of a good questionnaire**

To capitalise on the advantages that a questionnaire offers as a research instrument, Saunders, et al. (2009) highlight that a good questionnaire must show the qualities discussed below:

1. Inclusion of closed, multiple choice questions to ensure that questions were quicker and easier to answer. This would also allow answers to be easily compared as they were predetermined.

2. Inclusion of open ended questions to allow for self-expressions.

3. Maintaining brevity by ensuring that questions presented in the questionnaire were generally short and precise. Redundant and unnecessary words should be avoided as much as possible.

4. Focusing on relevancy by ensuring that all questions focus on the issue under study and the questions should be specifically formulated to answer the same aspects of strategic management.

5. Defining technical concepts before posing questions to enhance understanding and encourage responses.

6. Maintaining clear wording of questions to avoid ambiguity and misinterpretation of questions.

In carrying out this research, both the self-administered and interviewer administered questionnaire were used to collect the needed data. The questionnaires for the respondents from local community were interviewer administered given the inherent limitation of literacy in the rural areas. The questionnaire was used as the interviewer guide during data collection.
The questionnaires for the respondents from the ZMDC companies were self-administered and were mostly hand delivered to the respondents. The questionnaires were used on the 70 selected samples. Two questionnaires were designed, one being for the local community and the second one for the employees of the mining companies.

3.5.3 Designing the questionnaire

The questionnaires were designed following the seven-step model that highlights the important decisions that a researcher has to take into account when crafting a questionnaire, as proposed by Tull & Hawkins (1993). The model is shown in Figure 3.1.
In designing the questionnaires, the researcher assumed that the impact of mining on local communities and the environment as well as how the companies were mitigating the negative impacts are perceived differently. This prompted the design of the questionnaires to be all encompassing and also be open to allow different views to be captured.
The targeted respondents were people still living in the mining concessions who are being affected by the mining activities as well as management and employees from the companies carrying out mining activities. The questions were then constructed carefully, drawing upon a mix between the researcher’s experience and existing literature on the research area. Also, the style in which the questions were going to be answered by the targeted respondents was ‘anticipated’ when preparing for the questionnaire and hence it was a major point of concern in the designing of the questionnaire.

One of the objectives borne in mind in the design of the questionnaires was for it to be quick and easy to complete. This was important because the researcher was of the opinion that the study area was very broad and therefore there was need to construct numerous questions to come up with a satisfactory study of the subject matter. Thus the objective was to ensure that respondents would answer questions quickly and efficiently. To ensure that this objective was achieved, the questionnaires had many YES/NO and multiple choice questions. A few open ended questions were also included in the questionnaire but keeping these questions to a minimum.

The questionnaires had sub headings to capture the different aspects of the study which are;

1. Mining and health
2. Mining and the environment
3. Social impact on mining activities
4. Initiatives by the companies to mitigate the negative effects.

The question sequence was carefully considered to encourage and lead respondents to continue with the questionnaires to the end. The objective for abiding by this careful consideration was to maintain respondents’ interests whilst completing the questionnaires. This interest was envisaged to depend on the layout of the questionnaires as suggested by Tull & Hawkins (1993). As highlighted by Tull & Hawkins (1993) the researcher focussed on neat and attractive presentation of the questionnaires so that respondents would be encouraged to look forward to all other subsequent pages in the questionnaires.

Additionally, the researcher made a deliberate attempt to ensure that questions at the beginning of the questionnaires were introductory in nature to assist respondents to feel
comfortable and relaxed in responding to the questionnaires. More importantly, the questions were ordered, so that more demanding questions were in the later sections of the questionnaire.

**Questionnaires format**

The questionnaires were designed to extract as much information as possible on how mining activities have affected local communities and also looked at how mining companies have reacted to the negatives impacts of their mining activities on the local communities and the environment. The two questionnaires designed were;

1. Questionnaire schedule for residents in the surrounding communities
2. Questionnaire schedule for employees of diamond companies.

Questionnaire schedule for residents in the surrounding communities had the following subsections;

1. Personal information
2. Mining activities and impacts on the environment
3. Mining and health
4. Social implications on mining
5. Roles of legal regulating agencies and other stakeholder organisation within the mining sector

Questionnaire schedule for management of diamond companies had the following subsections

1. Personal information
2. Mining activities and impacts on the environment
3. Roles of legal regulating agencies and other stakeholder organisation within the mining sector

The overriding objective in the design of the format of the questionnaires was to ensure that questions that required more time and information were placed later in the questionnaire so that respondents would not be discouraged mid-way through the questionnaire. This could have threatened the completion of the questionnaire, which would consequently negatively affect the data analysis exercise. As expected, the questionnaire formats enhanced the research
study as all the respondents who provided answers to the questions completed the questionnaire as best as they could.

### 3.6 DATA GATHERING PROCEDURES

The data gathering procedure primarily aims at ensuring that the data collected in any research will enable the research questions to be answered and thus enabling the researcher to meet the research objectives (Saunders, et al., 2009).

To ensure research questions were answered and the objectives of the research were met, a data requirement checklist was created by making reference to the six steps that Saunders, et al. (2009) recommend as detailed herein:

1. the researcher decided on the main outcome of the research as exploratory, with elements of explanatory research expected to come up as complimentary outcome of the research;
2. research questions were sub-divided into more specific investigative questions about which the researcher needed to gather data;
3. the exercise of sub-dividing research questions was often repeated where the investigative research questions were not sufficiently precise;
4. variables about which the researcher needed to collect data were identified so that the investigative research questions could be answered;
5. the level of detail required from the data for each variable was also determined; and finally
6. measurement questions were developed to capture the data at the determined level of detail that was required for each variable.

Having developed the guiding framework against which data was going to be collected, two questionnaires entitled; “The Impact of Mining Activities on Local People and the Environment. A Case Study of ZMDC Operations in Chiadzwa” was circulated to 40 residents of the local communities and 30 to employees of the diamond companies. The overriding objective of the investigation was to assess the extent of the impacts of mining activities on the environment as well as on social footprint of the people living in the Chiadzwa as well as on the mitigatory measures employed by the diamond companies in minimising the extent of the impact.
Preliminary communication was made by dispatching an introductory letter to the village head of all the villages which were targeted as well as to the Chief Executive Officers of the targeted diamond mining companies.

The introductory letters were meant to inform the responsible authorities on the study to be carried out in their area as well as seek approval to dispatch and administer the questionnaires. Subsequently, each of the nominated respondents from diamond companies was contacted by phone and or by email to ascertain their availability and consent to be involved in the research. In the case of residents from the local communities door to door visits were carried in the company of the villager heads’ representative. Where one would excuse himself or herself, the researcher asked for reference to an alternative respondent, preferably in the same village to whom the questionnaires could be sent.

**Pre-testing the questionnaire**

Before drafting the final version of the questionnaire, it had to be pre-tested. According to Saunders, et al. (2009), pre-testing a questionnaire is a way of controlling the validity and relevance of the questionnaire as well as ascertaining the easy with which questions can be responded to. To pre-test the researcher’s first drafted questionnaire, pilot questionnaires were handed out to 5 managers and 2 village heads. Responses were collected in a week. The aim of the test was to judge the appropriateness of the questionnaire in terms of the content, response format and time considerations.

The responses received indicated that it was important:

1. To split the questionnaire into relevant sections; and that there was need to have the right mix of open-ended and closed-ended questionnaires, with the latter type having more questions than the former for time considerations.

Once the final version of the questionnaire was produced, the questionnaires were hand-delivered to the chosen respondents. The respondents were given a grace period of 10 days to respond to the questions after which the researcher returned to collect the completed questionnaires. On the interviewer administered questionnaires, the researcher first dispatched the questionnaires and returned to administer after 3 days.
70 copies of the questionnaire were produced and a copy was sent out to 40 people from the local community and 30 to employees of the diamond companies. The final collection date for all the completed questionnaires was 30 June 2015.

3.7 ANSWERING TECHNIQUES AND DATA ANALYSIS

All data obtained from the questionnaire using different answering techniques discussed hereunder was manually analysed.

Three techniques for answering questions in the questionnaire were used by the researcher. These were designed in such a way that they would aid the researcher to perform data analysis and present the research findings in a manner that does not compromise the validity of the findings.

The first technique was multiple choice, where a question was presented with 5 possible answers to choose from. To ensure that least time would be spent responding to the questions, all that was required was to pick the most appropriate answer from the one provided. The question provided an option for the respondent to record their own response in case the ones provided are not satisfactory. This approach was considered to be the best because when analysing the completed questionnaires, the marked numbers were input into SPSS as they were pre-refined and ready to be statistically analysed.

The second answering technique employed was the box technique, with simple ‘YES/NO’ questions being used. This meant asking questions with boxes marked YES/NO against each question denoting the two as the alternative responses. Other questions that could not be best answered with a simple YES or NO gave respondents choices of boxes with specific meanings and the respondents would tick the relevant boxes. Each box was then assigned a number to enable the researcher to perform statistical analysis and interpretation of the responses.

The third type of the questioning and answering technique was the open-ended technique. However, these questions were kept to a minimum by the researcher because these are time consuming. As such, it was deliberately attempted to identify possible responses to the questions in order to eliminate as far as possible the open-ended questions and thereby keeping the questionnaire short.
The researcher also took cognisant of the fact that responses to open-ended questions are, more often than not, very difficult to group together. Grouping was however needed because it allowed common information to be obtained and this helped in the statistical analysis of findings. Notwithstanding these facts, the researcher provided spaces at the end of each section and to all questions where further elaboration to suggested possible responses was required. This was considered necessary as it allowed respondents to write more about a point if they felt additional information was considered necessary or helpful. Content analysis was then used to analyse and interpret qualitative responses from such open-ended questions.

There were, however, some inevitable cases of non-responses to some questions in the questionnaire.

3.8 LIMITATIONS OF THIS STUDY

In every research, the tendency as a researcher to face certain challenges on the field of the study cannot be overlooked. The truth is that certain conditions and constraints exist in social settings that may invariably impact and challenge the work of the researcher. These challenges may be experienced in many ways and can for instance be in the methods that would be used in the collection of the data itself or in the social setting where the research is being carried out.

One major challenge that the researcher encountered in the community where the research was contacted was the uneasy access to information from the people concerned in the study. Information about diamond activities is regarded classified information in Zimbabwe and most people are not willing to discuss any topic to do with diamonds especially to outsiders. Further to that, rural communities in Zimbabwe are sceptical of outsiders who come to them for information. Probably experiences have created impressions in the minds of local people that all people who come to them for information require the information in order to maximise their benefits at the expense of the same people. As a result, usually people do not open up to give out much information.

Another challenge faced especially where there is direct contact with the respondents during a research study is that the respondents attempt to give answers they think are most required by the researcher. This resulted in some details being exaggerated thereby departing from the actual situation on the ground.
Finally, though it was easy for understand the language of the people in the area where the mining activities take place, problems occurred in the process of asking the questions from the questionnaires since the researcher had to translate them from English to the vernacular language to make people understand and respond appropriately. Translation from English to the appropriate vernacular language for the area required that certain words be added for easy comprehension. But this had the effect of introducing biases into responses especially stemming from the ways the questions are asked in the local dialect. This was a major challenge that was faced in the field since most of the people are not very conversant with English even though the literacy rate is not very low.

3.9 CHAPTER SUMMARY

This chapter has identified the procedures adopted to carry out the research study and the various mechanisms that were put in place to ensure validity, completeness and reliability of the data collected. The chapter outlined the research methodology, highlighting the underlying research philosophies that usually have a bearing on how research will eventually be conducted, research approaches that will be consequently used in relation to the philosophy adopted and the respective appropriate research methods thereof. Issues pertaining to the population, selection of the sample and sampling techniques, sources of data and the research instruments used were also brought to the fore in an attempt to demonstrate how the research questions would be eventually answered. Finally, the challenges faced during data collection were also discussed. Thus the whole research was carried out with references to the issues that are discussed in this chapter. The subsequent chapter, Chapter 4, will focus on data presentation, analysis and interpretation of the research findings obtained from the field research.
CHAPTER 4  RESEARCH FINDINGS AND ANALYSIS

4.1 INTRODUCTION
The chapter presents the empirical data and findings from the field of study as extracted from Chiadzwa community respondents and employees of the mining firm namely Jinan Mining and Anjin Investments from the questionnaires which were distributed. The findings are presented in relation to the research questions and objectives of the study. Each research question was captured by at least one question from the questionnaires.

The findings are therefore presented around the following research questions: methods of mining and their impacts, how the social and natural environment have been affected with the onset of mining operations, how mining operations are affecting the health conditions of the local people and whether management of the diamond mining companies are aware of the impacts of their operations on the community and how they are managing or intend to manage the impacts. The findings begin with a brief description of the socio demographic profile of the respondents who are residents of the Chiadzwa as well of the employees of the diamond mining companies.

An analysis of the empirical findings is done later on the chapter. The analysis was meant to give meaning to the empirical findings and data.

4.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS
It is imperative to have adequate personal information of the respondents who participate in a particular research. Such information will give readers a fair idea about the category of people who took part in the research.

For this study, personal information about respondents in terms of their gender, marital status, education, occupation and years of domicile in the community was collected. The total number of people who participated in the study was seventy (70). They were made up of both male and female respondents.
Out of this total number of respondents, eleven (11) of them representing 20% were females whereas forty five (45) of the respondents were males (80%). 14 respondents did not return the questionnaires within the maximum period given. 10 of these were the residents of Chiadzwa whilst 4 were employees from the mining companies.

**Table 4:1 Number of participants and respondents based on Gender**

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies</td>
<td>22</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Locals</td>
<td>23</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>11</td>
<td>56</td>
</tr>
</tbody>
</table>

The respondents were mainly made up of men. In rural settings, the men are the ones who are expected to deal with visitors hence the reason for more men in the study.

From the company setup, mining is usually reserved for men especially given that it is conducted in the remote areas where women might find it difficult to live.

**4.2.1 Occupational background of respondents**

One major determinant of the social status and economic power of people in most communities is their occupation. As a way of determining the economic livelihood of the people i.e. their poverty levels and the high expectation for job creation and opportunities with the onset of formal diamond mining by ZMDC companies, the occupational background of the respondents were sought. From the responses given by the locals, 37% were peasant representing 11 respondents whilst 33% indicated that they were not employed. The remainder of 10 respondents are formally employed mostly by the diamond companies.
4.2.2 Educational background of respondents

Another important determinant that would determine the quality of the data to be collected is the educational background of the respondents.

Table 4:2 Table Showing Educational Distribution of Respondents

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Primary</td>
<td>5</td>
<td>9%</td>
</tr>
<tr>
<td>Secondary</td>
<td>25</td>
<td>45%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>24</td>
<td>43%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>
None of the participants indicated to be illiterate. From the researcher experience, most of the residence indicated to have acquired some formal learning, but most of them would not comprehend the questionnaire which was written in English.

4.2.3 Years of Domicile of respondents in the community

Respondents were asked about the period that they have stayed in Chiadzwa. The question was particularly useful and worth asking as it helped to determine the level of familiarity and knowledge of environmental, health and social issues in the area before and after the start of diamond mining and thereby being able to give a fair account of the situation in an objective manner.

*Table 4.3* Respondents’ years of domicile in Chiadzwa

<table>
<thead>
<tr>
<th>Years in Chiadzwa</th>
<th>No. of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 years</td>
<td>4</td>
</tr>
<tr>
<td>11-20 years</td>
<td>7</td>
</tr>
<tr>
<td>21-30 years</td>
<td>5</td>
</tr>
<tr>
<td>Above 30 years</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Most people had stayed in Chiadzwa for more than 15 years and the researcher was confident with their capability to respond to the questions from a more informed position.

4.3 MINING METHODS BY ZMDC COMPANIES

The researcher through observation captured the method of mining used by ZMDC companies in Chiadzwa. All the companies use surface mining. Surface mining in Chiadzwa take two forms based on the type of diamond being mined which is either alluvial or conglomerate.

4.3.1 Surface Mining (Alluvial)

Alluvial mining involves scraping off the layer just below the top soil and the average depth is 0.5 meters to 3 metres deep. The entire layer which is referred to as the ore board is lifted off to the processing plants for processing.
Figure 4.2 below shows heaped piles of ore waiting to be taken to the processing plant.

Figure 4:2  Alluvial Mining in Chiadzwa

To confirm the researcher observation, all the sample respondents from the ZMDC companies were aware of the type of mining which is surface mining.

4.3.2 Surface Mining (Conglomerate)

Conglomerate mining, although it is regarded as surface mining involves digging pits in order to reach the ore body containing diamond. Open pits as seen by the research could be as deep as 40 metres covering 4 hectares of land.

One respondent from the ZMDC companies suggested that they also carry out underground mining which the researcher assumed was referring to conglomerate mining with pits going down as deep as 45 metres. Figure 4.3 below as captured by the researcher shows a conglomerate mining pit at one of the mining sites which was said to be 40 metres deep.
All the 56 respondents both the locals and employees from the diamond companies acknowledged that they were aware of the mining activities in Chiadzwa.

All the respondents also acknowledged that they were aware of the method of mining being surface mining. One respondent from the companies went on to say that they also engage in underground mining a position the researcher could not verify to be true

### 4.4 ENVIRONMENTAL EFFECTS OF THE MINING METHODS.

“Can’t you see for yourself what these diamond companies did to my farming area? This is the worst type of mining I have witnessed in my entire life where all the land is dug up and loaded in trucks for processing. And then what?” (A male respondent expanding his questionnaire answer, 25 June, 2015)

One respondent was quoted above whilst pointing to the area indicated on Figure 4.3 which used to be his maize fields.
In terms of figures, 100% of the respondents from the ZMDC companies acknowledged that the methods of operation by the mining company have some effect on the natural environment.

All the respondents from the local communities also acknowledged that the methods of mining by the companies have an effect of the environment.
Most of the respondents noted that land degradation was the main problem that came as result of diamond mining. The method of mining especially alluvial mining was noted to have contributed more to land degradation.

### 4.4.1 Land Degradation

Land is inevitably a valuable asset to many people especially the rural community like Chiadzwa. Land is therefore very important to the people of Chiadzwa because it is the very source of their livelihood especially with most of them being peasant farmers.

In terms of the impact of mining on the environment, one respondent had this to say.

*“Therefore are we going to live with this dangerous pit the rest of our lives? How many cattle are going to fall and die in that pit? What about the people, our children swimming and drowning in these dangerous pits. I had lived peacefully here for over 40 years and now look at what diamonds brought to our community”*  
(one female respondent, 24 June, 2015)

The respondents were asked whether their source of livelihood has been impacted in any way with the start of mining in the community and whether the mining companies had in any way compensated or are compensating the affected ones. All the respondents indicated that their land is hugely degraded and destroyed by ZMDC operation. 83% stated that clearing of
vegetation was the cause of land degradation whilst 53% noted that use of heavy machinery was the cause.

Figure 4:6 Causes of land degradation

4.4.2 Pollution

On pollution, one male respondent requested to be driven around the concession close to his home in order to show the researcher what mining activities had done. He was particularly interested in showing the researcher a river which was intercepted upstream as result of alluvial mining along the same river.

Whilst pointing at the Figure 4.3, the male respondent had this to say.

“This river used to be a source of water for us and our livestock for a greater part of the year even though it would eventually dry up. If you go upstream you will see the same river still with some water which I suspect to contain some toxic chemicals from a close by processing plant. (Male respondent, 25 June 2015)
A greater percentage of the respondents (63% from the locals and 60% from the companies) noted pollution as one of the effects of mining activities. On the causes of pollution 18 of the
local respondents noted use of toxic materials as cause and the other causes noted are shown on the table below.

**Table 4.4 Causes of pollution**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of tailing dams</td>
<td>8</td>
<td>27%</td>
</tr>
<tr>
<td>Use of toxic materials</td>
<td>18</td>
<td>60%</td>
</tr>
<tr>
<td>Use of heavy machines</td>
<td>17</td>
<td>57%</td>
</tr>
<tr>
<td>Clearing of Vegetation</td>
<td>15</td>
<td>50%</td>
</tr>
<tr>
<td>Long period of extraction</td>
<td>6</td>
<td>20%</td>
</tr>
</tbody>
</table>

These were confirmed by field observation by the researcher. The research revealed that mining activities particularly alluvial mining, have been a major source of both surface and underground water pollution.

There were claims by some of the respondents that some companies discharge water with chemicals directly into the river as captured below

“We know them, they are discharging contaminated water into Save river and downstream the water is milk white” (female respondent in Chiadzwa village, 27 June 2015)

### 4.5 HEALTH EFFECTS OF MINING ACTIVITIES ON CHIADZWA

Respondents were furthered questioned about the implications of the environmental impacts on the health conditions of the people in the Chiadzwa. Most of them indicated that people in recent times complain frequently of certain types of diseases which were not prevalent in yester years.

#### 4.5.1 Relationship between Mining and Health

Opinions on the effects of mining on health were sought from respondents. Initially the researcher wanted to establish the main diseases people usually suffer from in Chiadzwa. That included both the respondents and their families. The researcher wanted to establish whether the respondents would associate the disease prevalence with the mining activities in the area.
Respondents did not want to say much about disease prevalence in the area given that the apostolic sect most of them belong to usually do not seek medical help from clinics and hospitals. Therefore the researcher decided to use the questionnaire only without further probing.

4.5.2 Morbidity situation in the Chiadzwa community

It was noted from the responses that most people in Chiadzwa suffer from respiratory related diseases. 23 of the respondents (77%) confirmed to have suffered from some respiratory diseases. Other prevalent diseases are malaria and stomach diseases. Malaria as being caused by open pits that often gather water whilst stomach problems being caused by drinking contaminated water.

However, one of the respondents from the companies who is a nurse stated that Chiadzwa is a malaria prone hence the reason for low cases of malaria in spite of the known huge existence of mosquitos in the area.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>23</td>
<td>77%</td>
</tr>
<tr>
<td>Malaria</td>
<td>17</td>
<td>57%</td>
</tr>
<tr>
<td>Skin diseases</td>
<td>5</td>
<td>17%</td>
</tr>
<tr>
<td>Stomach diseases</td>
<td>13</td>
<td>43%</td>
</tr>
<tr>
<td>Colds and Flu</td>
<td>7</td>
<td>23%</td>
</tr>
<tr>
<td>Other-TB</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

In terms of the relationship between diseases prevalence and mining activities, 90% of the respondents felt that all the stated diseases were as a direct result of the mining operations in the area. 7% said no whilst 3% were not very sure.
4.4.3 Sources of Medicine in the Chiadzwa villages

Table 4:6  Respondents’ Choice of Medical Care

<table>
<thead>
<tr>
<th>Health Care</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinics</td>
<td>20</td>
<td>67%</td>
</tr>
<tr>
<td>Hospitals</td>
<td>11</td>
<td>37%</td>
</tr>
<tr>
<td>Traditional</td>
<td>9</td>
<td>30%</td>
</tr>
<tr>
<td>Pharmacies</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

4.6 SOCIAL IMPACTS OF MINING ACTIVITIES IN CHIADZWA.

This section deals with responses that sought to elicit information from the respondents on major and significant impacts that the community is experiencing with the onset of formal mining in Chiadzwa. This is based on questionnaires attended to by the people from Chiadzwa villages. One respondent had this to say:
“How does it feel seeing your father’s grave being dug up and buried in another place? Can you imagine this being done after 20 years” one male respondent, Tonhorai village, 24 June 2015)

4.6.1. Mining and the day to day life

As indicated in the literature, the social impacts of mining are widespread and that mining in any form ultimately affect the social, personal and civil lives of the people in the community involved. To ascertain the level of social impact the diamond mining is having on the people, the respondents were asked to indicate whether they have been affected by the presence of ZMDC companies and their mining activities in one way or the other.

29 of the respondents confirmed that mining activities had altered the way they lived on a day to day basis. Only 1 respondent was not sure whether the mining activities had a direct impact in the way he lives with his family. On further questioning these were some of the way mining affected the day to day lives of the respondents as result of the presence of mining companies;

1. No more freedom of movement given the diamond area was declared a security area
2. “we were separated from our relatives and families due to relocation”
3. Displacement of people resulted in distortion of culture

4.6.2 Poverty in Chiadzwa

The general belief is that the presence of such a big companies like Mbada Diamonds in any particular area would inject massive capital investments into community. That would in turn trigger capital flows thereby put more money in the system and hence reduce poverty since economic activities would be generated. This belief was derived from the economic activities which were experienced during periods of illegal mining where the place was estimated to have accommodated approximately 20,000 people at one go. As a result of the huge numbers in the area, there was virtually demand for anything ranging from water to drink and bath, accommodation, food, cell phone handsets, sanitary ware as well as equipment for illegal mining. The assumption was that the business boom would even increase given that the mining activities were formalised bringing in investors with deep pockets. In order to confirm this assertion and belief that is dominant in the community and even among people living outside the Chiadzwa, respondents were asked if the start of diamond mining have resulted in
a reduction in poverty levels that was dominant in the community. From the responses, the
respondents indicated they are worse off than before. 100% indicated that their source of
livelihood, being farming was severely disrupted due to mining activities. The following are
some of the activities that the respondents said were their new sources of livelihood.

1. Selling baobab fruit
2. Selling mats made from baobab barks
3. Selling their livestock i.e. cattle, sheep and goats
4. Basket making

The above mentioned economic activities’ are nothing short of declaring abject poverty in the
Chiadzwa community.

4.6.3 Impact on food provisions

The following are some of the answers given by the respondents when asked how they fend
for their families:

“Diamond companies only give us food as and when they want, we are starving” female
respondent from Tonhorai village, 29 June 2015).

“Selling baobab fruit for the family” male respondent from Tonhorai village, 24 June 2015)

“Brick moulding, making mattresses from baobab bark and selling goats and cattle” male
respondent from Tonhorai village.

The people of Chiadzwa are predominantly peasant farmers who provided for their families
mainly through farming activities. Food production is now very low compared to the needs of
the entire area. Respondents attributed low food production to the mining activities, as several
farmlands have either been converted into mining areas or the land has been severely
degraded. Land degradation has resulted from the removal of the top soils especially for
alluvial mining activities.

All the 30 respondents from the local communities indicated that mining activities affected
their farming activities in one way or the other. Given the nature of alluvial, respondents
indicated anything related to ground activities was reserved to the licensed miners, otherwise
one will be committing crime if seen working on the ground.
Whilst all the respondents indicated that their farming activities, only 8 confirmed to have received food assistance from the mining companies whilst 18 indicated that they never received help from the mining companies.

In relative terms, as shown on the Figure 4.2 below, 64% of the respondents did not receive any food help from the companies. 14% indicated that what they received cannot be quantified as help.

**Figure 4:10**  Respondents who have been assisted by mining companies

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4.6.4 Mining and Infrastructural Development

Infrastructure refers to those physical structures that enhance the life and living conditions of people in any place. Infrastructure basically includes electricity, roads, schools, water supply and other social amenities that make life comfortable. Chiadzwa may be referred to as a marginalised place where development was very minimal. It is one place where school children walk 15 kilometres to the nearest school. People in Chiadzwa thought that the coming of diamond companies was an indication that their prayers for development have finally been answered. They assumed that presence of big mining firms like Mbada Diamonds would inevitably lead to a massive infrastructural development in the community due to the massive injection of capital and infrastructural investments in their community.
Respondents were therefore asked to indicate whether there was such infrastructure development in the area. Responding initially to this question, most of the respondents noted that one major reason for accepting the proposal for formalised diamond mining to take place in the Chiadzwa was the promise made to them by the company, the government and community leaders about provision of certain basic infrastructure and social amenities like good drinking water for households, provision of electricity to houses, building of hospitals, schools, tarring of untarred roads and other physical structures that can open up the area readily for variety of economic activities. When asked whether such infrastructure have been provided, most of the respondents indicated most of the said infrastructure was only meant for the diamond companies. On respondent went to say that his home is almost underneath ZESA power cables that are going to serve the nearest diamond companies. He had this to say:

“I thought the diamond company was going to approach me with an offer to connect electricity to my homestead since I am very close to the power cables. I was actually requested to relocate my cattle pen because it was directly underneath the power cables (male respondent in Dzoma village, 28 June 2015)

Below is a picture of ZESA cables lines that are often seen whilst driving in the Chiadzwa community which only serve the power requirements of the diamond companies.

*Figure 4:11  ZESA power cables running to the nearest diamond company*
One aspect of infrastructure development which benefited the Chiadzwa is the issue of provision of water to the community. 65% of the respondents confirmed that the diamond companies provided them with alternative sources of drinking water. This ranges from drilling boreholes to sharing piped water from the Odzi and Save river.

On the issue of water, one respondent had this to say:

“Water for domestic use had always been a problem in Chiadzwa. We would walk long distances to fetch water from rivers. We are very glad because the diamond company here installed a water tap for us outside their premises” (female respondent in Tonhorai village, 27 June 2015)

Figure 4.12 below shows a tap specially made for the community outside the company’s premises. The community use the water for domestic purpose as well as watering their gardens.

Figure 4:12  Water tape outside a mining company fence
4.5.5 Impacts of relocations

At the onset of diamond mining, the government announced plans to relocate about 4,321 Marange families which were affected by the diamond mining operations. The affected families were to be relocated to a farm formerly owned by the Agricultural and Rural Development Authority (ARDA) at Transau in Odzi. However, the government plans were not fully executed as only a percentage of the affected families were relocated.

It is estimated that only a quarter of the affected families were relocated to Arda Transau. From the study the researcher also wanted to establish whether those still remaining were willing to relocate, 67% indicated that they were willing to relocate whilst a third were not. Those respondents who are willing to relocate had these to say:

“Schools were destroyed here so our children are walking long distances to school” (female respondent from Chirasika village, 24 June 2015).

“Too much dust and noise here” (male respondent from Dzoma village, 30 June 2015)

“Because when the diamond company wants to mine in my homestead, it is better to relocate because of noise and dust” (male respondent from Mwapamba village, 30 June 2015)

On the other hand, the minority who were against the idea of relocation made the following remarks:

“There are no adequate pastures for our livestock at Arda Transau. The place is already overcrowded. It is an urban setup which is hard for rural people to survive” (male respondent from Mwapamba village, 22 June 2015)

“Not all people are able to live urban life because relocation area is set in a town where it is difficult to provide for the family” (male respondent from Chirasika village, 24 June 2015)

“It is difficult to leave one’s birthplace, relatives’ graves, climatic condition and means of survival for an unknown place” (male respondent from Chiadzwa village, 1 July 2015).

Figure 4.13 below shows the distribution of those who are willing and those who are against the idea of relocating.
Figure 4:13  Simple pie chart showing respondents’ positions on relocation.

Figure 4:14  House for relocated families at Arda Transau
4.6.6 Impact on Employment

The promise of jobs is considered to be one of the major incentives for most communities to open up to mining activities. In order to confirm the responses on the uptake of locals by mining companies, respondents were asked to indicate their current occupation. The aim was to establish how many of the targeted respondents were employed by the mining companies. 37% of the respondents indicated that they had remained as peasant farmers, 30% indicated that they were employed by the mining companies whilst the reminder 33% cannot define their day to day activities as any form of employment.

On the issue of employment, the respondents said that diamond companies did not create employment for the locals had this to say:

From the 33% which the researcher indicated as not employed, the following are some of responses from the respondents.

“The employment rate for the locals is very poor. We do not know where the diamond companies’ employees came from (male respondent from Chiadzwa, 30 June 2015)

4.7 ZMDC COMPANIES’ AWARENESS AND MANAGEMENT OF IMPACTS

4.7.1 Awareness of Impacts by ZMDC companies.

One of the most important steps in dealing with problems of any nature is the acceptance and knowledge of the existence of the problems. In order to come up with strategies and measures to curtail the negative impacts of mining on the people of Chiadzwa, the management of the ZMDC companies first need to be aware of the existence of any such impacts and then be able to develop strategies to mitigate them. As a result, respondents were asked if they were aware of any attempts by ZMDC companies to curtail the effects of their operations.

4.7.2 Management of Environmental, Health and Social Impacts by ZMDC Companies

One major reason for the local community to accept the impacts of mining (social, health and environmental impacts) is the undertaking by mining companies to manage, mitigate and help community members to adjust to impacts so experienced. This would involve the
implementation of measures and strategies to help the people who are impacted directly or indirectly to live normal lives even though such impacts are felt by them. From the data collected from the respondents, it was clear that the majority of people in Chiadzwa are directly or indirectly affected by the mining activities. For instance, when asked whether diamond mining operations affect them, all the respondents from the local community were very positive about that.

4.7.2.1 Managing Environmental Impacts

In finding out about specific measures and strategies that the company is developing to deal with the impacts, the researcher asked the respondents whether ZMDC companies had done or were doing anything to reduce or curtail the adverse environmental effects of mining activities. The pie chart below shows the distribution of the respondents.

Figure 4:15  Pie chart attempts to curtail environmental effects
4.7.2.2 Managing Health Impacts

In order to establish the diamond companies’ awareness of the health problems that are being caused by their activities, the respondents were asked whether the diamond companies were doing anything to address the health needs in areas. 25 respondents thus representing 83% of the respondents denied having seen or heard anything done by the diamond companies to address the needs. The reminder acknowledged that something was being done by the diamond companies to address the health issues within their areas.

In terms of the presence of health facilities as well as health campaigns by the diamond companies, 100% of the local respondents indicated that no campaign engaged in any health campaigns in the area. From the responses given, 7 respondents acknowledged that the diamond companies built health facilities whilst the remaining 23 said nothing has been done in their areas.
4.7.2.3 Managing Social Impacts

On social impacts, all the respondents from the local community indicated that their lives were affected in one way or the other from the mining activities in the area.

In terms of whether the companies were doing anything to address the traditional and cultural issues in their areas, 4 respondents said “YES” whilst the other 26 respondents denied to have heard or seen any action by the companies to address traditional and cultural issues. Some of the initiatives done by the companies include relocation of the affected locals. Figure 4.18 below shows the relocation area in Arda Transau whether some of the original residents were relocated to.
4.8 ANALYSIS OF RESEARCH FINDINGS

This section discusses and analyse critically the empirical findings and data as presented above. The section is divided into two sections. The first part analyse the empirical findings on the impacts of ZMDC companies’ mining activities on the environment and social footprint of the Chiadzwa community. The second section deals with the impact management of diamond mining activities in Chiadzwa by the ZMDC companies.

Thus all the factors at work are evaluated in light of the 4 Actions Framework to ensure that sustainable mining is achieved in Chiadzwa.

4.8.1 Impacts of Mining activities on the social footprint

The impacts of the mining activities in Chiadzwa on the social footprint are mixed in terms of its positivity or negativity. With the impacts covering a cross section of the social indicators namely employment, poverty, food security, infrastructural development, relocations, there is the general acceptance in the community on the impacts of mining activities in the community.
in any of these ways. Nevertheless, majority of the respondents indicated that they have been affected by major social and structural changes in the community since mining began.

On employment creation, the situation in Chiadzwa proved to be quite contrary to popular opinions of massive job creation and massive business development in mining areas due to mining activities. In fact, the promise of jobs in the diamond mining company to the people of Chiadzwa which in one way or the other served as a guarantee for mining in the community has not been forthcoming thereby coming as a disappointment of the people. Most of the people are unemployed especially the youth after their land for farming have either been taken over or destroyed by mining activities.

On the companies’ initiatives to create employment, they claimed to have done the best given the literacy rate as well as the level of experience of the local residents. ZMDC companies claimed that those who have the prerequisite qualifications were employed by the companies.

Concerning poverty in the Chiadzwa, one would have thought that the large presence of commercial entities in the community employing thousands of people resulted in increased demands for goods and services. That would theoretically result in the growth of other petty businesses as well as the flow and circulation of cash in the rural economy which would in turn reduce poverty of the people. However, the standard of living of the people in Chiadzwa has been worst off with the start of mining activities. This is because most of the people in the community previously were and continue to be farmers and live very simple lives, therefore the destruction of their farms due to mining activities and the general lack of alternative employment for most of the people have brought untold sufferings to the people of Chiadzwa.

Infrastructural development comprises projects such as electricity, roads, good drinking water, schools, hospitals and clinics and the general provision of social amenities that would enhance the general living standards of people in the community. The existence of such infrastructures in Chiadzwa for the locals remained very unchanged. Infrastructure development that was witnessed in the area was only meant for the diamond companies. One such development which benefitted the people was provision of drinking water to the community. However, provision of alternative sources for drinking water may not be regarded as development since the original sources were affected by the mining activities.
ZMDC companies promised the local residents of Chiadzwa the provision and improvement of major infrastructure before mining started but most of them have not been provided. However, some few projects have been initiated by the mining firm such as the building of new schools and a clinic at the new resettlement sites but such facilities still lack basic facilities like electricity and computers. The companies have also provided some manual boreholes and water along their water pipelines for the community due to the unsafe nature of the water bodies which the people previously used. Although few infrastructure have been provided by ZMDC companies, majority of Chiadzwa residents were not pleased with these because they claimed that the diamond companies have capacity to do more than what they have done because of the gains they make from mining diamonds in the area.

Concerning relocations, one would have thought before mining activities commenced all the people living with the mining concessions were relocated. For the relocation exercise to be successful, standard of living in the new areas could have been made to be similar to the original standards of living for the Chiadzwa. The way the other families were relocated made the whole idea unpalatable for the remaining people in the Chiadzwa community.

4.8.2 Impact of mining activities on the environment

The environment has remained a significant asset to humans because it is the very source where livelihood is derived. More so, for the people of Chiadzwa, as the very nature of their occupation which is farming involves a constant and direct interaction with the environment, it constitutes their major source of livelihood. The environmental impacts considered in this study for assessing the impacts of mining activities in Chiadzwa are land degradation and pollution. Impacts on this natural resource to a larger extent influence the quality of life of the people in the community in one way or the other.

The impacts of mining activities by ZMDC companies on the environment noted in this study included land degradation, expropriation of land for mining activities and pollution.

On water pollution, water has been considered a very important resource in the lives of people in Chiadzwa because of its use on their domestic activities, livestock as well as their agricultural activities. It can now be stated that ever since mining started in Chiadzwa, these water bodies especially rivers have been affected and in most cases made to dry up due to mining activities. The remaining water bodies have been rendered unusable because they have
been polluted by mining activities. The people mostly affected by water pollution are those who lives downstream the mining sites especially along Save river. These people complained of massive pollution on the river. The response from the companies on curtailing pollution was not satisfactory given that half the responses confirmed that the initiatives by the companies were not satisfactory and effective.

On water pollution, most of the respondents complained of dust as main propellant of air pollution. Initiatives by the companies to reduce dust levels were noted to be mostly for the companies themselves and not for the residence of the local community. Therefore, it can be concluded that mining activities are impacting negatively in terms of air pollution.

Incidences of noise pollution were just a few given that most of the diamond companies concentrate of alluvial surface mining which do not require blasting.

Although ZMDC companies have responded to the issue of pollution especially from dust and untarred roads by periodically sprinkling water on the roads, the practice is considered very unsustainable since it is not done regularly and also because it was noted to be done mostly for benefit of the companies themselves. The situation can be linked to the increased respiratory ailments such as flu and cold (catarrh) as most respondents complained about even though Akabzaa & Darimani also notes that “all fine dust at a high level of exposure has the potential to cause respiratory diseases and disorders and can worsen the condition of people with asthma and arthritis” (Akabzaa & Darimani, 2001: 56).

Expropriation of land originally for farming activities was a major direct impact on the people of Chiadzwa that resulted from advent of the mining companies. Farming is the source of livelihood for rural communities and mining came as a direct competitor on that source of livelihood. Legislation in Zimbabwe gives priority to mining on all land activities be it in settlement or farming. All of the respondents indicated that locals lost their farm lands due to mining activities.

The impact of mining activities by ZMDC companies especially through excavation in Chiadzwa has affected the land and degraded it to a greater extent. Land degradation is very serious in some parts of Chiadzwa where mining was being carried out. The only area which was not being affected was mostly the mountains, where the companies claim not to have any diamond deposits.
Initiatives by the companies to address issues of land degradation and expropriation of land were considered to be both unsatisfactory and ineffective. The main initiative noted in this study was re-afforestation which the respondents further pointed out not to be so real because it is only done to the baobab tree which is considered endangered species in Zimbabwe. Therefore companies are not allowed to cut them down.

4.9 CHAPTER SUMMARY

The diamond companies in Chiadzwa have, to a larger extent, tampered with most of the environmental resources particularly large tracts of land and forest cover since the companies operate in most of the areas in Chiadzwa.

The companies cannot in any way absolve themselves of any impact of their activities since all aspects of environmental impact mainly land degradation, expropriation of land, pollution of the air, noise and water were largely felt in the community and is a source of great concern to the community. The relationship between these environmental impacts and the rise of poverty and disease levels in Chiadzwa is also an issue of great concern.

The initiatives by companies on the issue of environment impacts resulting from the activities is not adequate and also very ineffective.

The discussion and analysis of the social impacts of mining in Chiadzwa indicated a worrying trend of how mining is impacting on the social life of the residents of Chiadzwa. Impacts on employment, lack of food security, lack of infrastructure and social amenities and increased poverty levels are very widespread in Chiadzwa and are largely felt by most people in the community. In reality, the number of people affected by the social impacts of the mining activities is very widespread and in fact, social footprint of the people in particular, have greatly been affected.

Even though the companies made some initiatives to reduce the impacts of their operation on the social footprint of the Chiadzwa community, their initiatives were considered unsatisfactory given the gains they made from mining diamonds.
CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Mining is indispensable to the economic development of countries endowed with mineral deposits. Existing literature highlight the world wide contributions made to industrial revolution as well as human development from mining activities. In Zimbabwe the contribution of minerals to economic development cannot be overlooked. The country’s national flag recognises the significance of mineral resources to the development of the country.

However, it has been noted that extraction of mineral resources comes at a cost especially to communities within which mining activities take place. Given that mining takes precedence over any other form of commercial and domestic land use in Zimbabwe, the communities within which mining take place are at the receiving end of problems if their plights emanating from mining activities are not properly handled.

The purpose of this research was to assess the mining activities in Chiadzwa and their direct and indirect impacts to the local people and the environment.

After a thorough investigation into the mining activities in Chiadzwa, it has come to light that mining activities have resulted in land degradation thus limiting land available for local food production especially given that the Chiadzwa community is made up mainly of peasant farmers.

There are also incidences of pollution at its various forms namely water, noise and air pollution. Water pollution has affected the few water sources within the area given its arid climatic condition. Among the major river streams in Chiadzwa, Save river has been severely polluted by mining activities. The ZMDC companies have made attempts to avert the problems of water pollution through providing alternative sources for water for the people and their livestock. The initiatives are however considered inadequate.
Mining has also been found to be a source of social discontent in the Chiadzwa area. There is no doubt that mining activities appropriated land belonging to the local community thereby threatening food security within the community. Mining activities have also been found to have impacted negatively on health, altered social relations, and displaced current and future economic activities. The combined effect of the above problems have culminated into poverty, high levels of unemployment, prostitution and high levels of disease prevalence especially respiratory and stomach problems.

The ZMDC companies have also responded to the negative effects of their mining activities on the people of Chiadzwa and the environment. Such initiatives included re-afforestation, provision of alternative sources of water as well as relocation of the affected families to Arda Transau. The ZMDC companies also claimed to have employed a considerable number of people from the local community, a claim which was refuted by the Chiadzwa community.

The research was however not carried without its share of constraints. Among the challenges encountered was the sensitivity given to the diamond operations in Chiadzwa. Data on Chiadzwa diamond is not readily available and people are not willing to freely talk about the subject. The other constraints encountered include problems of data collection (including bias and reluctance to complete questionnaires) and problems of moving around the Chiadzwa diamond fields due to security constraints. Another major problem encountered was inadequate financial resources which were required to ensure that the researcher travels around the entire concessions in order to make adequate observation in order to verify data provided by the respondents.

In order to cover the challenges, the researcher had to depend on his own limited financial resources. Data collecting problems were tackled through frequent visits to the community in order to verify the data collected through filed observation.

The researcher concludes that diamond mining operations in Chiadzwa have impacted negatively both on the environment and on the social footprint of the Chiadzwa community.

5.2 RECOMMENDATIONS

The recommendations emanating from the research study have adopted the 4 Actions Frame work as highlighted on the project’s conceptual frame. The recommendations have been framed around the all the forces at play in respect of mining activities and their impacts to the
environment as well as on the social footprint of the Chiadzwa community. The researcher’s recommendations are basically categorised into factors to be eliminated, issues to be raised, elements requiring reduction and issues to be created.

5.2.1 Factors to be eliminated

Based on the research findings certain issues would require complete elimination. For example, it is difficult to imagine how a mining company would bring its equipment to someone’s door step with the intention of mining within his homestead. Such actions are nothing short of being considered inhuman and should be stopped. It could not be established during the research process, how such inhuman actions were being carried out without any recourse for the affected people. It is therefore recommended that the people of Chiadzwa need to be educated on their rights to live as any other community and seek recourse whenever they feel that their rights as human beings are not being observed.

5.2.2 Factors to be raised

Corporate Social responsibility activities have been undertaken by the ZMDC companies as a way of giving back to the community. From the research findings, it was noted that the CSR activities did not address the priority areas as expected by people from the community. It is therefore recommended that Corporate Social responsibility activities by the mining companies should be agreed with all the relevant stakeholders to ensure that they are directed to areas that are more beneficial to the targeted communities.

Another important aspect that needs to be improved is relocation. Companies assumed they had done the best to upgrade the living standards of the relocated families. However, it was established that the beneficiaries of the relocation exercise are not appreciating the new urban setup that was developed at Arda Transau. The researcher is recommending a community participatory model for future relocation exercises. The affected communities are better placed to contribute positively to the relocation exercise to ensure that their expectations are captured.

Further on relocations, mining companies should not be allowed to commence their operations with people still living in the vicinity of their concessions. The impacts of mining activities in Chiadzwa may be too severe compared to other mining operations because most of the people who are directly affected were not relocated in spite of them being chosen for relocations.
Another aspect which requires improvement is on the collaboration and co-ordination among governmental agencies who regulate mining activities in the country. From the research findings it was established that there is no effective coloration among various government institutions and agencies when regulating mining operations. For example, on the issue of relocations, it was observed that there were no concerted efforts from all relevant government agencies to ensure that the process was properly and effectively implemented. A combined assessment exercise involving Ministry of Health and Child Care, Ministry of Environment together with Environment Management Agency, Mutare Rural District Councils and Ministry of Mines and Mining Development on the Chiadzwa area to ensure that all the necessary procedures were followed and completed should have been carried out before mining activities commenced. Therefore the researcher recommends more effective coordination and co-ordination among government agencies when regulating mining activities in the country.

Furthermore, it was noted during the research study that monitoring activities by mostly EMA are regularly carried out in the Chiadzwa community but the level of defaulting by the companies did not reflect that. It therefore recommended that there should stringent measures on defaulters which ensures complete deterrence.

In terms of promises development and other social benefits made to the people that invariably served as a social license for ZMDC companies to operate in the community, it is demonstrated by the findings that to a larger extent, this has not been met by the mining company. It is therefore recommended that the companies begin taking steps in fulfilling their promises of infrastructural development and investment particularly water, electricity, hospital and as well job creation and promotion of local businesses.

5.2.3 Factors to be created

From the research findings it was established that they are new initiatives which if implemented would to a larger extent minimise the negative impacts of mining activities of the people and the environment.

Factors to be created include mining education initiatives by the mining companies. Companies should ensure that the local community is knowledgeable about the mining activities and the direct impact of their operations on the people and the environment. People
who are knowledgeable are better placed to react to the negative impacts of mining activities on them and their environment. Such education campaigns should cover areas of health as well as management of the environment.

Most importantly, the last phase on the mining life which is closure and reclamation should also be addressed. From the research findings there was no information from the companies in respect of the reclamation plans. It is therefore recommended that the government or its relevant agencies ensure that all the ZMDC companies operating in Chiadzwa have proper rehabilitation plans with evidence of funding being set aside for the programmes. The damage has been done on the environment therefore proper rehabilitation programmes will definitely help in minimising the extent of the damage done.

5.2.4 Factors to be reduced

Some of the initiatives by the ZMDC companies have been excessively done and may require slowing done. Even though, the initiatives were overdone, they did not result in any reduction on the impact of mining activities to the people and environment.
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Dear Respondent,

My name is Gumisai Makoni, an MBA Final Year Student at the Graduate School of Management, Faculty of Commerce, University of Zimbabwe.

I am currently conducting a Dissertation Research Project entitled “The Impact of Mining Activities on Surrounding People and Environment. A Case Study of Zimbabwe Mining Development Corporation Operations in Chiadzwa.”, to be submitted in partial fulfilment of the requirements of Master’s Degree in Business Administration. I am kindly asking your co-operation in carrying out the research by responding to the questions asked herein.

Answers to the questions will strictly be used for the purposes of this research only and shall be treated as confidential.

Please feel free to answer all questions as honestly and objectively as possible. The questionnaire takes approximately 20 minutes or less to complete. The questionnaire does not require you to reveal your identity. If a question appears to be difficult to answer, kindly provide your best guess.
For further information and/or any questions you might have, please feel free to contact the researcher, Gumisai Makoni, on mobile number 077 2 197 210, e-mail addresses agmakoni@gmail.com.

Your effort in taking time to attend to this questionnaire is unreservedly appreciated.

Yours faithfully

....................................................
Gumisai Makoni
Appendix 2: Questionnaire A

The Impact of Mining Activities on Surrounding People and Environment. A Case Study of Zimbabwe Mining Development Corporation Operations in Chiadzwa.

Questionnaire Schedule for Residents in the Surrounding Communities.

A. PERSONAL INFORMATION

1. Village……………………………

2. Sex…. Male [ ] Female [ ] 3. Age……… 4. Occupation……………………………


6. Highest level of educational attainment
   a. Illiterate [ ] b. Primary [ ] c. Secondary [ ] d. Tertiary (Polytechnic, University) [ ] e. Others, specify

7. For how long have you been staying in Chiadzwa?………………

B. MINING ACTIVITIES AND IMPACTS ON THE ENVIRONMENT

8. Do you have any idea about mining activities in this Chiadzwa? Yes [ ] No [ ]

9. If yes, what method(s) of extraction is/are used by the company? (Tick all that apply) A. Surface Mining B. Underground Mining C. Quarrying D. Panning E. Other, specify……………………………

10. Do you think the methods of operation by the mining company have some effects on the natural environment? Yes [ ] No [ ]

11. If yes, what are some of the effects? (Tick all that apply)
   A. Degradation of land and vegetation B. Water pollution C. Air pollution
   D. Noise pollution E. Other, specify ………………………………

12. What actually cause(s) land degradation? (Tick all that apply)
   A. Presence of tailing dams B. Use of toxic materials C. Use of heavy machines
   D. Clearing of Vegetation E. Long period of extraction
   Other, Specify……………………………………………………………………...
13. What cause(s) pollution (of any sort as chosen in Q11) on the environment?  
\textit{(Tick all that apply)}
A. Presence of tailing dams  
B. Use of toxic materials  
C. Use of heavy machines  
D. Clearing of Vegetation  
E. Long period of extraction  
Other, Specify.  

14. Has ZMDC companies made attempts to reduce or curtail the adverse environmental effects of mining activities?  
Yes [ ]  
No [ ]

15. If yes, what are some of the measures being undertaken?  
A. Re-afforestation  
B. Resettlement of affected communities  
C. Providing alternative sources of drinking water  
D. Compensation to affected communities  
E. Reviewing or varying methods of operation  
F. Others, specify  

16. Are the efforts at reducing the environmental impacts satisfactory and effective?  
Yes [ ]  
No [ ]

\textbf{C. MINING AND HEALTH}

17. Which of the following diseases do you usually suffer from or contract?  
A. Respiratory  
B. Malaria  
C. Skin diseases  
D. Stomach diseases  
E. Colds and catarrh  
F. Other disease(s)  

18. What diseases do people in your family frequently contract?  
A. Respiratory  
B. Malaria  
C. Skin diseases  
D. Stomach diseases  
E. Colds and catarrh  
F. Other disease(s)  

19. Would you say the disease(s) chosen above are related to the mining activities?  
Yes [ ]  
No [ ]

20. What are the sources of medicine to address your health needs?  
A. Clinics  
B. Hospitals  
C. Traditional (herbal) medicine  
D. Drug stores  
E. Other, specify  

21. Give reasons for your answer in Q20  

22. Are diamond companies doing anything to address the health needs in your area?  
Yes [ ]  
No [ ]
23. If yes, what are some of these activities?

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…………………………………………………………………………………………...
……………………………………………………………………………………………

24. Has diamond companies built any health facility in this community for the service of both workers and people in the community?    Yes [  ] No [  ]

25. Do diamond companies carry out any health campaign programme to educate people in the community?   Yes [  ] No [  ]

26. If yes, give any example of such campaigns you know of

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…………………………………………………………………………………………...
……………………………………………………………………………………………

D. SOCIAL IMPLICATIONS ON MINING

27. Did mining activities affect your day to day life? Yes [  ] No [  ]

28. Did mining activities affect your local traditional values and culture? Yes [  ] No [  ]

29. If yes, indicate how.

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…………………………………………………………………………………………...
……………………………………………………………………………………………

30. Are you willing to relocate to new designated places?  

Yes [  ] No [  ]

31. Give reasons for your answer on (30)

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…………………………………………………………………………………………...
……………………………………………………………………………………………

32. Are diamond companies doing anything to address the traditional and cultural issues in your area? Yes [  ] No [  ]

33. If yes, what are some of these activities?

………………………………………………………………………………………………
…………………………………………………………………………………………...
……………………………………………………………………………………………

34. Did mining activities affect your farming activities? Yes [  ] No [  ]

35. If yes, indicate how?

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…………………………………………………………………………………………...
……………………………………………………………………………………………

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36. If answer in (34) is yes, are diamond companies assisting you in respect of food security? Yes [ ] No [ ]

37. If no, then how are you fending for your family?

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…………………………………………………………………………………………………………

E. ROLES OF LEGAL REGULATING AGENCIES AND OTHER STAKEHOLDER ORGANISATION WITHIN THE MINING SECTOR

38. Do you have any idea of agencies or organisations that hold stake in monitoring, regulating and addressing the activities of the mining sector in the country? Yes [ ] No [ ]

39. If yes, what are some of them? (Tick all that apply)
A. EMA B. Ministry of Mines C. Mutare RDC D. NGO’s
E. Other, specify ……………………………………………………………………………

40. Do you often hear of any of the above organisation’s activities relating to mining activities in Chiadzwa? Yes [ ] No [ ]

41. If yes, which of them do you usually hear of? (Tick all that apply)
A. EMA B. Ministry of Mines C. Mutare RDC D. NGO’s
E. Other, specify ……………………………………………………………………………

42. Would you say that these (any of them) agencies and organisations are doing well in monitoring and regulating mining activities in Chiadzwa? Yes [ ] No [ ]

43. Give reasons for your answer to Q42

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Appendix 3: Questionnaire B

The Impact of Mining Activities on Surrounding People and Environment. A Case Study of Zimbabwe Mining Development Corporation Operations in Chiadzwa.

Questionnaire Schedule for Management of Diamond Companies.

A. PERSONAL INFORMATION

1. Company…………………………

2. Sex…. Male [ ] Female [ ]  3. Age……..

4. Department…………………………………………………


6. Highest level of educational attainment
   a. Illiterate [ ] b. Basic [ ] c. Secondary [ ] d. Tertiary (Polytechnic, University) [ ] e. Others, specify

B. MINING ACTIVITIES AND IMPACTS ON THE ENVIRONMENT

7. What method(s) of extraction is/are used by your company? Tick all that apply
   A. Surface Mining  B. Underground Mining  Quarrying  D. Panning
   E. Other, specify…………………………………………

8. Do you think the methods of operation by the mining company have some effect on the natural environment?   Yes [ ] No [ ]

9. If yes, what are some of the effects?
   A. Degradation of land and vegetation  B. Water pollution  C. Air pollution
   D. Noise pollution  E. Other, specify ……………………………

10. Has your company made attempts to reduce or curtail the adverse environmental effects of mining activities?   Yes [ ] No [ ]

11. If yes, what are some of the measures being undertaken? (Tick all that apply) A. Re-afforestation  B. Resettlement of affected communities  C. Providing alternative sources of drinking water  D. Compensation to affected communities  E. Reviewing or varying methods of operation  F. Other, specify ……………………………………………………………………………

12. Are the efforts at reducing the environmental impacts satisfactory and effective?
Yes [ ] No [ ]

C. ROLES OF LEGAL REGULATING AGENCIES AND OTHER STAKEHOLDER ORGANISATION WITHIN THE MINING SECTOR

13. How is the relationship of your company with EMA?
A. Very cordial  B. Cordial  C. Bad  D. Very bad

14. Does EMA conduct Environmental Impact Assessment on the activities of your company? Yes [ ] No [ ]

15. If yes, how often are such exercises carried out?
A. Monthly  B. Quarterly  C. Bi-annually  D. Yearly  Other, Specify………………

16. Has EMA ever cautioned the company on issues of environmental degradation or pollution?  Yes [ ]  No [ ]

17. If yes, what steps did the company take in any of such instances?
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........................................................................................................................
........................................................................................................................

18. Does the Ministry of Mines and Mining Development provide guidelines regarding methods of operation in reducing the rate of environmental hazards?  Yes [ ]  No [ ]

19. Does the Ministry of Mines conduct Environmental Impact Assessment on the activities of your company?  Yes [ ]  No [ ]

20. If yes, how often?
A. Monthly  B. Quarterly  C. Bi-annually  D. Yearly  Other, Specify………………

21. Does the Chamber of Mines of Zimbabwe carry out similar activities as asked in (Questions 18 and 19)?  Yes [ ]  No [ ]

22. What other stakeholder organisations apart from EMA, Chamber of Mines of Zimbabwe and Ministry of Mines do your company deal with in carrying out your activities?........................................................................................................................
........................................................................................................................
........................................................................................................................

23. Any role(s) by the companies/organisations provided in question 32?
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