

# The Impacts of Mining Activities on Local Community Livelihood in Rwanda “Case of Rutongo Mining Site in Rulindo District”

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**ABSTRACT**-Mining is the extraction of valuable minerals or other geological materials from the earth, from an ore body, vein or seam. In addition, socio economic development relating to mining activities are matters of concern within the public domain. This research aimed at assessing the impact of mining activities on the local community livelihood “case of Rutongo mining Site in Rulindo District” The study considered the miners and head of villages working in Rutongo mining site c living in Masoro and Ntarabana sectors of Rulindo District. The research period covers before and after mining activities within the study area. The researcher employed both primary and secondary data. The secondary data were relating to livelihood parameter’s change recorded as a result of mining activities. The primary data were collected from 89 miners and head of villages located and close to mining sites. These respondents were selected randomly and assessed by using a structured questionnaire. The Statistical analysis was used to present these data into relevant Tables and Charts. Thereafter, the Pearson Correlation in Microsoft excel was used to analyze how mining activities impact on the local community livelihood of residents in Masoro and Ntarabana Sectors of Rulindo district in Northern Province. The results of study indicated the changes recorded in terms of social, economic wellness, being positive where more than 83% agreed with the positive impact of mining on positive change of existing local community livelihood while 217% disagreed with the measurable contribution of mining activities related projects in the studied area. These changes are enabling policy makers to better understand how mining activities can contribute to development and ways of minimizing associated risks. Furthermore, the completion of the work added more knowledge in the academic work since the results will be used by further researcher as reference source, findings also showed that mining has positively impacted socio economic and

development in Masoro and Ntarabana sectors of Rulindo District sector of Northern Province in both tangible and intangible ways.

**Keywords:** Mining, Social-economic, community livelihood

## LIST OF ACCRONMYS AND ABBREVIATIONS

**3Ts:** Tin, Tungsten and Tantalum

**EIA:** Environment Impact Assessment

**EPA:** Environment Protection Agency

**FONERWA:** Rwanda Green Fund

**GDP:** Gross Domestic Product

**GoR:** Government of Rwanda

**IMF:** International Monetary Fund

**NGO:** Non-Government Organization

**NIST:** National Institute of Statistics of Rwanda

**REMA:** Rwanda Environment Management Authority

**RMB:** Rwanda Mines, Petroleum and Gas Board

**RSB:** Rwanda Standards Board

**RURA:** Rwanda Utilities Regulatory Authority

**SPSS:** Statistical Package for Social Sciences

**UNIDO:** United Nation Industrial Development Organization

**UNILAK:** University of Lay Adventists of Kigali

**WHO:** World Health Organization

## I. CHAPTER 1. Introduction

### 1.1. Background

In developing countries around the world, mining may provide substantial economic opportunities that are leading to sustainable growth (Alkire et al. 2015). However, mining continues to be contentious, as genuinely sustainable development has been shown to be dependent on far more than economic opportunities, several notable environmental, social and economic problems have resulted from mining operations that have been poorly planned and implemented (Ross, 2001). This has led to a questioning of the

potential for mining to produce sustainable outcomes. Much more these days, mining development is assessed in a multifaceted way in terms of its technical feasibility, economic opportunities, ecological impact and social equity (Essacu 2018).

The mining activities also stimulates trade and subsidiary business developments around the mining site (World Bank, 2013), this significant role was potentially recognized in Africa Mining Vision 2050, which encourages African countries to harness the potential of the mining to improve rural livelihoods and spark entrepreneurship, and to promote local and integrated national development as well as regional cooperation (SAIIA, 2012).

However, a question remains as to how mining interplays with other aspects of local economies, and how better integrated rural development strategies to avoid conflicts of interest among two or more equally important livelihood sources can be promoted.

Proposed mining projects vary according to the type of metals or materials to be extracted from the earth. The majority of proposed mining projects involve the extraction of ore deposits such as copper, nickel, cobalt, gold, silver, lead, zinc, molybdenum, and platinum and 3Ts (Angelsen, 2011). There are different phases of mining project, beginning with mineral ore exploration and ending with the post-closure period. Each phase of mining is associated with different sets of socio-economic and environmental impact (CAPAM, 2013).

A mining project can only commence with knowledge of the extent and value of the mineral ore deposit, information about the location and value of the mineral ore deposit is obtained during the exploration phases (ICMM, 2014). This phase includes surveys, field studies, and drilling test boreholes and other exploratory excavations (Pritchard et al, 2014).

The exploratory phase may involve clearing of wide areas of vegetation (typically in lines), to allow the entry of heavy vehicles mounted with drilling rigs (Pritchard et al, 2014). The exploration phase provides enough information on the types, quantity and grade of ore deposits. Once the results of exploration match with the economical expectations, the next steps are mine development (Danquah et al, 2017).

The mine development starts with Construction of access roads and required infrastructure, acquisition of mining equipment site preparation and clearing, selection of tunneling point (ADIT) (Hilson 2016).

Proposed mining projects differ considerably in the proposed method for extracting and concentrating the metallic ore. Almost every case, metallic ores are buried under a layer of ordinary soil or rock (called 'overburden' or 'waste rock') that must be moved or excavated to allow access to the ore deposit, Open-pit mining is a type of strip mining in which the ore deposit extends very deep in the ground, necessitating the removal of layer upon layer of overburden and ore. The use of heavy machinery, usually bulldozers and dump trucks, is the most common means of removing overburden. Open-pit mining often involves the removal of natively vegetated areas, and is therefore among the most environmentally destructive types of mining, especially within tropical forests. Because open-pit mining is employed for ore deposits at a substantial depth underground, it usually involves the creation of a pit that extends below the groundwater table. In this case, groundwater must be pumped out of the pit to allow mining to take place.

The extraction freedom has attracted people from all over Rwandan and East Africa to Rutongo but only a few locals participate, largely benefiting only brokers, middlemen, and other players along the supply chain. Unverified claims of exploitation of the environment and the local communities by miners have been made (RMB, 2017)

Exploitative systems are unlikely to be sustainable, in many mining sectors, sustainable development is considered as the combination of enhanced socio-economic growth and development, improved environmental protection and pollution prevention, the socioeconomic impact on national and county economy at large have a significant proportion towards the national mining production generated from exploitation of existing natural resources especially mineral.

Several studies on environmental impact caused by mining have already conducted but the on assessment of impact of mining on community livelihood have left aside which make the researcher to conduct these studies at Rutongo Mining concession of Rulindo District.

The additional internal motivation of conducting this types of research are that referring to the biophysical insight of the area surrounding Rutongo area, like Rusine River, physical landscaping degradation, the collapsing of mine tunnels, inadequate management of tailings and wastewater, the loss of vegetation cover during forest cut for supporting the tunnel, illegal mining raised due to poor recruitment of local miners and lack of capacity building and knowledge transfer

accompanied by poor implementation of environmental and social management plan on community social responsibilities as designed in EIA.

### 1.2. Problem Statement

The mining project related activities involves the extraction of valuable mineral ores from the earth beneath compositions for economic development purposes.

Globally, Mineral development can create new communities and bring wealth to those already in existence which enhance the better livelihood of the nearby community (Rwanda Mining Profiles, 2004). However, it can also cause considerable disruption, new projects can bring jobs, business activities, roads, schools, and health clinics to remote and previously impoverished areas, but the benefits may be unevenly shared, and for some they may be poor recompense for the loss of existing livelihoods and the damage to their environment and culture. If communities feel they are being unfairly treated or inadequately compensated, mining can lead to social tension and sometimes to violent conflict.

In Africa, Mining's interaction with local communities has changed over time. With the dramatic decline in the costs of transporting bulk materials and the emergence of multinational companies as major players, mines can now be located far from where the ores are processed. At the same time, they have become larger and more technically complex, bringing a decrease unemployment and an increase in the skill levels required of workers. In many countries, mines have tended to become specialist enclaves, isolated from other sectors of the economy.

According to Rwanda Mining board (RMB, 2018) report, the inherent tension between local and national rights to mineral wealth and the other benefits brought about by mining. That people living near mines or adversely affected by them and should be compensated for any inconvenience, hardship, or loss of opportunity suffered is generally not disputed. The sustainable implementation of environmental and social management plans leads to the improvement of community better living standard, this is highly justified if the positive impact of the mining project is greater than the negative impact caused the introduced mining project

The provisional of mining activities in Rwanda have brought more 25,000 new jobs which lead to the raise of standard of living and reduce unemployment level. In different mining sites of Rwanda, there are a continuous complain of local

community about how resources from mining area being equitably shared, and Some research studies in Rwanda have done on environmental impacts of mining to local communities but there is a lack of studies of impacts of mining on local community livelihood at Rutongo mining site in Rulindo

These gaps motivated the researcher to conduct an assessment of how mining activities are being affecting local community livelihood development, therefore, there is alarming reason for this research study to assess how Rutongo mining activities are affecting local community livelihood of Masoro and Ntarabana Sectors in Rulindo District.

### 1.3 Research Hypothesis

This research was guided by the following research hypotheses

**Ho:** There is no significant impact of mining activities on local community livelihood

**H1:** There is significant impact of mining activities on local community livelihood

### 1.4 Objectives of the Study

The main objective of the study was to assess the impact of mining on the community livelihood at Rutongo mining site in Rulindo District of Northern province of Rwanda.

#### 1.4.1 Specific Objectives

The specific objectives of this research have been to:

- i. Identification of mining activities in Rutongo mining site.
- ii. Assess effect of mining activities on local community livelihood.
- iii. To establish the relationship between mining activities and local community livelihood

### 1.5 Research questions

In line with the objectives outlined above, some key research questions to which answers were sought are:

- a. What are mining activities in Rutongo mining site?
- b. What are the effects of mining activities on local community livelihood?
- c. What is the relationship between mining activities and local community livelihood?

### 1.6. Significance of the Study

Mining activities are indispensable in the economic development of any country endowed with mineral resources. This is due to the economic benefits that are made available to countries that are involved in the extraction of mineral resources,

both internal and external. Internally, there is the creation of employment and revenue generation. Externally, a substantial foreign exchange is available to such countries.

#### **1.6.1. To the researcher**

The completion of the study advanced the skills and knowledge of the researcher and the fulfillment of one of the academic requirements to be awarded a Masters' degree.

The study may also be helping a researcher to raise the level of auditing, consultancy, research in social and economic related sectors and how theoretical knowledge acquired in class are being applicable on field.

#### **1.6.2. To the policy makers**

The significance of the research work lies in the fact that it seeks to undertake a thorough and broader outlook into the socio-economic effects of mining on surrounding communities, both negative and positive, and recommend policy directives to improve the already instituted social and economic development effects of the mining activities that may be identified in the research study and other surrounding area.

The study was designed to highly contribute to REMA, MINECOFIN, MINALOC, RMB, RURA and RSB which take count into population health and safe guards. Findings and recommendations serve as guide to other mining companies in the country.

#### **1.6.3. To the local community**

As long as the study employed responses from local residents of Rutongo Mining site living close to mining site, a real picture of how mining has affected their socio-economic wellness was indicated. This helped the residents of Rutongo mining site to better understand how mining can be a source of living and the best ways to envisage toward sustainable development of the area.

#### **1.6.4 To the researcher's host university (UNILAK)**

The researcher's host university (University of Lay Adventists of Kigali) benefited from the conduct of this study due to the reason that the final document has been deposited in its library. This served as a source of knowledge to further researchers in the same field.

#### **1.7 Scope of the study**

##### **1.7.1 Contextual scope**

Regarding the context, the research study was limited on socio-economic parameters like purchasing power, development of infrastructure, education, cleanness, living standard, job creations, commerce, financial services, prostitution, alcoholism, polygamy, equitable sharing of benefits, violation of compensation laws, social fundraising, culture, corporate social responsibilities, management of tailing and wastewater.

##### **1.7.2 Geographical scope**

In terms of space, the study was conducted by considering mining sites located in Rutongo concession of Rulindo District in the Northern province of Rwanda.

##### **1.7.3 Time scope**

This research covered a period of 4 years ranging from 2018 and 2022.

#### **1.8. Conceptual Framework**

The conceptual framework shows the impact of mining on the environment and the socioeconomics. This is based on the review of the available literature. Mining methods on the land can either be underground (deep shaft) or surface mining. With any of these methods, there are environmental and health impacts. For this research, as indicated in Figure 1.1, the researcher considered both independent and dependent variables. The independent variable of the study will be mining practices while the dependent variables will be socio-economic and environmental wellness

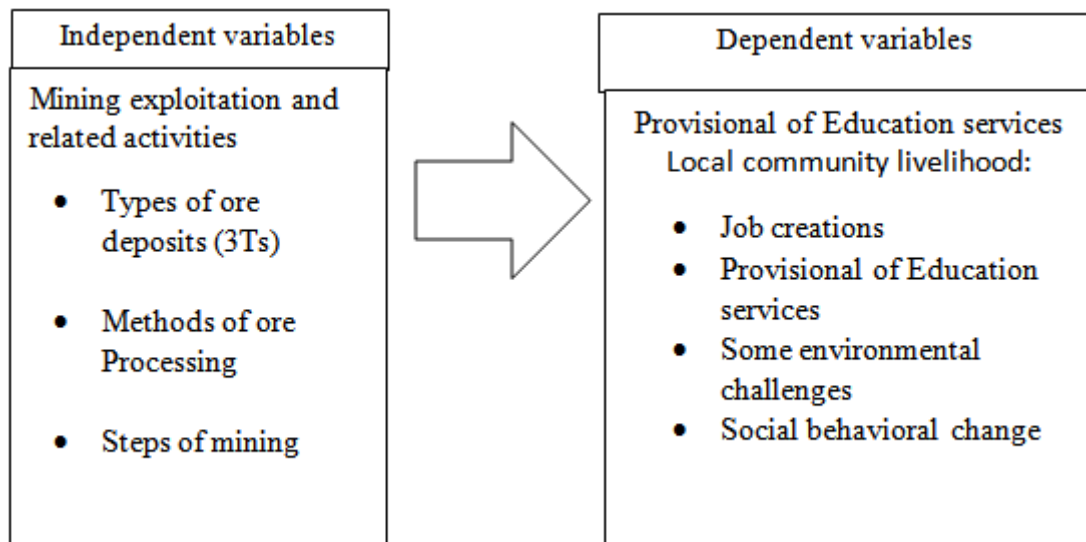


Figure1.1: Research conceptual framework

### 1.9 Definition of key terms

**Air pollution:** is the presence of substances in the atmosphere that are harmful to the health of humans and other living beings, or cause damage to the climate or to materials (UNIDO, 2001).

**Alcoholism:** addiction to the consumption of alcoholic drink; alcohol dependency (Musingwini, c. 2016).

**Land degradation:** is a process in which the value of the biophysical environment is affected by a combination of human-induced processes acting upon the land (Stephen & Ahern, 2001).

**Land sliding:** a collapse of a mass of earth or rock from a mountain or cliff (Stephen & Ahern, 2001).

**Landscape:** all the visible features of an area of land, often considered in terms of their aesthetic appeal (Stephen & Ahern, 2001).

**Living standard:** the quality of housing, material comfort, and wealth experienced by an individual or group (Musingwini, c. 2016).

**Mining:** is the extraction of valuable minerals or other geological materials from the Earth, usually from an ore body, lode, vein, seam, reef or placer deposit (Mbendi, 2015).

**Ore deposits:** A quantity of ore or mineral that makes exploitation worthwhile (Mbendi, 2015).

**Polygamy:** is the practice of marrying multiple spouses (Musingwini, c. 2016).

**Purchasing power:** is the amount of goods and services that can be purchased with a unit of currency (Musingwini, c. 2016).

**Tailings:** The material or waste left over after the valuable product/commodity has been extracted from the ore (SRK 2014).

**Tunnel:** A horizontal or nearly horizontal opening which intercepts the surface at two points (Mbendi, 2015).

**Water pollution:** is the contamination of water bodies, usually as a result of human activities (SRK 2014).

## II. CHAPTER TWO: LITERATURE REVIEW

### 2.0. Introduction

Several researches have been conducted on mining and its effects as well as contributions to economic development of countries endowed with mineral resources (TRI (2017). Whereas some researches highlight the benefits of mining to economic development, others focus on the negative impacts of mining on the overall development of such economies (Garriga, 2004). This chapter reviews what has been documented regarding mining as a concept, processes involved in mining and the methods employed in ore extraction, positive and negative effects of mining on local communities.

The current chapter will introduce the relationship between mining and socio-economic development as well as its impact on the environment and health of the people living close to the mining areas.

### 2.1. Mining practices

Mining is the extraction of valuable minerals or other geological materials from the Earth, usually from an ore body, lode, vein, seam, reef, or deposit, exploitation of these deposits for raw material is based on the economic viability of investing in the equipment, labor, and energy required to extract, refine and transport the materials found at



the mine to manufacturers who can use the material (MINIRENA, 2013).

Ores recovered by mining include metals, coal, oil shale, gemstones, limestone, chalk, dimension stone, rock salt, potash, gravel, and clay. Mining is required to obtain most materials that cannot be grown through agricultural processes, or feasibly created artificially in a laboratory or factory. (Cook and Mitchell, 2014). Mining in a wider sense includes extraction of any non-renewable resource such as petroleum, natural gas, or even water, modern mining processes involve prospecting for ore bodies, analysis of the profit potential of a proposed mine, extraction of the desired materials, and final reclamation of the land after the mine is closed (Wilson, 2013)

The types of mining are mainly classified as Open-pit, underwater, and underground mining. These are the three main methods of mining we use to extract our products from the ground (Risdon et al., 2003).

### 2.2.1. Methods of ore Processing

Ore processing is the most important steps to recover the valuable minerals, these steps made of separation of minerals from mined ore and dispose the waste.

Mineral processing can involve four general types of unit operation: comminution – particle size reduction; sizing-separation of particle sizes by screening or classification; concentration by taking advantage of physical and surface chemical properties; and dewatering – solid/liquid separation. In all of these processes, the most important considerations are the economics of the processes, which is dictated by the grade and recovery of the final product. To do this, the mineralogy of the ore needs to be considered as this dictates the amount of liberation required and the processes that can occur. The smaller the particles processes, the greater the theoretical grade and recovery of the final product, but this is difficult to do with fine particles since they prevent certain concentration processes from occurring (RNRA, 2013)

Crushing is normally carried out on "run-of-mine" ore, while grinding (normally carried out after crushing) may be conducted on dry or slurried material. In comminution, the size reduction of particles is done by three types of forces: compression, impact and attrition. Compression and impact forces are extensively used in crushing operations while attrition is the dominant force in grinding. The primarily used equipment in crushing are jaw crushers, gyratory crushers and cone crushers whereas rod mills and ball mills, usually closed circuited with a classifier unit, are generally

employed for grinding purposes in a mineral processing plant. Crushing is a dry process whereas grinding is generally performed wet and hence is more energy intensive, Sizing is the general term for separation of particles according to their size. (RNRA, 2013)

Concentration: There are a number of ways to increase the concentration of the wanted minerals: in any particular case, the method chosen will depend on the relative physical and surface chemical properties of the mineral and the gangue. Concentration is defined as the number of moles of a solute in a volume of the solution. In case of mineral processing, concentration means the increase of the percentage of the valuable mineral in the concentrate. (RNRA, 2013)

Gravity separation is the separation of two or more minerals of different specific gravity by their relative movement in response to the force of gravity and one or more other forces (such as centrifugal forces, magnetic forces, buoyant forces), one of which is resistance to motion (drag force) by a viscous medium such as heavy media, water or, less commonly, air.

Gravity separation is one of the oldest techniques in mineral processing but has seen a decline in its use since the introduction of methods like flotation, classification, magnetic separation and leaching. Gravity separation dates back to at least 3000 BC when Egyptians used the technique for separation of gold

Currently ore processing for 3Ts combines all techniques especially, size reduction, screening, and gravity separation. (RNRA, 2013)

### 2.2.2. Steps of Mining

Available literature indicates that basically, there are eight steps to mining process. These are as follows:

1. Prospecting to locate ore.
2. Exploration to defining the extent and value of ore where it was located.
3. Conduct resource estimate to mathematically estimate the extent and grade of the deposit.
4. Conduct mine planning to evaluate the economically recoverable portion of the deposit.
5. Conduct a feasibility study to evaluate the total project and make a decision as whether to develop or walk away from a proposed a project. This includes a cradle to grave analysis of the possible mine, from the initial excavation all the way through to reclamation.
6. Development to create access to an ore body.
7. Exploitation to extract ore on a large scale.
8. Reclamation to make land where a mine had been suitable for future use (Hilson, 2014).

### 2.3. Mining and community livelihood

Minerals are essential for human welfare and social life; their extraction is associated with both opportunities and challenges. Long-term challenges include environmental issues and the fact that mining operations must not endanger the health and well-being of its workers and the community's citizens. One often-mentioned aim is that after mining activities have ceased, there should be as few footprints as possible in nature and the landscape and in the life of the people living in the area (Mcquilken, 2014).

#### 2.3.1. Mining and social welfare

Mineral development can create new communities and bring wealth to those already in existence, but it can also cause considerable disruption. New projects can bring jobs, business activities, roads, schools, and health clinics to remote and previously impoverished areas, but the benefits may be unevenly shared, and for some they may be poor recompense for the loss of existing livelihoods and the damage to their environment and culture. If communities feel they are being unfairly treated or inadequately compensated, mining can lead to social tension and sometimes to violent conflict (Acheampong, 2004).

#### 2.3.2. Mining and economic development

The contribution of mining to economic development is immense. Mining has an essential foundation for human development through creation of wealth (Acheampong, 2004). The mining industry has been key to the development of civilization, underpinning the iron and bronze ages, the industrial revolution and the infrastructure of today's information age. In 2001, the mining industry produced over 6 billion tons of raw product valued at several trillion dollars (Mbendi, 2004). Traditional mining countries such as the USA, Canada, Australia, South Africa and Chile dominate the global mining scene.

Mining is the chief earner of foreign exchange in the country

- Provides substantial government revenue
- Provides capital and social infrastructure to the general public
- Generates direct and indirect employment
- Contributes to community development in mining areas" (Akabzaa and Darimani, 2001).

#### 2.3.3. Mining and Economic Perspective

Communities can receive compensation and substantial flows of revenue when a large mine is established, which can act as an important catalyst for change and growth. For areas previously peripheral to the cash economy, these monetary flows can transform the economic and

social basis of communities. The types of payments and the way they are used are key to mining's ability to contribute to sustainable development at the community level. (USGS, 2014).

Mining often provides local communities with jobs, which may enable those in subsistence to join the cash economy. Others who already had paid work may find themselves better off, since in many countries mining pays relatively higher wages. Particularly in developing countries, wages may increase through localization schemes or through moving local employees into higher positions within a company by way of corporate training. Counter to this, however, modern mines tend to have much higher levels of productivity than older mines, employing small but highly skilled work forces (Mbendi, 2015)

#### 2.3.4. Mining and Social Perspective

It is difficult to separate the economic impacts of mining operations from the social impacts. Many social problems are direct consequences of poverty, and if mining helps a community become prosperous, it may also help it tackle social ills such as malnutrition, illiteracy, and poor health. On the other hand, mining activities may cause economic hardship – by polluting rivers and damaging fish stocks, for instance, or by appropriating grazing land and forestry resources. This, in turn, may exacerbate existing social problems or create new ones. (Awaar, G. (2006), If the revenues from mining are not equitably shared, this aggravates inequalities within communities. For example, a social audit of the Grasberg mine showed that the worsening inequalities in income distribution our young adults, modifying their position and prestige vis-à-vis their elders and affecting traditional social structures. If people in a community perceive the revenues of mining to be unfairly shared, this can result in social tension and even violent conflict with in the community or between the community and the mining company or government (SRK, 2014)

#### 2.3.5. Mining and Infrastructure Improvements

There can be significant infrastructure improvements with the construction of a large mine. Mining operations of any size are served by airstrips, roads, water supplies, sanitation systems, and electricity. If these are restricted to use by the company, and designed solely for company objectives, they may be of little relevance to anyone else. With some advance planning and a willingness to consult with the community, however, these can bring lasting benefits at little or no added cost. And the development of

infrastructure may facilitate other forms of economic activity, such as tourism (Awudi 2002)

### 2.3.6. Mining and Education

As with health, access to educational services and facilities can improve dramatically for communities close to or around large mines, particularly for mines in remote areas of developing countries. The mining company is often involved in the provision of educational facilities – either directly or indirectly through the redistribution of revenues by the state or through innovative means such as the tax credit scheme in PNG.<sup>17</sup>Other increases in educational opportunities come through scholarships. These can come in the form of corporate support or through Trust Funds or foundations, such as the Inti Ray Foundation in Bolivia, which sponsors educational projects, and the Rio Tinto Aboriginal Foundation in Australia.<sup>18</sup>Even though the opportunity to receive income through direct or indirect employment in the mine can act as a disincentive for schooling, education is one of the most significant and lasting benefits that a community can derive from a large mine (Central Bank of Jordan, 2014)

### 2.3.7. Mining and Social Change

The social benefits of minerals development must be seen in the context of the many social problems associated with large-scale mining operations. These mines may be accompanied by the wide spread availability and consumption of alcohol, an increase in gambling, the introduction of or increase in prostitution, and a widely perceived breakdown in law and order. Violence, alcohol-induced and domestic, may increase. And, as at the Porgera mine, migrants may encourage traditional forms of violence such as tribal fighting. Of course, many of these processes of social change may be under way already and mining may simply accelerate them (SRK, 2014)

These problems are not restricted to pre-existing communities. Male-dominated mining camps, such as those found in South Africa, often attract prostitutes and may lead to high levels of sexually transmitted diseases. In an effort to overcome some of these problems, mine accommodations are being improved. In South Africa, in areas where the work force can be drawn locally, there is a trend away from single-sex hostels to family accommodation. (World Bank, 2014)

### 2.3.8. Mining and Cultural and Political Perspective

Mineral development often changes the balance of power within communities. This can be

exacerbated by mining companies being unaware of or choosing to ignore traditional decision-making bodies and negotiating with individuals who do not have the trust or support of their own community. Companies have been criticized for using ‘divide and rule’ tactics, which can seriously undermine the social cohesion of indigenous and other communities (Chimonyo, 2012)

Large flows of money at the local level can encourage bribery and other forms of corruption, undermining the potential for communities to receive a fair share of the revenues from mining for longer-term investment. This may damage the social fabric and lead to conflicts) Natural Resources Authority, 2014)

### 2.3.9. Maximizing Mining’s Contribution to Communities

If mining operations are to help communities work towards sustainable development, the communities need to be able to participate effectively in the decision-making processes for establishing and running the operations, in order to avoid or minimize potential problems. Moreover, the relationships between the community and other actors, including the company and government, need to be ones of collaboration, trust, and respect (Arab Potash Company, 2014).

It is obvious that the benefits brought and enabled by mining must be maximized and the negative effects avoided or mitigated. Furthermore, the benefits need to be shared equitably within communities and sustained after the life of the mine. The actions of companies and governments need to reflect cultural sensitivity and relevance (Chimonyo, 2012)

Revenue Distribution and Use  
Traditionally, all taxes and royalties from mining operations have gone to the central government, and the only benefits from equity that communities could expect to receive were those that trickled down through central government spending. This is not to say that money has not been used to the benefit of communities when collected at the national level through, for example, the establishment of funds or investment in services such as education (Chimonyo, 2012)

### 2.3.10. Mining and Gender Disparities

The impact of mining on women has been exacerbated by the failure to identify them as a distinct group of stakeholders in the planning and operation of mine sites and to establish trusted means of communication. This clearly needs to be redressed. One difficulty is the emphasis on consulting and channeling information to



community leaders, who are invariably male. (Hilson and Forum 2002)

### 2.3.11. Mining and Retrenchment

Some initiatives are more directly geared towards the concerns of workers who lose their jobs, in terms of providing psychological support and helping them develop skills or seek new employment. One example is the Care retrenchment project in Southern Africa

Between 1990 and 2000, 360,000 mineworkers lost their jobs.<sup>72</sup>This has had a major impact on mining communities, especially in remote areas and among communities that have been almost entirely dependent on the income from mining. The impact of retrenchment can be far-reaching, as each migrant mine worker usually supports many dependents at home (Stephen, 2001).

### 2.3.12. Mining and Community Health Initiatives

Traditionally, companies have provided health services to employees and their families, such as hospitals and health care centers with modern equipment and professional, often expatriate, staff (Abrahamson and Johansson, 2006).

Particularly in poor communities, such infrastructure has generally reflected an inadequate understanding of local needs and expectations, as well as a lack of consideration for its ability to be sustained after the mine closes. Furthermore, beyond work-related diseases, there have been few endeavors to prevent diseases that affect the wider community, such as sexually transmitted diseases or malaria, or to consider the broader well-being of the community (Andersson et al., 2013). On the whole, company involvement in community health issues has been reactive rather than pre-emptive (Chimonyo, et al. 2012)).

Land, soils and Forest Degradation Mining especially using the open pit and SSM degrade forestlands which are the only source of livelihood for some local communities, in that, it destroys the vegetation, including the economic timber species and the natural forest regeneration of all age classes. Not only does mining take land from the local people but also degrade some agricultural lands that could have been available for farming as most of them are not reclaimed (Badasu et. el, 2001).

Alternative livelihood Programs Alternative Livelihood Programs (ALP) in mining communities provide alternative source of employment and income for local people, who have lost their primary occupations as a result of mining activities. Even though literature on the

topic is not vast, a cursory look at what is available suggest that many ALPs that are implemented in mining areas in developing countries do not have the requisite impact on the targeted community and are to some extent imposed on the people without their consent.

### 2.3.13. Mining and Displacement, Dispossession, Resettlement

Mining-induced displacement, dispossession, and resettlement may occur through direct or indirect impact of mining activity in a particular geographical area. People lose their habitation through either encroachment or pollution of their habitation by mining activities. Moreover, individuals losing the source of their livelihoods are compelled to relocate. The effect of these, displacement and dispossession come in diverse ways (Terminski 2012), mentions a few including: “1. landlessness; 2. joblessness; 3. homelessness; 4. marginalization; 5. increased morbidity and mortality; 6. food security issues; 7. loss of access to common property, and; 8. social disarticulation, 9. community breakdown, and culture insecurity” Mining-induced displacement also causes infringement on women’s right. In regards to expect review, the repercussions of displacement put women at more disadvantage position. Women lose land needed for crop production, which is an important source of their subsistence for maintaining the family. Loss of land also affect 43 women’s normal functioning such as destroying their economic status along with malnutrition, health problems, and lack of access to basic resources (Terminski, 2012).

Gedicks (2005) in “Resource Wars against Native Peoples” argues that destroying one’s source of food supply is human rights abuse. He further explained that native people across the world suffer violence because their land contains valuable natural resources needed for industrial production. Multinational and non-states corporation who are into mining encroach resource frontiers of rural communities, and create a systematic displacement, dispossession, and in some cases, destruction of local communities.

### 2.3.14. Mining and community livelihood challenges

Mining has been blamed globally for harmful and impoverishing effects. Most countries are rich sources of minerals, yet there is very little development, since miners, and those around mining sites, still live in abject poverty, cross the world, mining contributes to erosion, sinkholes, deforestation, loss of biodiversity, significant use of water resources, dammed rivers and ponded waters, wastewater disposal issues, acid mine

drainage and contamination of soil, ground and surface water, all of which can lead to health issues in locals (Irene and Raphael,2020)

### 2.3.15. Mining and local community opportunities

Mining done in adequate methods may lead to development of infrastructures, increment in purchasing power, provisional of education services , job creations , commerce and financial services cleanness, increment in living standard, participation in social fundraising, equitable sharing of benefits, corporate social responsibility initiative, enhanced food vending, increased livestock ownership, increased urban centers developments , increased incomes, created markets for agricultural products, enlarge transportation and created opportunities for women(Irene mwakesi,2020)

## 2.4. Mining in Rwanda

### 2.4.1. Geology of Rwanda

The geology of Rwanda comprises Mesoproterozoicmeta sediments, largely quartzites, sandstones, and shales of the Burundian Super group which are locally intruded by granite. There are four types of granite in the Kibaran Belt. In eastern Rwanda are the “older granites” along with granitic-gneisses and migmatites of Paleoproterozoic age (SRK,2014).

The largest part of Rwanda land surface is underlain by a series of rock types widely referred to as the Kibaran System. This system extends right from Northern Tanzania through South Western Uganda, Rwanda, Burundi, Eastern part of Democratic Republic of Congo, Zambia and Angola. This rock system contains numerous granite-related ore deposits, which are rich in minerals ores like cassiterite ( $\text{SnO}_2$ ), niobo-tantalite ( $\text{Nb,Ta}_2\text{O}_5$ ), wolframite ( $\text{Fe,Mn} \text{WO}_4$ ), beryllium ( $\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$ ), spodumene ( $\text{LiAlSi}_2\text{O}_6$ ), amblygonite ( $\text{Li,Na} \text{AlPO}_4(\text{F,OH})$ ) gold (Au) (Minirena,2010).

These ore deposits are widespread in Rwanda. In addition to the above the following stream sediment geochemical anomalies have been detected; arsenic (As), Copper (Cu), Zinc (Zn), Phosphorous (P), Lead (Pb), Cobalt (Co), Thorium (Th) and Uranium (U). There is also potential for a variety of other nonmetallic resources like semi-precious stones (sapphire ( $\text{Al}_2\text{O}_3$ ): blue variety of corundum, ruby ( $\text{Al}_2\text{O}_3$ ): red variety of corundum, Emerald ( $\text{Al}_2\text{O}_3$ ): green variety of corundum, beryllium ( $\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$ ), raw materials for ceramic industry, dimension stones and energy

resources of peat and geothermal exist. (Rwanda Mining Profiles,2018). In Rwanda 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.

In Rwanda, mining started in the early 1930s and since then the mining sector has undergone wide reforms and is now Rwanda's second-largest export revenue earner in the country. In 2017, the sector generated \$373.4 Million of foreign exchange. Rwanda's mineral resources include Cassiterite, Coltan, wolfram, peat (used for electricity generation or processed as an alternative for firewood), gold and Nickel. In addition to this, the country has other precious stones such as amphibolite, granites, quartzite, volcanic rocks, clay, sand and gravel.

### 2.4.2. Mining in Rwanda economy

Rwanda produces between 8,000 and 9,000 tons of mineral compounds every year and the amount of money depends on the market pricing dynamics. Gold mining and export has recently emerged to have big potential. Rwanda is among the top producers of Tantalum, producing about 9% of the world's Tantalum used in electronics manufacturing. In addition to that, Rwanda is now home to two refineries of gold and tin, both of which have the capacity to process large amounts of minerals from within the country and the region. Rwanda has a mineral tagging and sealing scheme, internationally recognized as a member of the iTSCi program that ensures that the origins of the minerals can be traced in order to avoid conflict financing, human rights abuses, or other malpractices such as bribery in mineral supply chains.

Extending from eastern DRC across Rwanda and into southwest and northern Burundi, the 3T belt of east and central Africa produced 51% of the world's tantalum supply (28% of which is produced in Rwanda), 3% of the world's tin, and 2% of its tungsten in 2013. These products are largely exported in the form of mineral concentrates of cassiterite (tin), tantalite19, (tantalum), and wolframite (tungsten). In addition to the 3T minerals, Rwanda also produces niobium, some gold and gemstones, and a range of construction minerals serving mainly in-country markets (e.g., limestone used in cement production, clay bricks, stone aggregate)

Like its neighbors, Rwanda's 3T mineralization, is largely associated with granites hosted within Kibaran belt rocks formed approximately 1.3 billion years ago. The 3Ts in the

region are typically found in multiple, structurally controlled deposits (e.g., pegmatite fields), most of which are too small to be economically exploited by industrial means as such, most production is carried out via artisanal or semi-mechanized methods, with more than 82% of 3T production in 2015 attributed to ASM licenses. Given the nature of 3T mineralization, even medium-scale operations throughout Rwanda rely heavily on artisanal and small-scale workforces to profitably operate.

Minerals have become an increasingly important source of revenue for Rwanda. In 2011 and 2012, combined export revenues of 3T ore concentrates (cassiterite, tantalite, and wolframite) reached USD 156 million and USD 136 million, respectively. Although the mineral sector accounted for less than 2% of Rwanda's GDP in 2013, amounting to USD 228 million, it was double the export value of coffee and tea combined, the traditional agricultural mainstays of Rwanda's export economy. Even as domestic prices of 3Ts declined by 18–20% between 2013 and 2015, 3Ts combined with tea and coffee exports in 2015 were valued at USD 600 million. 3Ts still constituted approximately 20% of the country's total exports, positioning 3T minerals in the top five of Rwanda's biggest exports together with tea and coffee<sup>35</sup>. Annex 2 shows 3T production for 2015 by value and volume and disaggregated by district.

#### **2.4.3. Mining activity in Rwanda's Rulindo**

District Mining activity has been increasing in Rwanda, especially over the last five years. According to Rwanda Natural Resources Authority (RNRA, 2014), the mining sector contributed to average 30 percent of total export earnings in the last decade and currently employs in excess of 30,000 people. The mining sector is one of the key strategic priorities of Rwanda's phase two Economic Development and Poverty Reduction Strategy (EDPRS-2), setting a target of tripling the 2012 export earnings to US\$400 million by 2017 (MINIRENA, 2013).

The Rulindo District is one of five districts in the Northern Province of Rwanda (Fig. 1). It has a population of 288,452 and population density of 507.6 inhabitants per square kilometer (Rulindo District, 2013). Around 77 percent of persons above 16 years of age are engaged in agriculture, with coffee and tea being the principal crops (Rulindo District, 2013). Poverty is prevalent, with 43 percent of the district's population categorized as either poor or extremely poor and only 2.6 percent of households having

access to electricity (National Institute of Statistics of Rwanda, 2012).

In a district with a high population density and substantial dependency on subsistence agriculture, mining coexists with human settlements and agricultural land. Mining and quarrying employs 5.3 percent of persons above 16 years of age in the district and the expansion of this activity carries implications for both social structure and land use.

##### **2.4.3.1. Mining in Rutongo concession (Mining site)**

Mining activities in many parts of the country mainly involve artisanal small-scale mining (ASM), the Rutongo Mines in the Northern Province have been a major producer operating at semi-industrial scale. These cassiterite mines are operated by the privately-owned South African company, Tinco. The mines have been operational since the 1930s, with major developments made by a Belgian company before being nationalized by the Rwandan Government in 1986. Currently owned 100 percent by Trinity metals Ltd the Rutongo Mines produce over 100 t of 71 percent tin concentrate a month that is exported to Malaysia (TINCO, 2014).

In 2013 alone, the Rutongo Mines accounted for 11.3 percent of the total 6842 t of cassiterite produced in the country (Cook and Mitchell, 2014). The mines are the largest private sector employer in Rwanda currently employing 3475 people, mainly through subcontracting to local miners who are paid per extracted minerals.

TINCO is in the process of renewing its license with a long-term plan of expanding and industrializing its operations. At present, it covers a concession area of 9432 ha in the Ntarabana, Cyinzuzi, Murambi, and Masoro Sectors of the Rulindo District with estimated reserves of 52,000 t of tin (Wilson, 2013).

As part of the long-term plan, the company aims to produce between 200 and 250 t of tin concentrates per month. With industrialization and further expansion, social and environmental impacts are inevitable. According to interview with Tinco management, the mines coexist with the 70,415 population in all the four sectors where the mining concessions are located, and many people live within the concession areas (MINECOFIN, 2013a).

Initial site observation and consultations with the Ministry of Natural Resources authorities and the Rutongo Mines management team revealed impacts relating to population pressure and land issues, conflicts between illegal miners (subcontracted miners who illegally sell minerals)

and the company, land degradation, aggregate mining, employment and training of locals, and company support for community. Given these prevailing impacts and considering future activities at a larger scale, it is important to understand the main concerns and expectations of relevant stakeholders (RNRA, 2015).

This research engaged relevant stakeholders in the Rulindo District to gauge their understanding, perspectives, concerns and expectations about the existing activity and future expansion of the Rutongo Mines and the impact this holds for sub-national development. While the Rutongo Mines are by far the largest mining activity in the area, it is important to recognize that ASM activities either organized in cooperatives or run by family or individuals also play a role in the social and environmental impacts in the district.

### 2.5. 3Ts in Rwanda

Rwanda has a long and rich history in mining, a history dominated by the so-called 3T's, tin, tantalum, and tungsten. It should be noted that these three metals are derived from the minerals cassiterite, coltan and wolfram respectively. The minerals are mined in Rwanda and exported, and the metals are subsequently extracted from them. Through the Rwanda Mines, Petroleum and Gas Board (RMB), the mining sector and the Government of Rwanda (GoR), Rwanda has high hopes for the mining sector to contribute to

national development, such as the creation and maintenance of a significant number of off-farm jobs, export revenues, and foreign direct investments (Rwanda 2017). It is against this backdrop that the GoR has strived to promote and regulate the mining sector for transformation, growth and development, and ensure that all Rwandans derive sustainable benefit from the country's mineral wealth (Rwanda 2018).

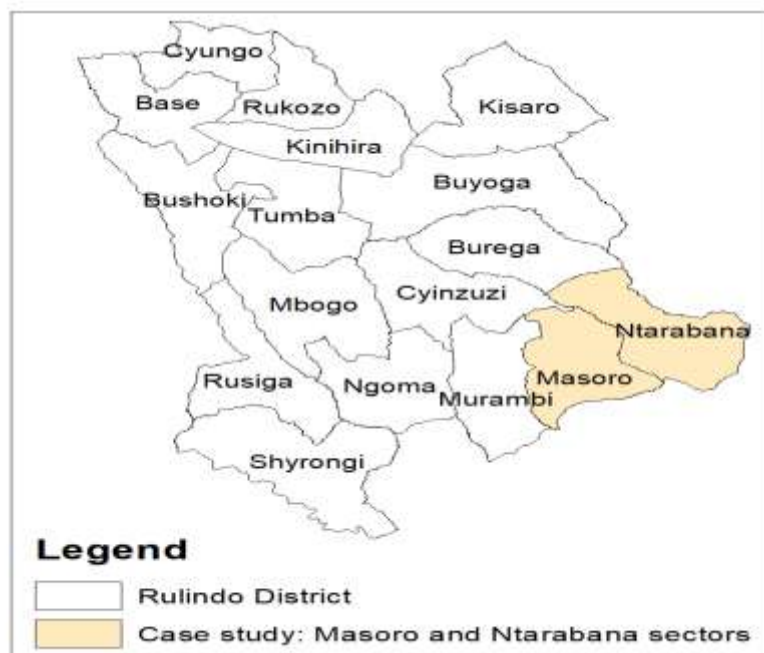
## III. CHAPTER THREE: RESEARCH METHODOLOGY

### 3.1 Introduction

This chapter describes the specific procedures or techniques which to be used by identifying, selecting, processing, and analyzing information about the research topic. It also describes the study area where the research was conducted.

### 3.2 Description of study area

Rutongo mining site is located and operated in Masoro and Ntarabana Sectros, Rulindo District, Northern Province of Rwanda, the area dominated by mining activities especially exploration of tin, tantalum and tungsten. The available deposit of those mineral lead to the development of Masoro and Ntarabana Sectors in Rulindo District and represent 25% of the district revenues (NIST, 2003).



**Figure 3. 1:Map indicating the location of the study area**



### 3.3 Research Design

This study employed descriptive survey research approach, where data were collected majorly through quantitative techniques during the fieldwork that has taken place in the study area between February and May 2022.

Data sources included both primary and secondary data. Primary data were gathered through key tools such as participant observation using an observation guide, in-depth interviews using a checklist of questions, and environmental assessments of various mining sites in Masoro and Ntarabana Sectors in Rulindo District of Rwanda. A random sampling technique was adopted for the selection of the communities and/or respondents for the interviews by considering both gender and different ages with education level for miners employed by Trinity metals Ltd. The secondary data used in this study included a critical review of literature on environmental and social impacts of mining in Rwanda, and a review of relevant laws and regulations currently in force. These also included international treaties and other documents or publications relating to standard international best practices of environmental protection.

### 3.4 Target population

As by definition, the target population is the entire group a researcher is interested in; the group about which the researcher wishes to draw conclusions. This research considered only the miners living in Masoro and Ntarabana sectors employed by Trinity metals Ltd, composed by 815 miners. The researcher selected sample size from the list of miners in the concession owned by Trinity metals Ltd.

Initially, the miners were divided into two strata, these qualified and unqualified employees from the Trinity metals Ltd living in Masoro and Ntarabana sectors and closer to mining site. The researcher was subjected to assess different views from miners who are carrying mining activities in Rutongo mining sites.

Since some miners and casuals are under their supervisors and team leaders, the researcher started with teams' leaders and supervisors who would then recommend suitable candidates who may assist in the study. Hence, the use of the snow

ball method has led to selecting 89 people including team leaders, miners and local villages in these 2sectors.

### Sample size

William (2004) noted that sampling is a device or a way that is used in selecting of the members is able to question, or who are a fair presentation of all the members in a union. Sampling techniques may be defined as the method used to select sample elements in the population. At this time the researcher has used purposive sampling technique in order to come up with the relevant information to the study. This technique of purposive sampling was applied to 89 respondents from selected in Masoro and Ntarabana Sectors.

However, the formula of Taro Yamane was used to calculate the sample size. Therefore, the fact that it is not possible to meet the whole population to achieve the research objectives, for the purpose of collecting detailed information that can lead to paramount decision making, a sub-set of the total population (sample size) would be selected. From the miners as target population of 782respondents of Masoro and Ntarabana Sectors, the sample size of 89 respondents will selected. As such, Sloven's formula for determining sample size was applied as illustrated below:

$$n = \frac{N}{1 + (N)e^2} \dots \dots \dots$$

(1)

Source: Yamane, 1967

Where N= Total population, n=Sample size, and e= Error margin, e<sup>2</sup> is 0.01 level of significance

Applying the above formula, the sample employed for this study was calculated from the 815 miners making a total miner living in of Masoro and Ntarabana sectors. The sample was calculated as follows

$$n = \frac{815}{1+815(0.1)^2} \dots \dots \dots (2)$$

n = 89.07 which makes approximately 89 participants ; whereby, n is the sample size, N stands for population and e<sup>2</sup> is 0.01 level of significance.

**Table3. 1:Selected respondents**

Type of respondents	Population Size	Sample size
Miners from Masoro	445	49
Miners from Ntarabana	401	40
<b>Total</b>	<b>815</b>	<b>89</b>



### 3.5. Research datasets and collection tools

To accomplish the research study, data was collected using the research methods and tools

#### 3.5.1. Desk review

Existing literatures on how mining activities impacted local communities' livelihood, Maps, previous socio-economic of the area, legal and institutional framework applicable to mining project were all reviewed using tools such as books, files and internet.

#### 3.5.2. Field visit

- Filed visits were conducted to the mining project sites and surrounding environment
- Assessment of the site area and plant species, animal species, neighborhood lifestyles, etc.
- Photographic recoding: a photographic survey of the site and the surroundings was performed.

Baseline data were collected through site visit and assessment of the site: field trips / surveys were conducted by the researcher at the site and surroundings to gather information on the existing environment.

Local people, neighbors, local authorities, RMB, and the Contractor's staff and other stakeholders were interviewed and involved in the consultations process.

#### 3.5.3. Questionnaire

A questionnaire is a research instrument that consists of a set of questions or other types of prompts that aims to collect information from a respondent. A research questionnaire is typically a mix of close-ended questions and open-ended questions.

#### 3.5.1 Primary data

Primary data have been collected from miners working in Trinity metals Ltd in Rutongo mining site and nearby head of villages. The primary data of this study also, include those data which have collected through field observation by the researcher.

The structured questionnaires allowed the researcher to collect relevant information from both local community and employees of mining companies available in the study area.

These data were mainly on the (a) mining practices applied at study site, (b) mining and health, (c) social and economic impact on mining activities (e) the effectiveness of the initiatives policies by mining company to mitigate the negative effects., the detailed questionnaire was focused on **livelihood opportunities parameters** (Development of infrastructure, Increment in Purchasing power, Provisional of Education services, Job creations, Commerce and financial service, Cleanness, Increment in living standard,

Participation in social fundraising, Equitable sharing of benefits, Corporate social responsibility initiative, Enhanced food vending, Increased livestock ownership, Increased urban centers developments, Increased incomes, Created markets for agricultural products, Enlarge transportation and Created opportunities for women) and **Livelihood challenges parameters**(Alcoholism, Prostitution and Polygamy). To ensure that primary data are well collected, the questionnaires were designed for YES/NO and multiple-choice questions. A few open-ended questions were also included in the questionnaire but keeping these questions to a minimum.

#### 3.5.2 Secondary data

These types of data were culled from company website, company policies, books, relevant articles from journals and reports of researchers conducted on the effects of mining operations on the socio-economic and environmental wellness of the surrounding communities.

The researcher also employed Google Earth to capture different images of the study areas in terms of spatial and temporal distribution of the changes on environment (water, wetland, water, forest, etc.) before and after mining at the study area.

These maps were well processed into Arc GIS in order to indicate changes on environment which resulted from mining activities at Masoro and Ntarabana sectors of Rulindo District.

#### 3.6 Pre-testing the questionnaire

Before drafting the final version of the questionnaire, it has already 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 was handed out to 5 managers and 10 supervisors or team leader.

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:

To split the questionnaire into relevant sections; and that there was a 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 already delivered to the chosen respondents. The respondents have

given a grace period of 5 days to respond to the questions after which the researcher returned to collect the completed questionnaires.

On the administered questionnaires, the researcher first dispatched the questionnaires and returned to administered after 3 days. 89 copies of the questionnaire will be produced and a copy will be sent out to 89 miners of Trinity metals Ltd

### 3.7 Data Analysis

All data obtained from the questionnaire analyzed. The data were marked with numbers which was inserted into Statistical analysis as they pre-refined and ready to be statistically analyzed.

The Pearson Correlation in SPSS enabled the researcher to determine the extent to which mining impacts affect the livelihood of Masoro and Ntarabana sectors in Rulindo District.

The ArcGIS helped the researcher to produce maps of environmental changes (on water, land, forest, wetland...) recorded as a result of mining activities at the Rutongo mining sites.

### 3.8 Ethical consideration

During the whole process of collecting data, ethics were considered. Rights and confidentiality of respondents have already respected in all phases of study.

### 3.9 Research Reliability and Validity

In order to ensure the reliability and validity of the research, the preliminary communication have made by dispatching an introductory letter to the company managers which are targeted as well as to the human resources officers and their supporting team.

The introductory letters have 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. Additionally, the researcher did a deliberate attempt to ensure that questions at the beginning of the questionnaires are 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 are in the later sections of the questionnaire.

## IV. CHAPTER 4: RESULTS AND DISCUSSION

### 4.1. Introduction

This research made use of focus group discussions of community members, structured interviews with local miners and head of villages whom are likely to be affected by the mining activities of Rutongo mining site living in Masoro and Ntarabana Sectors and key informant interviews. The survey data was analyzed using

quantitative methods and the focus group discussions and key informant interviews formed the qualitative part of the study.

These discussions were carried out in selected miners of Rutongo mining sites and Nearby heads of villages. For the focus groups, one focus group was used to represent each of the selected group with participants were well picked to offer diversity of experiences and views to represent the community perceptions. For the surveys, the target was to reach 89. The area was chosen to provide basic information on how the mining activities impacted the Local community's livelihood in Rulindo district especially Masoro and Ntarabana sectors.

#### 4.1.1. Qualitative findings

The qualitative part of this study was conducted using focus group discussions and semi structured interviews. The data was collected using a deductive approach from the categories and themes derived from the literature.

These main themes are Employment, infrastructure and social amenities, health, and the social fabric. Using directed content analysis, the author classified the answers into 5 Groups as Strong agree, Agree, neither agree nor disagree, Disagree and Strongly disagree, each question's findings were placed under the themes to see how communities perceived mining impacts in their community's livelihood relative to theory.

The themes were developed using data collected with links to theory identified. In the focus group interviews, theory (a deductive approach) and questions were designed to bring out views on the theories placed in well thought questions that were directly linked to mining activities. Visualization techniques were used for the key informant interviews which were presented.

The findings discussed in this section are based solely on perceptions of participants in the focus group discussions and key informant interviews unless otherwise stated and referenced (See household surveys, focus group discussions and key informant interviews.

### 4.2. Data findings design

Findings on how mining activities impacted community's livelihood parameters like increase in Development of infrastructures, purchasing power, Education, Job creations and employment, Commerce and financial services, prostitution and polygamy, Alcoholism, cleanness, living standard, social fundraising, compliance with mining laws, regulations and equitable sharing of benefits were sampled and examined in Rulindo District.

Each parameter on community livelihood was analyzed separately as the socio-economic factors varies from one group to another group of effects.

Data from questionnaires were compiled and ranked from agree, strongly agree, neither agree or disagree, disagree and strongly disagree referring on the feedback from selected respondents on interviewed groups.

The results presented in this section were obtained from 89 questionnaires which were systematical distributed among respondents in Rutongo especially the Miners from Masoro and Ntarabana Sectors while considering the head of villages around who provided their answers on how

mining activities have affected their Local community livelihood 2012 to 2020.

During data sampling both sex, different ages, education level, marital status local leaders and citizens has taken into account.

### 4.3. Description of respondents

This part provided a summary description of respondents on sexes, ages, education, marital status and living period in Masoro and Ntarabana Sectors

The interviewed respondents were mainly classified its frequency and percentage of sexes, ages, education, marital status and living period.

The description, categories and level of participation was summarized in the table below t

**Table4. 1:Description of respondents**

Description of Respondents	Categories	Frequency of respondents (89)	Percentage
Sex	Male	56	62.92134831
	Female	33	37.07865169
	<b>Total</b>	<b>89</b>	<b>100</b>
Ages	<18≥45	61	68.53932584
	≤45	28	31.46067416
	<b>Total</b>	<b>89</b>	<b>100%</b>
Education	Illiterate	32	35.95505618
	Primary	26	29.21348315
	Secondary	11	12.35955056
	University and above	3	3.370786517
	TVET	17	19.1011236
	<b>Total</b>	<b>89</b>	<b>100%</b>
Martal status	single	39	43.82022472
	Married	38	42.69662921
	widower	8	8.988764045
	widow	4	4.494382022
	<b>Total</b>	<b>89</b>	<b>100%</b>
Living Period	6 Months-3Years	58	<b>65.16853933</b>

	Above 3Years -6years	31	34.83146067
	<b>Total</b>	<b>89</b>	<b>100%</b>

#### 4.4. Data organization, analysis, discussion, and interpretation

##### 4.4. 1.. Description of mining activities in Rutongo and distribution of respondents

**Table 4.4. 1:Distribution of Respondents in Mining Activities**

Mining Activities	Offices	Tunneling	ore transportation	ore processing and trading	Total
Numbers	47	504	76	188	<b>815</b>
Percentage	5.7668712	61.8404908	9.325153374	23.06748466	<b>100</b>

The above table, describe the distribution of respondent of miners from Masoro and Ntarabana Sectors into mining activities of Rutongo mining sites of mining activities, each group of respondents was made by subgroups like offices( Managers of finance, operations, corporates services, and supportive teams),Tunneling (casuals, mining technicians, environmentalists, surveyors and other mining machines operators ) Ore transportation ( drivers and manpower's) while in ore processing and trading (plant operators, separator and crushers operators, production manager .....)

#### 4.4.2 Analysis of Community Livelihood Factors and Parameters

##### 4.4.2.1. Increase in job creation and employment

According to the mining policies and Rwanda mining board CEO regulations of 2018 on mining project related activities oblige an investor to give priority to local people during recruitment of workers during mining activities.

New employment opportunities provide chances for previously unemployed or under-

employed workers to increase take home pay and better their meet financial obligations. Increased employee earnings led to a higher rate of consumer spending, which benefits other businesses who depend on consumer sales to stay open and pay vendors. Wages and salaries increase the money circulating in the marketplace and leads to a healthier at overall local economy and allows more businesses to thrive.

The figure shows the respondent feedback on the increase of job creation and employment status in Masoro and Ntarabana sectors due to the implementation of mining activities in the area in the years ranging from 2012 to 2020

The study findings shows that mining activities have positively affected local community livelihood especially on socio-economic development in business growing, standard of living and increase of purchasing power which led to business to thrive in sustainable ways.

Here 87.8% of the respondents agreed with positive impact of mining activities on employment and job creations.

**Table 4.4.2.1:Increase in job creation and employment**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	26	13	3	2	5	<b>49</b>
Ntarabana Miners	17	17	3	1	2	<b>40</b>
<b>Total</b>	<b>43</b>	<b>30</b>	<b>6</b>	<b>3</b>	<b>7</b>	<b>89</b>

<b>G.Total</b>	<b>73</b>	<b>16</b>
<b>Percentage(%)</b>	<b>82.02247191</b>	<b>17.97752809</b>

The above figure summarizes the employment perceptions during the insertion of mining activities in Masoro and Ntarabana sectors of Rulindo District.

#### 4.4.2.2. Increase in Educational services

Mining activities affects socio economic activities through capacity building and getting wages and salaries which support education services by paying school fees of miner’s children and other benefiting from mining activities, Other increases in educational opportunities come through scholarship and is often involved in the provision of educational facilities – either directly or indirectly through the redistribution of revenues

by the state or through innovative means such as the tax credit.

The assessment of the impact of mining of Rutongo on socio economic development especially educational services has shown that the mining activities has positively affected the educational services based on the number of nurseries school and people attending schools from 2012to 2020.However even if Rutongo mining ltd has brought a Mining school, some left classes by working in mining sites.

Here 83% of the respondents agreed with positive impact of mining activities on the provisional of educational services in the area.

**Table 4.4.2.2:Increase in educational services**

<b>Group/Assessment</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>strongly Disagree</b>	<b>Total Respondents</b>
<b>Masoro Miners</b>	32	13	1	2	1	<b>49</b>
<b>Ntarabana Miners</b>	17	18	2	1	2	<b>40</b>
<b>Total</b>	<b>49</b>	<b>31</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>89</b>
<b>G.Total</b>	<b>80</b>		<b>9</b>			
<b>Percentage(%)</b>	<b>89.88764045</b>		<b>10.11235955</b>			

The fig (4) shows how people of Masoro and Ntarabana sectors of Rulindo District how the mining activities have affected education services.

#### 4.4.2.3. Increase in equitable sharing of benefits

Mineral development can create new communities and bring wealth to those already in existence, but it can also cause considerable disruption. New projects can bring jobs, business activities, roads, schools, and health clinics to remote and previously impoverished areas, but the benefits may be unevenly shared, and for some they may be poor recompensed for the loss of existing livelihoods and the damage to their environment and culture. If communities feel they are being unfairly treated or inadequately compensated, mining can lead to social tension and sometimes to violent conflict.

The rationale for local communities to receive a greater share of the benefits is clear: first, for communities to accept mining on their

doorstep, they must see some realizable benefits over and above being compensated for loss or other impacts. Second, for mining to contribute to the goals of sustainable development at the community level, it must provide a net benefit to the affected community. Sustainable development requires an equitable sharing of benefits; if there is obvious inequity, there will be strife, which impedes the development process.

Traditionally, all taxes and royalties from mining operations have gone to the central government, and the only benefits from equity that communities could expect to receive were those that trickled down through central government spending.

The below figure data represent how population of Masoro and Ntarabana sectors of Rulindo District are being benefited from sharing of government and investor spending in construction of infrastructures like hospitals, schools, roads development by government of



mining companies to ensure mining site accessibility and these are also used by local population through transport their production from agriculture to the market. Fair recruitment of miners and other operators show equal benefit of income and revenues from mining activities and Equitable capacity building on mining knowledge transfer also shows how resources and benefit area being shared in Masoro and Ntarabana sectors of Rulindo District.

Here 88.76% of the respondents agreed with positive impact of mining activities on the provisional of corporates social services in Masoro and Ntarabana sectors of Rulindo District, through social contribution in Umuganda participation, provisional of sport supportive services, relocation of people living in prone zones, payment of medical insurances for poors, maintenance of damaged roads.

**Table 4.4.2.3:Equitable sharing of benefits**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	27	13	1	7	1	49
Ntarabana Miners	15	14	2	3	6	40
<b>Total</b>	<b>42</b>	<b>27</b>	<b>3</b>	<b>10</b>	<b>7</b>	<b>89</b>
<b>G.Total</b>	<b>69</b>		<b>20</b>			
<b>Percentage(%)</b>	<b>77.52808989</b>		<b>22.47191011</b>			

The figure summarized the respondent’s feedback on equal sharing of benefits from mining activities in Rutongo mining site.

**4.4.2.4. Increase in business and financial services**

The introduction of mining activities in a given area, directly and indirectly affect business trend and financial related services through financial transaction from the income and expenditures through purchasing powers

Mining activities in Rutongo has brought many business and financial services delivery companies like Umurenge Sacco, Mobile Money and airtel money and local cooperatives called Ibimina in Masoro and Ntarabana sectors of Rulindo District

Among 79 out of 89 interviewed agreed with the increase of business financial services in the centers Masoro and Ntarabana sectors of Rulindo District in the range of period of 2012 and 2020.

**Table 4.4.2.4:Respondents feedback on increment business and financial services variation**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	30	16	1	1	1	49
Ntarabana Miners	14	19	2	3	2	40
<b>Total</b>	<b>44</b>	<b>35</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>89</b>
<b>G.Total</b>	<b>79</b>		<b>10</b>			
<b>Percentage(%)</b>	<b>88.76404494</b>		<b>11.23595506</b>			

**4.4.2.5. Increase of Infrastructures development**

Mining activities always depend on social infrastructures like roads for accessing their mine

site, electricity and water to ensure easy mineral processing and shelter to get home of miners. Once there are not available in the area the mining

company is responsible of incorporating these infrastructures in area. Local communities are being benefited from these infrastructures like roads which can be used to access the local market and provisional of electricity and water provisional. Mining activities bring a civilization in mines sites villages by enhancing the increment in constructing the houses and office which will be rendered by

mining companies and shelter and offices of miners.

Findings from 91% of respondents selected from local communities show the researcher that, there tangible increment in infrastructures development like roads, house, electricity and water, school, banks and water supplying system in the area during the years ranging from 2012 to 2020.

**Table 4.4.2.5: Respondents feedback on infrastructures development variation**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	16	30	1	1	1	49
Ntarabana Miners	14	18	5	1	2	40
<b>Total</b>	<b>30</b>	<b>48</b>	<b>6</b>	<b>2</b>	<b>3</b>	<b>89</b>
<b>G.Total</b>	<b>78</b>		<b>11</b>			
<b>Percentage(%)</b>	<b>87.64044944</b>		<b>12.35955056</b>			

**4.4.2.6. Increase of purchasing power and saving Money** and wealth can be classified as basic element of purchasing, money is the currency needed to exchange for goods or services, wealth is the abundance of **money** or material possessions **Wealth** is the power to turn goals into reality.

Mining activities also change money possession and wealth of anybody in area, therefore money received from wages and salaries surely

affect the purchasing power which is take as basic criteria of trading and commerce feasibility.

Findings on purchasing power and savings of local communities of Masoro and Ntarabana sectors have increased in measurable way means they almost smart (Abasirimu) in buying and selling. Local miners of Rutongo, they almost smart use banks, owned of bicycle and motor bicycle and houses.

**Table 4.4.2.6: Increase in purchasing power and saving**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	25	21	1	1	1	49
Ntarabana Miners	14	17	1	5	3	40
<b>Total</b>	<b>39</b>	<b>38</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>89</b>
<b>G.Total</b>	<b>77</b>		<b>12</b>			
<b>Percentage(%)</b>	<b>86.51685393</b>		<b>13.48314607</b>			

**4.4.2.7. Increase of prostitution, polygamy and Alcoholism**

Mining activities lead to faster increase and formation of urban center, this cause the migration of population from rural areas to urban centers, the higher the accumulation of population in center lead the mixtures of different cultures like

alcoholism, prostitution and polygamy once they are not aware on value of personality.

The development of urban centers in Rutongo area due to mining activities lead to an increase in prostitution level, polygamy and alcoholism this statement is supported by the

findings from respondent as appeared in figure below.

64.7% of total respondents agreed with the increment in prostitution level, polygamy and alcoholism in Rutongo mining nearby areas.

**Table 4.4.2. 7: Increase in prostitution, Polygamy and Alcoholism**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	13	29	2	2	3	49
Ntarabana Miners	20	12	3	2	3	40
<b>Total</b>	<b>33</b>	<b>41</b>	<b>5</b>	<b>4</b>	<b>6</b>	<b>89</b>
<b>G.Total</b>	<b>74</b>		<b>15</b>			
<b>Percentage(%)</b>	<b>83.14606742</b>		<b>16.85393258</b>			

**4.4.2.8. Conformity and compliance with mining law and regulations.**

The integration of mining policies and laws in mining development related project secure the environmental components and reduce the negatives impact which could be arisen from mining activities

New mining law of 2018, environmental law of 2018 and available employment policies with expropriation law n° 32/2015 of 11/06/2015 determines the procedures relating to expropriation in the public interest should be respected in all phases of the mining project.

The project developer should compensate all assets to be affected by the project and all activities should start after reception of compensation for all PAPs (Project Affected Persons).

The conformity and unconformity with the law may also affect socio economic development Therefore, the conformity with compensation regulation varies positively from 2012 to 2020 and this affect the socio economic of Rutongo especially nearby sectors in sustainable by reducing the conflict between local community and mining investors

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	26	13	3	2	5	49
Ntarabana Miners	11	21	4	1	3	40
<b>Total</b>	<b>37</b>	<b>34</b>	<b>7</b>	<b>3</b>	<b>8</b>	<b>89</b>
<b>G. Total</b>	<b>71</b>		<b>17</b>			
<b>Percentage (%)</b>	<b>80.68181818</b>		<b>20.31818182</b>			

**Table 4.4.2. 8: Conformity with mining laws and regulations**

**4.4.2.9. Increase in cleanness and standard of living**

research findings on cleanness and standard of living have changed in measurable way, where smartness of wearing cleaned clothes, bathing, reduction in number of patients related to

lack of hygiene and sanitation diseases received by local hospital and post of health.

Modern shelters in Masoro and Ntarabana sectors were introduced by replacing Nyakatsi 5 years ago after the implementation of mining activities in the area.the ubudehe categories also have changed from 4<sup>th</sup> to 2<sup>nd</sup> ubudehe category.

**Table 4.4.2.9: Increase in Standard of living**

Group/Assessment	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	strongly Disagree	Total Respondents
Masoro Miners	28	11	3	2	5	49
Ntarabana Miners	9	27	1	2	1	40
<b>Total</b>	<b>37</b>	<b>38</b>	<b>4</b>	<b>4</b>	<b>6</b>	<b>89</b>
<b>G. Total</b>	<b>75</b>		<b>14</b>			
<b>Percentage (%)</b>	<b>84.26966292</b>		<b>15.73033708</b>			

#### 4.5. Relationship of mining activities and local community livelihood

The mining activities have attracted people from different area of Rwandan Country (RMB,2017). Diverse economic activities have grown as a result of the mining activities in the area. Both genders are equally engaged in mining and diversification of economic activities for their household sustainability. Most men work mainly in the mining sector and have had greater economic and financial gains than women. Respondents agreed that mining activities assisted in creation of new business opportunities such as food vending, done mainly by women, improved transportation, food security and wealth creation. Every household has at least one family member actively working in the mining operations and this has been a great contribution to poverty alleviation within the household. Mining operation within the study area has brought about improvements of infrastructure such as roads, schools, health and market center as well as improved quality of houses. Mining helped some communities to purchase livelihood items such as farming and working tools.

There are nonetheless some negative outcomes owing to the mining operations which have affected the communities within the study areas of Rutongo. For some of the households, mining did not help them in acquisition of properties like land, cars and houses. This meant that even though mining enhanced ability to meet their day-to-day needs, it fell short of creating wealth in form of assets. Some communities lost their land due to increased number and sizes of mining pits especially where the same were poorly rehabilitated. Open mining pits and large-scale mining have caused a loss of agricultural land resulting in reduced crop yields and poor living standards. On the issue of compensation, some established mining companies in the area did not share their accrued revenues nor did they support development projects as was expected. Also lack of

proper enforcement of mining regulations has rendered the indigenes powerless when migrants invade their land for mining. The introduction of mining activities defines the increment in living standard of the nearby local communities, therefore Rutongo mining activities have positively affected the existing local community livelihood.

## V. CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS.

### 5.1. Conclusion

A research study has been conducted on how mining activities have impacted local community livelihood and how mining activities are being conducted in Rutongo mining perimeter, the researcher focused on community livelihood parameters like increase in Development of infrastructures, purchasing power, Education, Job creations and employment, Commerce and financial services, prostitution and polygamy, Alcoholism, cleanness, living standard, social fundraising, violation of expropriation law and equitable sharing of benefits and the relationship between mining and community.

The answers were classified based on the feedback from respondents, where a researcher classifies the respondents from strongly agree, agree, neither agree nor disagree, disagree and strongly disagree.

The research findings show that mining activities have impacted positively in the development of Masoro and Ntarabana sectors of Rulindo District for both who are directly employed by mining companies and indirectly to those are benefiting from business opened in the period of mining activities in the area.

Mining activities have contributed to the development of different sectors of life which are both directly and indirectly affected in Rulindo people's daily life.

Standard of living, cleanness and smartness, creation of new jobs, incorporation of new and moderns' infrastructures and improvement in purchasing power have been improved in the period of 10 years ago.

The level of alcoholism, prostitution, polygamy, violation of mining laws has also increased in Rutongo which led to the need of institutional framework on social protection.

## 5.2. Recommendations.

After evaluation and analysis of both primary and secondary data on how mining activities impacted local community livelihood, the following recommendations are addressed on policy makers, interested parties with local population and future researchers.

### 5.2.1. Policy Makers

- Laws and regulation governing compensation, environment and expropriation should be design and complied prior to the commencement of the proposed projects activities to reduce the conflicts of interest
- Mining policies regulator and inspector should reinforce the available social protection programs like provision of insurances to ensure early protection and mitigation from accidents related to mining sector.
- Institutional framework is highly recommended in all phases of mining to ensure the compliance with available laws, regulations and mitigation measures through integrating of all interested parties
- Environmental management plan on both impact prediction and mitigation should be implemented and incorporates all required cos during the implementation of mining project activities.
- Reinforcement on policies related recruitment criteria which requires that every developer should employ the skilled local communities in the project's area is highly needed

### 5.2.2. Local communities and public.

- Public participation is need in all phases of mining related project to ensure early awareness of their level of stake holding.
- Local populations and communities should respect the properties and infrastructures of investors by avoiding their damaging through illegal mining related practices

### 5.2.3. Future researchers

The obtained data are limited but not limited, therefore further research on social and

economic development is recommended in all mining areas. Therefore, futures researchers are recommended to carry out more studies on how mining sector affect socioeconomics development in Rwanda.

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## ANNEXES

### Questionnaire

**RESEARCH QUESTIONNAIRE**

Hello,

You are invited to participate in my survey “**impact of mining activities on local community livelihood in rwanda “case of rutongo mining site in Rulindo district ”**”. In his survey, you will be asked the questions related to how mining have

contributed to your community livelihood. It will take approximately 10 minutes to complete the questionnaire. No risks are associated with this project. Your survey responses will be strictly anonymous and confidential and data will be used for research purposes only.

**Section 1: Miner basic Information**

1. Gender 1. Male  2. Female

2. Age

3. Sector Name

4. Number of dependents

5. Marital status of the miner

1. Single       2. Married       3. Divorced       4. Widowed       5. Separated

6. Education

1. illiterate       2. Primary       3. Secondary       4. Diploma       5. Vocational

6. Bachelor       7. Others (Master, Ph.D, etc)

**Section 2: Information on the income and expenditure**

**A. What is the source of income before joining Mining activities?**

1. Government salaried       2. Private sector salaried

3. Self-employed       4. Unemployed

5. Jobless       6. Others

**B. What was your estimated monthly income before joining mining (FRW)**

1. Less than 30.000       2. Between 30.001-100.000

3. Between 100.001-200.000       4. Above 200001

**C. What was your previous Category (Icyiciro cy’ubudehe)**

1. First Category       2. Second category       3. Third category

4. Fourth category

**D. What was your current or expected Category (Icyiciro cy’ubudehe)**

1. First Category       2. Second category       3. Third category

4. Fourth category

E. what is your monthly expenditure on basic need(Tick all used) in RFW

1.	Food	<input type="checkbox"/> Below 30,000	<input type="checkbox"/> 30,000-50,000	<input type="checkbox"/> Above 50,000
2.	Water and energy	<input type="checkbox"/> Below 30,000	<input type="checkbox"/> Above 50,000	
3.	Rent	<input type="checkbox"/> Below 30,000	<input type="checkbox"/> Above 50,000	
4.	Clothes	<input type="checkbox"/> Below 30,000	<input type="checkbox"/> Above 50,000	
5.	Health	<input type="checkbox"/> Below 30,000	<input type="checkbox"/> Above 50,000	

**Section 3: Alcoholism and polygamy**

A. Tick in the order of your priority the following drinks.

	1. Most preferred	2. Preferred	3. Least preferred
Non alcoholic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alcoholic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Both	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water only	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milk, polidge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B. How many women or man do you have?

1     
  2     
  Above 2

**Section 4: Leisure**

A. How much money (FRW) do you spend on the leisure per month?

1. Less than 5000	<input type="checkbox"/>	2. Between 5001 to 50,000	<input type="checkbox"/>
3. Between 50,001 to 100,000	<input type="checkbox"/>	4. Between 100,001 to 150,000	<input type="checkbox"/>
5. More than 200,000	<input type="checkbox"/>		

**Section 5: Perception on benefits from mining activities**

A. Does schools, centers, modern houses, and road has increased in the area from the last 2years?

1. Disagree	<input type="checkbox"/>	2. strongly disagree	<input type="checkbox"/>
3. Neither agree nor disagree	<input type="checkbox"/>	3.. Agree	<input type="checkbox"/>
5. Strongly agree	<input type="checkbox"/>		

B. Do you think, you get any benefits from Rutongo mineral exploitations?

1. Yes

2. No

14. If yes, Tick the main benefit gained

1. Enhances education of my family

2. Enhance the development of my family

3. Improves the family health

Saves money

4. Increase my livestock

Improve the cleanness  Maintains

C. Apart from benefiting mining activities, do you think introduction mining in your area has helped you in Achieving the following (tick where appropriate)

1. Reducing poverty in the country

2. Creating employment

3. Sustainable development

5. Environmental protection

4. Incomes and Revenues generation

Corporate social contribution

**Section 6: Awareness on mining regulation and capacity building**

A. Have you ever heard of “mining law and regulation?”

1.

2.

No

17. If yes:

i) List down all illegal mining activities you are aware of:.....

ii) What are some of the major challenges experienced in this area in regard to mining activities and recruitment criteria

iii) What do you think the government can do in order to solve any of these challenges?.....

iv) What role can the investor (concession owner) play in solving any of these challenges?

B. Are you aware of any type of information from the government or environment organization which advocates for use of specific mining approach?

1. Yes

2. No

18. If yes;

i) What was/is the author of the information?

1. REM

2. RMB

3. Rulindo District

C. What is your level of agreement on this statement "major of the mining companies in this Rwanda looking for self-interest not for community"

1. Strong agree

2. Agree

Strongly disagree

4. Disagree

5. Do not know

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN THIS RESEARCH!

## 2.Coding During Data Analysis

After sampling, data were coded to ensure easy analysis.

### A. Coding of Answers

Answers	Code
Strongly Agree	1
Agree	2
Neither Agree nor Disagree	3
Disagree	4
Strongly Disagree	5