THE ROLE OF ARTISANAL AND SMALL SCALE MINING IN ENHANCING SUSTAINABLE LIVELIHOODS IN ZAMBIA

By

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A Dissertation submitted to the University of Zambia in partial fulfilment of the requirements of the Master of Science in Sustainable Mineral Resource Development

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DECLARATION

I, **Nachinanga Gubula Siaciti** declare that I am the author of the dissertation for the Master of Science in Sustainable Mineral Resource Development, at the University of Zambia. This dissertation contains my own original work and has not been previously submitted to any other institution of higher learning. I further declare that all sources cited or quoted are indicated and acknowledged by means of comprehensive list of references.

Signed…… **Date……**

APPROVAL

This thesis/dissertation of Nachinanga Gubula Siaciti has been approved as fulfilling the requirements or partial fulfillment of the requirements for the award of Master of Science Degree in Sustainable Mineral Resource Development by the University of Zambia;

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AN ABSTRACT OF A THESIS

THE ROLE OF ARTISANAL AND SMALL SCALE MINING IN ENHANCING SUSTAINABLE LIVELIHOODS IN ZAMBIA

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Master of Science in Sustainable Mineral Resource Development

This research aimed at investigating Artisanal and Small Scale Mining (ASM) in Zambia can play a big role in enhancing sustainable livelihoods in local and surrounding communities. Although ASM has the potential to stimulate local economic development and to promote poverty alleviation, it has failed to improve the livelihoods of its surrounding communities.

The potential benefits of ASM to create sustainable livelihoods around its geographical foot print are usually lost due to lack of proper institutional and governance frameworks to provide guidance on the operation of ASM. The Mines and Minerals Development Act of 2015, only provides guidance on distinguishing ASM from large scale mining and provisions for licensing. Rural local communities desperately need to benefit from the extraction of natural capital by stimulating other social-economic activities whilst at the same time maintaining environmental and social integrity.

The vast mineral wealth that Zambia has is exploited mainly through large-scale mining by the private sector whilst ASM on the other hand provides potential for ordinary Zambians to participate in mining and to create an alternative viable source of livelihood.

This study was aimed at identifying the key components that can enhance sustainable livelihood options by reviewing the context of ASM, governance and community assets through a Sustainable Livelihood assessment process.

Several community assets were identified such as access to clean drinking water, skills development, improved road infrastructure, environmental stewardship, access to finance that if supported can enhance sustainable livelihoods for communities around ASM activities.

To enhance the development of ASM in providing livelihood options for local communities, Government requires to establish a wing dedicated to conduct gap analyses, policy formulation, implementation and alignment in the sub-sector.

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ACRONYMS

AMDC	*African Minerals Development Center*
ASGM	*Artisanal and Small Scale Gold Mining*
AMV	*African Mining Vision*
ASM	*Artisanal and Small Scale Mining*
EMRB	*Energy and Minerals regulatory body*
GAHP	*Global Alliance for Health and Pollution*
IGC	*International Growth Cooperation*
ILO	*International Labor Organization*
ICMM	*International Council for Minerals and Metals*
Km	*Kilometer*
Km^2	*Kilometer squared*
MDG's	*Millennium Development Goals*
m^2	*Meter Squared*
MMSD	*Mining Minerals Metals and Sustainable Development*
OECD	*Organization for Economic Co-operation and Development*
SADC	*Southern Africa Development Commission*
SDG's	*Sustainable Development Goals*
SL	*Sustainable Livelihood*
UN	*United Nations*
WCSD	*World Commission for Sustainable Development*
ZCCM	*Zambia Consolidated Copper Mines*
ZCCM-IH	*Zambia Consolidated Copper Mines Investment Holdings*

CHAPTER 1: INTRODUCTION

1.1 Background

Artisanal and Small-Scale mining (ASM) has experienced exponential growth due to the rising value of mineral and metal prices and the increased difficulty of earning a living through agriculture and other rural activities (IGF, 2018). ASM typically refers to a poverty driven activity mostly undertaken in remote rural areas by a poorly educated population with little employment alternatives (World Bank, 2013). Be it formal or informal in its operation it is largely characterized with simplified forms of exploration, extraction and transportation and often uses intensive labor technologies (OECD, 2013). In 2017, an estimated 40.5 million people were directly engaged in ASM, up from 30 million in 2014, 13 million in 1999 and 6 million in 1993 (Inter-Governmental Forum on MMSD, 2017). Despite its low productivity, ASM is an important source of minerals and metals. It accounts for about 20 per cent of the global gold supply, 80 per cent of the global sapphire supply and 20 per cent of the global diamond supply (Inter-Governmental Forum on MMSD, 2017). ASM is also a major producer of minerals indispensable for manufacturing popular electronic products, such as laptops and phones. For example, 26 per cent of global titanium production and 25 per cent of tin comes from ASM (Inter-Governmental Forum on MMSD, 2017).

ASM however, is not just important to the companies and countries sourcing the minerals, it is an important source of income for many people living in poverty. It supports the existence of more than 150 million people in more than 120 countries compared to about 7 million people working in large-scale industrial mining worldwide (Much, 2020). ASM generally pursued as a route out of poverty, is an activity used to complement insufficient income, especially in communities where alternative employment is hard to come by and where mineral resources are readily available and accessible. In fact, ASM is considered as a source of revenue for millions of people in as many as 80 countries worldwide (World Gold Council, 2017; World Bank, 2013).

Due to the rapid growth that ASM is experiencing with the associated challenges it poses, it is often times tainted as the dark side of mining. Major environmental, safety, social and regulatory challenges are common in its operations. On a regular basis, stories hit the news about artisanal miners losing their lives due to poor mining and safety practices bringing scrutiny to all levels of the ASM sub sector. The livelihood of people around ASM communities continues to suffer severe

social problems as well as effects of environmental degradation (Shoko and Mwitwa, 2015). ASM miners continue living in a cycle of poverty creating a paradox of suffering amidst plenty (African Mining Vision, 2009). Despite the challenges that ASM faces, it is still envisaged as an activity with potential for poverty reduction in most countries where it is practiced (Mutagwaba, 2018). According to the African Mining Vision (2009), it is estimated that the sector provides direct employment to nearly 3.7 million people with another 30 million indirectly depending on it in Africa. Consequently, many countries have recognized the potential that ASM has on rural communities and are incorporating this activity into their long-term poverty reduction strategies.

In Zambia, the regulatory and incentive structure for ASM has not been well defined due to the traditional focus on large scale mining. ASM has at most been considered illegal with minimal policy direction on how the sub-sector should operate to realize its full potential. Furthermore, the sector in Zambia is known for high incidents of fatalities experienced from mined out old pits and old slug dumps (National Assembly of Zambia, 2018).

However, the mineral resource industry contributes to both the growth and deterioration of the social economic status of host communities due to the negative environmental and social costs borne during the process of mining. The relationship involving mining operations and communities is one that has had mixed results overtime. Franks and Davis (2011) argued that the extractive industry has the potential to transform environments, communities, and economies despite the mixed results obtaining at the moment.

The concept of Sustainable Livelihoods (SL) is vital to the discussion on poverty reduction, rural development and environmental management of the ASM sub sector. In addition, since ASM is mainly a poverty driven activity, the concept of sustainable Livelihoods is an attempt to go beyond conventional definitions and approaches to poverty eradication (Kranz, 2001). Kranz (2001) suggested that It is now recognized that more attention must be paid to the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner. The SL concept offers a more coherent and integrated approach to poverty alleviation. The SL approach rests on the core principle that stress people-centered, responsive and multi-level approached to development. In this vein, ASM needs to go beyond just providing income to rural operators but also create and support livelihoods, which are sustainable.

1.2 Statement of the problem

In many parts of the world, ASM activities are at least as important as large-scale mining activities, in terms of numbers of people employed. ASM has the potential to play an important role in poverty alleviation and rural development. Most of the people involved in this activity are poor and therefore ASM represents the most promising sector to provide a source of livelihood. Artisanal miners are commonly poverty-stricken people that live in poor countries (Musah-Surugu Justice et al., 2017). They become artisanal miners because of personal hardships (Hilson & Garforth, 2012) that require a consideration of other alternatives. For example, in Sub-Saharan Africa, most poor people live in rural areas, working as subsistence farmers on relatively small plots of less than ideal land (e.g., arid to semi-arid settings with poorly developed soils and agricultural infrastructure). The growing inability to create income from farming has led to widespread "agricultural poverty" requiring augmentation of farm incomes. Thus, farmers might enter artisanal mining on a seasonal basis, as a supplemental job, or permanently (Hilson, 2012; Hilson & Garforth, 2012). In some places, ASM has eclipsed farming as the primary source of rural income (Hilson & Garforth, 2012).

Despite its positive potential the ASM sub-sector is beset with problems of sustainability (AMV, 2009). The sub-sector is mostly rudimentary in nature, with little mechanization. Mine operators use simple tools like picks, shovels and wheelbarrows that are inefficient and hazardous to the environment and the safety and health of the miners. Miners continue living in a cycle of poverty because there is no visible development in their social economic status (Yaoundé Vision, 2002). A poverty trap is defined as the "critical minimum asset threshold below which families are unable to successfully educate their children, build upon their productive assets and move ahead economically over time" (Carter et al., 2007). In other words, survival is all that is possible with the available income. The livelihoods of the rural communities continue to dwindle around the sub-sector despite its potential. According to the AMV (2009), the poverty cycle created in the sub-sector (Figure 1) is worsened by legal and regulatory failures, including the failure of governments to recognize and formalize the sub-sector. Even where efforts are in place to regulate it, legal frameworks are not adequate and preference is still given to large-scale mining.

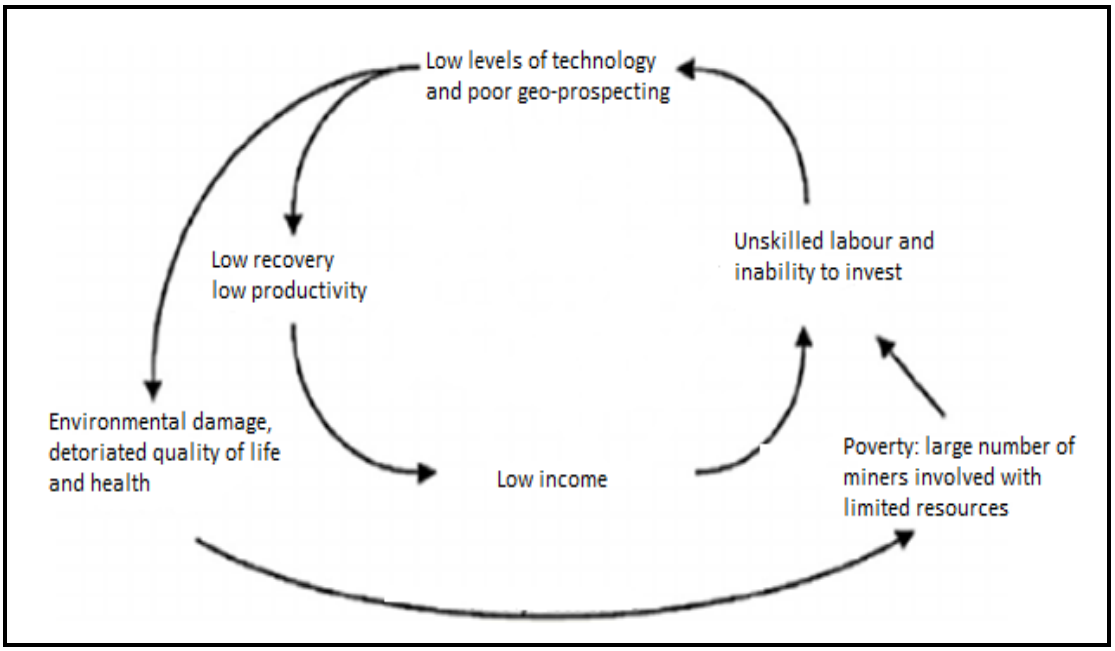

Figure 1 : Poverty trap (Hilson and Pardie, 2006)

The critical challenge in the ASM sub-sector in Zambia is to access the status of the sub-sector with more focus on the enhancement of Livelihoods of the miners. This is key since the sector is poised to grow exacerbated by ASM migrating from traditionally focusing only on precious stones but also exploiting base metals from smaller deposits and old mined out pits.

1.3 Research objectives

The overall objective of the study is to evaluate the social domain of ASM as a constituent component of Sustainable Livelihoods.

1.3.1 Sub- objectives

1.3.1.1 Governance

1. Determine the key stakeholders in creating Sustainable Livelihoods through ASM.
2. Determine the factors that limit or foster stakeholder collaboration to place ASM as a sustainable livelihood option; and
3. Determine the extent to which ASM miners are able to voice their concerns to different stakeholders.
4. Analyze the ASM subsectors alignment with the key tenets of the African mining vision

1.3.1.2 Livelihood assets

1. Determine the contribution of ASM in creating sustainable livelihood options

1.4 Research questions

1. Who are the main stakeholders in the development and operation of the ASM sub-sector?
2. What are the main constraints and opportunities for securing sustainable Livelihoods for ASM and the surrounding communities?
3. Which Livelihood assets or combination of assets are available to the ASM sub-sector?
4. How do institutions affect the livelihood opportunities for the ASM sub-sector?
5. How do institutions and livelihood opportunities align with the African Mining Vision?

1.5 Hypothesis

ASM has the potential to Enhance sustainable livelihoods in local communities by stimulating improved performance of community assets.

1.6 Significance of the project

Firstly, Zambia articulates its long-term alternative development policy scenarios through its Vision 2030 (Vision 2030, 2006). This Vision states that "By 2030, Zambians, aspire to live in a strong and dynamic middle-income industrial nation that provides opportunities for improving the wellbeing of all" (Vision 2030, 2006). Attainment of the Vision is envisaged to be driven by increased investment into the six identified development sectors, namely, agriculture (including livestock, fisheries and forestry); manufacturing; tourism; infrastructure; energy; and mining. ASM has immense potential to contribute to the economic development and wellbeing of rural communities. However, this potential has not been realized. Despite several efforts to formalize ASM the expected benefits from the sub-sector continue to elude local communities. Since ASM is poised to continue growing, it is crucial that countries having communities relying on ASM work towards making ASM sustainable. This study therefore is expected to contribute knowledge for identifying the community assets that are key in enhancing sustainable livelihoods in ASM surrounding communities as the country aspires to improve the wellbeing of all as guided by Vision 2030.

Secondly, a 2019 assessment of ASM is candid in its assessment of just how little information is available (World Bank, 2019). Beyond outdated estimates of how many people work in ASM, and production numbers, there are little other publicly available data. Data holes include information on the structure of the industry worldwide, the demographics of individuals and communities associated with ASM, and characteristics of the value chains responsible for moving commodities from mines to world markets. This data gap has existed for at least 40 years with a disturbing tendency to recycle numbers (World Bank, 2019). Because of the paucity of data, it is unclear how market forces, like commodity prices or socioeconomic drivers, affect the workforce or the capacity for developing the sub-sector (World Bank, 2019). This study is therefore significant in providing information to fill some of the knowledge gaps existing today in literature.

1.7 Scope of study

1.7.1 Location

Data for this project was collected from Lundazi District in the Eastern Province of Zambia (Figure 2) where ASM activities are on the increase. Lundazi is situated approximately 743 Kilometers east of Lusaka and is geographically the largest District in the Eastern Province of Zambia with 14,068 Km^2.

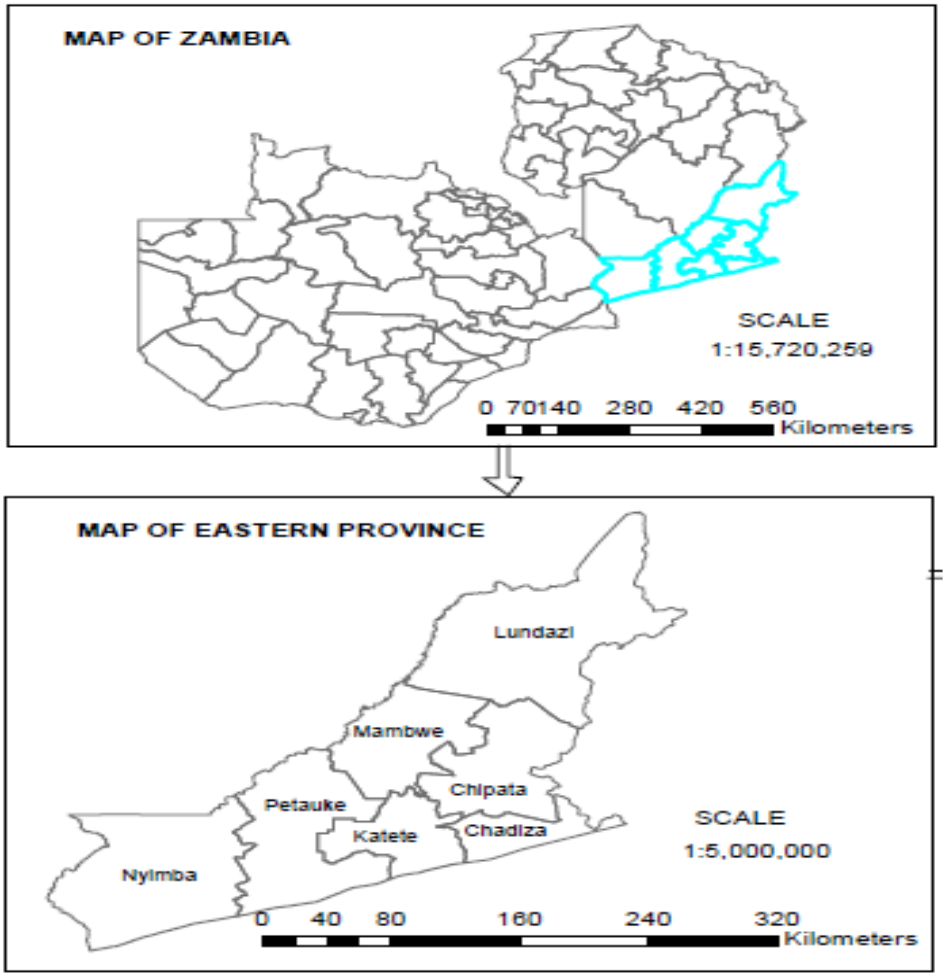

Figure 2: Locality maps showing Lundazi District (District Situational Report, 2016)

Lundazi District is located on a medium altitude of approximately 800 meters above sea level and in close proximity to the Lake Malawi/ Luangwa River watershed. The District shares boundaries with Chama District to the north, Mpika District to the West, Chipata District to the South, Mambwe District to the Southwest and the Republic of Malawi to the East.

The District has a total population of 390,314 with the growth rate of 2.6% per annum (CSO, 2010; projected population). The majority are female with a population of 192,714 while males have a population of 185,511. The urban and peri-urban population stands at 14,610 and this population is located mostly around the administrative center of the District whilst the rest of the population lives in the rural areas (CSO, 2010; projected population). The main ethnic groups found in Lundazi are Tumbuka and Chewa, with Tumbuka being the most widely spoken language. Other

tribes found in the district include Ngoni's, Bisa's and Senga's. In terms of population concentrations, the Chewas are the most populous group in the District with 39.7 percent of the population (CSO, 2010; projected population)

1.7.2 Climate

Lundazi District has a tropical type of climate with mean annual temperatures ranging from 17 to 29 °C. Prevailing winds are generally south - easterly and would appear to have an effect on the rainfall pattern. The District lies in the medium rainfall belt of Zambia with average annual rainfall of up to 833mm. Most of the rains fall within the wettest months of the year from October to April. The higher southern zone of the District receives more (relief) rain compared to the North. Some floods are experienced in the valley, which is rich with alluvial soils. The rich loamy soils in the District support the main economic activity agriculture.

1.7.3 Economic activities

The main economic activities in Lundazi include farming, livestock, tourism and gemstone mining (Figure 3). Lundazi District is endowed with abundant occurrences of various gemstone minerals of potential economic value, namely; Aquamarine, Garnets (Pyrope, Spessartite & Rhodolite) Iolite, Chrysoberyl, Moonstone, Corundum, clear/rose Quartz, Topaz and gold. However, to-date these much sought after gemstones of Lundazi District have remained unexploited, despite the high demand and ready market being offered for them by the international and local community.

Figure 3: Quartz mining in Lundazi District

1.7.4 Context

The Context of this research focuses on two thematic areas;

1. Governance
    a. Government policies on ASM
    b. Stakeholder involvement and engagement on ASM; and
    c. International standards on ASM
2. Livelihood Assets

1.8 Conclusion

Chapter 1 discusses the role that ASM plays in providing an alternative source of livelihood for local communities. It also presents the challenges that the sub-sector is faced with in enhancing their livelihoods on a global and local perspective.

The chapter further highlights the problem statement and derives the key objectives of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Artisanal and small-scale mining (ASM) has benefited from a body of research spanning decades, despite an ongoing lack of an in depth understanding and statistical data for the sector (Fritz et al. 2018). The existing literature, both academic and grey, has brought some consensus on key issues such as the challenges and the potential surrounding the sector, in many cases repeating similar findings and at times updating facts. This chapter reviews the existing literature on key thematic areas including global and local perspectives, challenges of ASM, key reforms on ASM and brings various findings together and subsequently, introduces the concept of sustainable livelihoods to the sub-sector.

2.2 Artisanal and small scale mining definitions

There is no single definition for ASM; it varies from country to country and for different developmental organizations (Mining facts, 2012). Artisanal mining is part of the informal sector and is typically identified by rudimentary mining techniques, a large labour force, and poverty (OECD, 2016). In the case of small-scale mining, there may be some level of mechanization during both the mining and beneficiation stages of the value chain. In Zimbabwe for instance, according to the Mines and minerals Act. 20:27 (2014) an artisanal miner is defined as a miner who carries out activities using approved tools and employs up to 50 people. These include government registered groups and cooperatives. Small-scale mining on the other hand employs the use of mechanization such as excavators, dredgers, generators and earth moving equipment. The official distinction therefore between artisanal and small-scale miners in Zimbabwe is based on the scale of operation and the degree of mechanization. In Zambia on the other hand, according to the Mines and Minerals development (MMD) Act (2016), artisanal and small scale mining licenses can only be issued to citizens, or to a citizen influenced or citizen empowered company. The distinction between small scale and artisanal mining is specified in mining legislation and defined according to the area of mining rights and requirements of mine safety regulations (MMD, 2016). As can be seen, in Zambia there is a concentration on formal small-scale mining. It is however, an undeniable fact that informal, illegal mining though discouraged does take place (Mulambia, 2018).

Different authors in trying to establish the boundaries of what is actually implied when discussing ASM have proposed several definitions. According to Siegel and Viega, (2009), the study of small scale mining in developing countries is an emerging professional and academic field whose terrain is largely unmapped and hard edges being determined. Labonne and Gilman (1999), however, offer a simple and simplistic definition of ASM by saying that artisanal mining is characterized mainly by absence or low degree of mechanization. ASM sub-sector has low safety standards, poorly trained personnel, large influx of migrant workers, low pay scale, low productivity, chronic lack of capital, and illegality (Guey, 2001). Noetstaller (1995) on the other hand, is of the view that artisanal mining could be defined as encompassing all non-mechanized, low output extraction of minerals carried out by individuals and small groups, frequently on an intermittent basis, employing essentially traditional techniques. Bryceson and Geenen (2016) view ASM as associated with democratic, social levelling effect in which physically fit men, risk-taking men from across the social spectrum start working as amateur miners with little or no experience.

In conclusion, on definitions, one way that ASM can be defined may depend on the geographical distribution, national legislation, and mining policy implementation, and other aspects, to characterize it more specifically see Table 1.

Table 1: Characteristics of small-scale mining

Positive	Negative
Stimulates local economies	Precarious Health and Safety conditions
Low production costs	Environmental Damage
Generates local production chains	Low level of technological development
Explores new deposits	Promotes social and legal conflicts
Wide range of products	Intense use of manpower
Supplies local markets	
Wider access to mineral deposits	
Encourages Geo-political development	

2.3 Global Perspective on Artisanal and small scale mining

Artisanal and small-scale mining is recognized as a considerable source of revenue for millions of people in about 80 countries worldwide (World Gold Council, 2017; World Bank, 2013). ASM takes place in diverse regions of the world, mostly in the global south—sub-Saharan Africa, Asia, Oceania, Central and South America. The term "artisanal and small-scale" has been defined in various ways, often characterized in terms of the number of miners, the production capacity of a mine, the level of mechanization or size of capital investments (International Labour Organization (ILO), 1999; World Gold Council, 2017).

In 1993, about six million people were believed to be working in ASM; in 1999 the International Labour Organization (ILO) revised this number to 13 million miners (including women and children) and estimated that about 80–100 million people depended on this activity at that time (ILO, 1999). In recent years, the number of people directly involved in ASM has more than doubled, reaching about 30 million people in 2014 (Figure 4).

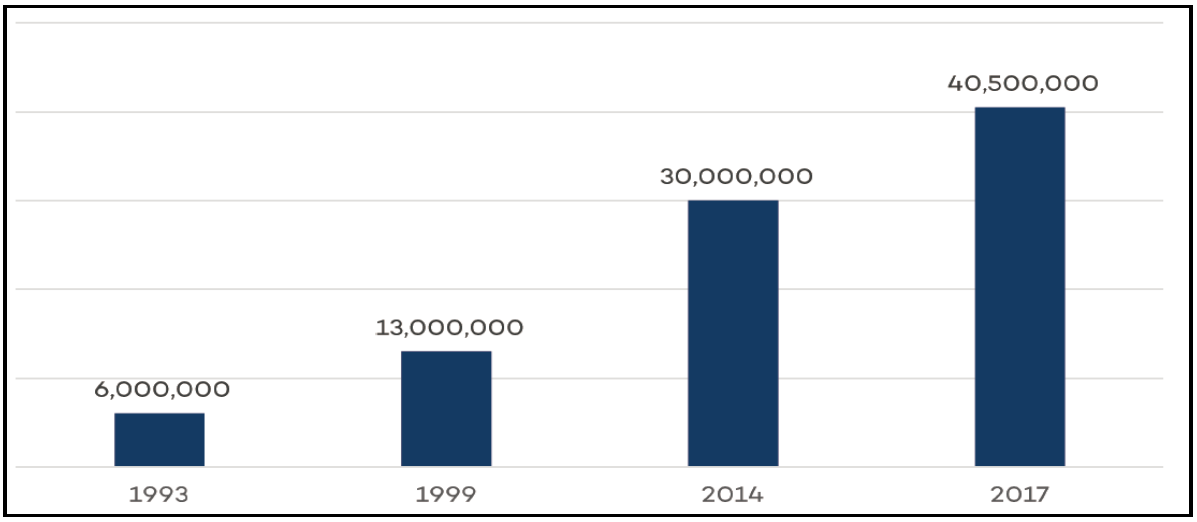

Figure 4: Number of artisanal and small scale operators worldwide showing corresponding growth between a number of operators worldwide between 1993 and 2017 (ILO, 1999; Seccatore et al., 2014; Levin, 2014).

The increase in activity in the sector can be attributed to rising mineral prices and the increasing difficulty of earning a living from alternative activities like agriculture (García et al., 2015; Seccatore et al., 2014).

According to current data from the Artisanal and Small-scale Mining state of the sector report (2020), there are approximately 44.75 million people directly involved in the ASM subsector. Indirectly, there are more than 150 million people who benefit from the ASM subsector (Levin, 2014). As shown in Figure 5, the number of people involved in ASM differs across countries in Africa, Latin America and Asia. In most African countries, 5–20 per cent of the population directly depended on ASM in 2009; in Latin America 0.1–5 percent; and Asia 0.1–1 percent.

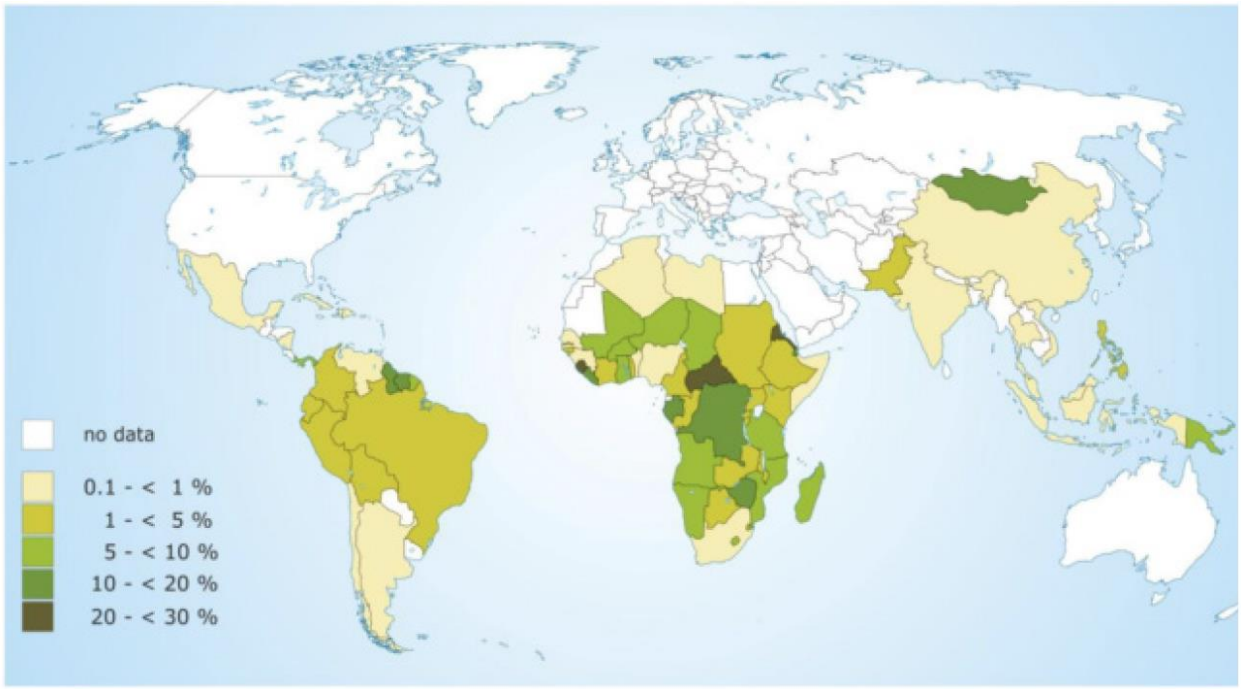

Figure 5: Percentage of population that depends on ASM (Dorner et al, 2012)

However, an emphasis is needed to improve national data benchmarking and consistency, to disaggregate numbers by gender, and to establish a criteria-based census of ASM operators. ASM is believed to account for 15 to 20 per cent of global non-fuel mineral production and is an important source of revenue for miners, their communities and local governments, especially when the activity is focused on mining high-value minerals like gold, silver and gemstones (ILO, 1999). About 50 per cent of the total number of ASM operators work on gold extraction, contributing to 90 per cent of total employment in gold mining (the remaining 10 per cent is mainly large-scale

gold mining) (Levin, 2014). Estimates of the contribution of ASM to global gold production vary from between 12 and 15 per cent (Levin, 2014) to up to 20 per cent (Global platform, 2019). According to the World Bank (2013), ASM also accounts for 80 per cent of global sapphire supply, and 20 per cent of global diamond supply. The activity is, however, not limited to these minerals; according to Veiga et al. (2014), ASM operators work on more than 30 different types of minerals.

Perceptions of ASM activity vary from country to country. Stakeholders often tend to vilify ASM because of its informal nature and hazardous characteristics, with significant health and safety risks as well as susceptibility to social conflict and human rights violations (World Gold Council, 2017). ASM is further criticized due to rising awareness of "conflict minerals," which has detrimental effects on the reputation and activities of ASM communities and countries (OECD, 2017) despite this only being relevant to some countries (World Gold Council, 2017).

2.4 Artisanal and small scale mining in Africa

There are about 13 million people directly involved in ASM operations in Africa. In addition, approximately 54 million people whose livelihoods indirectly depend on the sector (Ledwaba & Nhlengetwa, 2016 Persaud et al., 2017). The Africa Minerals Development Centre (AMDC) considers this a "conservative estimate," citing an important lack of data on ASM, as the activity is often informal and mostly operates illegally in several African countries (AMDC, 2015). The research acknowledges that ASM is both complex and highly important for the economies of at least 23 countries in sub-Saharan Africa, especially in rural contexts.

Estimates of the total number of ASM operators for the African region are as shown in Table 2.

Table 2: Estimates of total artisanal and small scale mining operators in Africa (IGF, 2017).

PERIOD	NUMBER OF ASM OPERATORS	NUMBER OF COUNTRIES
1999	1,998,350	24
2011	8,210,000	23
2014	9,878,500	40

See detailed table in appendix A1.

In 2011, according to the data provided by Hilson and McQuilken (2014), the number of people dependent on ASM activity in Africa was between four and 12 times the number of ASM

operators, but mostly around six times the ASM miner population (e.g., in the Central African Republic, Chad, Côte d'Ivoire, DRC). In 2003, women represented between 5 per cent (in South Africa) and 50 per cent (in Mali) of the total mining population, and up to 75 per cent in Guinea (Hentschel, 2003; Hinton et al., 2003a). In most cases men and women have different tasks along the mineral processing chain, with men being more present in the extraction phase, and women in mineral processing and the delivery of auxiliary services (Armah et al., 2016).

ASM in sub-Saharan Africa is often believed to be a "rush-type" activity, characterized as chaotic and entrepreneurial-driven, where miners are "fortune-seekers" (Hilson, 2009). It is also often seen as a "distress-push" type of activity where miners are looking to alleviate their poverty and work in ASM to complement revenues from farming (Hilson, 2009). However, it is impossible to generalize the characterization since mining activities in Africa are very diverse, with varying commodities, linkages with other activities, seasonality, migration, level of engagement and so on. For example, Hilson (2016) shows the seasonal nature of ASM and farming–ASM linkages in selected sub-Saharan countries such as Ghana, Liberia, Malawi, Mali, Mozambique, Sierra Leone and Zimbabwe. Persaud et al. (2017) uses the case of Senegal to highlight the importance of understanding the dynamics between agriculture and ASM, as these activities are significantly impacted by seasons. Table 3 shows African countries where various minerals are mined and the number of people indirectly dependent on ASM activity.

Table 3: Estimates of artisanal and small scale mining employment in selected countries in Sub-Saharan Africa and corresponding minerals (Hilson, 2016).

COUNTRY	DIRECTLY WORKING IN ASM	ESTIMATED NUMBER OF DEPENDENTS	MAIN MINERALS MINED BY ASM
ANGOLA	150,000	900,000	Diamonds
BURKINA FASO	200,000	1,000,000	Gold
CENTRAL AFRICAN REPUBLIC	400,000	2,400,000	Gold, diamonds
CHAD	100,000	600,000	Gold
CÔTE D'IVOIRE	100,000	600,000	Gold, diamonds
DRC	200,000	1,200,000	Diamonds, gold, coltan
ERITREA	400,000	2,400,000	Gold
ETHIOPIA	500,000	3,000,000	Gold
GHANA	1,100,000	4,400,000	Gold, diamonds, sand
GUINEA	300,000	1,500,000	Gold, diamonds
LIBERIA	100,000	600,000	Gold, diamonds
MADAGASCAR	500,000	2,500,000	Coloured gemstones, gold
MALAWI	40,000	-	Coloured gemstones, gold
MALI	400,000	2,400,000	Gold
MOZAMBIQUE	100,000	1,200,000	Coloured gemstones, gold
NIGER	450,000	2,700,000	Gold
NIGERIA	500,000	2,500,000	Gold
SOUTH AFRICA	20,000	-	Gold
SIERRA LEONE	300,000	1,800,000	Gold, diamonds
SOUTH SUDAN	200,000	1,200,000	Gold
TANZANIA	1,500,000	9,000,000	Gold
UGANDA	150,000	900,000	Gold
ZIMBABWE	500,000	3,000,000	Gold, diamonds, coloured gemstones

Clearly various minerals are extracted in Africa. In Tanzania, where there are more than one million ASM operators, two thirds are gold miners (Bryceson & Geenen, 2016). In the DRC, where about two million people directly depend on ASM, miners work mainly on gold, cassiterite, coltan and diamond extraction (Bryceson & Geenen, 2016). In DRC, cobalt mining is increasingly important due to market demand for electronics and electric vehicles batteries (RCS Global, 2017).

In sub-Saharan Africa, ASM has traditionally been administered by policies designed for large-scale mining (LSM) and considered a subset of LSM (O'Faircheallaigh & Corbett, 2016). In Ghana, for instance, policies tend to be incentive-based, ASM is regulated to avoid child labour and to support miners in getting a fair price for the minerals they sell, equipment and so on (O'Faircheallaigh & Corbett, 2016). Ad hoc ASM policies are made at both the national and local levels. Currently, the Ghanaian government has taken drastic action to eradicate illegal mining, banning a significant number of ASM operators (Boafo et al, 2019). This motivated by the heavy Human, health and environmental toll that gold mining has had on the sector campaigners have been lobbying against illegal mining known as “galamsey” due the adverse effect that the use of mercury in recovering gold has on soil and water. (Boafo et al 2019).

2.5 Artisanal and small scale mining in Asia

For Asia, in 1999 about 1,978,100 artisanal miners across 10 countries was estimated, and in 2014, this number has rapidly increased to 10,610,000 artisanal miners in 15 countries (ILO, 1999; Artisanal and Small-scale Mining Knowledge Sharing Archive, 2017). The largest number of

miners are found in China, Pakistan and the Philippines (see Table A2 in the Appendix). In addition, at least 15 countries are known or are likely to have ASM activities in Asia today, but no estimates are available (Artisanal and Small-scale Mining Knowledge Sharing Archive, 2017). The share of women involved also varies in this region (e.g., 10 per cent in Indonesia and 22 per cent in Papua New Guinea) (Hentschel, 2003).

As in Africa, ASM activity is sometimes combined with agriculture (rice farming), for instance in Cisitu, Indonesia; and the common use of mercury can lead to significant risks to human health and the environment (Bose-O'Reilly et al., 2016).

For instance, in Bombana, Indonesia, the number of miners rose by 40 per cent between 2007 and 2008 due to the discovery of new gold ores, attracting miners from neighboring areas (Basri et al., 2017).

ASM policies in Asia differ from those in Africa, where ASM policies are national; in the Philippines, for instance, local and regional policies and practices can differ greatly between the 30 provinces where ASM occurs (O'Faircheallaigh & Corbett, 2016). National legislation regulates ASM but has limited and/or variable impacts on the ground, as there are no livelihood alternatives for miners and many regions have their own local legislation (O'Faircheallaigh and Corbett, 2016).

2.6 Artisanal and small scale mining in Latin America

In Latin America, in 1999 a total of 641,875 ASM operators was estimated across 17 countries, and in 2014, 1,442,700 ASM operators in 19 countries (ILO, 1999; Artisanal and Small-scale Mining Knowledge Sharing Archive, 2017). In addition, at least five countries are known or likely to have ASM activities, but no estimates are available (Artisanal and Small-scale Mining Knowledge Sharing Archive, 2017).

The largest number of ASM operators can be found in Brazil and Colombia. ASM activity in Colombia is significant, representing 72 per cent of the country's total gold production in 2013 (Güiza, 2013). The Latin America ASM sector has strict regulations on informal operators and the use of certain substances, but has limited capacity to implement these regulations. It is particularly difficult to control informal mining where there are large numbers of miners; such as in Colombia, where about 87 per cent of 4,134 Colombian gold mining operations are illegal and 95 per cent of all the gold mines have no environmental permit (García et al., 2015).

As in Africa and Asia, migration is an important aspect of ASM in Latin America, such as in Serra Pelada (Brazil) and Nambija (Ecuador), where thousands of people migrated in the 2000s in search of gold and sapphires (Hentschel, 2003).

Policies concerning ASM differ from country to country. For instance, in Peru the government has been swinging between coercive policies involving military force on the one hand (e.g., in the Madre de Dios region) and incentive-based initiatives to support miners in creating cooperatives and providing them with financial support on the other (O'Faircheallaigh & Corbett, 2016). The government seems to have now opted for coercive interventions, as the incentives have failed. This is mainly due to a lack of organization and the financial means to support miners on site, due to the growth of ASM activities over the last 30 years (O'Faircheallaigh & Corbett, 2016).

2.7 Challenges of the artisanal and small scale mining sub-sector

2.7.1 Environmental, health and safety

While ASM is contributing to the economy (e.g. 34 per cent of Ghana's gold production in 2013) and rural employment (e.g., about 1 million rural Ghanaians), it has a significant negative impact on the environment. Environment, health and safety (EHS) conditions are poor; crops and farmland are degraded, affecting food production; and streams and rivers are polluted, resulting in costly water treatment to make it safe to drink (UN Environment, 2017:28). Although each ASM site has specific characteristics, some common factors can accentuate the general EHS impacts of ASM activities. These include lack of mechanization, use of rudimentary techniques, low levels of occupational health and safety (OHS) practices, lack of a skilled workforce, lack of social security and lack of awareness about EHS issues.

The use of hazardous substances for mining puts the health of miners and their communities at risk—they are exposed, for example, to mercury, zinc vapour, cyanide, or other acids (Obiri et al., 2010). This is a particular concern in gold mining, where mercury is frequently deployed and cyanide use is growing. Mercury can be inhaled, swallowed or absorbed through the skin, but the health consequences are usually not immediate (Armah et al., 2016). Inhaling dust and fine particles from blasting and drilling processes can cause respiratory diseases such as silicosis or pneumoconiosis in men and women, and in the children who often accompany their parents (Armah et al., 2016). According to the authors, a lack of ear protection to filter noise from

equipment like drills or crushers can cause temporary or permanent hearing loss and speech interference. Most OHS risks in sub- Saharan Africa are borne by women, due to the division of tasks between male and female miners.

Since research on chemical use in ASM is focused on gold mining, this section mainly addresses the use of mercury and cyanide in artisanal and small-scale gold mining (ASGM). As underlined by Spiegel et al. (in press), ASGM usually consists of two types: hard rock gold mining (primary ore) and alluvial gold mining (secondary ore). Both mining types involve different types and grades of ore, different technologies, different mercury uses and different socioeconomic characteristics. Mercury is more frequently used in hard rock gold mining than in alluvial gold mining, but in both cases resulting in serious environmental pollution and human diseases (Spiegel et al., in press).

South America is the region where the most environmentally friendly techniques are used in ASM Gold sector, and other examples of good practices can be found in Central Asia and Central America (Seccatore et al., 2014; Basu et al., 2015; Malehase et al., 2016). The practices that cause most damage to the environment are more common in Africa, with sub-Saharan Africa leading on mercury emissions, as well as East Asia (Basu et al. 2015; Malehase et al., 2016).

2.7.2 Legislation and formalization

ASM activities have expanded rapidly in the last few years. Most of these activities however, are scattered across lands with no official titles. In response to ASM's unrealized potential and associated vices, formalization has been projected as the 'magic bullet' through which distinct benefits can flow to operators and the state alike: it should be a 'win-win' situation (Echavarria, 2014). Advocates envision that with the formalization of ASM, operators would secure legal titles, which would lead to situations in which property laws could be enforced by the state; a greater visibility of miners, thus enabling governments to administer credit and technical support; improved environmental assessments, which would translate into greater environmental protection; and potentially, create a platform for investment. The drive to formalize ASM has been significant and noticeable: by the mid-1990s, 36 countries in sub-Saharan Africa alone had taken steps to legalize the sector (Collins and Lawson, 2014).

2.7.3 Social issues

Social factors in the mining sector are concerned with the distribution of costs and benefits between the shareholders involved. Where mining is well planned and all stakeholders involved in the decision making processes, it has a potential to spur development contribute to poverty alleviation in host communities and regions (Pedro, 2004; World Bank 2011 cited in Orguela, 2012)

Shoko and Mwitwa (2002) argue that "the challenge for mining development is to be able to equitably distribute mineral resource revenues to all stakeholders and contribute to reducing vulnerability of local communities". Mining has been known as an activity that disempowers surrounding communities who usually bear the greatest economic, environmental and social cost (IIED, 2002). The situation is made worse by dysfunctional systems that exist between government and communities and poor infrastructure (IIED, 2002; Le Billon, 2001).

Due to the rudimentary nature in which ASM activities are performed and the cycle of poverty ASM operators are found in, it has led to various social problems emerge such as prostitution, substance abuse, Child labor and gender inequality (AMV, 2009).

2.7.4 Large-scale mining bias

Large-scale mining receives more attention that ASM in many countries across the globe. Many developmental programs and policies in the extractives sector are mostly tailored around LSM activities. In Zimbabwe for instance, Hilson (2019) notes that tension exists between ASM and LSM activities. He suggests that although ASM dates back to the 12^{th} century, ASM is symbolized as a high-density and informal illegal entity.

However, major arguments in favor of ASM have emerged due its ability to unlock otherwise un-exploitable deposits by large scale mining (LSM), high employment opportunities for low-skilled labor in rural areas, efficient use of scarce capital, minimal infrastructural requirements, opportunities for local entrepreneurial development, low investment costs and short implementation periods (Noetstaller, 1987). Moreover, ASM being a poverty driven activity plays an important economic role in local communities. (Hrucshka, Hentschel, Priester, 2003). In South Africa, Lwedaba (2018) argues that formal LSM alone cannot foster the achievement of National development projects. This is from a background that the mining sectors has undergone numerous challenges ranging from labor instabilities, infrastructure constraints, declining productivity, and

policy and regulatory uncertainties. He suggests that there is need to develop the ASM sub-sector to complement operations of LSM. In Ghana, Hilson (2013) argues that despite reports from the World Bank and ICMM on the positive contributions of LSM to the economy and local communities, LSM has had debilitating effect on local communities. LSM operations have an edge due to the shift of wealth and production from traditional enterprises to them. Taking lessons from the Columbia's emerald sector, Communities have experienced a loss of collective assets and lack of community institutional capacity to mitigate pressing issues in post conflict market economy that favors those with who control capital and technology (Franco, 2018).

Furthermore, LSM due to its extensive operations and geographical footprint has caused many communities to be displaced from the land they depend on for their livelihoods. Due to these displacements, many communities have resorted to taking up illegal mining working near or in LSM, alluvial deposits as a replacement activity for their livelihoods (ILO 1999, Andrew 2003). To tackle this rush for illegal mining activity, many governments have resorted to using force to reduce illegal mining activity. This has not worked as the ASM sector has grown rapidly over the past decade (Hilson et al., 2007a). In fact, Hilson (2007) argues that antagonistic approaches have had the opposite effect, unifying groups of people that have been marginalized by the state: artisanal camps are becoming increasingly organized, stratified and policed, offering refuge to tens of thousands of men, women and children. Over the years, donor agencies such as the World Bank, United Nations and the UK department for international development (DFID) have also acknowledged that ASM is key to poverty alleviation (Labonne and Gilman, 1999).

In summary, ASM has high costs due to its poor environmental, social, economic, safety and health shown in Table 4.

Table 4: Artisanal and small scale mining environmental, economic and social challenges (Zvarivadza, 2018).

Social	Environmental	Economic	Safety and Health
Crime	Deforestation	Lack of collateral security	High fatality rate
Prostitution and spread of HIV/AIDS	Pollution of water bodies	Difficulty in getting information for planning purposes	Rapid spread of diseases
Alcoholism and substance abuse	Soil erosion	Rent capturing difficulty	Lack of protective clothing
Neglect of human rights	Siltation of rivers	Lack of education and professionalism	Unsupported or poorly supported workings
Conflict and lack of security	Dust and noise pollution	High grading	Unsafe working tools
Child labour	Land degradation	Failure to adapt to technological change	Main reliance on natural ventilation
Destruction of cultural and ethnic value	River Diversion	Mineral rush effect (Tragedy of commons)	Poor lighting
Destruction of cultural heritage sites	Mercury and cyanide pollution	Retardation of economic growth	Uncoordinated transportation
Gender discrimination	Destruction of biodiversity	Short sighted planning	Exposure to dust and dangerous gases
Limited social amenities	Poor disposal of mine tailings	Corruption	Insufficient safe drinking water

2.8 Solutions to overcome artisanal and small scale mining challenges

2.8.1 Cleaner production alternatives and practices

Technological alternatives and environmentally friendly practices are critical to tackling chemical usage in ASM. However, while technical alternatives exist, they are not always applicable due to geological, socio-economic, cultural and other site-specific factors. One barrier to adopting cleaner technologies for mining communities is cost effectiveness; the technology must increase the amount of minerals recovered and/or reduce efforts (GAHP, 2014). In addition, ASM operators are usually risk-averse and will not change their practices until the benefits have been clearly demonstrated to them (GAHP, 2014).

Kambani (2003) suggests that in order to achieve cleaner production in the ASM sector, improving the technical capacity of miners in mining skills and environmental management is important. Furthermore, the provision of adequate resources to monitoring institutions will be a key to the success of the process.

2.8.2 Key reforms to tackle artisanal and small scale mining challenges

2.8.2.1 African mining vision

The African mining vision (AMV) was adopted in 2009 at the African Union Summit and shows the commitment of African countries to exploit natural resources sustainably (African Union, 2009). The fact that this initiative is defined by African nations themselves gives it country specificity. Making ASM one of its main work streams, the AMV recognizes the contribution of ASM to local economic development. Oxfam (2017 :10) describes it thusly "The AMV follows the 2002 Yaoundé Vision on ASM adopted by the Communities and Small- Scale Mining (CASM) Africa Initiative in 2005 to call for a participatory ASM development strategy that focuses on the formalization of the ASM sector and its integration into local and regional economic development and land-use plans and strategies, especially Poverty Reduction Strategies; and reviewing mining policies to incorporate a poverty reduction dimension to ASM strategies."

Unveiled officially at the February 2009 African Union Summit in Addis Ababa, the AMV is founded upon a series of core pillars or tenets (Table 5) and its architects believe will yield;

Table 5: African mining vision key tenets (AU commission, 2011)

Tenet
Optimizing knowledge and benefits of finite mineral resources at all levels of mining and for all minerals
Harnessing the potential of small scale mining to improve livelihoods and integration into the rural and national economy
Fostering sustainable development principles based on environmentally and socially responsible mining, which is safe and includes communities and all other stakeholders
Building human and institutional capacities towards a knowledge economy that supports innovation, research and development

Developing a diversified and globally competitive African mineral industry which contributes to broad economic and social growth through the creation of economic linkages
Fostering a transparent and accountable mineral sector in which resource rents are optimized and utilized to promote broad economic and social development
Promoting good governance of the mineral sector in which communities and citizens participate in mineral assets and in which there is equity in the distribution of ben

One of the initiatives resulting from this common vision is the African Minerals Governance Framework developed in 2016 among the interventions proposed, one goal is to develop sustainable mining practices in a safe, environmentally and socially responsible way, and engage the mining community directly. The African Minerals Development Centre, an organization tasked with implementing the AMV in member countries, asks and supports governments to develop a "sustainable environmental, health and safety plan to reduce or eliminate the adverse effects of ASM" (Oxfam, 2017:13). However, it does not provide specific guidelines as to how this can be done in practice (Oxfam, 2017).

2.8.2.2 The southern African development countries protocol on mining

The Southern African Development (SADC) Protocol on small-scale mining was aimed at providing guidance on the running of the sub-sector. The protocol, which was formulated in 2007, outlines how member states should facilitate the development of ASM through amongst others the provision of technical extension services, establishment of marketing facilities including exhibitions and establishment of mineral exchanges.

2.8.2.3 Mosi-oa-tunya declaration

In view of the persistent challenges, and the still yet to be realized opportunities of artisanal and small-scale mining and quarrying (ASM), a multi-stakeholder global participants of the international conference on Artisanal and Small-scale Mining and Quarrying was held in Livingstone, Zambia, 11-13 September 2018, to reaffirm the

Centrality of ASM for enhanced livelihoods, employment creation, poverty reduction and sustainable development. The protocol reaffirmed that artisanal and small-scale miners and quarry workers must be at the heart of any efforts to transform ASM. It calls on all stakeholders to recognize the initiative and leadership demonstrated by miners and their representatives. It fosters active listening to all issues and concerns and suggestions raised and seek to understand on the ground realities and act in a way that empowers miners to chart their own vision of development. The declaration further focuses on gender mainstreaming, environmental protection and capacity building for miners.

2.9 Local perspective (national)

2.9.1 History of mining in Zambia

Copper mining has put Zambia on the world map as one of the largest producers holding about some six percent of global deposits (World Bank, 2011). Lindahl (2014) claimed that Zambia has a long history of mining due to its abundant resources of mainly copper and cobalt. Alastir and Lungu (2006) gave a historical account of mining in Zambia from the colonial era to the privatisation period. Scholars argue that Zambia has one of the world's largest sources of copper ore found on the border of Zambia and the Democratic Republic of Congo, in a region known as the Copperbelt. Since the first commercial mine was opened at Roan Antelope (now Luanshya) in 1928, copper mining has dominated Zambia's economy (Simutanyi, 2008). Under British colonial rule, Northern Rhodesia (now Zambia) was envisioned as a source of mineral wealth to support the development of Southern Rhodesia (now Zimbabwe). Roan Selection Trust (RST) and the Anglo-American Corporation (AAC) owned and controlled the mines after independence in 1964. The development plan was driven by the copper industry when the world prices were favorable in the 1960s and early 1970s.

Lindahl (2014) adds on that the copper industry was gradually nationalized from 1969 and the mining operations were after that run by the state through Zambia Consolidated Copper Mines Limited (ZCCM). Copper production in Zambia peaked in the late 1960s and early 1970s. During that short period, the country saw an exceptional investment in the construction of new schools, hospitals and roads using surpluses from copper revenues. After 1975, the copper production declined, and the industry faced some challenges due to the lack of investment, over-staffing, inferior technology, and falling copper prices. In the year 2000, the mines were privatized, and

ZCCMs assets were divided and sold to various investors. Zambia's government kept shares in some operations during privatization and today still owns a minority stake in many of the mines through the holding company called ZCCM-Investment Holdings (ZCCM-IH). Zambia experienced massive development as the country enjoyed high revenue collection from the mining industry. This point was affirmed during data collection by the interviewees as they happily narrated how they enjoyed a good standard of living in that social services and infrastructure development was done as compared to today when the mines are privately controlled.

According to the Zambia Investment Mining Report (GRZ, 2011) since the early 1930s when the exploitation of Copperbelt Copper-Cobalt deposits begun, the mining industry was the key driver of economic and social development in Zambia. Carmody (2009) noted that Zambia has a long history of mineral dependence, with copper and associated products like cobalt currently providing nearly eighty percent of exports. Copper mining is the lifeblood of the Zambian economy, generating a majority of the country's foreign exchange earnings asserts (International Copper Study Group, 2014). Copper is equally important to western and newly industrializing countries like China where is it used for electrical wiring, phone and internet lines, computers and cars. Further, Fraser and Lungu (2006) argued that increased demand for these goods in countries like China resulted in a boom in international copper prices. With its vast reserves of high-quality copper, Zambia should be benefitting handsomely, yet levels of poverty in Zambia are incredibly high. According to the UNDP (2015), Zambia was statistically ranked number 139 on the United Nations' Human Development Index in 2014. However, one can argue that the local people hardly benefit from the mines, especially in the actual towns and districts where mining takes place. During data collection, most participants agreed with other scholars that they were experiencing poverty because of no access to income due to unemployment and their businesses were performing poorly. Alstine and Afionis (2012) elaborated that Mining had transformed the Copperbelt from an area of a bush to a dynamic urban and industrial region, and with independence and the growth of the sector, Zambia became the model for a continent rushing towards political and economic autonomy, industrialization and an end to poverty. Zambia was ranked as a middle-income country in 1969 with one of the highest gross domestic product in Africa. It grew three times that of Kenya, doubled that of Egypt and higher than Brazil, Malaysia, Turkey, and South Korea. Further, Zambia's urban population was one million out of a total population of four million with 750,000 in waged employment.

In 1968, President Kenneth Kaunda noted the low levels of investment post-independence by the two companies. Therefore, the government nationalized the mines including prospecting and mining licenses forcing the companies to give 51% of shares in all existing mines to the State. The two nationalized companies were combined in 1982 to form Zambia Consolidated Copper Mines (ZCCM). ZCCM focused on developing the potential of the indigenous population through a five-year National Development Plan. Considering that there was inadequate infrastructure development to drive the education and health sectors during independence. For instance, less than 0.5% of the Zambian population was estimated to have completed primary education and about 107 graduates. Mining contributed over 50% of the government revenue (Alstine and Afionis, 2012).

2.9.2 Artisanal and small scale mining in Zambia

Zambia's development trajectory has been shaped by mining. For close to a hundred years, the extraction of copper has dominated the economy. Without exception, the firms that have controlled the sector have been large-scale, mostly foreign-albeit with periods of national ownership- had access to huge capital outlays, and have focused on copper mining. Relatively less is known about Zambia's ASM sub-sector (IGC, 2019).

For Zambia's people, ASM is an important economic activity, providing supplementary income for agricultural communities and seed money for small-startups. Although the size of the sector is unknown, it is estimated that around 30,000 people are directly involved in ASM activities (ASM Handbook, 2017). In Zambia, ASM is also associated with a high level of informality. The Distinction of ASM from LSM is however largely dependent on the size of the mining license rather than the actual characteristics of the activity (ZMM, 2016).

The ASM sector in Zambia though highly formalized is highly inefficient with miners exploiting minerals using novel tools such as picks and shovels as seen in the Figure 6.

Figure 6: Tourmarine small scale mining in Lundazi District

2.9.3 The artisanal and small scale mining footprint

Zambia is well endowed with a plethora of mineral deposits beyond copper, which have primarily been mined by ASM miners. These principally include gemstones – emerald, aquamarine, tourmaline, and amethyst. The map below shows the distribution of minerals across the country. More recently, gold and manganese have risen in importance. Several gold rushes have taken place over the last few years opening up new ASM sites all over the country. On top of this, a rise in demand for manganese on world markets has spurred on the production of the mineral in the northern province of Luapula. More recently, the Zambian government has also bequeathed large copper rich slug dumps in the Copperbelt province, colloquially referred to as black mountains, to political supporters introducing another category of urban politicised ASM miners.

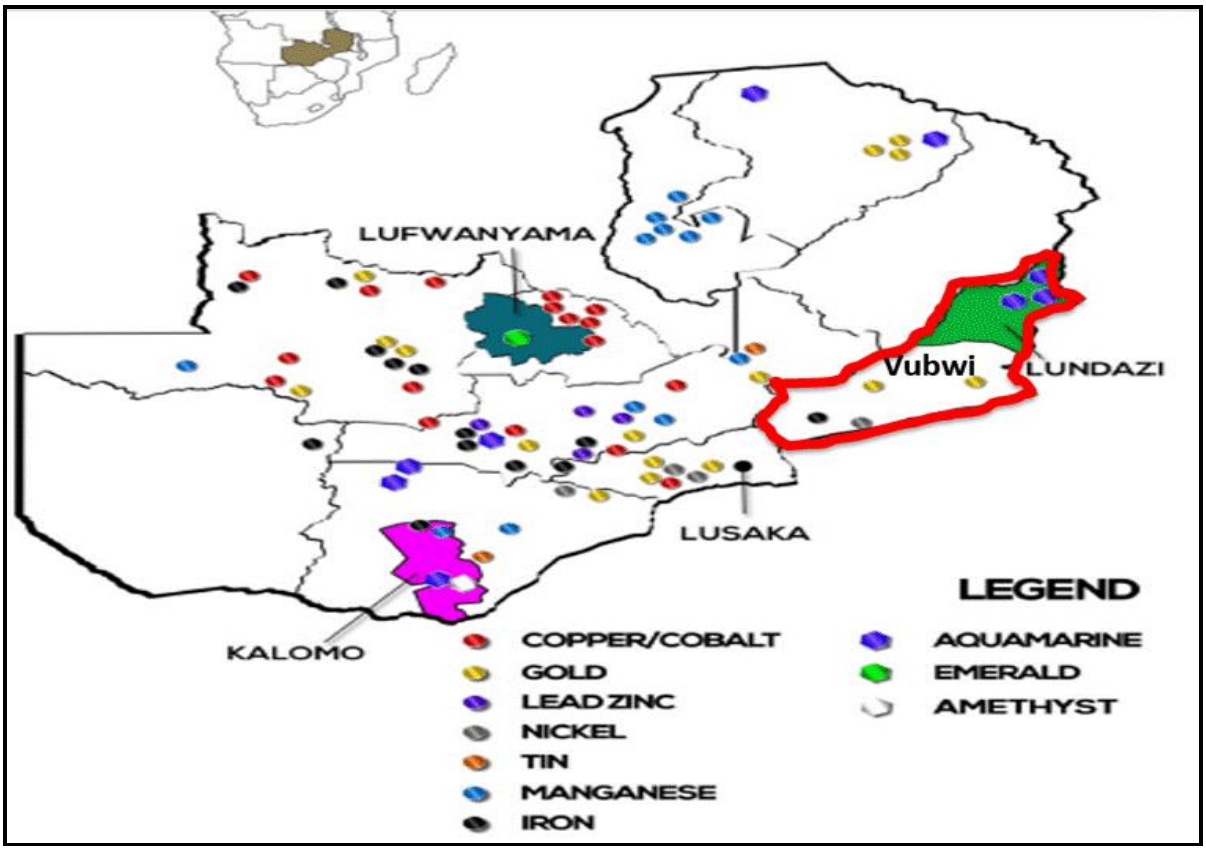

Figure 7: Distribution of gemstones and selected minerals in Zambia (IGC, 2019).

2.9.4 Characteristics of artisanal and small scale mining in Zambia

2.9.4.1 Formalization

ASM in Zambia is known for high levels of formalization. The World Bank's (2016) Mining and Governance review rates the extent to which ASM operators are allowed to legally operate in Zambia as 'Very High' (4.0 out of 4.0). This is if formalization is understood as legalization or the granting of legal title. This high level of formality is in contrast to most of sub-Saharan Africa where ASM is largely informal. This high level of formalization partially emanates from the fact that ASM in Zambia has traditionally focused on the gemstone mining of emeralds and amethyst, which are found in restricted zones that are mapped out as areas under license. What the Zambia case reveals is that formalization, or more accurately legalization, has done little to unlock the benefits that are often touted as the outcomes of formalization.

For instance, Siwale and Siwale (2017) find that even though emerald ASM miners are in possession of mining licenses, they have had limited success in accessing finance, technology, and

institutional support from the state. Siwale (2018) finds that in the amethyst sector formalization has given rise to different mining arrangements with varying consequences. Three types of mining arrangements have emerged formalized, mine-owner driven enterprises that resemble modern firms and are growth oriented, quasi-formal joint-production arrangements involving degrees of formality and informality, and illegal ventures. Another contingent of ASM miners that also emerges are individuals who hold licenses for speculative purposes. What is clear is that formalization is a necessary but insufficient condition for the development of the sector.

2.9.4.2 Scale of operations

ASM in Zambia has traditionally been concentrated in the gemstone sub sector, primarily emeralds and amethyst mining. However, recent discoveries of gold in numerous locations in the country is changing the narrative. Gold mining, in particular, has attracted the state's attention with gold panning certificates issued then quickly suspended with the objective of better organizing the sector. Both presidential and ministerial statements exalting the role that gold mining can play in stabilizing the economy have been issued.

Additionally, due to the rise in demand for electric cars in the West, the demand for manganese, a key component in the production of lithium batteries, has grown rapidly. In 2018 alone exports of manganese in Zambia nearly doubled from 33,000 to 57,000 tonnes (Lusaka times, 2019). This new ASM activity differs significantly from traditional ASM in Zambia. It is in contrast characterized by high levels of informality. The more traditional challenges that occur with informal mining are therefore commonplace – lack of safety standards, environmental concerns and child labour practices. Much of what we know about this emerging sector, however, remains anecdotal and more research is needed to better understand the evolving nature of the sector. A coordinated approach is needed if this diversity is to be harnessed and well managed.

2.9.4.3 Government involvement

"The primary statute governing the mining sector in Zambia is the Mines and Minerals Development Act No. 11 of 2015 of the laws of Zambia (MMDA) as read together with the Mines and Minerals Development (amendment) Act No. 14 of 2016. The MMDA became effective on 1st July ,2015, although the date of assent was 14th August, 2015. It repealed and replaced the

MMDA Act No. 7 of 2008. The MMDA deals with mining rights, licenses, large scale mining in Zambia, gemstone mining, health and safety, environmental protection, and geological services on analysis, royalties and charges" (ICLG,2020). Other pieces of legislation other than the MMDA include mine acquisition.

State institutions in Zambia have, for the large part, been disinterested in the activities of ASM at best, and regarded them as borderline criminal elements at worst. Consequently, the regulatory and incentive structure has not always been tailored for ASM. Part of the reason for this has been a traditional focus on large-scale mining, which has provided a steady flow of revenues and been the mainstay of the Zambian economy. This is best illustrated in the area of mining taxation policy. The Zambian government has undertaken numerous policy changes in the mining taxation system aimed at large-scale mining firms that have inadvertently negatively affected ASM miners. For instance, changes in the payment of royalties in 2015 significantly increased the tax burden of ASM operators but was in fact a policy change aimed at large-scale copper producers. The effects of this focus extends beyond taxation policy to environmental regulation as well. Corresponding state support and the provision of essential public goods to ASM miners has also been lacking but the requirements for area fees, taxes, and royalties, and the compliance burden of meeting state regulations, has only been growing. In addition, even the seventh national development plan underpinned by vision 2030 strategy for small-scale mining focuses only on productive capacity and formalization (7NDP, 2018). ASM richly deserves to be a focus of policy and regulatory effort by the states in which it occurs. There is unfortunately little sign of such effort. Politicians and regulators often ignore ASM. When it does attract their focus, policy tends to be inconsistent over time and characterized by wide discrepancies between legislation, policy rhetoric and policy practice (O'Faircheallaigh and Corbett, 2016).

2.10 Artisanal and small scale mining and sustainable livelihoods

The ASM industry is poised to grow because it provides an alternative source of livelihoods for usually remote communities. It is very apparent that in countries where poverty is strife, there are more people involved in ASM activities. (Hilson and Banchririgah, 2007). As ASM is becoming a main stay in many local communities, mainstream business investments have concentrated in a few hands leading to deterioration in many aspects of community livelihoods and wealth

distribution (Franco, 2018). Government policies and programs have concentrated much on capacity building and formalization and hence not providing holistic programs that can sustain the livelihoods of people around ASM communities. Poverty remains strife despite on-going mining in the sub-sector. Putting everything together, the Zambian government must consider whether ASM should be treated as a poverty driven activity and hence should focus on livelihoods, or whether the state should focus on generating revenue from the sector. In policy documents, the Zambian government views the sector as a vehicle for job creation and economic diversification (7NDP, 2018). However, from the experiences and research studies from other countries, the government should consider approaching the sector as a conduit for livelihoods and rural enterprise thus creating wealth.

2.11 Sustainable livelihoods

Poverty has in most cases been gauged on the basis of income or consumption criteria. Following this view, a person is considered poor if his/her income falls below some defined income level or if consumption falls below some defined minimum. However, when the poor are asked what poverty means, in often times income is just one aspect they highlight (Chambers, 1987). The other aspects include; sense of insecurity or vulnerability; levels of health, literacy and access to assets; lack of platforms to voice out issues to the community and government.

Poverty hence is not measured on the basis of income or consumption models, it includes various perspectives which go far beyond income. To measure livelihood performance of a community there is need to consider basic health and education, clean water and other services which are required to prevent people from falling into poverty. More recently, poverty has been defined in terms of the absence of basic capabilities to meet these physical needs, but also to achieve goals of participating in the life of the community and influencing decision-taking.

The concept of 'sustainable livelihoods' has increasingly become central to the debate about rural development, poverty reduction and environmental management. But what does this new entry into the development lexicon actually mean? "The now burgeoning literature on this subject is not particularly clear on this question. As with the now well-established term 'sustainable development', there are often uneasy compromises between different objectives embedded in the same definition" (Scooness, 2017).

The term ‘sustainable livelihoods’ relates to a wide set of issues which encompass much of the broader debate about the relationships between poverty and environment. Yet in the existing literature, there is often little clarity about how contradictions are addressed and trade-offs are assessed. As Carswell et al (1997: 10) point out: “definitions of sustainable livelihoods are often unclear, inconsistent and relatively narrow. Without clarification, there is a risk of simply adding to a conceptual muddle…”.

Chambers and Conway (1992) define Sustainable Livelihoods, as “A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base”.

2.12 Approaches to sustainability

There are many approaches that have been formulated to integrate innovative economic, social and environmental business practices to deliver long-term value to shareholders, partners, communities, employees and the environment. The desired result of sustainability approaches is a state of society where living conditions and resource use continue to meet human needs without undermining the integrity and stability of the natural system. While the modern concepts of sustainable development are derived mostly from the 1987 Brundtland report, they are also rooted in earlier ideas of sustainability. It has been suggested, “the term sustainability should be viewed as humanity’s target goal of human-ecosystem equilibrium, while sustainable development refers to the holistic approach and temporal processes that lead us to the point of sustainability.

As the concept has evolved, it has shifted focus more on economic development, social development and environmental protection for future generations. The selected sustainability approaches discussed below are all inclined towards achieving sustainability.

2.12.1 The Oxfam doughnut

The original doughnut model, developed by Kate Raworth, former Oxfam senior researcher, focused on a global perspective (Oxfam, 2012). Raworth developed the doughnut from earlier work on planetary boundaries that was done by Johan Rockstrom and Will Steffen. Raworth combined the environmental ceiling and social ceiling to present what is diagrammatically called

the Oxfam doughnut (Figure 8). “The doughnut uses 22 indicators to describe environmental and socio-economic systems, while highlighting the interdependent nature of those systems and identifying where people and the environment face unacceptable and dangerous stresses” (Oxfam, 2015).

Figure 8: The Oxfam doughnut (Oxfam, 2015)

In the doughnut, the social foundations are covered as health care, Sanitation, water, food security, energy, jobs, income, voice, resilience, social inequality and gender inequality. This tool provides a good framework for measuring social performance because it is also aligned to achieving sustainability into operations.

2.12.2 The world business council for sustainable development

The WBCSD framework is a tool that can be used to measure the impact that companies have on society. It highlights the benefits of measuring social impacts on business (WBCSD, 2008). This framework was developed by a steering committee of member states that believed that industries can be more inclusive and benefits shared more with all stakeholders. They believed that the economic benefits from businesses can provide benefits that can positively influence other challenges that the world is faced with like poverty and environmental degradation (Figure 9).

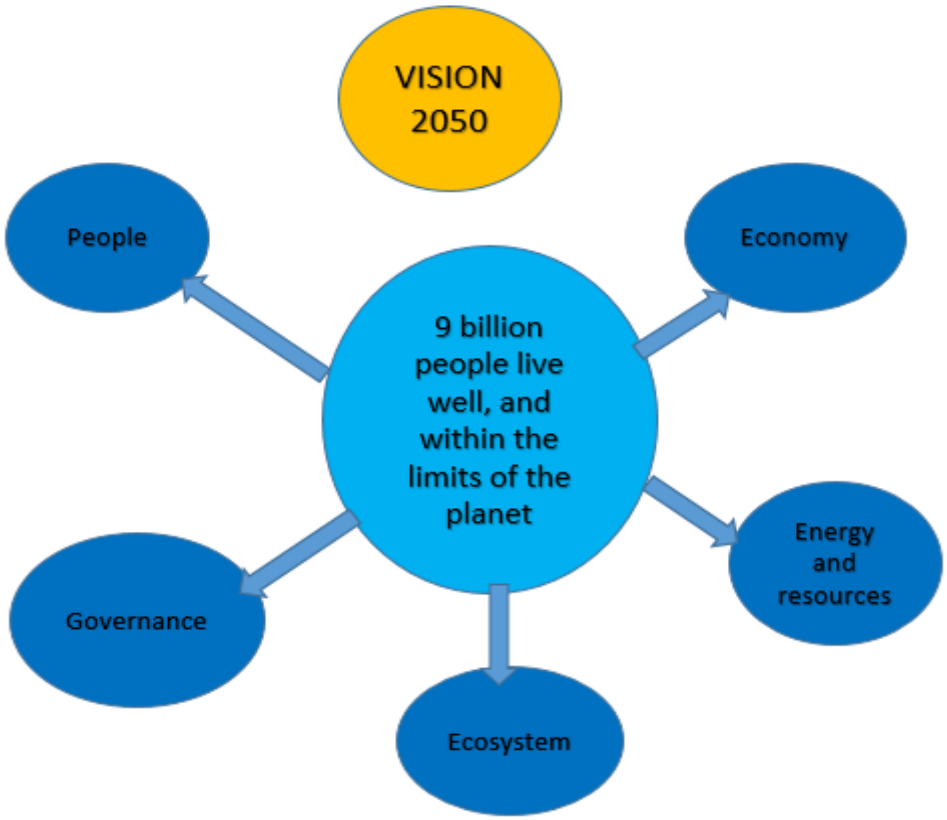

Figure 9: Extract of sustainable development (WBCSD, 2008)

The key features of the WBCSD measuring framework include;

- Grounded in what business does- Built by business for business
- Moves beyond Compliance-Attempts to answer questions about what business can contribute beyond traditional reporting
- Encourage stakeholder Engagement-Supports open dialogue with stakeholders to create shared understanding of business impacts and social needs, and to explore what business can and cannot do to address these needs
- Flexible- Designed for any business or industry at any stage of its business cycle
- Complements existing tools – Makes use of current tools (for example, the global reporting initiative and international finance cooperation standards)

In the use of this framework, a four-step methodology is used to measure the impacts of business on society. It measures the impact of business activities by looking at governance and

sustainability; assets (infrastructure and products and services); people (Jobs and skills and training; and financial flows (procurement and taxes).

The first step in the methodology is setting the boundary in which the business operates. This is cardinal in understanding the key business activities and geographical surroundings. The second step is measuring the footprint of the business activities. That is the direct and indirect impacts that the business has on society. The third step assesses the contribution of the business activity to local development. The last step is based on decision-making. It evaluates the risks that the company faces with regard to societal impacts and helps in management response.

2.12.3 Mining and the 17 sustainable development goals: Indicative priorities

With the declaration of a movement towards attainment of sustainable development by 2030, the United Nations developed 17 SDG's (Figure 10). These goals were formulated on the foundation of the triple bottom line (people, environment and economic prosperity) in order to eliminate poverty, reduce inequalities and foster economic prosperity for all (UN, 2015).

Figure 10: Mining and the 17 sustainable development goals (UN, 2015)

With mining being one of the major sources of economic activity across the globe, a tool has been developed that links its impact in relation to the 17 SDG's. This tool of indicative priorities can be used to measure social performance by measuring the impact of mining activities on the 17 SDG's.

2.12.4 The social progress index

The SPI is a tool that aims to measure social performance by considering three spheres that is basic human needs, foundations of wellbeing and opportunity. This framework is a measure of inclusive growth and is measured independent of gross domestic products (GDP) see Figure 11.

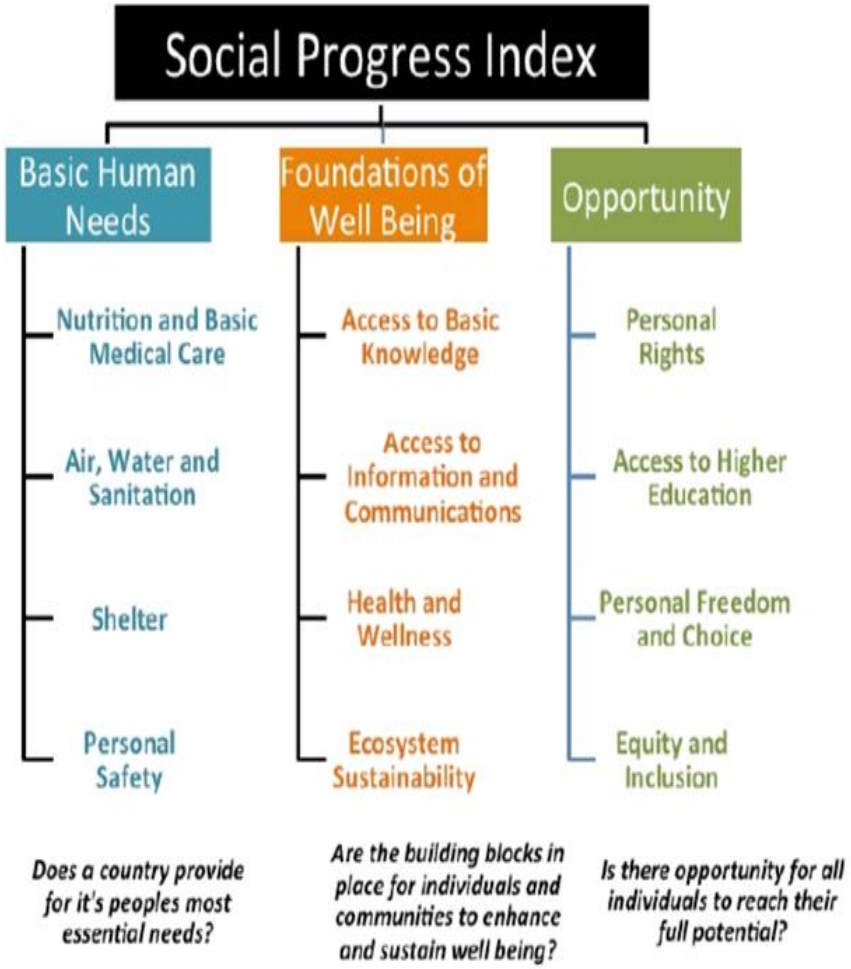

Figure 11: Social progress index (SPI, 2020)

2.12.5 The sustainable livelihood framework

The Sustainable Livelihood (SL) concept first introduced by the Brundtland commission on environment and development, and the United Nations conference on environment and

development provides an integrated approach of measuring social performance. (Krantz, 2001). The SL concept (Figure 12) helps to organize the factors that enhance or constrain Livelihoods and how they relate to each other.

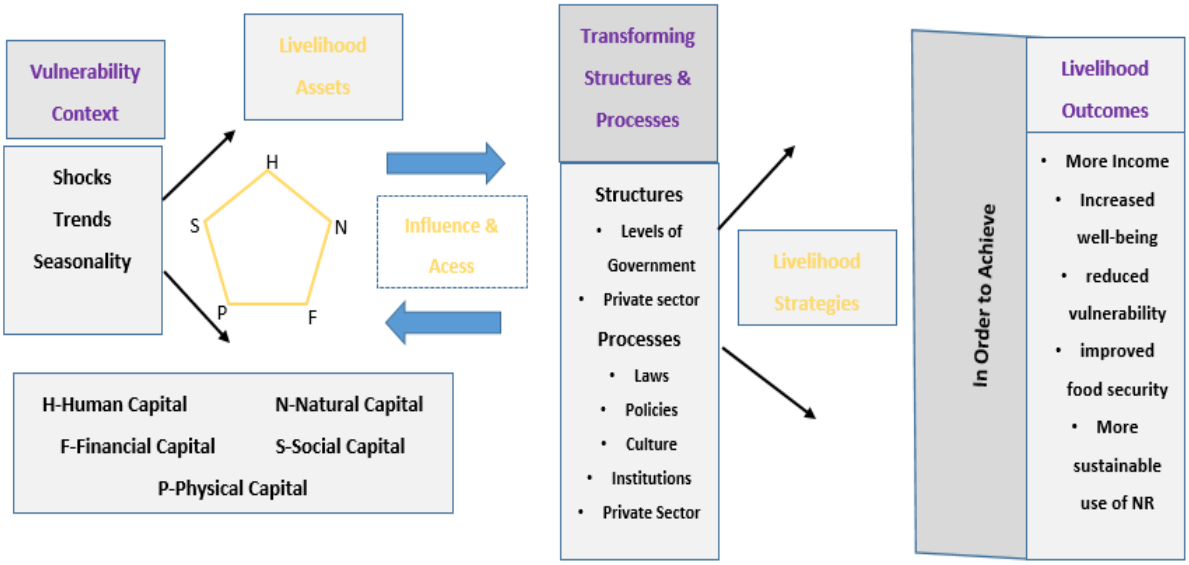

Figure 12: Sustainable livelihood framework (Ashley and Carney, 1999)

The sustainable Livelihood framework according to Ashley and Carney (1999) focuses on the following;

- Supporting systematic analysis of poverty and its causes, in a way that is holistic, more realistic and manageable;
- Promoting a wider and better informed view of the opportunities for development activities and their likely impact
- Placing people and the priorities they define firmly at the center of analysis and objective setting.

2.13 Rationale for selecting sustainability approach

Businesses have never found problems in measuring economic and environmental performance. But when we take a closer look at the social arena, its measurement is not so straight forward. The biggest challenge has been to draw the line where a company's social responsibility starts and

stops. Different firms and industries will have varying insights to what extent their social obligations lie (Staskevicius, 2015).

However, there are weaknesses in some of the sustainability approaches. For instance, this thesis argues that the Oxfam doughnut does not completely provide a good measuring tool at a local scale. Limiting growth within social and planetary boundaries makes sense at global level and may be difficult to align to a narrower perspective such as at community level.

The WBCSD framework is also a good tool from a global perspective in measuring social performance. The focus in this framework is on how to make business sustainable by regulating consumption. This thesis argues that it does not present the strongest tool in aligning societal impacts because the focus is more on business efficiency.

The sustainable Livelihood, SPI and indicative priorities frameworks present the most effective tools of measuring social impacts in this analysis. This is because they are relevant on a narrow view and also aim to provide resilience in the social sphere. Their wide spectrum on dealing with social, economic and environmental issues provides a good basis for measuring social performance.

This thesis however, studies the role of ASM in forging sustainable livelihoods by using the sustainable Livelihood approach. The choice in this sustainability approach is because it presents a more holistic approach and It is rather intended as an analytical structure for coming to grips with the complexity of livelihoods, understanding influences on poverty and identifying where interventions can best be made without compromising natural capital.

2.14 Artisanal and small scale mining and sustainability livelihoods making the links

ASM activities often cause extreme environmental and social impacts and seldom contribute to government revenues. Hoadly and Limptlaw (2004) suggest that ASM "In their current form, they cannot be regarded as contributing to sustainable livelihoods, but they provide emergency poverty relief and daily sustenance".

ASM provides a form Livelihood for miners, but there is usually no generation of wealth. The benefits accrued from this activity are usually outweighed by the costs incurred. These costs are usually directly borne by the miners like poor health and safety practices, or borne on a larger scale by the community from environmental degradation, social disruptions from increase in

prostitution, alcohol, drug abuse and use of child labor. According to Davies and Franks (2011) "The extractive industry has the potential to significantly transform environments, communities and economies". The potential to improve the surrounding society in most cases results in conflicts between mine owners and the community (Davies and Franks, 2011). The biggest problem that the extractive industry has faced is to find solutions of improving the quality of life of surrounding communities. Beaulieu (2014) suggests that the quality of life can be measured by strong local economy, sound local leadership, quality government services, and good education and health services.

Hoadly and Limptlaw (2004) suggest that to promote sustainable livelihoods (SL), ASM should increase the sustainability of poor people's livelihoods in four inter-related ways;

- Improving the community's ability to cope with, and recover from, shocks and stresses;
- Improving economic effectiveness, or the use of minimal inputs to generate a given amount of output;
- Promoting ecological integrity by ensuring that livelihood activities do not irreversibly degrade natural resources within a given ecosystem; and
- Enhancing social equity, which suggests that promotion of livelihood opportunities for one group should not reduce options for other groups, either now or in the future.

Hoadly and Limptlaw (2004) further suggest that "Sustainable livelihoods require participation and social capital development. They require access to good governance and ecological, socio-cultural, and economic resources. Fundamental requirements are equity, ownership of resources and participatory decision-making. The nature of the ASM sector, and the manner in which its activities are conducted,

do not align with any of these requirements. Social capital comprises social networks – ASM does not contribute to the formation of such capital, except in those relatively few cases where miners have formed co-operatives. The characteristic individuality of miners excludes participation, while the illegal nature of many ASM operations bars access to good governance. Most miners do not have title to the land, nor the minerals deposits that they mine. Consequently, they are not concerned by sterilization of these resources during mining operations. They thus deprive themselves, and adjacent communities, of ecological resources. They are isolated from society and the risky nature of their business denies them access to economic resources".

Initially the livelihoods approach was created to alleviate poverty in rural communities. And mostly this approach was confined to agricultural livelihoods (Adato and Dick, 2002) with minor consideration to the multiplicity of livelihood options which exist in rural areas, including ASM. Consideration of the framework's applicability in mining communities began much later with Labonne and Gilman's proposal to produce an "assessment of policy-specific interventions to reduce poverty in artisanal mining communities" (1999: 7). Since then, various other academic and development projects have surfaced which have been using the livelihoods approach to study and alleviate poverty in artisanal mining communities. Although there has been some research conducted on ASM relating to sustainable development in the SADC region (MMSD, 2001), no research has applied the livelihoods approach to artisanal mining in Zambia and so it is hoped this thesis will contribute to this field.

2.15 Conclusion

This Chapter reviews literature surrounding the ASM Sub-sector with key focus of the main drivers, key challenges, current mitigations including key reform and the relationship between ASM and sustainability.

ASM is poised to grow as shown from the number of people directly and indirectly involved in the sub-sector. ASM being a poverty driven activity, many rural communities are increasing getting involved as an alternative source of income owing to difficulties being encountered in other sources of income. Despite the potential that ASM has to alleviate poverty, it has very high environmental and social costs. The livelihoods of miners does not improve and there is usually no net generation of wealth. Miners continue to live in a cycle of poverty and their livelihoods continue receding.

Government and institutional policies and frameworks on the other hand put much emphasis on formalization (As a source of income for the government) without a clear road map on how these policies would improve the livelihoods of rural communities. Community assets require to be identified and improved by ASM activities if livelihoods are to improve and become more sustainable.

From the literature review, there is not sufficient evidence to show or inform how the AMV has been implemented to transform the ASM sub-sector in Africa. There is no study yet that has

evaluated ASM activities against the AMV to show progress of the sub-sector in Africa. This study therefore through the Sustainable Livelihood assessment process shows through this case study the level of implementation of the AMV in Zambia's ASM sub-sector.

CHAPTER 3: RESEARCH METHODS

3.1 Introduction

This chapter outlines the research methodology used in this thesis. The methodology is part of the overall research design which includes the assessment tool (SLA), a case study method of approach and data collection techniques.

To satisfy objective 1,2 and 3 under governance, semi structured interviews with ASM operators, selected government officials and local cooperatives were conducted. Whilst Objective 4 on governance and objective 1 on livelihood assets were assessed through desktop studies by reviewing the African mining vision, existing literature and government policies.

3.2 Theoretical framework

3.2.1 Sustainable livelihood approach

This research uses the SL approach as the governing theoretical Framework. According to Carney (2008), "The SL thinking centers on the objectives, scope and priorities for development from the perspective of poor people. This way of thinking requires a commitment to probe beyond technical issues, beyond the superficial political and institutional issues to develop a realistic understanding of the livelihoods of poor people and how it can be improved. The choice of the SL approach is because;

- The SL approach places people at the center, in an environment where analysis has hitherto focused almost exclusively on resources or institutions. This approach puts people at the center of development. This is equally important at macro levels (e.g. in relation to economic reform) as it is at the micro or community level (where it may already be well embedded).

  The SLA starts with an analysis of people's livelihoods and how these have been changing over time; fully involve people and support them in achieving their own livelihood goals; focus on the impact of different policy and institutional arrangements on people's livelihoods; and, seek to influence these arrangements so they promote the agenda of the poor.

- The SL approach facilitated a process of stepping back and looking at the wider issues affecting rural development. It extended the menu for support to livelihood development both in the short and long term;
- The SL framework proved to be a useful tool for structuring a review of secondary information sources and offered a way of organizing the various factors and making relationships between them;
- It specifically highlighted the links (or lack of them) between the macro and the micro level and highlights that higher level policy development and planning is being formed with little knowledge of peoples' needs and priorities.
- It is non-sectoral and applicable across social groups
- It recognizes multiple influences on people, and seeks to understand the relationships between these influences;
- It recognizes multiple actors (from the private sector to national ministries, from community-based organizations to newly emerging decentralized government bodies)
- It acknowledges the multiple livelihood strategies that people adopt to secure their livelihoods
- It seeks to achieve multiple livelihood outcomes, to be determined and negotiated by people themselves.

The way of thinking of the SL framework to enhance livelihoods is through linkages and systematic approach (Figure 12).

Employing the Social domain of the SLA tool, this research reviewed;

3.2.2 Governance

Governance is a key aspect in the operations of ASM in local communities. The research identifies the key stakeholders required in creating sustainable livelihoods. It reviews current institutions and policies that exist in guiding the running of ASM in local communities.

3.2.3 Capital assets

The framework identifies five types of capital asset which people can build up and/or draw upon: human, natural, financial, social and physical (Figure 13). These assets constitute livelihood building blocks. To a limited extent they can be substituted for each other. Thus, the poor may

draw on social capital such as family or neighborhood security mechanisms at times when financial capital is in short supply.

This research therefore identifies the priority areas required to forge sustainable Livelihood's by reviewing the capital assets of the research area.

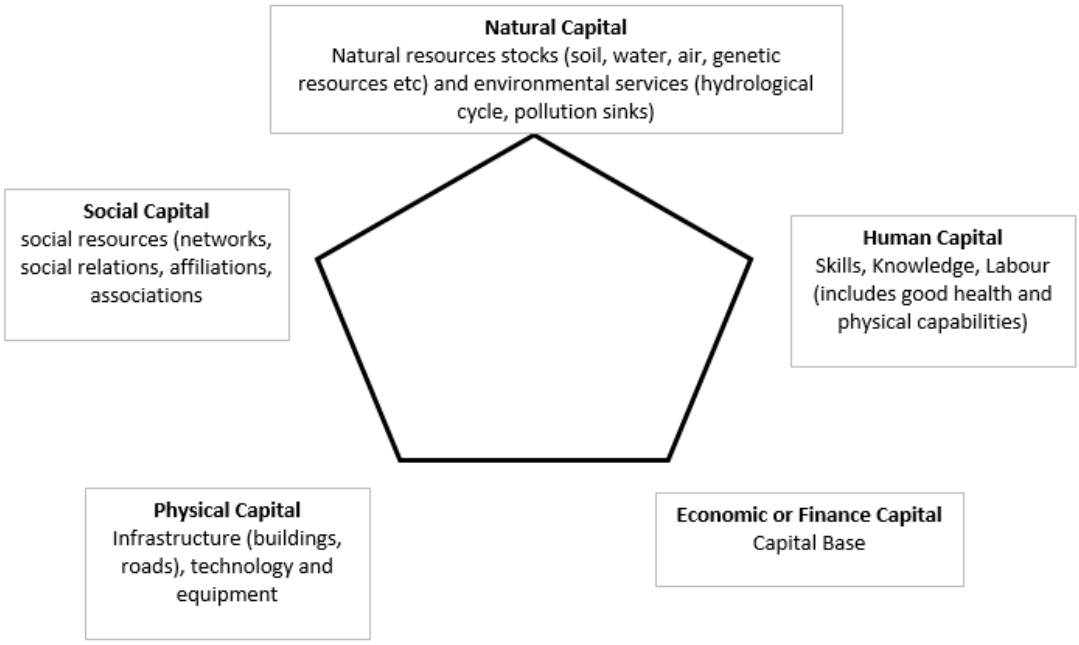

Figure 13: Five capitals model (Franco, 2017)

3.3 Research methodology

A qualitative methodological approach is employed in developing this research. The choice for a qualitative approach is because components such as governance, institutional frameworks and community assets are so complex to analyze by strictly using analytical means. A qualitative research approach also permits us to "formulate and seek answers to questions about the social world" (Singleton & Straits, 2010, p. 13).

The qualitative research approach was selected for this study because the study brings out the 'soft side' of the topic since it describes the behavior, beliefs, opinions, emotions, and relationships of individuals. It also seeks to understand a research problem from the perspective of the local population so as effectively acquire culturally specific information about their values, opinions, behavior and social contexts of a particular population (Family Health International 2011). It

focused on discovering the meanings that people give to events they experience (Bogdan and Biken, 2003; Denzin and Lincolyn, 2000). Apart from that qualitative methods identify intangible factors like social norms, socioeconomic status, gender roles, ethnicity, and religion. In this case, the study identified the key components of the SLA in enhancing sustainable livelihoods of ASM operators and their surrounding communities.

Qualitative research takes into account the context in which the participants are to produce a detailed understanding of the issue under study. Thus, this study research question; "What are the main constraints and opportunities for securing sustainable livelihoods for ASM and the surrounding communities?" The study used naturally occurring data to find the sequence 'how' in which participants' meanings 'what' were deployed to establish the character of some phenomenon (Silverman, 2006). This research question brings out the aspect of how the community benefits from the ASM activities and what are the challenges that hinder their ability to experience 'good life' due to the exploitation of the minerals. For a further understanding of how sustainable livelihoods can be enhanced, the research question; "which livelihood assets or a combination of assets are available to the ASM sub-sector?" This research question brought out the community perspective, opinions, feelings with regard to what assets as guided by the 5 capitals model are available in enhancing their livelihoods. The last two research questions bring out how governance affects the livelihood opportunities i.e. "How do institutions affect the livelihood opportunities for the ASM sub-sector?" and "How do institutions and livelihood opportunities align with the African mining vision?"

The methodology included two components: analysis of secondary information and primary research.

3.3.1 Analysis of secondary information

In addition to the global literature review conducted as the overall research project, the study undertook a review of mining policy documents, the 2016 amended Mines and Minerals act, the 7th national development plan and the African Mining Vision. These documents are referred to where necessary in the text.

3.3.2 Primary Field Research: Site selection

The research was conducted in nine locations within a 15 Km radius from the Lundazi central district (see Figure 14). The study was limited to the 15 Km radius due to challenges of access by road. The areas where the study took place was guided by the provincial mine safety department and did not include areas of illegal mining activities. Only areas with licenses were visited in the presence of a member of the small-scale cooperative committee.

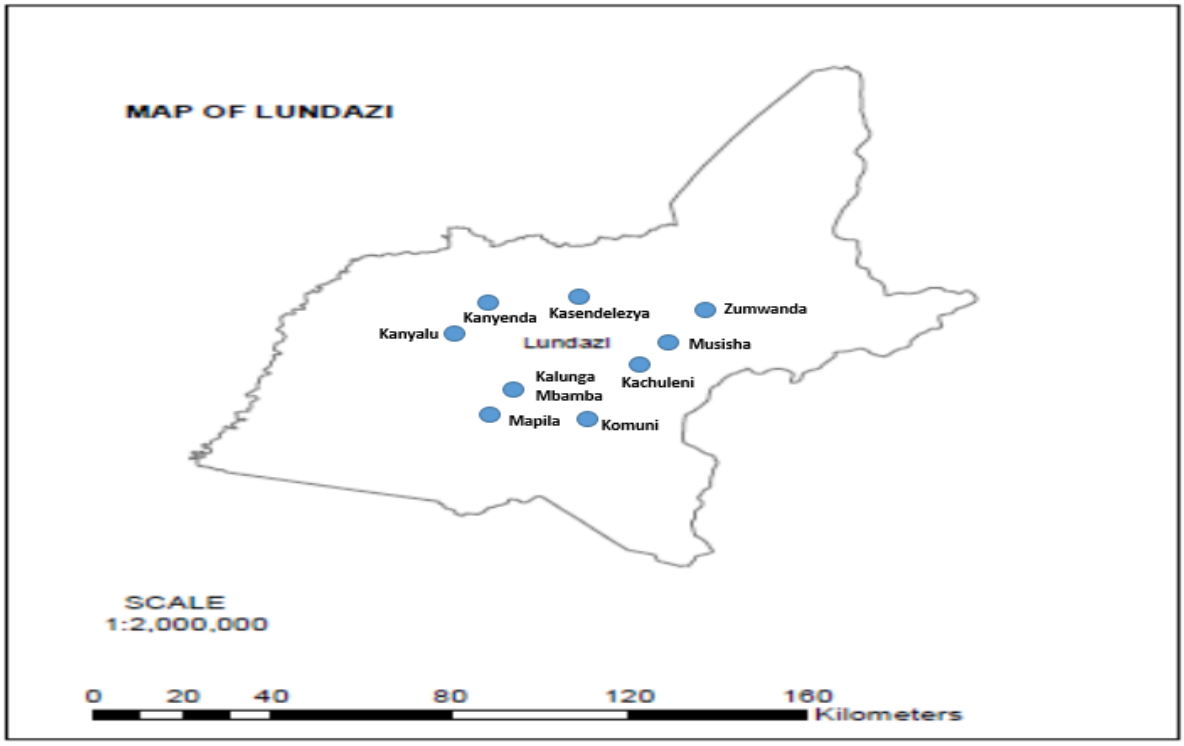

Figure 14: Map of mine sites visited around Lundazi central business district

3.3.3 Primary field research: Methods- case study

A case study is a research approach that is used to generate an In-depth, multi-faceted understanding of a complex issue in its real life context.

Case studies have often been viewed as a useful tool for the preliminary, exploratory stage of a research project, as the basis for the development of the more structured tools that are necessary in surveys and experiments. Eisenhardt (1989) says that case studies are "particularly well suited to new research areas for which existing theory seems inadequate. This type of work is highly complementary to incremental theory building from normal science research. The former is useful

in early stages of research on a topic or when a fresh perspective is needed. Whilst the latter is used in later stages of knowledge."

The case study research design is differentiated from other research designs by the type of research questions that are asked. Yin (2009) stipulated the five important components of research design as firstly a study's research questions, secondly its propositions, thirdly unit of analysis, fourthly the logic linking the data to the propositions and fifthly the criteria for interpreting the findings.

Yin (2009) argued that the most essential condition for distinguishing the various research methods is to classify the type of research question being asked. The 'what' questions are either exploratory or describe the prevalence while the 'how' and 'why' questions are explanatory as can be seen from the research objectives. This favors the use of case study because they deal with operational links needing to be traced overtime rather than mere frequencies or incidence.

Thus, this case study will show why community engagement is an essential tool for mines to have a sustained trust-based relationship with the host community and not just depend on the legal license to operate.

The unit of analysis is an important component of a case study because it defines the area of focus of the research (Yin, 2009). Yin (2009) pointed out that it is the primary entity that is analyzed. Sociologists identified the individual, groups, organizations and cultural artifacts as units of analysis. Individuals can be selected because they provide information about individuals and their personal experiences, which can reveal patterns and trends that are common to society and their solutions. Groups are an important category as they provide information on social ties and relationships. They show how social structure and forces affect whole categories of people. Organizations differ from groups because they are formal and have well-organized ways of collecting around specific goals and norms. In this study, the miners forming part of the community are the unit of analysis because the research analyzed how ASM activities were enhancing their livelihoods.

3.3.4 Primary field research: The sample

Identification and selection of participants for this qualitative bounded case study was not complicated because it targeted miners and residents living in communities that lie within 15km within Lundazi central business district. This is because the study focused on getting the

community perspective of how ASM activities affect their Livelihoods. Maxwell, (2005) defines purposive selection as a strategy in which particular settings, persons or activities are selected deliberately to provide information that cannot be gotten as well from other choices. Purposive sampling techniques enabled large amounts of data to be generated from small sample. In the current study 86 miners and 10 members of the community and 4 stake holders were engaged as shown in the Tables 6 and 7. The sample size was determined by looking at different stakeholders required to inform fully all the important elements of the phenomenon being studied. Furthermore, the target selection was partly an arbitrary exercise and was determined by accessibility to mine sites, security and the limited resources available.

In terms of qualitative social-economic data gathering, the focus groups sought to include all the miners present at every mine site. Every effort was made to include gender balance although this was difficult to achieve as the sub-sector is dominated by male operators.

Table 6: Research study area. Miners and community members interviewed

Mine Site	Minerals Mined	Miners		Community Members		Total
		Male	Female	Male	Female	
Kalunga Mpamba	Quartz	10	0	1	0	11
Mapila	Tourmarine	4	0	1	0	5
Zumwanda	Tourmarine	30	0	1	0	31
Komuni	Aquamarine	13	0	0	0	13
Kanyalu	Beryl Tourmarine	3	0	0	0	3
Musisha	Quartz Tourmarine	10	0	0	1	11
Kasendelezya	Beryl	6	4	2	4	16
Kachuleni	Beryl	3	0	0	0	3
Kanyenda	Blue Quartz	3	0	0	0	3

Table 7: Stakeholders interviewed

Government	2 interviewees
Civil society	2 interviewees

3.4 Data collection methods

3.4.1 Semi-structured interviews

The Field interviews took the form of semi-structured conversations aimed at a specific purpose (Singleton & Straits, 2010, p. 367). Franco (2008) suggests that "Semi-structured interviews pursue a list of pre-identified areas of conversation, although the form in which these topics are covered" varies from interview to interview. Franco (2008) further suggests that "Interviews are usually applied to study phenomena that go beyond particular settings". Field interviews were conducted in Chipata and Lundazi districts. Face-to-face semi-structured interviews with Ministry of mines, Lundazi District executive officer, Small scale mining cooperatives committee members, Non-governmental organizations were conducted.

3.4.2 Taking notes

Notes were taken during the interviews at all times, and were transcribed.

3.4.3 Document review

A literature review surveys books scholarly articles, and many other sources relevant to a particular issue, area of research, or theory, and by doing so, provide a description, summary, and critical evaluation of these works in relation to the research being investigated. Literature reviews are designed to provide an overview of sources you have explored while researching a particular topic and to demonstrate to your readers how your research fits with the larger field of study. The review of literature is important in making linkages and describing the relationship of each work to the others considered (O'Leary, 2005).

Apart from Scholarly articles and publications, this study reviewed local government policies and legislation with regard to ASM. The following documents were reviewed;

1. 7th National Development Plan of 2018
2. Amended Mines and Minerals Act of 2016 of the Zambian law
3. 2016 Lundazi District situational report

4. Vision 2030
5. Newspaper articles and blogs

3.5 Limitations and delimitations to study

The study had limitations and delimitations. Although the study was conducted in one district, ASM is wide spread in the whole Eastern province. Furthermore, the study could not have access to areas beyond the 15Km radius of the Lundazi business district due to poor road infrastructure to access ASM sites and communities.

3.6 Conclusion

This chapter has outlined the method used in the study.

Data collection was done through semi-structured interviews and desktop study (Document analysis).

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

The study examined how ASM can be used to enhance sustainable livelihoods through a case study research design. Data was collected through 21 semi-structured interviews. Although the participants have diverse backgrounds, they all have one common factor of being in the study sites and openly participated in the interviews. The findings will be presented, analyzed and interpreted in this chapter.

4.2 Results

Here we present the findings of the research augmented by some qualitative information from focus group discussions and semi-structured interviews.

4.2.1 Migration and population dynamics

Population dynamics within ASM mining areas are important to analyze because they provide means to understand the change that is taking place and the viability of mining into the future.

A key feature in ASM communities is the large number of people that have immigrated from other provinces driven by increased mining activity in the study area. The general perception is that an immigrant is a person who came from other districts to explore minerals in the study area. The immigrant vs. native status in the nine mining areas is summarized in Table 8.

Table 8: Immigrant vs native status by mining site

Mining Site		Native	Immigrant	Total
Kalunga Mpamba	*Count*	7	3	10
	% within Site	70.0%	30.0%	100.0%
Mapila	*Count*	4	0	4
	% within Site	100.0%	0.0%	100.0%
Zumwanda	*Count*	21	9	30
	% within Site	70.0%	30.0%	100.0%
Komuni	*Count*	5	8	13
	% within Site	38.5%	61.5%	100.0%
Kanyalu	*Count*	0	3	3
	% within Site	0.0%	100.0%	100.0%
Musisha	*Count*	10	0	10
	% within Site	100.0%	0.0%	100.0%
Kasendelezya	*Count*	5	5	10
	% within Site	50.0%	50.0%	100.0%
Kachuleni	*Count*	3	0	3
	% within Site	100.0%	0.0%	100.0%
Kanyenda	*Count*	3	0	3
	% within Site	100.0%	0.0%	100.0%
Total	*Count*	58	28	86
	% within Site	67.4%	32.6%	100.0%

The general picture from the nine mine sites is that 70.8% of the mine operators are native, whilst 29.2 percent are immigrants. From the statistics from Table 1, it can be deduced that the potential benefits of ASM activities can benefit local communities because they have interests by virtue of them being native. The fluidity of immigrants however cannot be ignored because there is likelihood of ASM immigrants to prefer sending any proceeds from the minerals sold to their original homes.

The second feature considered under population dynamics is the broad age groups (See Table 9).

Table 9: Distribution of miners in broad age groups

Age group	Frequency	Percent	Cumulative percent
0-18	18	20.9%	20.9%
19-29	25	29.1%	50.0%
30-50	35	40.7%	90.7%
50+	8	9.3%	100.0%
Total	86	100.0%	

Distribution of broad age groups shows that between the ages of 30-50 constitute the largest number of people involved in ASM activities in the study area. The ages above 50 constitute the smallest group due to the physical demand that ASM demands on the operatives. However, it's also important to note that there is a significant number of minors below the age of 18 involved in ASM activities.

The third feature considered under this section is formal education. Table 10 shows the levels of education and training attained by the ASM miners in the study area.

Table 10: Highest Level of formal education reached by artisanal and small scale operators

	Frequency	Percent	Cummulative Percent
None	14	16.3%	16.3%
Primary	37	43.0%	59.3%
Secondary O level	14	16.3%	75.6%
College	12	14.0%	89.5%
Undergraduate	0	0.0%	89.5%
Other training	9	10.5%	100.0%
Total	86	100.0%	

From Table 10 above, it can be seen that the 40.8 percent of miners have only attained primary education. This is consistent with the assertion that ASM is a poverty driven activity as most ASM operators cannot get formal employment.

4.2.2 Artisanal and small scale mining and livelihood activities

In each of the nine mining areas under study a range of livelihood activities take place. Apart from mining and gemstone polishing, Lundazi being agrarian in nature also encompasses crop farming, livestock keeping, formal employment, shops, markets and other business activities (Table 11).

Table 11: Livelihood activities that the ASM operators are involved in apart from mining.

	Kalunga	Mpamba	Mapila	Zumwanda	Komuni	Kanyalu	Musisha	Kasendelezya	Kachuleni	Kanyenda	Total
Crop Farming	8	4	19	13	0	7	3	3	1		58
Livestock Keeping	4	2	12	3	0	3	1	0	1		26
Full time ASM	0	0	9	0	3	0	6	0	1		19
Employee other than ASM	1	0	2	0	0	1	0	0	0		4
Food service	0	0	0	4	0	0	0	0	0		4
Shop	3	1	6	5	0	2	0	0	0		17
Bar	0	1	3	0	0	0	0	0	0		4
Other business	0	0	7	0	0	0	0	0	0		7

In terms of weightage, from Table 11 it can be deduced that the ASM operators are involved crop farming and livestock keeping as a livelihood option apart from mining. ASM operators also own shops as a means of investments from their income from ASM. From the semi-structured interviews, a population of immigrants usually work full-time in the mines and only a small population (32%) of immigrants venture into other livelihood activities.

4.2.3 Mining and seasonal change

Seasonal change has an impact on ASM activities. As shown in Table 12, ASM activities decline in the rainy season firstly because of dewatering challenges in the pits and secondly because miners take time off to grow crops for food security during this season.

Table 12: Percentage of activity in the wet season

	Jan	Feb	March	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Full time	20.3	17.6	24.8	46.7	77.1	84.6	84.2	85	84.8	86.4	38.9	24.3
Part time	79.7	82.4	75.2	53.3	22.9	15.4	15.8	15	15.2	13.6	61.1	75.7
Total	100	100	100	100	100	100	100	100	100	100	100	100

Results given in Table 12 above suggest that mining takes place throughout the year, however the level of activity wanes during the wet season (Figure 15).

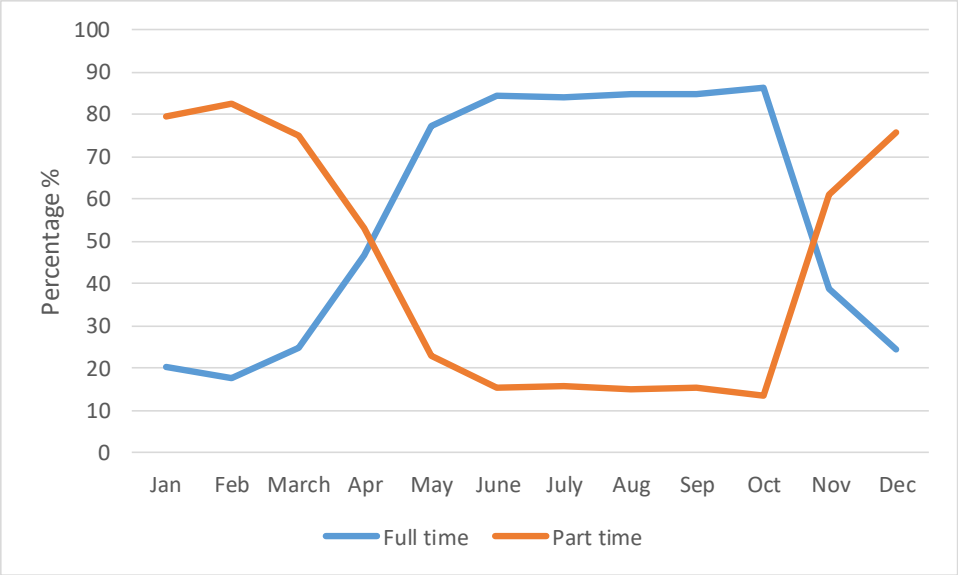

Figure 15: Percentage of miners on fulltime vs part-time according to period

4.2.4 Livelihood assets

This section will assess the empirical data drawn from the fieldwork, revealing the available livelihood assets for ASM operators and their surrounding communities in Lundazi, their linkages and the various strategies they apply to improve their livelihoods.

In the following sections, the study will give an account of the various livelihood assets discerned and their constraints. This will enable the researcher to expose links between livelihood assets and the employed strategies. It is important to note that asset endowments are constantly changing, influenced by both economic environment and regulatory frameworks. Figure 16 shows details of the community assets that ASM miners deemed important in enhancing their livelihoods and their opinions on the level of development of identified assets as guided by the five capitals framework.

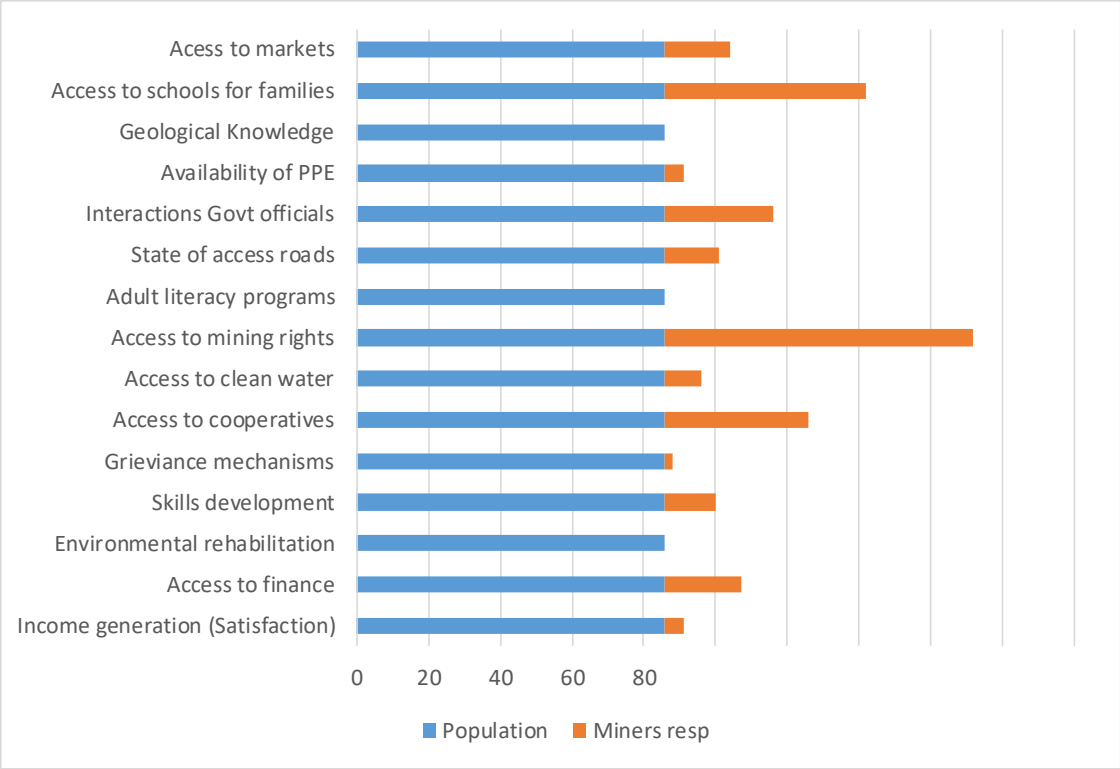

Figure 16: Population of structured questions vs miners responses

4.2.4.1 Human capital

Human assets are necessary for making use of any other assets available and are, therefore, required for creating an income. Human assets are the quantity and quality of labour force, enabling people to pursue different livelihood strategies and achieve their livelihood objectives. Household size, health status, knowledge and education as well as skill levels and leadership qualities determine human assets. From the results, the study showed that only 40.8 percent of miners have had some form of education. This coupled with low skills and know how in mining poses a challenge if efficiency of exploitation and the safety and health of the operatives.

4.2.4.2 Labour

As a unit of analysis in this study, most interviewees were between the ages of 18 to 60 years (Table 9) and were involved in extensive manual work to exploit the mineral resources. What was common was the use of novel tools such as picks, shovels, wheelbarrows, hammers and sacks for material handling (see figure 17). Because of the use of these novel tools, demand for labor is quite high in the sub-sector competing with agriculture, which is another economic driver in the district.

The other finding that was interesting was that 29% of the mine operators where not indigenous to Lundazi district. The Challenge with this statistic is that immigrant miners would prefer to develop their points of origin with any proceeds recovered from the mine. This is demonstrated in Table 11 where only 32% of the immigrants ventured in other income generating activities apart from mining.

The other finding was that most of the miners interviewed lacked sufficient personal protective clothing and hence susceptible to harm (Figure 17). As shown in Figure 16 only 10 % of the miners interviewed had access to personal protective equipment.

Instances of child labor are not common, though the study found that 20% of the miners interviewed were below the age of 18.

Figure 17: Miners using shovels to mine with insufficient personal protective equipment

4.2.5 Skills and education

Access to education is an important factor affecting human assets. None of the interviewees stopped their children from attending school to join mining, although access to education is quite difficult due to few schools available in the vicinity of the mine sites studied.

To work as a miner, you need to have some basic skills in safety, mining and tools handling techniques. However, only about 16% of the interviewees had some basic skills training organized by some civil society organizations in collaboration with the government on value addition to gemstone mining with a few members from cooperatives attending.

4.2.6 Financial capital

The unit of analysis of this thesis is the ASM operator's household, and hence all Interviewees earned some of their income from the mining activities. The miners said there was a difference in their capacity to earn money from their mining activities alone and to secure their livelihoods. It is important to note that while financial assets tend to be versatile, they cannot alone solve all the problems of poverty. People may not be able to put their financial resources to good use due to a lack of knowledge, or they can be constrained by inappropriate policies, institutions or processes.

4.2.6.1 Income generation

The main economic assets defined in the livelihoods framework is income generation. For the ASM operators in Lundazi, different mineral products (Quartz, Tourmarine, Aquamarines, Beryl, and Blue quartz) are the main sources of income. Although miners only get a salary from the proceeds and have no control on pricing and the final proceeds from the sales of the minerals, they get cash when a sale is done. However, income generation is not easily gotten, one miner said:

"We can stay for months on end without finding subsistence minerals to sale and the owner of the mines in that case just gives us some subsistence allowances to keep us going"

From the study, only about 10% of the miners were content with the income generated from the mining activities. The Income generated is usually not sufficient to meet the basic needs of the miners and hence another reason why they venture into crop farming and other income generating activities.

4.2.6.2 Access to finance

From information gathered the study found that only 20% of the miners had some form of access to finance for ASM activities (Figure 16). The study revealed that there is insufficient capital to buy equipment for simple mechanization as shown by the novel tools being used for exploitation in Figure 17. Access to finance has proved to be difficult since there are insufficient bankable documents to use as a means to access finance from banks and financial institutions.

4.2.7 Natural capital: Land use

Lundazi has rich loamy soils that have supported agro-forestry business in the district. Around the ASM sites, Fields with farm produce could be seen indicating that miners still depend on agriculture as another source of livelihood.

The increase in ASM activities in the district raises a concern because there are no programs of rehabilitation after the mining resources are exploited and hence reducing access to arable land for farming (see figure 18). The study found no program of rehabilitation from the miners interviewed and usually mined out pits facilitate soil erosion during the rainy season and hence affecting reducing the fertility of soils in the long term. Furthermore, mass soil inversion because of the open pits mining going on render large areas of forest ecosystems devastated and pose a danger to the safety and health of the surrounding communities.

Figure 18: Land degradation due to ASM activities

4.2.8 Social assets

Social assets are important, since they create a safety net and a buffer against shocks, can assist in creating livelihoods. All social relations from networks, groups, social connections, kinship, and family form them.

4.2.8.1 Access to social services

Most of the interviewees raised concerns over access to clean water around the mining sites. One miner named Victor said;

"We just drink natural water that gets exposed as mining progresses"

The Lundazi district situational report (2016) indicated that only 68% of the population in the district has access to safe and clean water. The other 32 % of the population accesses water from

shallow wells and natural streams. From the study less than 10% of the miners interviewed had access to clean drinking water from nearby villages.

Sanitation is another key component of social assets. The Lundazi district situational report also either showed that only 15% of the population has access to flushable toilets whilst the rest of the population used pit latrines or the bush.

Access to Schools and health facilities was also a challenge as these facilities were in far-flung areas. Only one mining area in Kasendelezya had a well-developed community with access to a school and clinic within a radius of 5 kilometers. One of the mine owners indicated that the ASM operators in that area had come together and collectively sold the mineral products and contributed money towards the maintenance of the clinic and school.

4.2.9 Physical capital

Physical assets include both private and public owned resources. These types of assets can be particularly expensive, as in the case of infrastructure, because it requires not only the initial investment, but also a lasting commitment of financial and human resources to meet the operation and maintenance costs of the service (DFID 1999).

4.2.9.1 Roads

The access roads to the various study areas were in very bad state. The study was actually restricted due to poor road infrastructure to access the mines. The bad state of roads makes marketing the minerals a challenge. The Lundazi Gemstone Association has been a beneficiary of funds from a European Union-Mining Sector Diversification Program (EU-MSDP). The residual funds from this program me is being employed in provision of 153KM Road distance covering (7) seven feeder roads in the district. So far, (3) three mining access roads have been successfully constructed. However, at the time of the study, the Lundazi Gemstone association was still lobbying for the completion of the program (Lundazi district situational report, 2016).

4.2.9.2 Summary of the five capitals

The Table below (Table 4.1) provides a summary of the five capitals rating generated from the interview process.

Table 13: **Summary of the five capitals from interview responses**

Capital	Fundamental area	Expected programs	Fundamental programs	Effectiveness	Effect on livelihoods enhancement
Financial	Economic-Productive	Income Credit Transportation	Income Generation	Income- Yes (not sufficient to sustain families)	Medium
			Access to Credit	Credit- No	
			Transportation	Buyers provide	
Natural	Territorial-Environmental	Securing and controlling of natural resources	Conversation methods, cleaner production	Top Soil Preservation- Not done Hedging to avoid soil erosion- Not done	Low
Social	Political-Social	Trust relationships Membership to groups Access to wider institutions	Leadership Skills development	Training- Done to cooperatives	High
			Grievance Mechanisms	Feedback- Done through Cooperatives	
			Networks	Cooperatives- exist	
Human	Quality of Life	Health and Nutrition Access to Information	Access to water	Water- Low	High
			Adult literacy	Literacy levels-low	
			Ownership	Mine rights- few licenses issued	
			Skills	Skills levels- low	
Physical	capacity building	Infrastructure development	Access roads	Roads- low road development	High

			Housing	Housing- miners still live in huts	
			Processing centers	Mineral products sold in raw form	

4.3 Governance

A broader examination of the governance environment is developed in the light of the SLF component of policies, institutions and processes. This component deals with the governance environment in which livelihoods are constructed (Rakodi & Lloyd-Jones, 2002, pp. 15-16). For the purpose of this research, governance processes for ASM include the interactions between three stakeholders: government, the private sector (particularly the miners) and civil society. This section also develops an analysis that aims at increasing our understanding of the roles that stakeholders and existing policies play in the ASM sector to enhance livelihoods of local communities.

4.3.1 Stakeholder engagement

Stakeholder engagement sits at the core of development of the ASM sub-sector. Collaborations between Government, Private sector and civil society is key in understanding the sector and in deriving progressive policies and regulations. Since the control of ASM activities in the district is by the central government, limitations in the local administration with civil society and the ASM operators is compromised. One ASM operator named Moses said;

"We only see Mines Safety Department inspectorate when they come to check for licenses. We have no mechanism to share our challenges and proposals for improvement"

There is lack of effective mechanisms of engagement between government, private sector and civil society. The ASM cooperative, which is used as a link with the miners, is not sufficient to convey grievances that miners may have.

4.3.2 Policies and regulatory framework

Currently, there exists no legal framework allowing the Local Authority (District Council) to participate in the exploitation of gemstone mineral resources in its area of jurisdiction.

The local authority has been denied an opportunity to collect revenue from the gemstone mineral resources being mined in the district. The absence of regulatory by-laws has led to a situation where there is no data or records to show the level of gemstone trade volumes in the district (Lundazi district situational report, 2016). The Acting District Commissioner said that the Lundazi Gemstone association sent representatives for the monthly meetings but the district administration had no idea about the scale of ASM activities in the district. This function is controlled at provincial level with the Mines inspectorate.

The government have policies that focus on the ASM subsector such as the 7NDP and vision 2030; however, there are no clear guidelines on how these roadmaps will be actualized. The Mines and Minerals Development Act (2016) focuses primarily on formalization and licensing.

4.4 Capital assets, governance research findings and the African mining vision

The AMV action plan is built on a bedrock of key tenets that provide a means to measure the progress of various program clusters implemented in different countries including Zambia. This research uses the AMV key tenets as a guide to review the development of the key thematic areas prioritized in the research (Governance and capital assets) see Table 13.

Table 14 Research findings versus the AMV

Thematic area	AMV expectation	Research findings
Governance	Developing a diversified and globally competitive African mineral industry which contributes to broad economic and social growth through the creation of economic linkages	Generally appropriate policy, legislative and regulatory framework in place but no clear direction on how it can stimulate other local economic activities
	Harnessing the potential of small scale mining to improve livelihoods and	Focus has been on formalization and licensing whilst the strategy to improve

	integration into the rural and national economy	livelihoods is not clearly provided to support community assets
	Optimizing knowledge and benefits of finite mineral resources at all levels of mining and for all minerals	Formalization programs are in place.
	Fostering a transparent and accountable mineral sector in which resource rents are optimized and utilized to promote broad economic and social development	Beyond this, ASM is left to operate with minimal government support and monitoring
Thematic area	AMV expectation	Research findings
Livelihood assets	Building human and institutional capacities towards a knowledge economy that supports innovation, research and development	The sector remains novel with low level of skill of ASM Operators. Evidence of simple mechanization exists in some areas
	Fostering sustainable development principles based on environmentally and socially responsible mining, which is safe and includes communities and all other stakeholders	Community assets such as access to clean water, Skills development, and environmental protection not fully developed. There is no existing plan on rehabilitation of former arable land where open pits and trenches have been mined
	Promoting good governance of the mineral sector in which communities and citizens participate in mineral assets and in which there is equity in the distribution	The level of stakeholder engagement between government, civil society and community is still low to

		advance equal participation in resource exploitation

4.5 Conclusion

The research in Lundazi District indicates that they are several barriers to achieving aspirations and sustainable livelihoods. First of all, miners are trapped in an occupation with minimal impact on the quality of their lives. In addition, the context provides an uncertain environment in which they have to implement their livelihood strategies. The environment confronting the ASM operatives is becoming more difficult. Not only do the miners face long-standing risks related to poor access to community capitals, opportunities for growth are hindered by poor institutional capacities and ineffective government policies and regulations. The current policies and regulations do not enable sustainable livelihoods to take place. ASM has potential to stimulate growth of the community capitals if governance especially stakeholder engagement is modeled to meet the needs of the miners to increase their capacity to retain more value from ASM activities. From the research, it has been deduced that ASM has the potential to forge sustainable livelihoods and improve the quality of life of the miners and surrounding communities if strong institutional structures are implemented.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is represented in three sections. The first section contributes to an overall summary of the study followed by the summary of the findings and their conclusions. Subsequent to this are the implications of the study and followed by recommendations for future research.

5.2 Summary of the study

With increased activity in the ASM sub-sector, there is need to promote sustainability of mining activities, communities and environments. This study provides some insights to show the significance of ASM in enhancing the livelihoods of many people and in addressing rural poverty in general. The main Objective of this study was to analyze the social domain of ASM as a constituent component of sustainable livelihoods through the research questions listed below;

1. Who are the main stakeholders in the development and operation of the ASM sub-sector?
2. What are the main constraints and opportunities for securing sustainable Livelihoods for ASM and the surrounding communities?
3. Which Livelihood assets or combination of assets are available to the ASM sub-sector?
4. How do institutions affect the livelihood opportunities for the ASM sub-sector?
5. How do institutions and livelihood opportunities align with the African Mining Vision?

Research Question 1 identified the key players who are involved and are affected by ASM activities and whose role is key in the development of the sub-sector to enhance Livelihoods of local communities. Research Question 2 determined the challenges being faced by the miners through their experiences, the effects that ASM activities has on the environment and facilities which if explored can secure sustainable ASM activities.

Research Question 3 reflected the miner's awareness of the key aspects as guided by the five capitals framework are important in improving their quality of life. Research Question 4 examined and consolidated the roles that the government and civil society play in the development of key policies and frameworks to position ASM to enhance sustainable livelihoods for local communities. Finally, Research Question 5 reviews the alignment of current government policies, actions with the African mining vision which provides one of the key reforms of the ASM sub-sector.

5.3 Conclusions

The conclusions of the findings address the four main objectives of the research as stated below;

1. Findings revealed that government, ASM miners, civil society (including non-governmental organizations), and the local community are the main stake holders that need to collaborate to enhance and develop the ASM sub-sector. Even though the government has recognized the potential that ASM has on livelihoods of people, there lacks properly established institutions to enforce, regulate and conduct gap analyses on the performance of the sector.
2. Stakeholder collaboration should receive increased attention due to its promoting effect on the performance of the ASM sub-sector. However, the research reveals that what forms the stakeholders take to collaborate in light of sustainability factors affecting the ASM's social dimension is not clear. The key factors that can limit or foster stakeholder collaboration according to research findings are social motivation, industry supervision (government) and economic benefits that which if harnessed can provide a path for stake holders to collaborate.
3. Riding on the level of stakeholder collaboration revealed by the study, there exists no established channels for ASM miners to voice out any challenges they are faced with. Cooperatives are in place and occasionally attend district meetings, but a well-established platform to resolve their issues does not exist.
4. Zambia is one of the countries in sub-Saharan Africa that ascribes to the African mining vision reform to encourage sustainable mineral resource exploitation. Comparing the key findings of the research on governance and development of capital assets, the study concludes that there is low implementation of the key thematic areas of the AMV in the ASM sector.
5. In terms of stimulating and enhancing livelihood options, the study illustrated that ASM proceeds can help the miners and community to develop other activities they are involved in such as crop farming, livestock rearing, shops and other income generating activities.

5.4 Implications of the study

The findings in this study have contributed to the understanding that the role of ASM in enhancing sustainable livelihoods is in stimulating the growth of other income generating activities that ASM operators are involved in. Beyond licensing and formalization, the government should provide clear policy direction with checks and balances that are socially motivated and supervised and develop improved information delivery regarding mining issues to enhance a sustainable ASM sub-sector.

5.5 Recommendations

The Research draws the following recommendations;

1. The creation of a dedicated unit within government focused on ASM could help ensure improved economic and social returns from ASM, a less negative environmental impact, fewer disputes within the sector, and improved tax returns
2. The central government should align mining policy to focus on livelihood enhancement in addition to formalization and licensing
3. Strategic social partnerships should be introduced that will aid in providing finance that is directed to livelihood enhancement rather than profit
4. The efficiency of mineral extraction should be increased through Skills upgrade and training for the ASM operators
5. Specific policy on environmental protection for small scale mining should be formulated

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APPENDIX

Table A1: ASM Population in Africa (Hilson and McQuilken, 2014).

Country	1999			2011		2014		
	Min	Max	Average	Average	Dependants	Min	Max	Average
Algeria								7 000
Angola				150 000	900 000			200 000
Benin								15 000
Bostwana								15 000
Burkina Faso	60 000	70 000	65 000	200 000	1 000 000	100 000	200 000	150 000
Burundi			10 000			10 000	20 000	15 000
Cameroon								40 000
Central African Republic			45 000	400 000	2 400 000	100 000	290 000	195 000
Chad	10 000	15 000	12 500	100 000	600 000	40 000	140 000	90 000
Côte d'Ivoire	10 000	25 000	17 500	100 000	600 000			500 000
DRC			150 000	200 000	1 200 000			2 000 000
Egypt*								
Equatorial Guinea								15 000
Eritrea*				400 000	2 400 000			
Ethiopia	100 000			500 000	3 000 000	200 000	700 000	450 000
Gabon								10 000
Ghana	50 000	300 000	175 000	1 100 000	4 400 000	400 000	1 000 000	700 000
Guinea			40 000	300 000	1 500 000	200 000	300 000	250 000
Guinea-Bissau								7 000
Kenya	30 000	40 000	35 000			100 000	150 000	125 000
Liberia				100 000	600 000			100 000
Libya								7 000
Madagascar	5 000	20 000	12 500	500 000	2 500 000	400 000	500 000	450 000
Malawi				40 000	-			40 000
Mali			100 000	400 000	2 400 000			500 000
Mauritania								20 000
Morocco	5 000	10 000	7 500			70 000	150 000	110 000
Mozambique	700	100 000	50 350	100 000	1 200 000	100 000	300 000	200 000
Namibia	5 000	10 000	7 500			10 000	30 000	20 000
Niger			440 000	450 000	2 700 000	290 000	440 000	365 000
Nigeria	10 000	20 000	15 000	500 000	2 500 000	20 000	100 000	60 000
Republic of the Congo*								
Rwanda	5 000	15 000	10 000			30 000	70 000	50 000
Senegal			3 000					15 000
Sierra Leone	30 000	40 000	35 000	300 000	1 800 000	200 000	400 000	300 000
Somalia								15 000
Somaliland Somalia**								
South Africa			10 000	20 000	-	10 000	30 000	20 000
Sudan				200 000	1 200 000	300 000	2 000 000	1 150 000
Tanzania (United Republic of)	450 000	600 000	525 000	1 500 000	9 000 000	900 000	1 000 000	950 000
Togo						15 000	20 000	17 500
Uganda	5 000	10 000	7 500	150 000	900 000			200 000
Western Sahara*								
Zambia	20 000	30 000	25 000			30 000	80 000	55 000
Zimbabwe	50 000	350 000	200 000	500 000	3 000 000	400 000	500000	450 000
TOTAL	**845 700**	**1 655 000**	**1 998 350**	**8 210 000**	**45 800 000**	**3 925 000**	**8 420 000**	**9 878 500**