Global Scientific JOURNALS
GSJ: Volume 11, Issue 6, June 2023, Online: ISSN 2320-9186
www.globalscientificjournal.com

Artisanal and Small-Scale Mining (ASM) in Zambia: A Systematic Analysis of the Sector in Relation to Size, Production, Marketing, Value-Addition, Government Regulation and Support.

Richard Musukwa[a,*], Frank Mukwilima[b], Professor E. Kazonga[c], Professor B. Mapeto[d],

[a] *PhD Scholar in Innovation, Wealth Creation and Management, University of Lusaka, Zambia.*
[b] *PhD Scholar in Economic Management, University of Central Nicaragua.*
[c] *Professor, School of Post-Graduate Studies, University of Lusaka, Zambia.*
[d] *Professor, School of Post-Graduate Studies, University of Lusaka, Zambia.*

ABSTRACT

This paper presents a systematic analysis of the Artisanal and Small-Scale Mining (ASM) sector in Zambia with emphasis on sector characterization, production, marketing, value-addition, and government regulation and support. The main methodological approach consisted of an extensive desk review combined with field visits to government departments, mining associations, and companies. Data collection was conducted using structured closed and open-ended questionnaires administered to 15 organizations. The analytical framework was adopted from the Africa Minerals Development Center (AMDC) Growth framework which recognizes three (3) important elements of growth in the mining sector: ((i) Governance – legal and fiscal framework and institutions; (ii) ASM benefits (economic, social, financial, and infrastructures); (iii) negative impacts (environmental, physical, social and cultural)) that support the "ASM. The major findings were that ASM comprises more than 400 small scale miners and non-specified number of illegal miners and artisanal miners who are estimated to be over 500 thousand. Further, this paper establishes that mineral production by Artisanal and Small-Scale Miners is not documented posing a challenge to establish the actual contribution of the ASM sector; the market is uncoordinated; and value-addition is absent. Major challenges include: Taxing the artisanal miners specially the illegal miners; Accessing production data from ASM; Illegal mining which interfere with operation of this sector; and Lack of sustainability in the ASM which prevent proper planning of the outputs. On the ASM side, challenges include: Lack of capital (no bankable document to access finance from the bank, hire proper geologist, etc.); Lack of technical and business skills; unfair and inappropriate market arrangement; Lack of processing plants; and Illegal miners. The paper recommends the following: i) the strengthening of policy and legislation; (ii) the need for devising innovative financing mechanisms for ASM; (iii) the need for improvement of technology grounded in local intermediated technology and research & development; (iv) optimization of mining and processing operations (to improve productivity and efficiency); (v) regulated and structured access to the market at mine pit; (vi) beneficiation and access to market at mid and downstream; (vii) and tax payment by the miners, which could be at selling point.

KEY WORDS*: Regulation; Support; Production; Market; Value-addition.*

1.0: Introduction

This paper presents a systematic analysis of the Artisanal and Small-Scale Mining (ASM) sector in Zambia with emphasis on size, production, marketing, value-addition, regulation and government support. The main methodological approach consisted of an extensive desk review combined with field visits to government departments, mining associations, and companies.

The rationale was based on the understanding that several organizations and researchers have already carried out projects on diversified issues of ASM and have produced relevant publications. The ASM sector has been targeted by researches and institutions that have published a significant number of reports, research papers, press briefs, and project reports which were also thoroughly reviewed.

The literature review focused on the description of the mining sector in general and in particular the ASM sector; the existence of policies and Mining Codes or Mining Laws and to what extent they address issues of ASM in terms of production, marketing and value-addition.

The data collection was conducted on the basis of structured closed and open-ended questionnaires. These were initially sent by email to the selected organizations. Unfortunately, the response level by the organizations was very negligible. Given this unpredicted scenario, it was necessary to undertake telephone calls, virtual meetings, and where necessary, physical visits to collect the required information and data. These arrangements were done with a total of 15 organizations engaging mainly with government departments and associations in charge of the Mining Sector. In some of the organizations it was also possible to interact with other players actively working on ASM. 2 organizations on the sample list were not reached representing 1.7% non-response rate.

2.0: Background Information

Mining is one of the key primary industries for the development of societies since time immemorial. The importance of Mining is still valid in our modern societies. Mining is carried in large scale, medium and artisanal and small-scale mining.

The large scale and medium scale mining is dominated by corporations from developed economies, although developed in the developing countries. ASM is typically undertaken by the developing countries' nationals.

There are close to 30 million people involved in ASM in 80 countries worldwide, 30 – 40% of whom are in Africa.[1] Those in ASM mine and process more than 35 different minerals and make a significant contribution to the world production of critical mineral products.[2] For instance, in 2005, 15% of the gold production (400 – 600 t/a) valued at approximately 20 billion USD is undertaken by ASM.[3] The ASM activity generates and supports secondary activities/economies of close to 100 million people with the sector supporting direct and indirect livelihoods of

[1] African Minerals Development Center, 2017
[2] ibid
[3] ibid

120 – 150 million people. Several studies report that there are at least 9 million women and 2 million children involved in ASM activities worldwide.[4]

The often-quoted phrase "Artisanal mining" means different things to different people the world over depending on their level of exposure to the mining industry. Appiah (1998) highlights the immense diversity of a sector for which it was hard to agree on a common definition in the 1980s and 1990s.[5] At the time, the goal was to find a single global ASM definition. Various definitions were offered that attempt to integrate qualities with symptoms or implications of the informal setting. Illegality and the usage of primitive technologies were frequently included in these classifications. There was frequently lack of clarity regarding the reasons and aims for selecting a particular definition. However, having a clear ASM definition serves two purposes in general.

From development standpoint, the goal of establishing a working definition is to guarantee a shared understanding and a long-term vision for the industry. In terms of public policy, and notably for the purpose of regulation, a definition distinguishes ASM from other mining activities in practice.

The Organization for Economic Cooperation and development (OECD) developed an ASM definition that was strongly aligned with a developmental strategy. This will also serve as the basis for a growing number of national legislations conforming to OECD advice to differentiate ASM from other mining operations and identify supply chain concerns.

ASM refers to official or informal mining activities that use primarily simplified means of exploration, processing, extraction, and transportation.[6] ASM has a low capital investment and a high labor- intensive technology.[7] People working alone, including those working in family groupings, in partnership, as members of cooperatives or other forms of legal organizations with hundreds or even thousands of miners, are classified as ASM. For example, it is typical for labor groupings of 4-10 people to share responsibilities at an individual location of mineral extraction, sometimes in family units, excavating one tunnel. Groupings of 30-300 miners are common at the organization level, extracting one mineral deposit jointly, working in different tunnels, and sometimes sharing processing facilities.

Zambia has a long history of mining, spanning over 100 years, with the mining sector continuing to play an important role in the country's economic development. Even though most of the mining activities to date have been undertaken by large-scale mining companies, there are a growing number of artisanal and small-scale miners involved in the exploration of both gold and gemstones as a result of the Government's policy to formalize and empower artisanal and small-scale miners in order to make them more productive so that they can support the development of lapidaries and local auction sales and therefore enhance the capacity of local businesses to participate in the mining sector value chain and to boost export revenue.

[4] ILO, 2017
[5] Appiah, 1998
[6] World Bank, 2020
[7] ibid

In Zambia, ASM dates back to the 1930s when the first mineral deposits were discovered in Ndola Rural. From the early beginnings and until 1984, the area played host to numerous unlicensed mining activities. In 1984, mining activities became subject to licensing as the area was declared a protected area. By 1990, the area had been divided into mining plots of about one square kilometer each. As of December 2017, the Ministry of Mines and Minerals Development has issued about 579 mining licenses to the ASM sector.[8] At present, ASM operations have become so extensive that mining excavations and huge waste dumps have become the most common sights in and around mining areas.

Despite the Government's efforts to support and promote the ASM sector, a majority of ASM workers cannot afford to acquire the necessary equipment to explore and exploit the mines in a cost-effective way, but are forced to employ simple tools and methods, such as a pick and shovel, to access the mineral resources; hence, the contribution to the country's Gross Domestic Product (GDP) by the ASM sector is almost negligible due to underdevelopment. In most cases, especially where simple tools are used, mining is conducted in an uncoordinated and dangerous way, which poses a hazard to humans and the environment.[9] Some of the negative aspects of unregulated ASM activities include poor health and safety practices, child labor, pollution and contamination of water systems.

This uncoordinated nature of the ASM sector in Zambia implies that it is difficult to determine it size as well as its contribution to the economy in terms of production, sales and employment. This paper tries to contextualize the sector using available data and views of sector players, in terms of its size, production, marketing, value-addition, and government regulation and support. The idea is to provide the basis for further policy considerations as well as research.

3.0: Methodological Approach

A mix method design as provided by Creswell (2012), was adopted utilizing both quantitative and qualitative methods. Creswell argues that the problems addressed by social science researchers are complex, and the use of either quantitative or qualitative approaches by themselves is inadequate to address this complexity.[10]

Similarly, the interdisciplinary nature of research, as well, contributes to the formation of teams with individuals with diverse methodological interests and approaches.[11] Finally, there is more insight to be gained from the combination of both qualitative and quantitative research than either form by itself. Their combined use provides an expanded understanding of research or evaluation problems.

In terms of timing, the design was cross-sectional (measurement of outcome and the exposures in the study participants at the same time). Unlike in case–control studies (participants selected based on the outcome status) or cohort studies (participants selected based on the exposure status), the participants in a cross-sectional study are just selected based on the inclusion and

[8] ASM Handbook for Zambia, 2018
[9] Ibid

[10] John W. Creswell, 2012: 188
[11] ibid

exclusion criteria set for the study. The design was preferred because cross-sectional studies can usually be conducted relatively faster and are inexpensive. This type of designs can give us information about the prevalence of outcomes or exposures. However, since this is a one-time measurement of exposure and outcome, it is difficult to derive causal relationships from cross-sectional analysis. Nevertheless, we can be able to estimate the odds ratios to study the association between exposure and the outcomes in this design.

The target population was the ASM players comprising government departments, associations, and miners/institutions. A sample of 17 organizations/departments was defined in order to map at a very high level the present dynamics and situation of the ASM sector in Zambia. Thus, the sample comprised 5 officials from the Ministry of Mines and Minerals Development, 2 officials from the Chamber of Mines, 2 officials from Small-Scale Miners Association of Zambia, 1 Official from the Zambia Environmental Management Authority, 5 representing selected small-scale miners.

A purposive sampling method was used to select participants on the basis of high-interest high-involvement criteria. The data collection was conducted on the basis of structured closed and open-ended questionnaires. These were initially sent by email to the selected participants. Unfortunately, the response level by the organizations was very negligible. Given this unpredicted scenario, it was necessary to undertake visits, calls and virtual conferencing to collect the required information and data. Visits were made to 15 organizations engaging mainly with government departments and associations in charge of the Mining Sector. In some of the organizations it was also possible to interact with other players actively working on ASM. We also undertook systematic review of relevant documents such as the mining code (mining laws), mining policies, the Zambia ASM Handbook, official national production and export statistics, and other available literature.

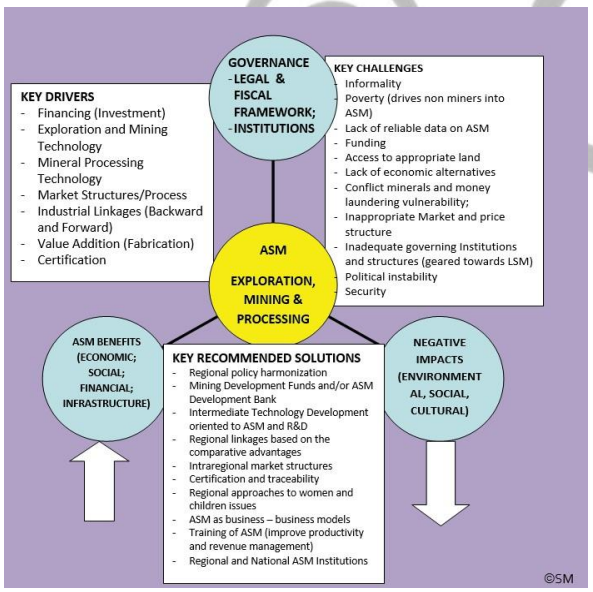
Quantitative data was analyzed using MS Excel. Qualitative data was analyzed using "content analysis". Content analysis is a procedure for the categorization of verbal or behavioral data, for purposes of classification, summarization and tabulation. The content was analyzed on two levels: (1) Basic level or the manifest level where descriptive accounts of the data i.e. this is what was said, but no comments or theories as to why or how these were said; and (2) Higher level or latent level of analysis where more interpretive analysis that is concerned with the response as well as what may have been inferred or implied. This involved coding and classifying of data, also referred to as categorizing and indexing and the aim was to make sense of the data collected and to highlight the important messages, features or findings.

4.0: Theoretical/Conceptual Framework

The analysis was undertaken in line with the Africa Minerals Development Center (AMDC) Growth framework. The framework recognizes three (3) important elements of growth in the mining sector: ((i) Governance – legal and fiscal framework and institutions; (ii) ASM benefits (economic, social, financial, and infrastructures); (iii) negative impacts

(environmental, physical, social and cultural)) that support the "ASM Exploration, Mining and Processing". The landscape framework also describes the key drivers, key challenges and key recommended solutions based on field observations and interviews with key stakeholders. The recommended solutions aim mainly at enabling the operationalization of the African Mining Vision, especially the "harnessing of the potential of artisanal and small scale mining to stimulate local/national entrepreneurship, improve livelihoods and advance integrated rural social and economic development" while minimizing the negative impacts on one hand, and maximizing the benefits on the other.

Figure 1: Landscape and Transformation Options for ASM in Africa



Key assumptions

The study assumes that the number of ASM miners declared by the official sources means miners and direct service providers to the ASM sector. It also assumes that the selected organizations provide a fair representation of the continent in terms of ASM activities, legislation and management by the relevant authorities.

The study is skewed towards metallic minerals and few non-metallic such as gemstones, and it does not discuss in details, the construction materials due to lack of data.

It is also assumed that by leveraging the ASM sector, in line with AMV aspirations, the country can tap into broader socio-economic development efforts. This analysis, will thus have a start on factual and comprehensive research-based information that could contribute to guiding the government on how to address the ASM sector.

Study Limitations

The study was affected by the following limitations:

- **Availability of government data.** Key persons from government departments were contacted via email and phone yet little data was yielded from these sources. This necessitated travel to most of the sample organizations. Some data was still not available despite travel to relevant government departments and promises that the data would be sent. This problematic scenario in some cases was exacerbated by bureaucracy including the need to have the Minister's authorization for release. Furthermore, most of the

departments do not have updated information on their web sites some of which were not functional (websites).

- **Limitation on the quality of the data.** Most of the data available on the ASM sector is not consolidated and does not result from census or scientific estimations. The numbers on ASM are allrough estimations. In some cases, an entire community is regarded as ASM and the whole number of community members as miners, regardless of they having other livelihoods such as being food vendors or traders.
- **Limited time frame for data collection.** The initial time allocation for the study did not factor in travel to selected organizations.
- **Limited publications on legislation analysis for ASM sector.** There is no single study at country level that assesses the extent to which Mining Legislation supports the development of ASM in Zambia; thus, this is the first comprehensive study undertaken at national level.

4.0: FINDINGS

4.1: Zambia's ASM Sector

This section presents results in terms of composition of miners and mineral mix and activities. It begins with presentation of available minerals as presented by the department of Geological Survey Department in the Ministry of Mines and Minerals Development, and ends with characterization of players in the ASM sector.

4.1.1: Minerals

Characteristics of the most common minerals extracted by ASM operators in Zambia include among others, the following: Emerald; Aquamarine; Tourmaline; Garnet; Amethyst; Limestone; and Talk. Of late, there has been growing involvement of ASM in the extraction of gold and copper.

An emerald is a clear green variety of beryl (a Beryllium-Aluminum Silicate). Emeralds crystallize in the Hexagonal crystal system (six-sided elongated prism). The hardness of emeralds ranges from between 7.5 and 8. The SG of emeralds is between 2.63g/cm3 and 2.91g/cm3.[12]

Similar to emeralds, an aquamarine is a member of the beryl group. An aquamarine is blue in color, but the color may vary from a deep blue to a much pale shade of blue. The green variety, denoted "apple green", is a watery green without any trace of yellow, due to the presence of iron.[13] The most valuable color of an aquamarine is a rich sky blue; however, because the stone (an aquamarine) is pleochroic, i.e. doubly refracting, even blue stones have a hint of green color. Being a beryl, an aquamarine has the same hardness as an emerald, i.e. between 7.5 and 8. The SG of aquamarines is about 2.71 g/cm3. The refractive indices are

[12] Zambia Geological Survey Dept.

[13] ibid

about 1.570 to 1.590. The lustre is vitreous and not exceptional.

Tourmaline is a complex silicate of Boron and Aluminum, which commonly occurs as well-developed prismatic crystal, belonging to the Trigonal crystal system.[14] The crystals have triangular cross-sections and are often elongated with vertical striations running parallel to the optic axis. The gem varieties are bright and transparent and have hardness of 7.5. The SG is between 3.02 g/cm3 and 3.20 g/cm3. The refractive indices are about 1.620 to 1.640. The fracture is concoidal and lustre is vitreous. Tourmaline assumes many different colors, such as: brown to brownish; black (Dravite); black (Schorl); deep blue (Indicolite); colorless (Achroite); pink to red (Rubelite); peacock blue (Elbaite); green (Verdelite); emerald green (Tsilaisite); and lilac – mauve (Siberite).

Garnet is a group name applied to about fifteen different and complex silicate species with generally similar characteristics but of different compositions and with elements that are replaceable with each other. The minerals of the garnet family contain silica and other elements, such as aluminum, iron, manganese, magnesium, calcium and chromium. There are at least six end members, which mix in all proportions so that most garnets, in practice, are a mixture of two or more of these.

Garnets crystallize in the Isometric (Cubic) crystal system. The hardness varies from 6.5 to 7.5 and is dependent on the chemical composition. The density ranges from 3.50g/cm3 to 4.50g/cm3 and the refractive indices for the various garnets range from about 1.690 to 1.890. Garnets have no cleavage and break into splinters (concoidal fracture). The lustre is usually vitreous.

The different varieties of garnet include:

- **Pyrope**: The magnesium-rich member of the pyrope-almandine series. Usually bright red, but Pyrope can also be of a less attractive black or dark red color. Its red color, sometimes very bright, is due to small quantities of chrome in the crystal structure. Pyrope can also be perfectly transparent, but this feature is less visible in dark specimen. The most valuable types are, of course, the transparent ones with the brightest red color. A garnet is referred to as pyrope if its SG is between 3.65 g/cm3 and 3.87 g/cm3, the refractive index is between 1.720 and 1.760 and the hardness is 7. Pyrope is relatively common, although less than Almandine. Very large stones, up to several hundred carats, have been found; but these are rare and are found in museums and famous collections.
- **Almandine**: This type of granite is generally darker red than pyrope and may appear black, although minimal cases of pinkish red specimens are found. It has a brilliant lustre, but its transparency is frequently marred, even in very clear stones, by excessive depth of color. The deep, almost violet-red is typical, and has given rise to the expression “Red Garnet”. The SG of almandine is between 3.95 g/cm3 and 4.20 g/cm3 and the refractive index is between

[14] ibid

1.760 and 1.830. Its hardness is between 6.5 and 7.

- **Rhodolite**: This is an intermediate group of garnets in the pyrope-almandine series. It is a deep pink or pinkish-red color. Rhodolite is a sub-variety of pyrope-almandine characterized by its particular color. The SG of rhodolite is between 3.74 g/cm3 and 3.94 g/cm3 – a very limited range – and the refractive index is between 1.755 and 1.765. The hardness is 7.
- **Spessartite**: A silicate of manganese and aluminum, belonging to the garnet family. It has a typical crystal form of garnets, usually occurring as isolated, well-formed rhombic dodecahedral crystals. The color is orange-pink, orange-red or brownish yellow. It may be semi-opaque or transparent; however, gem-quality spessartites are a scarcity. Transparent crystals are highly lustrous and are used as gems. Spessartite has a hardness of 6.5 to 7.5. The SG of gem-quality spessartite varies from 4.12 g/cm3 to 4.20 g/cm3 and the refractive index is between 1.790 and 1.810. Similar to all other garnets, spessartite has no cleavage.
- **Grossular**: Silicate of calcium and aluminum, belonging to the garnet group. Grossular garnets occur in a very wide range of colors. Grossular also has typical crystal form of garnets, occurring in isolated crystals, which are often complete, in the shape of a rhombic dodecahedron, sometimes combined with a trapezohedron. They vary from opaque to semi-opaque. The typical color is light (gooseberry) yellowish green, but they can also be strong to bluish green, honey yellow or pinkish yellow or even perfectly colorless. When transparent, the crystals have good lustre. Like other garnets, grossulars have no cleavage. The greenish to yellow varieties are used as gems. The hardness is 6.5 to 7.5 or a little more. The SG is somewhat variable, i.e. from 3.58g/cm3 to 3.69 g/cm3. The refractive index is 1.740.

An amethyst is a purple or mauve colored quartz. The purple color is due to traces of titanium and manganese. It varies from light to dark purple. The crystals are seldom homogeneous in color but have alternating light and dark bands parallel to the crystal faces (color zoning). Amethyst occurs in the Trigonal crystal system. Amethyst has a hardness of 7 and a SG of 2.65 g/cm3. The refractive index varies between 1.540 and 1.550. The lustre is vitreous and is dichroic, i.e. exhibiting a bluish or reddish purple tinge when viewed from different angles.

Citrine is a yellow-brown to ochre coloured (fine reddish-yellow or golden) transparent quartz, which derives its
colour from traces of ferrous oxide. The colour varies from pure yellow to dull yellow, honey, or brownish yellow, sometimes even with a russet tint. As with amethyst, the colour is often broken up into patches or bands, although due to its depth of hue, the zoning is less obvious. It has good lustre, similar to amethyst, and is generally very clear and virtually free of inclusions, because the amount of raw material available allows for considerable selectivity. A high-quality citrine is rare; hence, most citrines, which are marketed (often under the name “Golden Topaz”), are amethyst or smoky

quartz, which have been heat-treated. Similar to amethyst, citrine has a hardness of 7, the SG is 2.65 g/cm3 and the refractive index is between 1.540 and 1.550.

Quartz (SiO2) Quartz (Silica Dioxide), also known as Rock Crystal, is the most common mineral found in the Earth's Crust. Quartz occurs in veins and pegmatites and in fine to medium or course grained rocks (Sedimentary, Igneous, and Metamorphic). Quartz has a hardness of 7 and the crystals are usually hexagonal and columnar and crystallizes in the Trigonal crystal system. Quartz also occurs in a gentle pink variety called rose quartz, ref. Figure 8 below. The SG of quartz is 2.65 g/cm3 and the refractive index is between 1.544 and 1.553.

Granite Granite is a common type of felsic rock that is usually granular and phaneriric in texture. It can be predominantly white, pink or grey in colour. Granite is usually massive (lacking internal structures), hard and tough, ref. Figure 9 below.

Limestone Limestone is a sedimentary rock composed of skeletal fragments of marine organisms, ref. Figure 10 below. The major components/materials of limestone are calcite and aragonite minerals. Limestone also often contains variable amounts of silica.

Talc is a clay mineral composed of hydrated magnesium silicate, which occurs as foliated to fibrous masses. Talc has a hardness of 1 and can easily be scratched by fingernails. Its colour ranges from white to grey and has a distinct greasy feel.

Gemstone occurrences in Zambia are not just restricted to the famous copper belt region but are widespread. Most of the Zambian gemstones were formed during the pan African orogeny. An orogeny is an event that leads to a large structural deformation of the Earth's lithosphere (crust and uppermost mantle) due to the interaction between tectonic plates. These geographical areas include:

- Emeralds of the Kafubu area. The emeralds were emplaced in the pegmatites during the Proterozoic Time Period, dating back to approx. 1400 Ma, prior to the deposition of the Katanga super group.
- Aquamarines of the Lundazi area. The aquamarines are post-Katanga, pre-Karoo and probably synchronous with agranite, dating back to 489 Ma.
- Amethysts of the Kalomo area (Mwakambika Hill). The amethysts are post-Karoo and probably Jurassic in age, i.e. approx. 300 Ma. Solwezi amethyst occurs in the Basement Domes.
- The coloured gemstones of the Mkushi-Serenje area. The coloured gemstones, such as Tourmaline, Topaz, Zircon, Spinel, Beryl, Rock Crystal, Chrysoberyl and many other types of gemstones are found in the pegmatites of the Basement Complex.

Most of the Zambian gemstones occur in large veins or dykes consisting mainly of pegmatites. Veins are bodies of mineral matter where length greatly exceeds width. Gemstones commonly found in veins include: Fluorite, Quartz, Apatite, Tourmalines, Topaz,
Epidote, Beryl and Chalcedony. Pegmatites are extremely course grained igneous or metamorphic rocks. Gemstones commonly found in this type of rock include: Beryl, Tourmalines, Garnets, Quartz, Topaz,

Chrysoberyl, Spodumene, Zircon and Amazonite.

4.1.2: Composition of miners

In terms of composition, a review of records at the Ministry of Mines and Minerals Development revealed that as at close of December 2022, the Ministry has issued about 579 mining licenses to the ASM sector[15].

However, a review of the census report of Development Minerals in Zambia, conducted by the Ministry of Mines and Minerals Development with the support of the ACP-EU Development Minerals Program, revealed that of the 109 mining plots/sites visited in the ten provinces of the country, both mechanized and non-mechanized mining operations, approximately 75% held legal licenses.[16] The survey furthermore revealed that the vast majority of the ASM workers were unaware that their ASM activities required a valid license nor did they know how to obtain such a license.

A review of the Delve Database on the composition of ASM in Africa indicates that there are approximately 500,000 people involved in Artisanal and Small-Scale mining in Zambia.[17] It is however, estimated that the number of actors in ASM in Zambia could be more than 600,000 by December, 2022.[18]

ASM DATA - Country Database Record

Country	Zambia
ASM Status	Existing (data assessed)
Data year	2017
ASM Miners	500,000
- gold	5 ,000
Data curation	as reported
- min.	500,000
- max.	600,000
- female	125 ,000
ASM Commodities	gemstone, 3T, copper, gold

Apparently historic/statistic estimates, based on increasing initial estimates of ILO-99, do not take into account “illegal” (i.e. informal) miners. See AMDC-17! Sitting in-between of DRC, Tanzania and Zimbabwe, the AMDC-17 estimate is much more plausible → 500,000 Min/max: AMDC-17 indicates “over 500 thousand” additional to 400 formal mines. → 500,000 - 600,000

Female participation: no data. Likely in the magnitude of neighboring countries (20-30%). In videos, a lot of women can be observed. → 125,000 (?) Gold: no quantitative data. According to the Minamata Initial Assessment there are no emission from ASGM. Video evidence however, shows local communities engaged in ASGM. Possibly ASGM is not reported because of being considered “illegal” in this country with an important LSM sector. It appears reasonable to assume that at least 1% of the miners are ASGM miners → 5,000.[19]

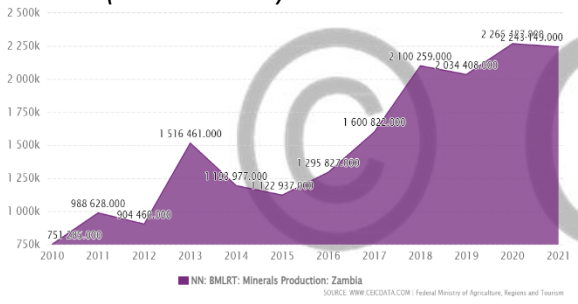
[15] Ministry of Mines and Minerals Development.
[16] ibid
[17] Delve database, 2017
[18] Ministry of Mines and Minerals Development.
[19] Minamata, 2017

4.2: Production

Mineral production in Zambia presents an increasing trend. For example, taking a 10-year period (from 2010 – 2021), production figures show an upward trajectory from around 750 thousand metric tones to above 2 million metric tones per annum as shown in figure 2 below.

However, national production figures are not disaggregated between Large and Small-Scale mining activities, making it difficult to analyze the contribution of ASM to national mineral production.

Figure 2: Annual Mineral Production – Zambia (2010 – 2021)



The ASM sector in Zambia is dominated by the mining of gemstones, primarily emeralds, amethysts, aquamarines, beryls and garnets. Other minerals exploited by the sector include topaz, quartz, and opal. Most of these gemstones and precious stones are used for ornamental purposes due to their specific properties.

Gemstones are mainly produced in rural areas, such as: Ndola Rural on the Copper belt (emeralds); Lundazi and Nyimba in Eastern Province (aquamarines, tourmalines and quartz); Siavonga and Mapatizya in the Southern Province (amethysts). Other gemstones mined by the ASM sector in these rural areas include: aquamarine, amethyst and rosequartz. In the Nyimba area at Hofmeyer, illegal miners, at an abandoned site that used to belong to the Mindeco Small Mines, mine black and green tourmaline, and pink quartz. In the Muchinga and Northern Provinces, quartz, used by the construction industry, is mined. Similarly, in Solwezi, along the Lunga River, quartz is mined and exported to China, where it is used for jewellery and other ornamental purposes.[20]

4.3: Market

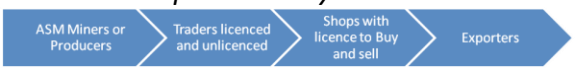
Although the Government recognizes the negative impacts of illicit trade on minerals, it has not yet adopted the framework of the international instruments aiming at control and traceability of the mineral resources. The Mining Code mention very softly that licensees should not engage in illicit trade of their products. Unlike other countries, like Angola that have decided to certify the products from ASM, especially bringing the ASM produced diamonds into the main stream of Kimberley Process.

The Kimberley Process was developed to create a legally binding global certification system for rough diamonds, it involves more than 75 countries and controls the movement of all rough diamonds from mine to market, throughout the world. It is considered a unique system that goes beyond governments, involving the private sector and civil society organizations in a system that has continued to improve since its inception in 2003.

[20] ASM Handbook for Zambia

Formerly, Base metal ASMs producers sell their raw production on LSM, especially to the Chinese Companies due to lack of processing facilities. The producers are at the tail of the value chain and as a result they get always the least in the value of their commodity, even in the case when subsidies are introduced in the market structure.

Figure 3: typical market structure of minerals commodities produced by ASM



4.4: Value Addition

The policy and mining code elaborate in a more significant way the need for local value addition and fabrication. They all recognize that the "Value added" mineral products like jewellery, pottery and stone carvings, can give a much higher return than the unprocessed mineral alone; but finding a market for these goods can be a major challenge. In all cases, developing skills in marketing and selling is critical to the success of an ASM business.

One cannot consider value addition dissociated from the linkages that are required to establish functional economic value addition. The linkages that contribute to the value addition include the availability or induction of local and regional market of the final products that are produced by ASM. The marketing of ASM products require proper branding and certification that will make them unique and able to enter international markets (e.g. Fairtrade Products). For that to happen, the country need to embark on capacity building process that will equip the miners with business skills that will allow them to run their mines as businesses. The linkage dimension includes the specialization of the sector in its entire value chain where there should be miners (e.g. cooperatives), processors (e.g. integrated regional processing centers), traders (buyers and sellers of raw products), fabricators (e.g. blacksmiths) and buyers and sellers of final products.

Table 2. Conceptual value addition model for minerals and their major inputs

		Processing/ Beneficiation				
	Mining	Pre concentration	Concentration	Smelting	Refining	Market
ASM	Mining/ resource extraction (open pit and shallow underground mines)	Pre concentration (eg. Gold panning; sluicing)	Concentration (e.g Amalgamation)	Smelting	Rudimentary fabrication/ blacksmith	Local
Power	Off the grid and operating small equipments	No power	No power	Gas torches	Using domestic power (welding)	
Water						
Opportunity for improving	SSM cooperatives	Integrated ASM services (would have the role of registering miners as they come to the centre) (e.g. shaking tables)	Integrated ASM services (would have environmentally friendly techniques) (e.g. Amalgamation drums)	Integrated ASM services (would integrate a fair market for producers)	Branding and certification of ASM products	Regional and international Market

4.5: Government Regulation and Support

It was established that all respondents stated that government regulation and assistance to ASM is fundamental for the sustainability of the sector and to be able to bring the sector to implement environmental standards and to adhere to best mining practices, however, this should not be used as conditionality for formalization because if two sites operating side by side, one formal and one informal, all effort being put into the formal site will be meaningless if next to it an informal site continues operating and polluting the environment, for example.

The Government would benefit more by assisting the two sites simultaneously while raising awareness about the need for

formalization. Formalization is a process and should not be regarded as a means for benefiting from government assistance, because the government assistance may not be sustainable for several reasons. Formalization needs to live beyond government assistance to turn the sector in a sustainable one.

Provision of technical extension service (by the regional and central level) on mining methods geological assessment and support on how to comply with law. Usually under the inspection services the Ministry guide miners on how to comply with law. Assist the ASM on conflict resolutions, etc.

Additional assistance from Government is expected in the following areas:

(i) Financial assistance to ASM in Zambia;
(ii) Alternative mechanisms for sponsoring ASM activities (at one stage government had created a revolving fund for the mining sector, but due to weak control mechanisms the scheme failed). This scheme can be improved to give assistance in equipment hire for example);
(iii) provision of business management training aligned to mining activity.

It is recognized that sustainable ASM can only be achieved through some sort of financial and technical assistance. The technical assistance from government is very limited due to lack of financial and human resources.

The financing of ASM, has long been recognized as one of the main constraints to its development. Despite this realization, most country initiatives have failed to promote the sector from Artisanal into small scale and possibly into middle scale mining.

According to the CMV Guidebook, "To ensure effective mineral sector governance, it is essential to have a sound regulatory framework that is grounded in enforceable legal systems, providing for accountability, transparency, human rights and informed administration of the sector which fully acknowledges the rights and needs of mining communities.[21]

Zambia has clearly identified the potential underpinning the ASM and the transformative capacity of the sector in rural economies. The country has also recognized the impact of the sector on the environment, citizens and social fabric. The Government, under the guidance of the World Bank, reviewed the mining and environmental laws in the nineties to make them responsive to the dynamics of the mining sector including the under regulated ASM sector. The mining sector policies, acts and regulations have paved the way for licensing procedures (sometimes supported by Cadastre Systems); have also decentralized the mining support institutions to the Provinces or even to the Districts.

Furthermore, the Ministry in charge of Mineral Resources has established Departments or Directorates that are responsible for ASM. The Ministry responsible of environmental issues and the Ministry of Mines have streamlined the environmental impacts from mining activity including ASM and have in some cases created specific environmental regulations for mining activities.

[21] CMV Guide Book: Domesticating the Africa Mining Vision

4.6: Challenges of ASM Sector

In this paper, it is clear that Government recognizes the importance and significance of ASM in the rural economy and the fact that in most ASM communities, mining is the only viable income generation activity. ASM also induces other ancillary economic activities, such as agriculture for food production to supply to the miners; trade (especially food and beverages); as well as local transport between the mine site and the neighboring villages. The government also recognizes that the activity has several problems that range from social, cultural, criminal, health, safety, illegality, to environmental.

Government also see the need to assist the ASM sector to maximize its gains and turn the activity into an economic, social and environmental viable one. However, the government faces numerous challenges that prevent it from intervening in a more effective way. The most common challenges include:

(i) Government institutions which are not fully decentralized in order to reach the remote rural mining sites;
(ii) Government institutions that are not properly resourced (human, financial and infrastructures) to conduct permanent supervision of ASM activities;
(iii) Government does not have adequately skilled staff to assist ASM (the low salaries prevent government from retaining skilled staff);
(iv) Government also recognize that legislation for ASM need to be strengthened in order to promote sustainable ASM (the majority of mining legislation is geared towards attracting LSM investments);
(v) As a consequence of legislation that is not oriented towards ASM promotion, the country has run out of potential areas earmarked for designation of ASM activities;
(vi) The Government also recognize that the competing interests and legislations over land (land law, forestry law, environmental law and mining law) need some sort of integrated approach to define priorities and management modalities.
(vii) It has been difficult to make ASM to comply with environmental legislation, usually seen as expensive and lengthy;
(viii) The role of local authorities is key to the management of ASM, however they need adequate skills and resources to supervise ASM;
(ix) Government also understand that legislation (Mining Laws) need to be improved to include gender and child labor issues;
(x) Government also is powerless to address the formalization of ASM, especially due to high influx of foreigners (in many instances, national ASM are only 15% of the total);
(xi) Poor geological knowledge which would lead to more informed area designation for ASM;
(xii) Government faces huge difficulties in taxing ASM due to its informal nature;
(xiii) Government recognize the need to structure properly the market for ASM products (a structured market would allow taxing ASM products);
(xiv) Government also faces challenges of illicit trade of minerals and cross border trade taking advantage of low export taxes in some countries. Thus, government see also the need to harmonize the tax regimes at least at sub-regional level;

(xv) Government understands that there is need to channel ASM diamonds through the Kimberley Process, nevertheless its complex configurations.

Table 3: Specific Challenges

Govt Specific	ASM Specific
• Taxing the artisanal miners specially the illegal miners; • Accessing production data from ASM; • Illegal mining which interfere with operation of this sector; and • Lack of sustainability in the ASM which prevent proper planning of the outputs.	• Lack of capital (no bankable document to access finance from the bank, hire proper geologist, etc.); • Lack of technical and business skills; • unfair and inappropriate market arrangement; • Lack of processing plants; and • Illegal miners.

5.0: CONCLUSION

This paper finds that there are over 500 thousand people involved in ASM in Zambia and that it is one of the major sources of livelihood in rural areas. The paper has also established that although the ASM sector contributes significantly to Zambia's mining, its contribution in terms of production statistics is not documented. Value addition in ASM sector remains a pipedream.

6.0: RECOMMENDATIONS

Despite knowing the challenges that face the ASM sector the government recognizing the key transformation factors, ASM has grown to astronomic numbers with very little changes in terms of operational practices. This chapter does not provide a silver bullet for the management of ASM but an attempt to highlight the key issues that can be recommended to address by the different ASM stakeholders, including government, institutions and local donor agencies.

The approach is based on the ASM value chain, and the required ingredients for the sustainable management of the sector. The main elements include: (i) the strengthening of policy and legislation; (ii) the need for devising innovative financing mechanisms for ASM; (iii) the need for improvement of technology grounded in local intermediated technology and research & development; (iv) optimization of mining and processing operations (to improve productivity and efficiency); (v) regulated and structured access to the market at mine pit; (vi) beneficiation and access to market at mid and downstream; (vii) and tax payment by the miners, which could be at selling point. This means that the price has to factor-in tax component that must be collected at buying centers or agencies which would increase government income.

Even though gold mining is an enclave economy with weak linkages to the rest of the economy, forward linkages increase foreign reserves, tax revenues (income tax, royalties, land tax etc.), and employment; while backward linkages create demand for locally produced intermediate inputs and capital goods as well as domestic demand for finished goods. Backward linkages are naturally few because most of the intermediate inputs required for gold production are imported. Moreover, although there are some real sector impacts in the form of job creation, they are limited because mineral extraction is capital intensive and requires specialized skills that

are scarce in the local labour force. The real employment generation in the sector is by virtue of ASM.

7.0: REFERENCES

7.1: Publications

1) *Barreto, M.L.,Schein, P., Hinton, J., Hruschka, F. (2018): The Impact of Small-Scale Mining Operations on Economies and Livelihoods in Low- to Middle-Income Countries. ARM, Envigado, PACT, Westcombe.*

2) *IGF (2018): Global Trends in Artisanal and Small-Scale Mining (ASM): A review of key numbers and issues. IIED/IISD, London, Winnipeg.*

3) *UNEP (2018): Global Mercury Assessment 2018. Technical Background Report E-Annex. Chapter 3.2. UNEP, Geneva.*

4) *AMDC (2017): ASM Sector Report. Selected countries policy profile review of ASM.*

5) *Seccatore, J., Veiga, M., et al. (Univ. of British Columbia - UBC) (2014): An estimation of the artisanal small-scale production of gold in the world. Scitotenv. 496.*

6) *Buxton, A. (2013): Responding to the challenge of artisanal and small-scale mining. How can knowledge networks help? IIED, London.*

7) *Hentschel, T., Hruschka, F., Priester, M. (2003): Artisanal and Small-Scale Mining - Challenges and Opportunities. MMSD (IIED), London.*

8) *Dreschler, B. (2001): Small-scale Mining and Sustainable Development within the SADC Region. MMSD, ITDG, London.*

9) *Jennings, N. (1999): Social and labour issues in small-scale mines. Report for discussion at the Tripartite Meeting on Social and Labour Issues in Small-scale Mines. ILO, Geneva.*

7.2: Websites

1) http://artisanalmining.org/InventoryData/doku.php/country:zambia
2) (https://www.mercuryconvention.org/sites/default/files/documents/minamata_initial_assessment/Zambia-MIA-2017.pdf)
3) African Union Commission (2003), Agenda 2063, available at: http://www.nepad.org/system/files/Agenda%20 2063%20%20English.pdf
4) African Union Commission, (2009), The Africa Mining Vision February 2009, available at: http://www.africaminingvision.org/amv_resources/AMV/Africa_Mining_Vision_English.pdf
5) 3. African Union Commission, (2013), Draft AU Youth & Women Employment Pact for Africa (UWEP-A)
6) 4. African Union Commission, (2015), AU Herald: Panafricanism and African Renaissance, Volume 4: January –
7) December 2014
8) 5. African Union, (2009), The African Women's Decade. Theme: Grassroots Approach to Gender Equality and Women's Empowerment (GEWE), available at: <http://wgd.au.int/en/sites/default/files/African%20Women's%20 Decade%20-%20English.pdf>
9) 6. Alliance for Responsible Mining Foundation - ARM (2009-2014), Fairmined Standard for Gold from Artisanal and Small-Scale

Mining, including Associated Precious Metals Version 2.0 / ARM – 05 April 2014, available at:

10) <http://www.communitymining.org /images/sampledata/EstandarFairmined/ Fairmined%20Stnd%202%200_2014_.pdf>
11) 7. Assefa Bekele (2012) - Support to Improve the Economic, Social and Environmental Sustainability of Artisanal Miners Project on ESMF. Sponsored By: The World Bank.
12) 8. Assembly of The African Union (2003), AU Protocol to the African Charter on Human Peoples' Rights on the Rights of Women in Africa, 2003, Maputo, available at: <http://www.achpr.org/files/instruments/women-protocol/ achpr_instr_proto_women_eng.pdf >
13) 9. Assembly of the African Union, (2004), Declaration on Emloyment and Poverty Alleviation in Africa, Ouagadougou, available at: <http://www.ilo.org/wcmsp5/groups/public/---africa/---ro-addis_ababa/documents/ meetingdocument/wcms_234812.pdf>
14) Assembly of The African Union, (2004), Solemn Declaration on Gender Equality in Africa (SDGEA), Addis Ababa, Ethiopia, available at: http://www.afrimap.org/english/images/treaty/AU_GenderSolemnDec04.pdf

15) Assembly of The African Union, (2013), Draft AU Youth & Women Employment Pact for Africa (UWEP-A) Addis Ababa, available at: http://www.au.int/ar/sites/default/files/YOUTH%20EMPLOYMENT%20PACT%20FOR%20 AFRICA-English.pdf

16) Assembly of The African Union, (2014), Common African Position, (CAP) on the Post-2015 Development Agenda, Addis Ababa, Ethiopia, available at: http://www.uneca.org/sites/default/files/uploaded-documents/ Macroeconomy/post2015/cap-post2015_en.pdf

17) Available at: http://vc.bridgew.edu/jiws/vol13/iss3/7

7.3: Other References

1) Dreschler, B, (2001), Small-scale Mining and Sustainable Development within the SADC Region, Mining, Minerals and Sustainable Development {MMSD), International Institute for Environment and Development (IIED), the World Business Council for Sustainable Development (WBCSD).

2) 22. Eftimie, A K, Heller, J S, Hinton, J, Lahiri-Dutt, K, Mutemeri, N, Insouvanh, C, Sambo, M G and Wagner, S (2012). Gender dimensions of artisanal and small-scale mining: A rapid assessment toolkit. The World Bank,

3) Estelle Levin Ltd. (2012), Understanding Artisanal & Small-scale Mining in Protected Areas and Critical Ecosystems: A growing global phenomenon. Presentation for ASM

Protected and Critical Ecosystems London Roundtable November 2012.

4) Government of Zambia, (2008), Mines and Minerals Development, Act No. 7 of 2008,

5) Hentschel, T., Hrushka, F., and Priester, M., 2002, Global Report on Artisanal and Small-scale Mining, Summary Report commissioned by MMSD, 67p. http://www.iied.org/mmsd/.

6) IM4DC Action Research Report 2014 - Investigating Approaches to Working with Artisanal and Small-scale Miners: A Compendium of Strategies and Reports from the Field

7) International Institute for Environment and Development (IIED), (2002), The Mining, Minerals and Sustainable Development Project Report, available at: <http://pubs.iied.org/pdfs/9084IIED.pdf>

8) John P. Williams, Global Trends and Tribulations in Mining Regulations, Journal of Energy & Natural Resources Law, Vol. 30, No. 4, 2012, p. 391 to 422.

9) KPCS. (2008). Annual Global Summary: 2007 Production, Imports, Exports and KPC Counts. Retrieved 10 11,

10) Mineral Resources Development Policy of Zambia; 2013

11) Minerals and Africa's Development, The International Study Group Report on Africa's Mineral Regimes, UNECA, 2011.

12) Protocol on Mining, (1997), The Southern African Development Community (SADC);

13) Regional Indicative Strategic Development Plan (RISDP), (2003), Southern African Development Community (SADC), available

14) 69. Southern African Development Community, (1997), A Declaration on Gender and Development,

15) UN Economic Commission for Africa (UNECA), Southern Africa Office (ECA-SA), (2004), Harmonisation of Mining Policies, Standards, Legislative and Regulatory Frameworks in Southern Africa Paper,

16) UNEP (2012) Analysis of Formalization Approaches in the Artisanal and Small Scale Gold Mining Sector based on Experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda: Tanzania Case Study, June 2012.

17) Zambia Mines and Minerals Development Act; 2008