

DEVELOPING A MODEL FOR A SUSTAINABLE & SCALABLE ROUTE TO MARKET FOR ETHICALLY PRODUCED GOLD OF ASM ORIGIN

Bachelor Thesis
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The hospitality and warmth of the miners in Uganda has made this research project an exciting and fulfilling experience. I hope that the findings of this report can help make a small step in the direction of inclusive international market access for responsibly producing ASM producer groups in Uganda and the Lake Victoria Region at large.

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ABSTRACT

This research report has been commissioned by The Impact Facility, trying to gain a deeper understanding of the ASGM value chain of its project ASMOs in the Busia District of Uganda. It attempts to answer the question of how specifically this ASGM value chain would need to be (re-)structured and processes at mine level improved to supply the international market with responsible gold. At the focus of this report are the specific cases of four mining associations in Eastern-Uganda, visited and interviewed in March 2018.

The research has been designed in accordance with Trienekens' VCA Framework, conducting an analysis of the region's external environment and introducing the role of every value chain actor involved, before exploring some of the challenges and issues the ASM sector is facing.

The findings suggest that Kampala-based traders are paying the miners up to 97.5% of the LBMA fixing price, defying the widespread idea that ASMOs are selling their gold at extremely low prices. A lack of trust in the working practices of the traders from the part of the miners and certainty that the gold is traded on illegally, demand for the introduction of an alternative trading mechanism.

The report continues with a thorough analysis of downstream requirements, regarded during the design of a model value chain set-up, linking ASM producers directly to a European refinery. The report concludes that a robust information system is needed to ensure without doubt that the gold entering the supply chain has no direct or indirect connection to conflict, has been produced without the use of child labor, in respect of human rights and as environmentally friendly as possible. Therefore, the proposed system comprises a fully traceable, blockchain-based supply chain set-up, allowing miners to sell their gold locally at fair and transparent terms, whilst communicating all relevant data and assurances to downstream companies. The report concludes that any market-based intervention, will need to be implemented in conjunction with capacity building and the provision of financial services to the ASMOs to guarantee the sustainability and long-term success of this value chain upgrade. The proposed intervention embeds a system of pro-active engagement with the mining community, driving continuous improvement against a number of ESG criteria.

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LIST OF ACRONYMS & ABBREVIATIONS

3TG	Tin, Tungsten, Tantalum and Gold
AMV	African Mining Vision
ARM	Alliance for Responsible Mining
ASGM	Artisanal- and Small-scale Gold Mining
ASM	Artisanal and Small-scale Mining
ASMO	Artisanal and small-scale Mining Organization
CIA	U.S. Central Intelligence Agency
CoC	Chain of Custody
CoP	Code of Practices
DGSM	Directorate of Geological Survey and Mines
DRC	Democratic Republic of Congo
ESG	Environmental, Social & Governance
g	gram(s)
GBP	Great British Pound
GDP	Gross Domestic Product
ha	hectares
HH	household
iiid	International Institute for Environment and Development
ILO	International Labour Organisation
kg	kilograms(s)
LBMA	London Bullion Market Association
LSM	Large-scale mining
MDL	Mineral Dealer's License
MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-Operation and Development
PR	Public Relations
RJC	Responsible Jewellery Council
SME	Small- & Medium-Scale Enterprise
TDI	The Dragonfly Initiative
TISMA	Tiira Small-Scale Mining Association
UGX	Ugandan Shilling
USD	United States Dollar
VCA	Value Chain Analysis
VSS	Voluntary Sustainability Standard

CHAPTER 1 INTRODUCTION

This thesis report is the result of a five-month research project commissioned by The Impact Facility focused on the development of a model for a sustainable route to market for responsibly produced gold of artisanal and small-scale mining (ASM) origin. It also serves as the final piece of research in the process of completing a 4-year BSc in International Development, majoring in Sustainable Value Chains, graduating from Van-Hall-Larenstein University of Applied Sciences in Velp, the Netherlands.

The Impact Facility is a global grant and impact investment vehicle established to enable downstream supply-chain businesses, social-development foundations, and impact investors to participate in the development of high impact raw material value chains through the provision of production equipment at fair terms to small-scale mines and community enterprises; by providing technical assistance to said communities, and by connecting ASM communities and enterprises to the international market for ethically produced commodities. This report provides an in-depth analysis of the existing gold supply chain of four artisanal and small-scale mining organizations (ASMOs) in Uganda through research of existing literature and findings gathered from qualitative interviews conducted with both representatives of selected ASM producer organizations as well as leading experts and global supply chain stakeholders interested in the uptake of responsible ASM production practices and increase of ethical trade.

The World Bank estimated that about 20% of global gold production is of ASM origin (World Bank, 2013). Although ASM has the potential to be a driver for economic development, it does not offer sustainable living conditions for most communities living in resource-rich parts of the Global South, but instead seems to be part of a self-perpetuating cycle of poverty, where the poorest and most vulnerable groups see mining as a last resort (Environmental Justice Atlas, 2017), (Barreto, et al., 2018). Harmful artisanal and small-scale gold mining (ASGM) operations are not only a failed chance to foster sustainable development and use the resource wealth to generate prosperity for all of society (Tibbett, 2009), but also pose a reputational threat to companies unable to verify the origin of the gold used in their supply chains.

The Impact Facility is aiming to link ASMOs dedicated to continuous improvement and the adoption of more sustainable and responsible mining practices to the international market. In the case of Tiira, this effort is part of a wider initiative led by *Stop Child Labour / Hivos* to create child-labor-free zones in and around Tiira village; a goal only attainable, if decent working conditions and sustainable livelihood strategies enable households to make a living without relying on an additional income.

The report will discuss how value is created at various levels of the gold value chain considering the economic, social and environmental impacts at every step. This thesis will present the process of gold production, trade and export from mine to market using Trienekens' theoretical framework for Value Chain Analyses (VCAs) and Value Chain Upgrades.

The Dutch Gold Covenant is a cross-industry agreement on International Responsible Business Conduct, involving "government, jewelers, recycling firms, smelting firms, NGOs and goldsmiths" (International RBC, 2017) committing to the use of 'responsible gold' across the value chain" (Dutch Government, 2017). To facilitate a market-based mechanism to allow the flow of ethically-produced ASM gold to these buyers, a route-to-market model needs to be developed that can demonstrate a reasonable level of risk management, based on either:

- (a) a reform of existing local value chain mechanisms for gold ethically produced of ASM origin, or
- (b) through the implementation of an entirely new value chain system.

1.1 The Impact Facility's Lake Victoria Gold Program

The ASMOs in Tiira are one of four ASM hubs in the Lake Victoria Region (Uganda, Kenya & Tanzania) receiving the support of The Impact Facility. Each mining hub comprises several ASMOs who have agreed to work with The Impact Facility. The Impact Facility engages with ASMOs with the goal of creating strong and resilient small- and medium-scale enterprises (SMEs) producing gold as responsibly as possible.

It does so by providing mines with access to access financial capital, equipment and training financed by impact investors and downstream companies keen on experiencing an increase in supply of ethically produced gold of ASM origin. The companies expect evidence for the positive impact their investments have on the ASM communities receiving the support they financed.

Therefore, ASMOs need to agree to participate in The Impact Facility's Impact Escalator program, committing to adopting responsible mining practices and allowing The Impact Facility the continuous monitoring of their environmental, social and governance (ESG) performance. The provision of technical training and assistance provided through a local partner network, allows the miners to reach responsible production practices one step at a time. The ESG assessments are conducted by these partners using the impact assessment tools developed by The Impact Facility.

The Impact Facility's ESG Criteria are used to measure continuous progress towards a performance level that would allow either Fairtrade or Fairmined certification of the ASMO after a period of 2-4 years of engagement. The Impact Facility receives the ASMOs' performance data on a quarterly basis, using the data to formulate continuous improvement plans that need to be implemented by the mining organizations. The performance data is shared with the downstream investors, demonstrating the impact trainings and investments have.

One of the factors why downstream companies support ASM communities is the interest in including ethically mined ASM gold into their own supply chains. In order to satisfy this need and incentivize ongoing investment from the downstream, and also to enable ASMOs to access the international market directly, The Impact Facility wants to create and facilitate a direct market link between the producer organizations and refineries, linked to the downstream demand.

The Impact Facility is currently working with four mining associations located in Tiira, in the Busia region of Eastern-Uganda, which will be at the focus of this research, namely:

- Busia United
- Tiira Landlords
- Angariama Mining Association
- Tiira Small Scale Miners Association (TISMA)

1.2 Previous Understanding of the Gold Value Chain of the Selected Mines

The following paragraphs lay out the initial understanding and assumptions regarding the situation in Tiira. The findings of this report challenge various aspects of these while confirming others to be correct.

Based on the statements of several miners given in interviews during an initial scoping conducted in the region by The Impact Facility's subject matter expert, Joshua Read, it was found that ASM miners often find themselves in a weak bargaining position. Miners' limited access to regional markets and small production volumes cause a dependency on local traders, often referred to as middlemen. Local traders pay miners significantly lower prices than the current market rate (approx. 65-70%) of the LBMA price.

The most vulnerable groups, the poor and women, are the ones to receive the worst prices for their gold or their labor respectively, as their production volumes tend to be the lowest as well as their bargaining power. Besides, traders often provide more than just one service to the miners, including advanced payments in the form of loans, or mining equipment. Miners feel compelled to maintain a positive relationship with their trader, despite receiving a low price for their gold. In other cases, traders might even pay above market price, while overcharging for equipment or profiting from interest on existing loans.

Due to the informal nature of the trading mechanisms, it is currently not possible to provide an assurance or traceability system at the level of surety and compliance with environmental and social criteria that is required to satisfy the needs of companies such as Fairphone. It is not uncommon for gold to be sold two or three times before reaching a smelter, where the gold is purified and transformed into bars or ingots before it is exported out of the country. By the time the gold reaches the smelter, the origin might be impossible to identify.

The most important benefit of the current system is that miners are almost always paid on the spot. Since most ASM miners pursue mining at a subsistence level, immediate payment is highly valued. A second advantage is that the local traders buy directly at mine level so that the miners do not have to walk to a central selling point but can receive payment at the mine. Lastly, the miners can sell gold individually, without having to put their trust in anyone else. An approach that aims to scale and exploit the advantages of scaled economies might require mining sites to aggregate production volumes before selling.

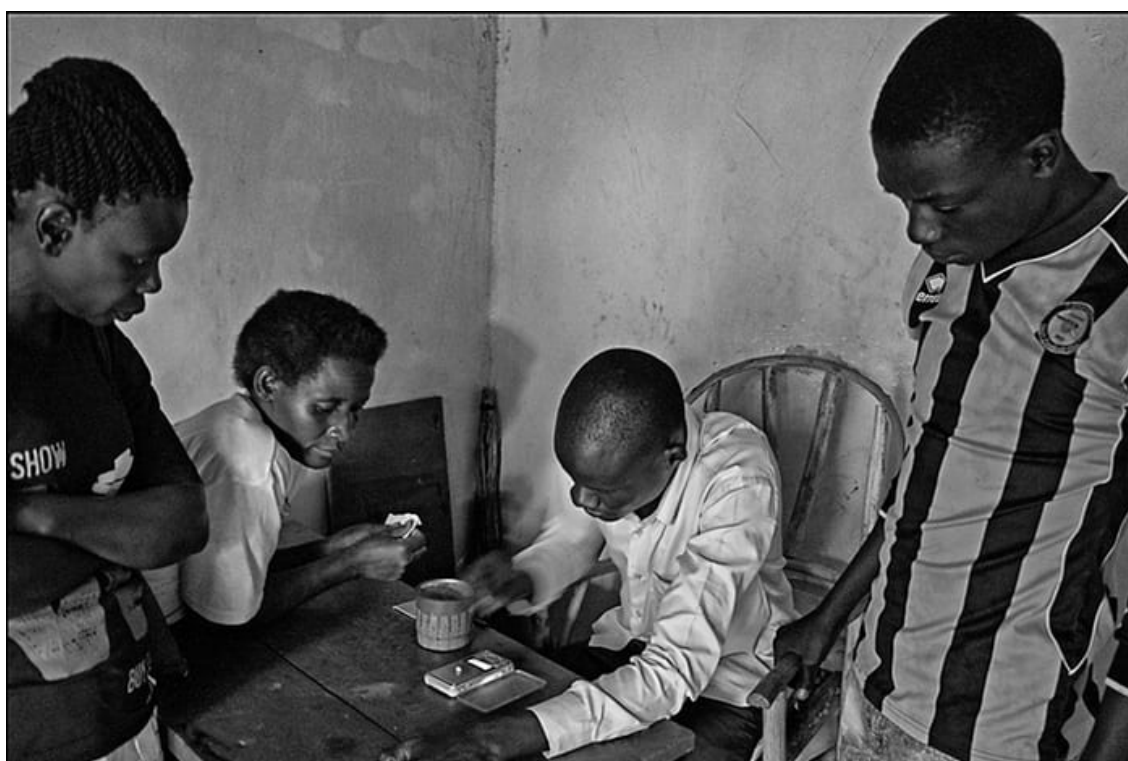


Figure 1 Local trader buying gold at the offices of Busia United (Photograph: Ian Berry)

1.3 Problem Statement

ASGM plays a vital role in the Ugandan economy and offers a livelihood to thousands of miners. However, miners tend to occupy a somewhat weak position in the value chain, due to some reasons.

- A significant majority of miners operate in an illegal environment, only 5% of all ASM operations are estimated to retain a location license. While the government is planning to support ASM in a number of ways, Uganda currently lacks critical support infrastructure, to develop ASM into a source for a sustainable livelihood (Barreto, et al., 2018).
- Lacking access to capital that would allow miners to increase their productivity restricts the professionalization of the current, labor-intensive and dangerous mining practices.
- Furthermore, livelihood strategies are the product of numerous factors, motivating or disincentivizing individuals to engage in longer-term, committed value chain dependencies. This complexity makes it difficult to conduct a successful value chain intervention.

The Impact Facility is facing a lack of understanding of the workings of the current ASGM value chain of the mining associations working at the four project mines in the Busia region and needs to find out which components are required to set up a sustainable route to market for ethically produced gold and which external components may influence this and will have to be taken into account.

1.4 Research Objective

The objective of this research is to identify critical components necessary to ensure an ethical ASGM value chain and give recommendations as to what aspects of the existing value chain would have to change, and how, to strengthen the position of ASG miners. In order to achieve this, the flow of goods and services between value chain actors has been analyzed, taking into account the power relations between them as well as an analysis of the external environment and enabling factors.

CHAPTER 2 RESEARCH QUESTIONS

The research is guided by the following overarching theory-building question:

Which key components, implementation mechanisms, and external conditions are necessary to ensure an ethical value chain for ASM gold viable in the socio-economic context of the Busia region, Uganda?

The research has been structured in accordance with Trienekes (2011) value chain analysis framework aiming at the formulation of an appropriate value chain upgrade. The concept of value chain upgrades is explained in depth on subsequent pages.

As such, principal components were derived from the value chain analysis referring to actors needed to be involved in the value chain. The external conditions, describe the institutional environment needed to guarantee a stable value chain. Thirdly, implementation mechanisms refer to systems and processes in place to ensure that possible value chain constraints and challenges are mitigated and dealt with.

As a first step market requirements for ethical gold have to be understood, before applying the underlying set of criteria to the current value chain for ASGM gold originating from the Busia region. Subsequently, identifying value chain actors and value chain linkages necessary to ensure the integrity of the ethical gold value chain in the future. Accordingly, the thesis will address a number of sub research-questions in the research that will include, but not be limited to the following:

- What are the minimum requirements for ‘ethically produced’ gold of ASM origin from a down-stream perspective to guarantee product offtake?
- How is gold from the ASM sector produced, traded and transformed from mine to export?
- Who are the principal actors in ASGM production and what are the economic, social and political relationships between them?
- What value is created at the respective stages of the production chain?
- How is the financial value of the gold distributed among the value chain actors?
- Which risks are associated with the different roles of the various supply chain actors?
- Which aspects would need to change for a value chain upgrade establishing a reasonably risk-free ‘ethical’ ASM gold value chain?

The research will conclude in an economic model for an ethical value chain for ASGM from Busia that can be tested in future research.

2.1 Conceptual Framework & Relevant Terminology

As a foundation for the research existing literature has been reviewed systematically. This chapter explores the underlying academic VCA framework and provides definitions for relevant terms used throughout this research.

2.1.1 Definitions

Artisanal and Small-scale (Gold) Mining (ASM & ASGM): refers to often informal (gold) mining activities carried out using no or low technology or with rudimentary equipment. Some literature differentiates small-scale mining (SSM), where the production volume is the determining factor, rather than the degree of mechanization or professionalization. (Hentschel, et al., 2003) In this report, the terms artisanal and small-scale mining are used interchangeably.

Miners: is ambiguous in its use, as it is most often associated with the people digging for gold and processing ore. For the sake of this research the term miners refers to associations, groups or individuals holding a mining license, operating a mine or a pit.

Workers: “The term “workers” refers to all waged employees of the ASMO, and of registered miners or their organizations – including processing units. It includes migrant, temporary, casual, seasonal, sub-contracted and permanent workers.” (Fairtrade, 2013)

Responsible/Ethical gold: the terms responsible or ethical gold as well as responsibly or ethically produced gold, are best described as a loosely defined concept of gold that was produced and traded under socially acceptable conditions. There are no concrete criteria or claims connected to the terms, and they are generally used interchangeably.

Green/Eco-Gold: the terms green or eco-gold are used to describe gold produced without the use of mercury. On the global market this might include both LSM and recycled gold. For the purpose of this research the terms would be restricted to ASGM.

Value Chain: A value chain is a set of activities and processes that an organization operating in a specific sector performs in order to deliver a valuable product or service to the market. (Porter, 1985).

2.1.2 Trienekens’ Value Chain Analysis Framework

This research follows the academic framework of Trienekens’ (2011) Value Chain Analysis Approach, consisting of three elements:

1. Conducting a Value Chain Analysis
2. Identifying Constraints within the value chain
3. Formulating recommendations for value chain upgrades.

A Value Chain Analysis (VCA) is a strategic analysis tool “used to understand competitive advantage better, to identify where customer value increases or decreases cost, and to better understand the company's relationships with suppliers, customers, and other companies in the industry.” (Simatupang, et al., 2017)

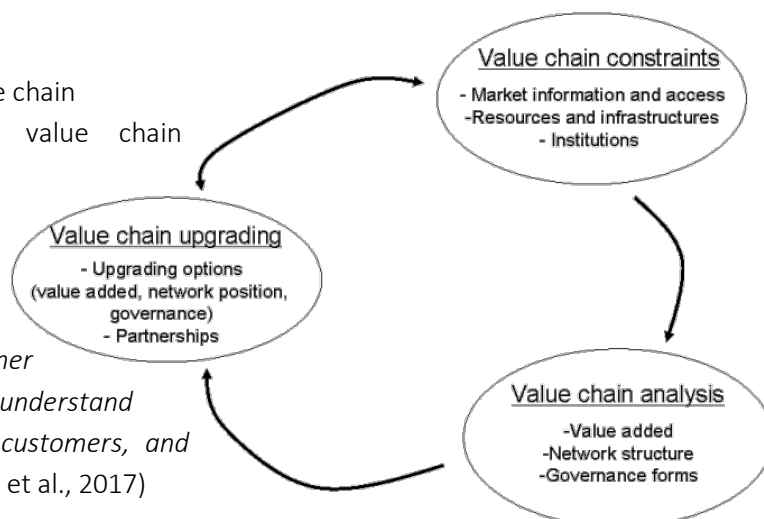


Figure 2 Value Chain Analysis Framework (Trienekens, 2011)

The value chain analysis builds upon three aspects, namely:

- Network structure: building vertical connections between economic actors aiming to produce jointly for a market. Network theory combines horizontal and vertical relationships between actors.
- Added value: answering the question of how value is added throughout the chain (value added can be defined in terms of (high) quality, (low) cost, delivery time, etc.).
- Governance form: describing the governance structure between economic actors.

The VCA is complemented by an analysis of value chain constraints regarding market access, transaction costs, the institutional environment as well as the resources and infrastructure available to the organization.

Once the current situation is fully understood, this framework allows for the formulation of recommendations for value chain upgrades. According to the framework, upgrades can focus on:

- *“upgrading of value-added production: through innovative products and product differentiation, innovative processes and innovative marketing activities;*
- *value chain-network upgrading: reaching for the right market and being part of the right market channel*
- *upgrading of governance form: choosing the right organizational form with horizontal and vertical value chain partners.”*

2.1.2.1 Upgrading of Value Added during Production

Product attributes can either be of intrinsic or extrinsic nature. Conditional on the existence of demand for specific requirements, added value can help reach premium markets or secure access to niche markets. Trienekens stresses that Western consumers pay increased attention to extrinsic product attributes regarding aspects of corporate social responsibility of the production, i.e., in terms of social and environmental impact. Furthermore, value chains can be improved through process upgrades, including but not limited to ‘modern transportation technology as well as improved communication facilities in the supply chain such as internet connection, GPS systems or the intense use of mobile phones in production and transportation planning.’

2.1.2.2 Upgrading of Value Chain-Network Structure

The second proposed form of value chain upgrades evolves around the upgrading of the network structure including ‘upgrading of horizontal as well as vertical relationships focusing on taking part in the right market channel.’ A value chain network structure upgrade could encompass the collaboration between horizontal partners for activities such as “joint purchasing of production inputs, joint use of production facilities and joint marketing of products.” This is often accomplished through the creating of producer associations or cooperatives.

2.1.2.3 Upgrading of Governance Structures

Trienekens further describes how “modern market-oriented chains have the tendency to become shorter (with fewer actors) as intermediaries between producers and downstream parties in the chain become superfluous because of the emergence of direct trading relationships between large producers (or producer groups) and downstream parties.” As an example, Trienekens names “the transformation of export-oriented producers to producer-exporters in some countries” aiming to decrease transaction costs and increase control over the supply chain. Respective value chain upgrades evolve around Inter-company relationships which are often “enforced by (transaction-specific) investments of processors or exporters ... to decrease delivery uncertainty and increase quality and quality consistency of deliveries.” The intensified collaboration of value chain actors has the potential to boost market power and smoothen the flow of both the physical product and correlating information.

The paper concludes that value chain upgrades generally relate to:

- *“addressing markets that offer opportunities for increased value added,*
- *innovation in products, including marketing activities, and processes,*
- *vertical and horizontal organizational arrangements that enable chains to capture value from markets for various chain actors.”*

CHAPTER 3 METHODOLOGY

The underlying research methodology is a qualitative case study. A case study “aims to understand the case in depth, and in its natural setting, recognizing its complexity and its context. It also has a holistic focus, aiming to preserve and understand the wholeness and unity of the case” (Punch, 2014).

In order to answer the research questions stated above, the following research methods have been applied.

- I. interviews with researchers, experts, practitioners in the field and downstream supply chain actors;
- II. field research conducting interviews with subject ASMOs, traders, and other supply chain actors;

Fieldwork was conducted in Uganda between March 22nd and April 18th, 2018, following a scoping visit in preparation for the fieldwork that took place February 8th-26th, 2018.

3.1 Interviews

Given the case-specific nature of this research and the informality of the sector, as well as the nature of the commodity and the fact that ASM gold trade is a topic yet to be fully explored in academia, interviews have formed the main base of this research. About half of the interviews conducted followed a semi-structured approach; the idea behind semi-structured interviews is to let people express themselves freely regarding the related subjects.

In total, more than 20 individuals have been interviewed. The interviewees (see ANNEX I) have been selected based on their expertise or (potential) position in the supply chain, as well as their willingness to be interviewed. Interviews took place in person, via Skype or on the phone.

Once identified, the stakeholders have been contacted and approached for an interview. Much effort has been made to conduct the interviews in an open manner so that respondents could provide any information they deemed relevant. At the beginning of every interview, the goal of this research was stated as well as the outputs to be generated. In addition to interviews conducted with individuals, a joint interview has been set up to discuss wage levels with a group of about a dozen hired day laborers. The location in which the interviews took place varied, experts and practitioners were mainly interviewed via phone, email or skype, and representatives from mining organizations in their office. Several interviewees have been visited multiple times. All interviews were conducted in English, except for the group discussion which was interpreted by an employee of TDI’s local implementing partner EWAD.

3.2 Document Analysis

Documents received during the interviews, such as receipts of Royalty payments or trading receipts, as well as the working agreement with the investor of Busia United, have been digitalized and analyzed. Data gathered through document analysis either confirmed or added nuance to the information provided by the interviewees.

3.3 Business Enquiries for Export Model

In an attempt to produce a realistic export model, more than three dozen businesses have been approached to provide quotes for their services. The businesses were mainly banks, secure transport companies, forwarding agents and airlines, as well as an insurance company and a blockchain-based traceability solutions provider. These inquiries have been business negotiations and any offer received is subject to availability and the prices quoted might be subject to change. Inquiries have been made in person, via email or phone.

3.4 Data Management

In this study, documentary data covered any website, reports, organizational memoranda, where the relevancy of the documents and its reliability was taken into account. The primary goal was to combine the different range of data with interviews and observations in order to ensure the quality of the Information produced.

In order to be able to manage all the data gathered during this study, field notes, pictures, interviews (taped, recorder or written), digital documents and hardcopy documents were stored online to avoid loss. Unfortunately, all of the taped voice records of interviews have been lost when the SD card used to save the recordings malfunctioned.

3.5 Study Limitations

The study has focused on the product flow of gold from the extraction of ore up to the door of an international refinery. It consciously excludes any following production steps, as the supply chain disperses after the gold leaves the refinery. The study also excludes an in-depth analysis of the inputs and indirect economic links created by the need for housing and food, as the focus has been set on the value chain of the actual gold as it is produced, sold and transformed.

CHAPTER 4 ANALYSIS OF EXTERNAL ENVIRONMENT

Uganda is a landlocked country in East-central Africa sharing most of its borders with the DRC, South Sudan and Kenya. The country's population measures approximately 39.5 million, comprising more than 30 ethnic and tribal groups, speaking a variety of languages and dialects specific to local regions, with Luganda and English being the official state languages.

4.1 Political Context

Uganda is a presidential republic, led by President Yoweri Museveni, who came to power in 1986 and brought stability to a country suffering from more than a decade of conflict. By changing the constitution through a referendum, this allowed him to exceed the maximum number of presidential terms. The former British territory first gained independence in 1962, followed by a period of dictatorship and brutal civil unrest between 1971 and 1985 due to ethnic tensions in part attributable to borders drawn up in disregard of ethnic diversity and tribal relations.

Whilst violent conflict has ceased, the country is still facing challenges democratizing the country with tribal structures deeply embedded, and corruption and human rights issues undermining underdeveloped democratic institutions (Barreto, et al., 2018).



Figure 3 Map of Uganda highlighting the research area (Uganda Bureau of Statistics, 2017)

4.2 National Economy

Agriculture is one of the predominant sectors of the economy, with coffee being the country's leading export. The agricultural sector employs 72% of the workforce. Uganda has significant natural capital in terms of oil and mineral deposits, including copper and gold as well as other minerals. Record coffee harvests and increasing gold exports have led the country out of an economic recession caused by the conflict in South Sudan. Uganda's secondary sector is dependent on imported inputs such as refined oil and heavy equipment. Insufficient infrastructure, a lack of investment in agriculture and slow technological progress keep the economy from growing faster.

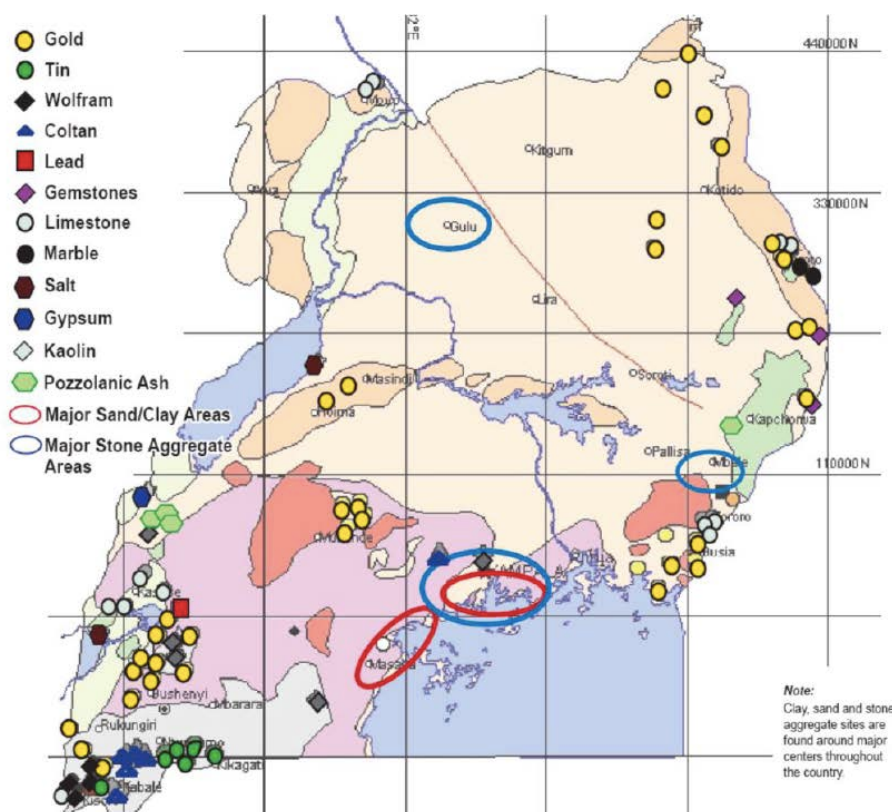
Partially due to a highly informal market and the resulting low tax income, Uganda relies on foreign donor support to finance long-term drivers of growth (CIA, 2018).

4.2.1 The Informal Economy

According to a study on the Ugandan ASM sector, the informal economy currently accounts for more than 50% of the national GDP. One of the reasons for the high rate of informal businesses being the complicated and time-consuming process of legally registering permeated by high levels of corruption.

Although 95% of ASM activities are estimated to be informal, looking not only at gold but also quarrying, brick production and other minerals, they are largely excluded from statistics on the informal economy. The authors

believe ASM's contribution to the GDP to be as high as 3.5% of the country's overall economy, as opposed to the 0.3% officially reported in 2008.



4.2.2 ASGM as a Livelihood Strategy

4.3 Legal Regulation of the ASGM Sector

According to Barreto, et al. (2018) the Ugandan government has announced its commitment to “organise, license, regulate and transform artisanal and small-scale mining into viable and sustainable mining entities.” To achieve this level of formalization, however, extension services, advisory support, in conjunction with awareness-raising campaigns for artisanal and small-scale miners would be needed. (Barreto, et al., 2018). The

report poses the concern that even though a policy mandate exists, there is no institutional base to support the accomplishment of the government's goal.

4.4 Living & Working Conditions in Busia, Uganda

The Ugandan Bureau of Statistics (2017) has published a comprehensive statistical analysis specific to the district of Busia using data captured in 2014. This data is of great value when used to describe the living and working conditions the average household is facing in the region.

Busia district has a population of roughly 320,000 people, with an average household of 4.7. More than 80% of households rely on subsistence farming, many of them holding livestock (71%), or cultivating either maize (87%) and beans (29.8%). Some of the households (11%) receive remittances from abroad in cash or in kind. 11.6% of households can afford only one meal per day (for adults).

Almost a third of all adults are illiterate, showing a positive trend among children and teenagers aged 18 and below. With HIV/AIDS being a pertinent issue, 8.5% of children will lose at least one of their parents by the time they turn 17.

94.5% of all households do not live in a decent dwelling, with nearly half (47%) the households residing with only one room for sleeping. Only one out of twenty households have access to electricity in the district.

Only 11.8% of households hold a bank account, while many people use MPESA, a mobile payment system allowing mobile phone users to send and receive money. Slightly more than half the demographic of 18-30-year-olds own their own phone, with a clear difference between males (61.3%) and females (42.3%). The radio remains a dominant source of information with approximately 60 percent of all households owning a radio.

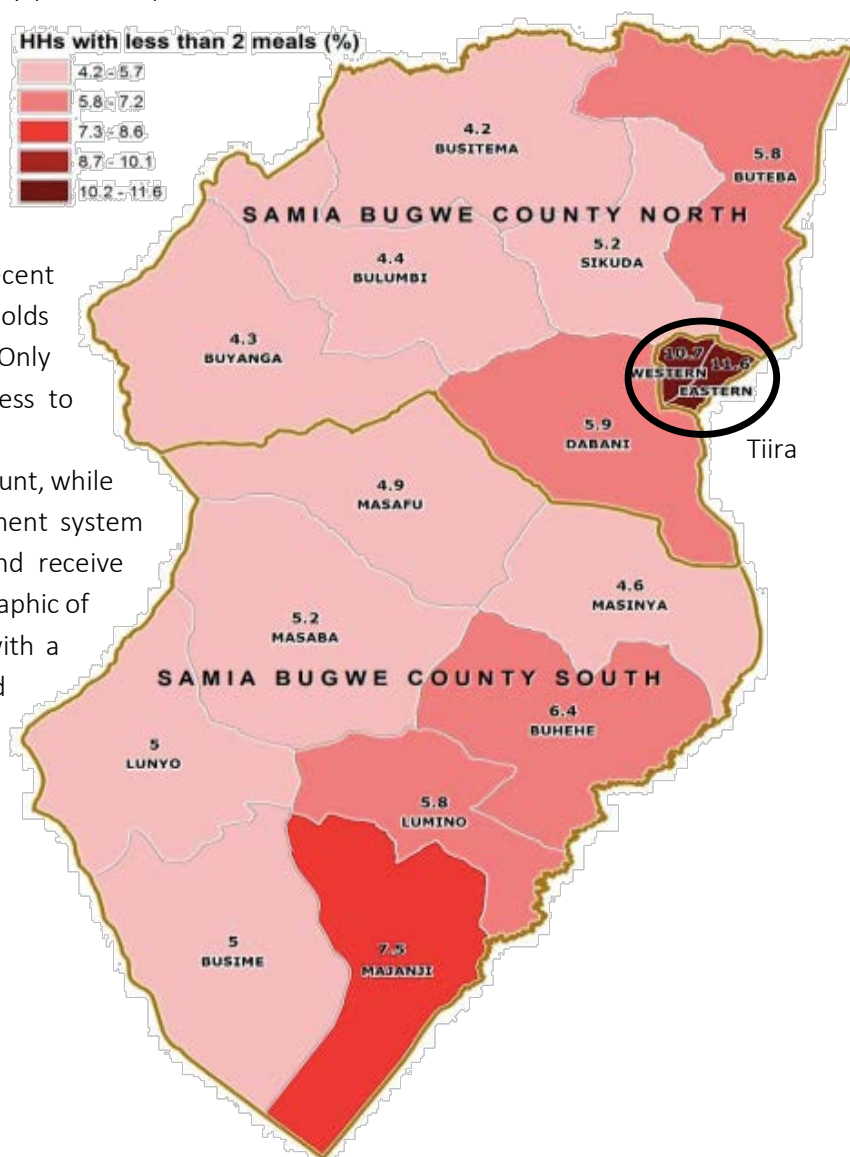


Figure 5 Households with less than 2 meals. (Uganda Bureau of Statistics, 2017)

CHAPTER 5 FINDINGS OF VALUE CHAIN ANALYSIS

This chapter forms the value chain analysis and helps identify the value chain constraints as defined by Trienekens' VCA framework. It starts off providing a brief introduction of the value chain actors involved following the product flow from mine to market. This chapter compares both existing literature and findings from the field research to lay the foundation for the subsequent Results chapter, answering the research questions as formulated in the respective chapter above.

5.1 Introducing the Value Chain Actors

Barreto, et al. (2018) describe the supply chain as it is typical for subsistence (ASM) gold mining. The value chain starts with miners. Any gold produced is sold to mine site buyers buying the gold directly on-site, "or in the case of scattered mining, usually in local markets where foodstuffs and livestock are also traded." Often these mine site traders act as representatives of district or national traders, but it is also common for local traders to act independently.

Local traders sell the gold to regional traders operating out of bigger cities. Usually, gold ends up with traders in Kampala who aggregate the gold until a significant volume is built up. They then sell the gold to "refiners who physically export the gold, typically to the United Arab Emirates (UAE)." Due to the close proximity to Entebbe Airport, a large share of legally exported Ugandan gold is likely to be refined at the African Gold Refinery in Entebbe or, alternatively, at the export destination.

The graphic below illustrates the supply chain¹ including all actors involved in the flow of goods (Dutch Ministry of Foreign Affairs, 2015).

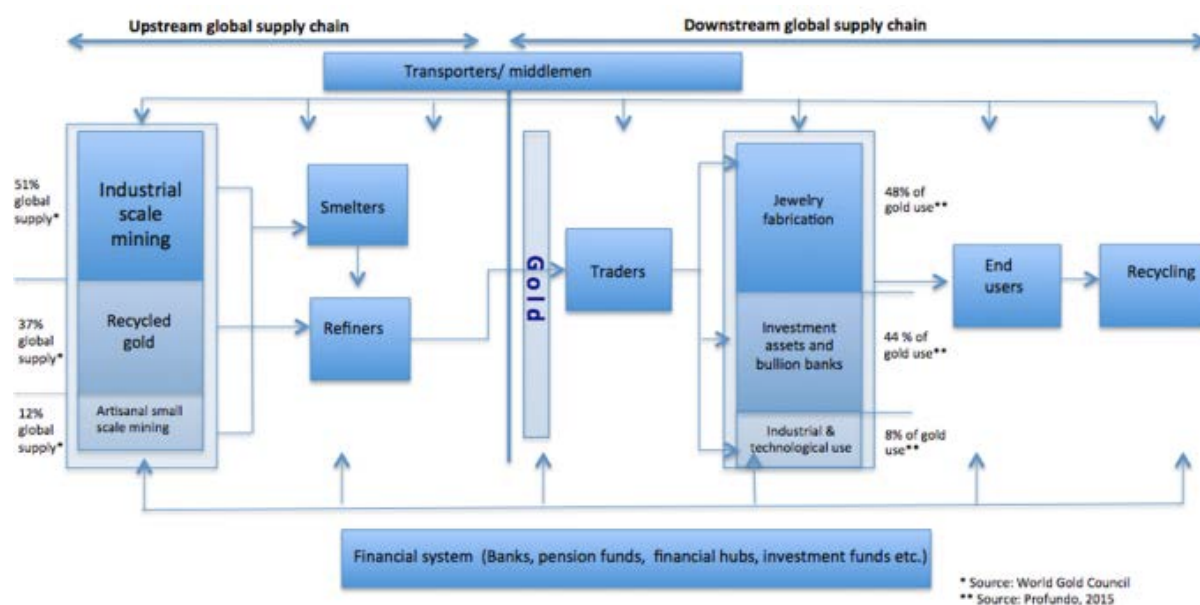


Figure 6 Visualizing the global gold supply chain. (Dutch Ministry of Foreign Affairs, 2015)

Besides the directly involved value chain actors depicted in the graphic above, workers, landowners and mining licensees as well as national oversight and regulation bodies as important value chain actors should also be

¹ Please note that the ASM global supply volume is different from an estimate provided earlier in the report. The two sources refer to 12% (above) and 20% (World Bank, 2013) respectively. Discrepancies might have been caused by differing years of reference or ASM definitions.

considered. Research suggests that the role of transporters as a separate value chain actor is practically non-existent due to ASM's small production volumes (Ngabiirwe, et al., 2012).

Accordingly, the report will discuss the roles of all actors relevant in the case of Uganda, namely:

Miners & Workers – Investors & Financial Institutions – Landowners – DGSM & URA
Local & National Traders – Refineries & Smelters – Export (Contraband & Official)

5.2 Miners

In order to fully understand the economics of the gold supply chain, the mining process needs to be briefly described. Depending on the type of gold deposit (primary vs. alluvial) gold production happens in three steps, namely extraction, crushing and grinding, concentration and finally selling, as illustrated in the graphic below (Hinton, 2016).

Once concentrated, gold might be smelted at a mine level. However, buyers do usually accept gold of lower concentration.

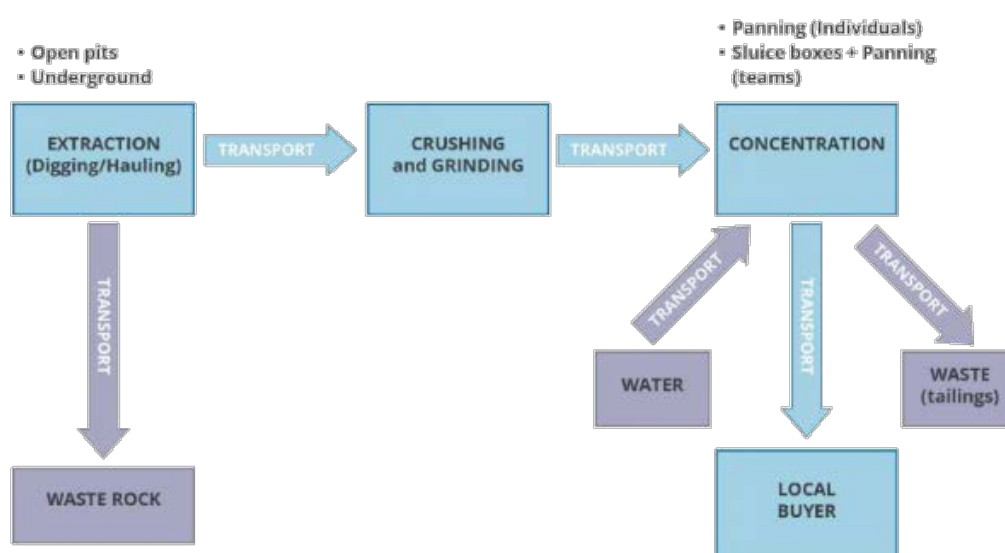


Figure 7 Main steps in production of hard rock gold. (Hinton, 2016)

Day laborers, paid on a daily basis, are hired to perform these activities, while miners (or mining association members) are responsible for marketing and hold the entrepreneurial risk of running a business.

5.2.1 Subsequent Processing Steps

All gold product goes through either a smelting stage or initial refining stage prior to final refining to produce a high-grade product that can easily be valued for export and will minimally hinder the refining process.

Smelting uses heat in the presence of a flux (or cleaning agent) to remove impurities from the gold concentrate, whereas initial refining uses a mix of nitric and hydrochloric acids to dissolve the more reactive minerals, leaving only the gold and some minor silver elements.

The gold concentrate can be in several forms depending on the process of concentration employed. The two that are most common in artisanal gold mining are mercury amalgamation and gravity separation. The output of mercury amalgamation is 'gold sponge,' which contains a mix of gold, silver and mercury. The output of gravity separation is gold dust mixed with some minor heavy elements such as iron and silver.

Smelting is a relatively safe process but only increases the concentration of gold to 94-97%, whereas acid refining can increase concentration to 99%, but the reaction between the hydrochloric acid and metals (particularly mercury) releases extremely toxic fumes and a toxic waste sludge which is challenging to dispose of in an environmentally responsible manner.

5.2.2 Organizational Structure of ASMO

Legal mine ownership can have several forms. In artisanal and small-scale mining in Uganda a distinction can usually be made between ASMOs and privately-owned mines. ASMOs are mining groups that are legally registered at the sub-county, district (what is known as a Community Based Organization) or national level. A private mine, on the other hand, is where a landowner has mine pits on his land as well as the correlating location licenses and all the miners working on the pits are not subject to any legal structure or organization of any sort.

The associations differ in size from just 14 members (TISMA) to 93 members (Busia United). Members receive a share of the production of the pits they belong to. The associations are democratically organized groups, led by an elected chairperson, and employing a secretary, a treasurer as well as a pump operator, all of which are provided a monthly salary in exchange for their work.

The operating personnel (chairperson, secretary, treasurer and pump operators) receive a fixed, monthly salary, at Busia United (UGX 192.000)² and TISMA (UGX 300.000), while being remunerated through an increased profit share at Tiira Landlords and Angariama.

5.2.3 Production Levels

Only two of the subject mines were able to provide reliable production data for last year. Busia United provided access to all its production and royalty payment records, which show that they have produced 2195g of gold in 2017. TISMA has provided its records, stating that they had sold gold just three times since the start of their operation: Approx. 400g in 2015, 700g in 2017 and 300g in the first quarter of 2018, having no production due to technical difficulties and heavy rain in 2016.

The production level itself says little about the profitability of the mines, as productions costs differ from pit to pit and since the number of stakeholders varies vastly between the different mining associations. Besides, Busia United has received the financial support of an external investor to boost its production, resulting in a reduced share of the overall production to be distributed among the association's members.

Looking forward, The Impact Facility's subject matter expert Joshua Read expects the aggregate production volume to be as high as 2-3kg per month in 2018 with an expected increase to 3-4kg in 2019. It is not unlikely, that the ASMOs have underdeclared production volumes in the past, in an attempt to save royalties.

5.2.4 Wages of Workers

The subject of wages has been discussed both with the association's representatives individually and in a group setting with about a dozen day laborers working at Busia United. Some of the workers have lived in Tiira all their lives, while others migrated to Tiira in an effort to find work. Participants had between two and five children on average, some of them being the sole breadwinner for their families.

Hired labor is usually paid UGX 7.000 a day, with the exception of Tiira Landlords, where laborers receive UGX 10.000 a day. Representatives of all mines agreed that UGX 10.000 would be an appropriate wage to pay, but

² GBP 1= approx. UGX 5036 - USD 1 = approx. UGX 3773 (as of June 2nd, 2018)

at the current production level, the mines were unable to pay more than UGX 7.000. Assuming that workers work 24 days a month (about six days a week), the daily wage of UGX 7.000 would add up to a monthly income of UGX 168.000.

It is common practice for the associations to pay their workers in ore when the organization faces constraints on financial liquidity. This means that the workers are expected to process and sell their share of the gold on their own, possibly reaching a higher margin.

In an attempt to gain a better understanding of how ethical production criteria should impact wage levels; the concept of living wages has been explored. However, Fairtrade, one of the two leading ASM standards active in the area, does not calculate a living wage for the mining sector. Given the time constraints and value chain focus of this research, it fell out of scope to conduct an in-depth living wage assessment. However, the group discussion resulted in an exemplary enumeration of the average costs encountered by the miners.

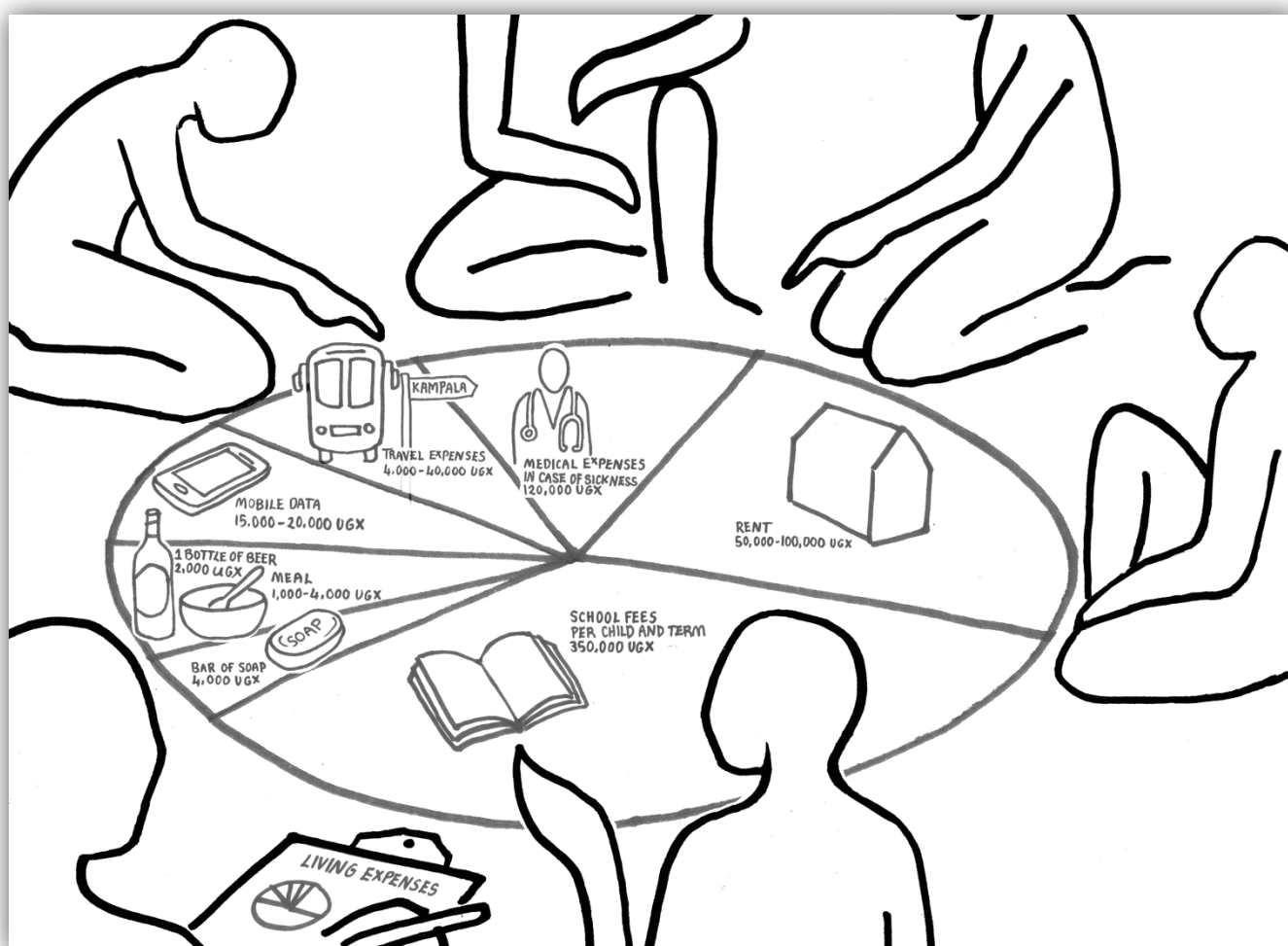


Figure 8 Illustration of living expenses assessment (original artwork by Emily Seffar, 2018)

Even though wages amount to no more than UGX 240.000 a month, average monthly spending comes in at around UGX 450.000 to UGX 600.000 per household. It remains unclear how the miners attain an income of roughly 2-3 times their monthly income from the mining activities. Consequently, in order to meet their financial needs, all members of a household need to contribute to the family income.

The group's members claimed that, despite financial pressure, all of their children attend school. Assuming that a worker has three children, the costs of the tuition fees alone would amount to UGX 350.000 per month, and thus 50% above their monthly income from their mining work. Apparently, workers engage in various income generating activities, assumingly, most of them of informal nature. But as already laid out above, the subject of livelihood strategies and income generation in the context of a living wage assessment would be broad enough for its own study.

5.2.5 Sample Profit & Expense Calculation

Production numbers and costs differ widely from month to month, depending on the weather, performance of machines, costs of servicing and to a large degree simply the luck of finding gold. To make any substantiated claims about miners' income and profit distribution within an organization a long-term study with a wider sample group would be needed.

The following analysis of Busia United's expenses and profits merely serves the purpose of illustration and provides at least a rough idea of the margins the ASMO's are operating on. The calculation is based on the expenses disclosed as part of the official Location License return form (see next page) as well as costs estimated for the process of selling the gold and paying royalties (see Chapter 5.6.2).

Table 1 Analysis of Expenses & Profits of Busia United - December 2017

	Total	Relative to value of gold
Gold produced (g)	303	
Value when sold	UGX 34,845,000	
Workers wage (34)	-UGX 4,800,000	13.8%
Salaries	-UGX 1,000,000	2.9%
Welfare	-UGX 2,700,000	7.7%
Illegible	-UGX 3,900,000	11.2%
Spare Parts and Tools	-UGX 3,600,000	10.3%
Fuel & Lubricants	-UGX 11,900,000	34.2%
Royalties Due (@80% purity)	-UGX 1,393,800	4.0%
Transactional Costs	-UGX 672,675	1.9%
Balance	UGX 4,878,525	14.0%
Investor share	UGX 2,927,115.0	8.4%
ASMO Profit	UGX 1,951,410	5.6%

The numbers in the table are in reference to the value of the gold produced in the month of declaration (303g at UGX 115,000 per g), in other words, it shows how much of the money that Busia United will be able to get for the gold produced will have been spent on various cost categories. The table above makes clear that powering generators and pumps is by far the highest cost for the ASMO, taking up more than a third of its margin. Workers' wages and salaries make up a little less than 14%. The item marked as welfare refers to meals provided to the miners on a daily basis and makes up more than half of the actual wages.

It should be noted, that this data might not be an accurate depiction of reality as it may be subject to human error and purposeful over- or underestimations of costs and production volume respectively.

The profit of roughly 14% will be split 60-40 as to the investor agreement (see Chapter 5.3.1), leaving 93 ASMO member with a total share of about 5.6% of the golds value when sold.

FORM XXVII.
Reg. 53(1).


 THE REPUBLIC OF UGANDA
 THE MINING ACT.
 THE MINING REGULATIONS.

DIRECTORATE OF GEOLOGICAL SURVEY AND MINES
 19 DEC 2017
 RECEIVED BY [Signature]
 SECURITY REGISTRY

'LOCATION LICENCE / MINING LEASE RETURN FORM.
 to be lodged in triplicate as soon as circumstances permit and in any case not later than fourteen days after the end of the month reported on).

Turns in respect of the month of DEC year of 20 17

Holder of licence/lease BUSIA UNITED SMALL SCALE MINING

Name of agent, attorney or manager Peter ORO ORO

Address of holder P.O. Box 94 BUSIA CU

THE COMMISSIONER FOR THE GEOLOGICAL SURVEY AND MINES DEPARTMENT.

erals to which licence/lease relates GOLD

erals discovered GOLD

Number of* licence(s)/lease(s)	<u>LC 0989</u>		
Number employed;	<u>34</u>		
Workers on surface	<u>NILL</u>		
Workers underground			
Total wages and salaries	<u>4,800,000/-</u>		
Total Wages Shs.			
Total Salaries	<u>1,000,000/-</u>		
Capital expenditure			
Investments and welfare Shs.	<u>2,700,000/-</u>		
Plant	<u>3,900,000/-</u>		
Spare parts and tools	<u>3,600,000/-</u>		
4. Fuel and lubricants	<u>11,900,000/-</u>		
Mineral Production			
1. Mined and on hand at end of preceding month	<u>2229m</u>		
2. Quantity produced during the month	<u>3039m</u>		
3. Quantity sold/consumed during month	<u>5259ms</u>		
4. Quantity in stock at end of month	<u>NILL</u>		

Page 1 of 2

Figure 9 Official Location License Return Form of Busia United (Dec 2017)

5.3 Access to Financial Services & External Investment

None of the subject mines were able to secure an official line of credit from any of the banks in the nearby town of Busia. Even dedicated efforts to engage in a dialogue on the subject of providing services to the ASMOs of the region were met with a lack of interest due to the bad reputation of the sector and the high risk of default.

5.3.1 External Investor at a Project Mine

In order to finance exploration, one of the mines has entered into a working agreement with an external investor. Their working agreement states that the investor and two associates of his choice receive a 15% share each in the decision-making process, as well 60% of the profits generated. In return, the investor agrees to provide working capital to cover ongoing expenses such as worker wages and salaries or rents for machines, as well as investment in equipment. The agreement further grants him ownership of the equipment acquired, despite being adequately reimbursed for all expenses made, before receiving his 60% profit share. In other words, the miners handed the financial risk of production to the investor, in exchange for 60% of their profits. In practice, the agreement did not satisfy the miners' expectations; the investor has repeatedly failed to provide equipment and pay the wages of the workers. Consequently, hired laborers had to be paid in ore at the time of this research. Furthermore, he has not provided official receipts or invoices to document his investment in equipment but has only referred to the listing price available online. This practice allows him, theoretically, to benefit further from potential discounts he might have already profited from.

5.4 Concession Holders & Landowners

Under Ugandan law, a difference is made between concession holders permitted to mine and landowners. Concession holders have the formal right to use the land for mining, permission granted by the government. The concession holder can conduct mineral exploration and other mining activity without owning the land. A landowner, on the other hand, is an individual or company that has legal claim over a piece of land. Several landowners may be situated on one concession. This situation often leads to tensions due to competing interests between the concession holders with mineral exploration and mining rights and landowners with surface rights.

The mining law allows four different kinds of licenses:

- I. Prospecting licenses: issued to both ASGM operations and large-scale mines (LSM), prospecting licenses involve sampling and review of the literature regarding different potential areas across the country for a period of 1 year, after which, one can apply for an Exploration license.
Small-scale miners are allowed to leap this step as it is assumed that they are mining in a place that they are conversant with. However, for those that apply for it, it involves opening pits, drilling, collecting data and other "mining-like" activities, carried out in the coordinates that one applied and was granted a license for after prospecting. After exploration, they are required to submit the data for review.
- II. Location licenses: it is only issued to small-scale miners prospecting and mining operations by methods which do not involve substantial expenditure and the use of specialized technology and covers an area not larger than 14km². Location licenses require a "description of how the environment will be protected by the mining operation(s) and measures are taken to mitigate these impacts. Applicants must also list reclamation and rehabilitation activities" (Barreto, et al., 2018).
- III. Mining Leases: This is the equivalent of a location license for large-scale miners and covers an area larger than 14km².

- IV. Retention Licenses: this is applied for when one is in the process of renewing a location license or mining lease.

Fewer than 5% of ASMOs hold a location license, reasons for the limited uptake are that many ASG miners have little or no knowledge of the legislation governing mining and that there “are significant costs for and bureaucratic barriers to obtaining a location license, in addition to yearly fees, reporting requirements, and taxes.” The application requires UGX 500,000 with an additional UGX 100,000 for registration; as well as an annual mineral rent of UGX 200,000. (Barreto, et al., 2018)

Both Busia United and TISMA already hold a location license. Angariama and Tiira Landlords are in the application process for their respective licenses. Within the associations, the location license is informally divided among various pit holders. The location license entitles the holder to not only mine the minerals on the respective plot but also export any gold produced, given that due royalties have been paid.

Any licenses granted or currently applied for are registered online by the Directorate of Geological Survey and Mines (DGSM), and can be seen, updated weekly, online at <http://portals.flexicadastre.com/uganda/>.

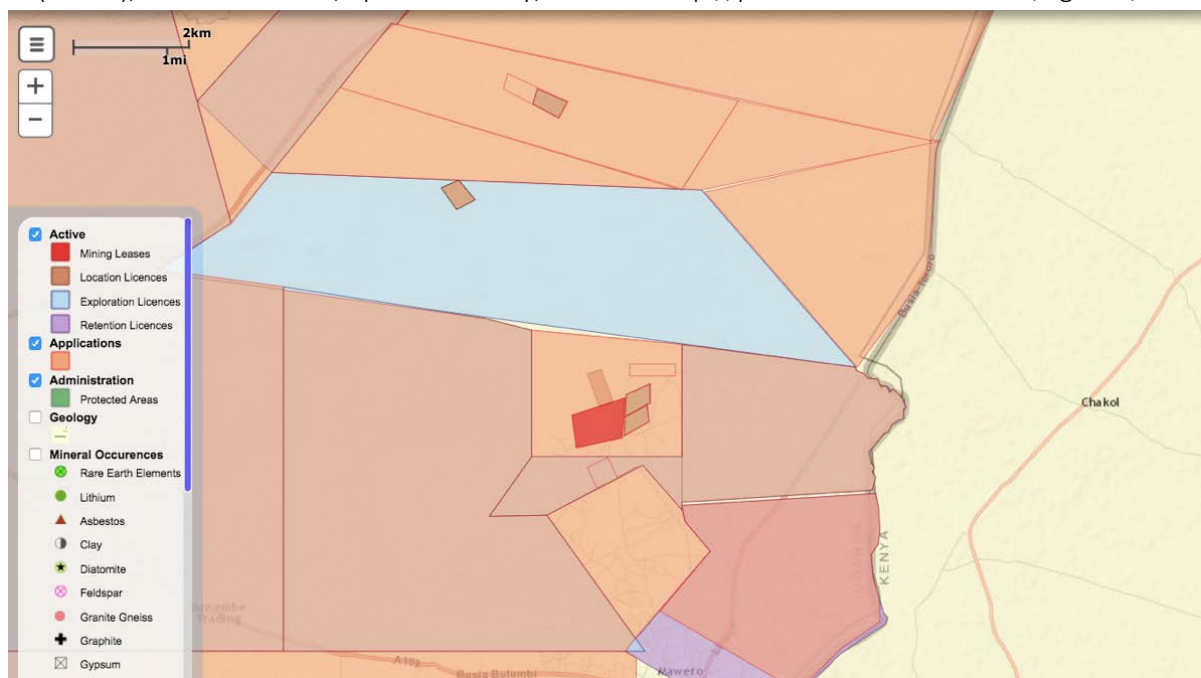


Figure 10 Only two associations currently hold a valid mining license in Tiira.

The landowners in Tiira have not been interviewed personally, but according to the information provided to The Impact Facility, the ASMO's in Tiira are generally on good terms with the landowners owning the land of their concessions. Busia United, for example, operates on a piece of land owned by three brothers who inherited land from their father 20 years ago. The land is divided into three parcels; the largest comprising most of the mining concession, the other two are far smaller and are located on either side of the concession and used for the processing of ore. The brothers are paid in a share of the profit.

The plot of Angariama, on the other hand, is owned by one of the workers, also renting the parcel out in return for a share of the profits made. In this regard, landowners take a similar position as external investors, receiving a profit cut, rather than a fixed rent for their land.

5.5 The Directorate of Geological Survey and Mines - Regulation & Oversight Body

The DGSM implements mining related regulations and acts as "the lead agency under the National Environment Act for environmental issues in the minerals sector, including related inspections, reviews, and recommendations on Environmental Impact Assessments (EIAs) and environmental audits."

The Entebbe-based government branch is further responsible for "granting and monitoring performance for all mineral licenses; collecting and disseminating production statistics; and collecting, analyzing and reporting on geo-data and information." According to the Minerals Policy (2001), DGSM has a mandate to "regularize and improve artisanal and small-scale mining through lighthanded application of regulations, provision of information on production and marketing, provision of extension services through miners' associations and implementation of awareness campaigns targeting artisanal and small-scale miners." The upcoming revision of legal requirements and policies - expected to happen by the end of 2018 - is likely to strengthen DGSM's mandate to strengthen and support the ASM sector (Barreto, et al., 2018).

Furthermore, DGSM is accused of systemic corruption materializing in licenses being handed out not to the most suitable candidate, but patrons of both high and low-ranking officials, in addition to not enforcing royalty payments from selected license holders. Global Witness further stresses that even though allegations were brought to the attention of high ranking officials, no action has been taken to bring more transparency into the matter (Global Witness, 2017).

Without being able to verify any allegations or accusations brought against the DGSM, it is worth pointing out that the design of the organizational structure of the DGSM itself, eases the way for preferential treatment and bribery. Many countries have separate institutions for the processing of license applications (usually done by the Ministry of Mining) and environmental inspections of the mining companies that have already received a license to operate (usually conducted by the Ministry of Environmental Protection). The DGSM, however, is responsible for both licensing and environmental inspections, and does, thus, not allow for a system of checks and balances.

5.5.1 Paying Royalties

Both TISMA and Busia United are paying their royalties quarterly, providing production figures, expenditures and profits broken down per month. To determine the absolute amount of royalties due, the location license holder needs to bring a sample of each gold batch to DGSM offices in Entebbe for either density-measuring or fire assaying in order to determine the purity, and thus the royalties due. The miners said that it usually takes 2-3 days to receive the results of the assessment.

5.5.2 Expected Lowering of Royalties

In 2017, the President of Uganda announced that royalties would be reduced to 0% by the end of 2018. The Ministry confirmed that appropriate legislation is currently being worked on. However, some people expect the 0% royalty rate to be conditional on refining at the African Gold Refinery, which only refines volumes upwards of 5kg; accordingly, excluding most ASM actors from benefitting from the lowered rate.

5.6 Local & National Traders

Barreto's case study found that on-site buyers in the district of Karamoja mislead sellers "by adulterating the scales used to weigh the gold. Consequently, miners were found to sell at only approximately 55% of the LBMA gold price, well below the rate reportedly paid at other Ugandan sites."

The four mining associations in Tiira, however, sell their gold directly in Kampala, circumventing the involvement of local traders. All four ASMOs sell to one of two traders. Trader 1 actively reached out to the mining community in Tiira by sending a recruiter to the mines a few years previously.

The miners voiced concerns over the accuracy of both the purity measurement conducted by and the scales used by the traders in Kampala. It was, however, not possible to verify the accuracy of past measurements.

No.	6 & 7		Date	05.02.2018				
Sr.No.	Name	Gram	Net	Tola	Purity	Price 92%	Net Price	Amount
1		47.12	45.75	3.922	95.25	447.0	462.79	1,815.22
		11.44	11.11	0.953	69.50	447.0	337.68	321.64
USD - 2100								
UR, 133000								
								\$ 2,136.86
All paid								

As can be seen in the picture above, Trader 2 provides print-out receipts, giving a detailed overview of the value of the gold. The receipt lists a serial number, as well as the name of the client, the weight of the gold, as well as net-weight. The net weight in gram is then transformed into a measure for gold called Tola; 1 tola is equal to 11.66g. Next to the weight in tola, the receipt shows the purity, as measured during the fire assay. The price 92% refers to 92% of the price per tola unit, whereas the Net price is the product of 100% of the tola price and the purity. The final amount is the product of the net price and the tola weight, i.e., the Net weight.

Neither trader provides any additional services to the mines in Tiira, such as pre-financing for gold or the provision of tools and machinery. Also, neither one requires proof of royalty payments, indicating that they engage at least in part in illegal trade.

In addition to these high-volume gold traders, there are roughly 30 jewelry shops that are also buying and selling gold, most of which identified themselves as members of the same extended family. These shops offered to buy gold at a USD 2 margin per gram and are, as such, unlikely to compete with either the traders 1 and 2.

Table 2 Analysis of trading transactions - trader margins

Date	Name	\$ per gram	LBMA Price	Margin in \$	Margin in % of LBMA
09/05/2017	Seller 1	\$38.36	\$39.31	\$0.96	2.43%
16/08/2017	Seller 2	\$39.63	\$40.88	\$1.25	3.05%
27/01/2018	Seller 3	\$42.21	\$43.52	\$1.31	3.01%
30/01/2018	Seller 3	\$41.94	\$43.25	\$1.32	3.05%
05/02/2018	Seller 3	\$41.66	\$42.93	\$1.28	2.97%
24/03/2018	Seller 1	\$42.15	\$43.23	\$1.08	2.49%

Due to the sensitivity of this subject, neither of the traders has been interviewed. The margins, however, have been backed up by the study of Barreto, et al. (2018), as the subject mines sell directly in Kampala instead of going through local traders.

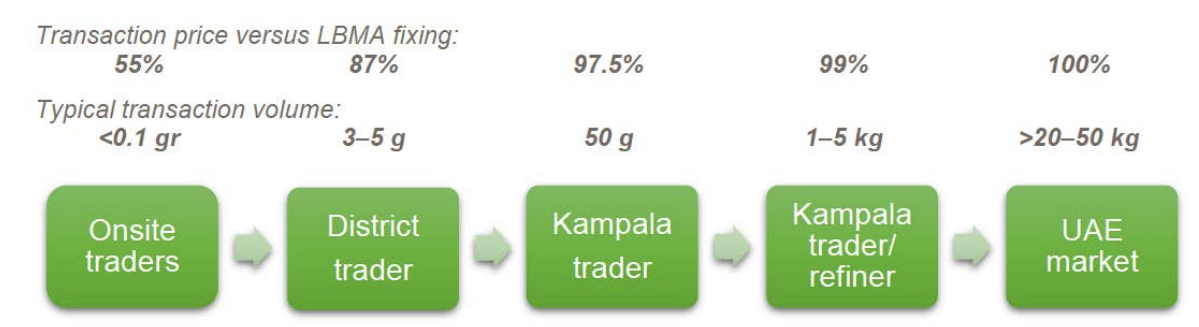


Figure 12 Karamoja ASGM supply chain (Barreto, et al., 2018)

These margins correlate with a study conducting a VCA for ASM contraband gold in Burkina Faso (Bertran Alvarez, et al., 2016), that found that traders handling between 50 and 300 grams would receive around 97-98% of the LBMA.

5.6.2 Transaction Costs of Selling Gold

In the current system, the mines carry all of the risks of transporting the gold as well as traveling to and from Kampala and Entebbe. Interviews with the association's representatives have shown that the miners were unaware of the hidden transaction costs they incur.

Depending on the mode of transport as well as the number of people sent to sell the gold, the mines pay up to UGX 200.000 per transaction for fuel and food. In this case, two people travel together to and from Kampala on the same day using a private vehicle, to mitigate the risk of being robbed or losing the gold or cash en route

to their destination. Angariama encountered the lowest costs at just UGX 46.000, using public buses as a means of transport, not having the comfort and security of a private vehicle.

The two mines that already pay royalties, estimate the costs of paying royalties to add up to approximately UGX 250.000 (TISMA) and UGX 150.000 (Busia United) respectively, as paying for Royalties usually takes at least two days at the Ministry of Mining in Entebbe, requiring both food and accommodation for the person traveling. These costs occur quarterly, while the costs of traveling to Kampala can occur monthly to bi-monthly, depending on the frequency of sales.

In addition to traveling from and to Kampala, the mines face costs when changing the USD notes to local UGX. An April 19th, the costs of changing USD 2000 into local currency would have amounted to roughly USD 20, or UGX 75.000 respectively; thus, a relative cost of roughly 1%.

Table 3 Sample exchange calculation of UGX to USD

	Conversion Rate	USD 2000
Selling Rate:	UGX 3,650.00	UGX 7,300,000.00
Official Exchange rate:	UGX 3,688.51	UGX 7,377,020.00
	Conversion Costs:	<u>1.04%</u>

5.6.3 Compensation for Impurities

Additional hidden costs lie in the practice of only being compensated for the gold content of the gold sold. The ore in Tiira is rich in silver and platinum and might contain traces of platinum, which could be paid for if a smelter/refinery is able to extract it. Gold samples have been taken and are yet to be analyzed to provide an insight into the potential extra value. While the value of silver is almost negligible, every gram of platinum would bring the mines roughly USD 29.45 at current market prices (May 14th, 2018).

In summary, it can be said that the mines are facing the choice between relative security and transaction costs when selling their gold. If TISMA was to sell USD 2000 worth of gold in Kampala, the associated costs would amount to as much as UGX 600.000 or USD 161.62, while the other mines might be able to keep costs at roughly half of these costs, using public transport (assuming all mines need to pay their royalties and thus travel to and from Entebbe).

5.7 Refinery & Smelters

The subject-ASMOs do not engage in smelting the gold themselves. This task is usually carried out by the trader in Kampala. The smelted gold then ends up at a refinery, either pre- or post-export. Within Uganda, there is one prominent refinery, with smaller refineries operating on a more regional level.

5.7.1 The African Gold Refinery

A significant share of the gold officially exported from Uganda is processed by the African Gold Refinery (AGR) located near Entebbe International Airport. AGR received substantial foreign investment in early 2017 in an attempt to create government revenue through in-country value addition. Co-run by former high-ranking government officials and with ties to the president's family, "the company is able to source gold from several sources because it enjoys a 10-year tax holiday from the government for adding value to Uganda's gold. This is

an exemption granted to companies that add value on minerals in Uganda before exporting them” (Muhumuza, 2016).

International Watchdog Global Witness claims that the African Gold Refinery “has processed and exported over USD 200 million worth of gold, paying only half a million dollars in tax”, and while failing to disclose the origins of the gold (Global Witness, 2017). Furthermore, Global Witness accuses the Belgium-Ugandan business venture of failing to publish provenance information, quoting inside information that parts of the gold originated from both Sudan and the DRC. On top of these allegations, the organization refers to its correspondence with the Commissioner of the DGSM dating back to January 2017, stating that the DGSM “has not issued any export permits” to the AGR.

When approached to discuss the option of processing the ASMO’s gold at AGR, the manager made clear that the refinery would not process any less than 5kg per batch, making it impossible for most ASM producers to refine their gold before selling it.

5.8 National Gold Export

Uganda reported extremely low export volumes for gold in 2014, reporting less than 5kg of Ugandan gold to be exported in 2015 (Schipper, et al., 2016). However, in the following year, official exports skyrocketed to USD 339.54m equivalent to more than 8000 kg of pure gold (Bank of Uganda, 2018).

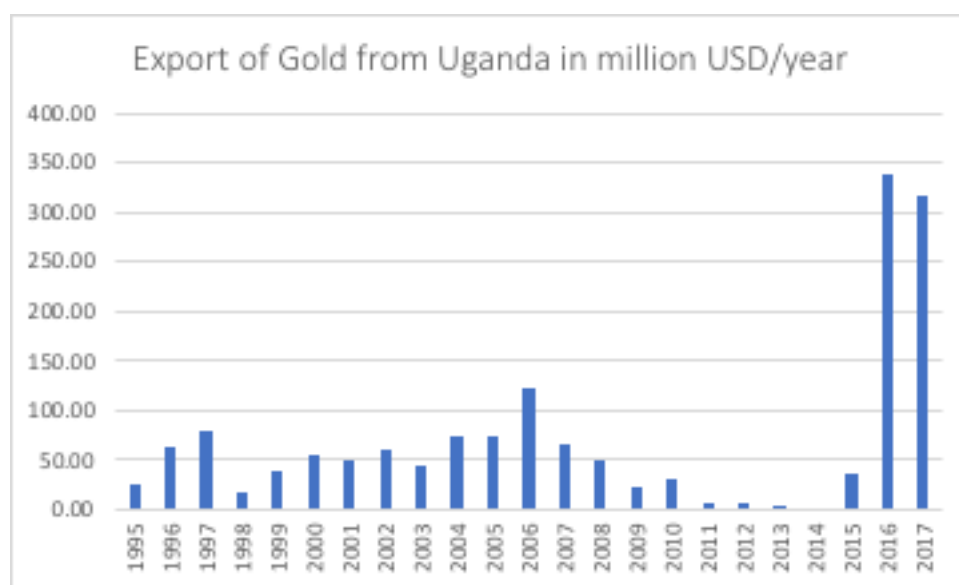


Figure 13 Export of gold from Uganda in million USD/ year

This stark increase in volumes might partially be attributable to the uptake of mining activities within the country, the more plausible explanation, however, might be that AGR’s tax break allowed previously smuggled gold to leave the country via an official route. In other words, Uganda has since been a transit country for contraband gold originating from the DRC, South Sudan and Rwanda, the final destination often being Mombasa port in Kenya, it seems that much of the previously smuggled gold transported to Mombasa is now being exported from Entebbe.

5.8.1 Exporting gold as an ASM Producer

The process of applying for an export permit is almost identical to paying royalties, as a core requirement to export is proof of royalty payment in conjunction with filing an official request to export as well as providing a copy of the location license of the mine of origin. Accordingly, in order to export, royalties would need to be paid on an export-batch basis instead of quarterly payments (as it is currently done by the subject ASMOs). Holding a location license includes the right to export one's own production; if wanting to export gold of external origin a minerals dealers license (MDL) would be required.

As part of this research, an application for an export permit has been filed making use of the implementation partner's MDL, with the goal of testing a small sample's composition in Europe. Attempting to export the samples, substantiated the accusations of systemic corruption at all levels, as brought forward by Global Witness (2017). Instead of the regular three-to-four-day process, unwillingness to pay an out-of-the-ordinary, additional fee directly to a high-ranking ministry official resulted in a delay of more than three weeks. The official's explanation for the delay was that the Directorate was unable to grant the permit until the DGSM receipts were replenished, costing an estimated USD 150. The option was presented to either cover the costs of new receipt books or wait until the DGSM was provided with new funds by the government to cover this expense.

However, representatives of the ASMOs stated that it is usually no problem to have the paperwork for royalty payment processed within two-three days. It is worth highlighting, that following up on the process is expected, if one wants to progress through the application process. Having personal ties to any of the officials helps the speed up the procedure significantly.

5.8.2 Contraband Gold & Illegal Exports

While a small part of the increase in national gold production can be attributed to a gold rush in recent years (Schipper, et al., 2016), the largest share is most probably the result of AGR processing and exporting gold originating from neighboring countries, most of which is likely to be contraband gold from DRC, Sudan and Rwanda (Mthembu-Salter, 2015).

Much of the contraband gold that leaves the country illegally is said to be smuggled on to Dubai, where it is processed and often sold on to India. The most common route for contraband gold seems to be the land route to Port Mombasa in Kenya, as Illegal export via roadways is hard to regulate. Mthembu-Salter (2015), however, reports to the OECD that Entebbe International Airport officials engage in air smuggling of gold as hand luggage and even as cargo. Gold traders often have various informal arrangements with airport security officials in order to facilitate the smooth (and illegal) export of gold (Blore, 2015).

A business inquiry for the services of a forwarding agent substantiated these claims, as the forwarding agent specified that more than half of his USD 400 fee would be spent on paying airport staff to speed up the process of clearing and guarantee a secure process.

5.9 The Role of Transporters

As illustrated in Figure 5, transporters or middle men play an important role in the traditional set-up of ASM gold value chains, connecting the various actors by transporting the gold from one geographic location to the next. In the case of Tiira it has been found that the ASMOs circumvent the need for transporters by travelling

directly to Kampala. By doing so the miners expose themselves to the risk of being robbed or potentially even harmed and consequently losing their gold en route to the traders in Kampala.

During an interview with a representative of the Alliance for Responsible Mining (ARM) it was explained that Fairmined certified mines in South America are using armored, cash-transit vehicles to transport their gold via roadways to the nearest airport. Industrial or large-scale mining (LSM) operations usually have their gold air-lifted from the mines, making use of private helicopters, transporting several hundred kg of gold at a time.

There are currently no service providers offering the transport of unrefined gold in Uganda, as most cash-transit companies have safety policies in place, prohibiting the transport of unrefined gold.

CHAPTER 6 RISKS & CHALLENGES ASSOCIATED WITH ASM

Public debate around ASM gold usually focuses on the health and safety of workers, the pertinent issue of child labor, exploitative trading relationships and especially the widespread use of mercury. This chapter will shed some light on these issues, concluding with a general analysis of the risks and opportunities ASGM holds. Once the issues have been introduced, the following chapter will focus on the interests of downstream companies in actively sourcing responsible gold of ASM origin.

6.1 Working Conditions & Health & Safety

Some of the most commonly named issues associated with ASM are the poor health and safety conditions experienced by miners and their communities. Mining and especially artisanal and small-scale mining is an extremely hazardous profession. Injuries of varying degree and even fatal outcome are common to occur, not only among workers but also directly affecting the surrounding community. Due to the sector's informal nature and low levels of enforcement of national health and safety laws from the side of the government, downstream actors face an increased responsibility to guarantee decent working conditions. While there is a plethora of risks and issues, “the single most pressing issue impacting health and safety in the ASM sector is mercury use by artisanal and small-scale gold miners because of its harmful effects on both human health and the environment” (Smith, et al., 2016).



Figure 14 A miner displays a bottle of mercury (NEWs 24 Africa, 2017)

The graphic on the following page describes the application of mercury during the gold production process and how it contaminates both air and water in the process. The authors also provide a number of reasons, why mercury is used by the ASGM community, despite its toxicity:

- ease of use

- readily available
- easy to transport
- relatively effective at capturing gold (40% discovery rate)
- relatively inexpensive
- lack of awareness of adverse effects for both for health and environment
- no access to alternatives

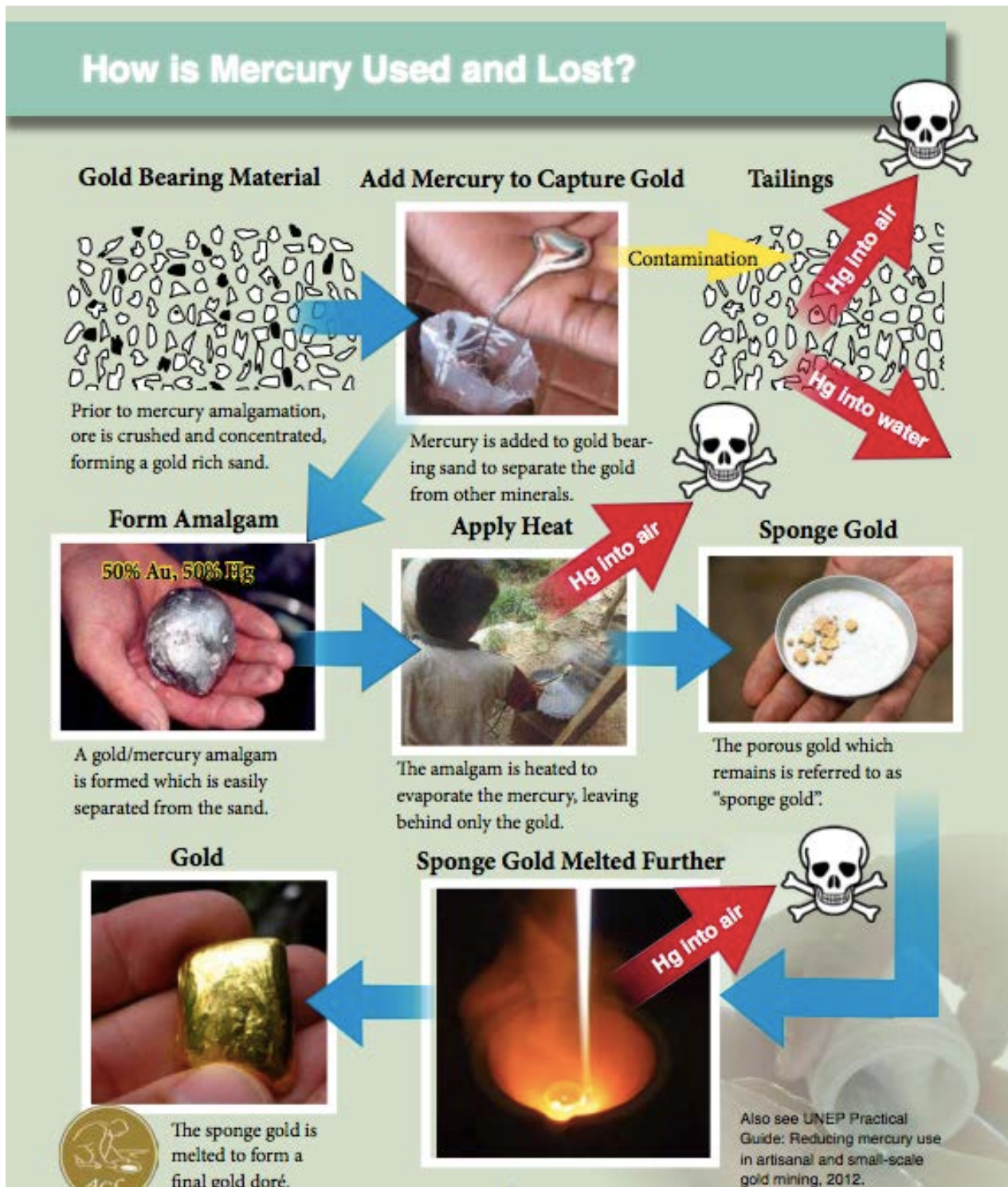


Figure 15 Application of mercury during the gold production process. (Persaud & Telmer, 2015)

6.2 Child Labor

When discussing child labor, many standards and laws refer to ILO Conventions 182, stating in summary that no child (person below the age of 18) shall engage in what is known as the worst forms of child labor, including, but not limited to: hazardous work, forced or compulsory work and illegal activities. This is often further defined through reference to Convention 137, demanding that no child shall be allowed to/asked to work before finishing their compulsory education or alternatively below the age of 14, whichever maybe be higher.

In summary, teenagers between the ages of 14-17 may engage in work as long as it is safe and not in competition with their obligation to attend school until the level of compulsory education has been completed. According to SOMO's research report No Golden Future, the Ugandan ASGM sector is permeated by systemic child labor (Schipper, et al., 2016). While a share of children works only during their 'free' time, children as young as seven have been found working in and around Ugandan mines. Children might engage in various work activities such as panning, sluicing or ore crushing and work, often 'voluntarily' to subsidize their own school fees or contribute to the family income in general. While SOMO's study is not fully representative for the Busia region due to regional differences, it is worth noting that the report estimates that it was "realistic to assume 10,000 to 15,000 children are working in gold mines (20 to 30 percent of all artisanal miners)" in Uganda.



Figure 16 Child laborer in Tiira working on the weekend

6.2.1 School Attendance

The map below shows that more than 12% of children in the region between the ages of 6-12 years do not attend school (Uganda Bureau of Statistics, 2017). Attending a local stakeholder meeting on the topic of child laborers in mining with local teachers, parents and police attending, showed that many children choose to work in mines ‘voluntarily’ or even secretly instead of attending school. Reasons vary, one of them being the pressure to contribute to the family income. Some parents attending, however, pointed out that their children would work in the mines without their consent, due to peer pressure and a lack of interest in school, seeing the short time benefit of earning money, rather than the long-term loss of not being educated.

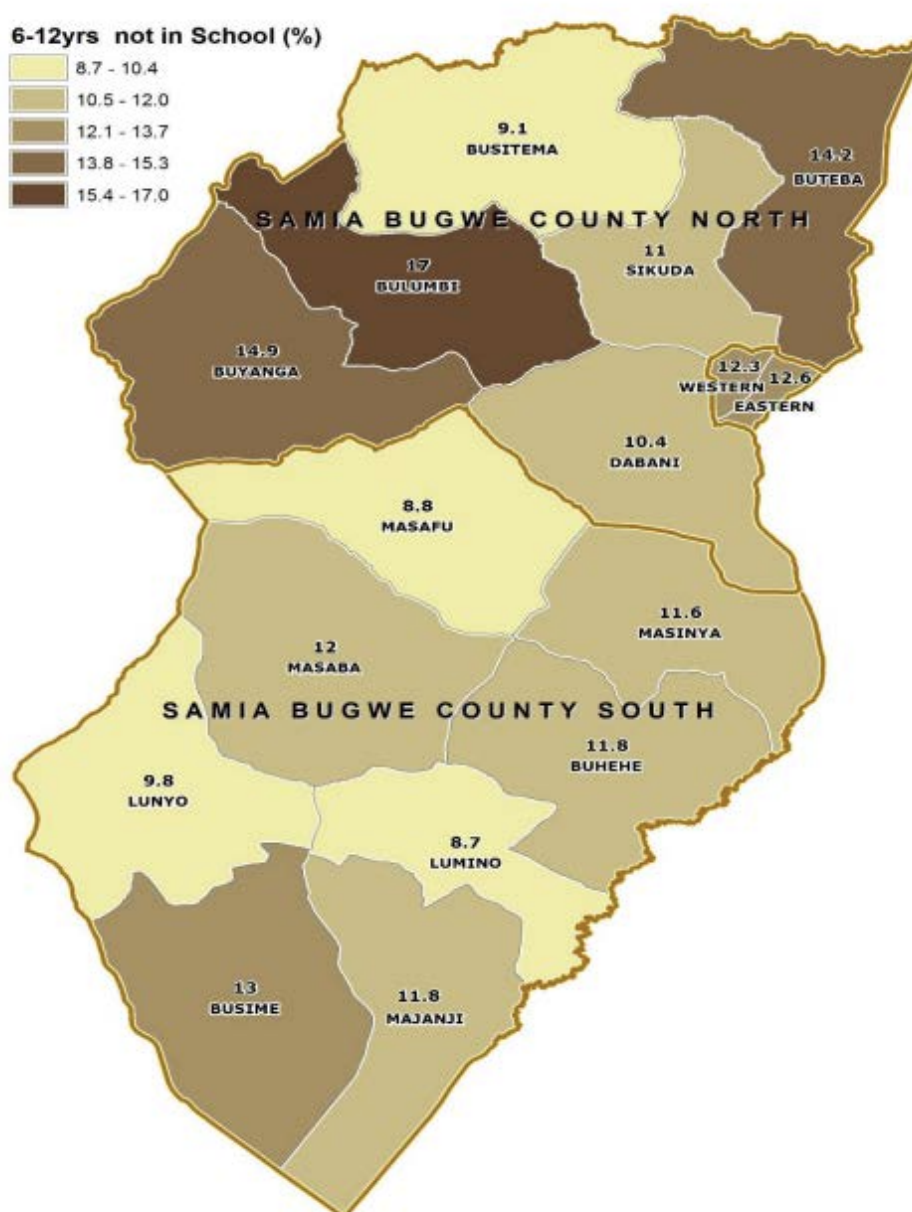


Figure 17 Percent of 6-12-year-olds not in school. (Uganda Bureau of Statistics, 2017)

6.3 Lack of Transactional Transparency

Another pertinent issue in the ASGM sector is the lack of transparency regarding the trade of gold. A recent case study focused on the neighboring Karamoja region found that local traders mislead sellers through the use of adulterated scales and fake purity assessments (Barreto, et al., 2018). Miners, however, have no means to determine the weight and purity of their gold accurately.

A culture of secrecy and uneven power positions within the value chain network have led to high levels of corruption and deceit. Clear communication and informational exchange between value chain actors would be needed to establish trust necessary for a long-term collaboration.

Concerns about conflict minerals are fueled by frequent trading, aggregation, smelting and refining by different actors, making it impossible to determine the origin of gold once it reaches the international market.

6.4 Illustration of Mining-related Issues & Challenges

The final part of this chapter will provide a wider view on some of the many challenges associated with ASGM by analyzing and interpreting aspects of the illustration on the following page published by The International Institute for Environment and Development (iied, 2015). The description of the illustration on the next page shall also serve as a summary of findings laid out in this chapter and Chapter 5.

Simultaneously, this section attempts to conclude this brief introduction to the ASGM value chain by also pointing out some of the positive impacts an ethical ASGM value chain might have in terms of social and economic development.

Figure 19 draws attention to the difference between ASM and LSM operations. It depicts how the use of machinery is minimal for ASM mines which results in more unskilled, physical labor for workers, many of whom are forced through poverty or a lack of education to seek low-paid work. Mining can be exploitative of migrants and child laborers and often finds itself in direct competition with agriculture and subsistence farming in terms of land claims, resource use and environmental pollution.

The image further illustrates the power hierarchy putting workers at the very bottom. The imbalance of power begins here as the laborers toiling in the mines have no voice and work in conditions which negatively impact their health, whilst living in polluted areas. Frequent use of mercury takes a toll on both human health and the environment, but is a necessary evil, as it is cheap and relatively efficient when concentrating the valuable gold dust into gold sponges. The miners themselves are dependent on landowners, politicians and financiers, exploiting their position of power through the deep-rooted culture of bribery and corruption.

A lack of access to public services and low levels of visibility pave the way for organized crime and conflict minerals to permeate the ASM sector.

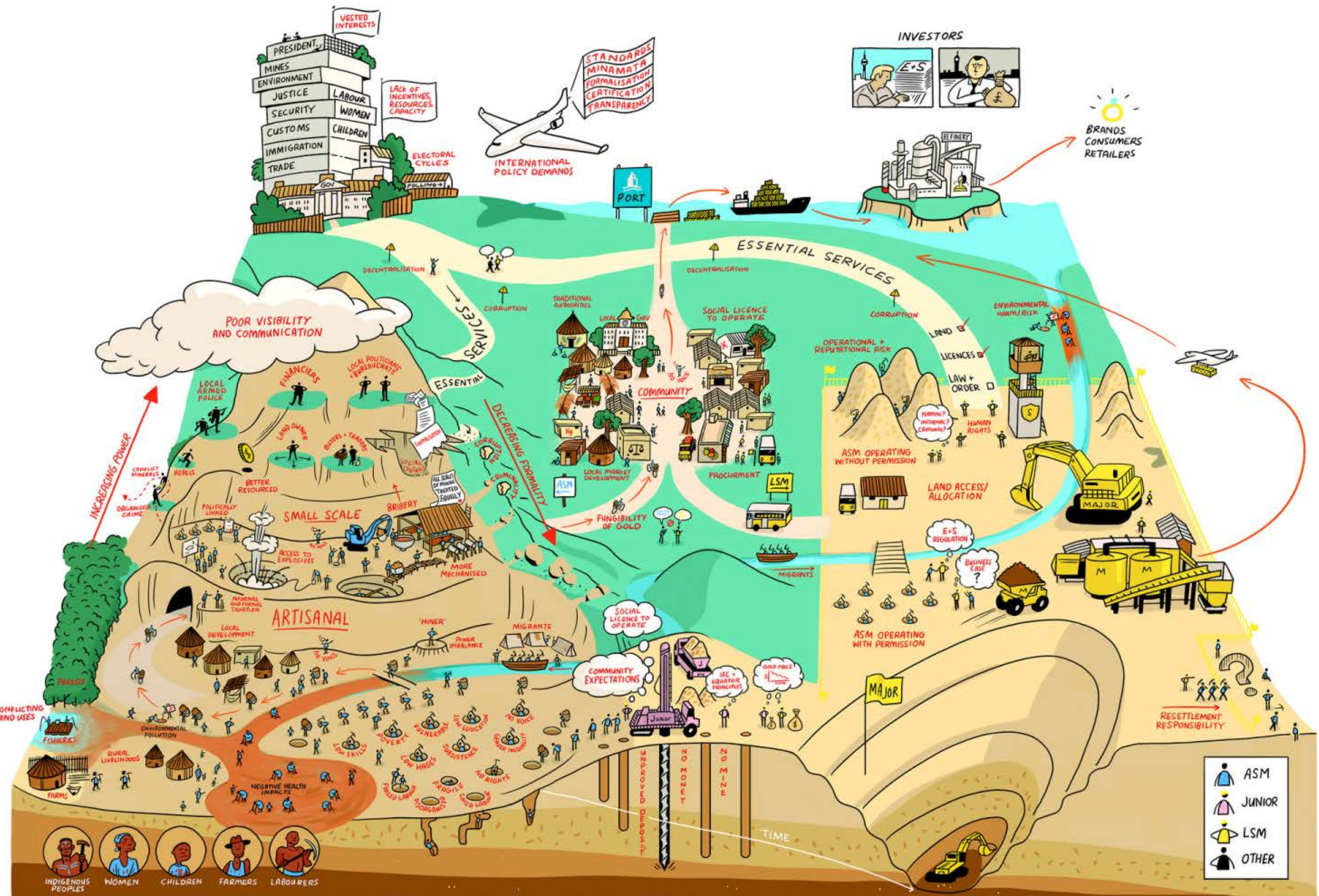


Figure 18 Differences between ASM and LSM mining operations. (iied, 2015)

6.4.1 Observations regarding the ASMOs in Tiira

The experience of the ASMOs in Tiira is to a large extent in line with the generalizations made through the figure above. The mines should be categorized on a step between artisanal and small-scale mining, as they do not yet have advanced processing equipment for ore crushing and gold concentration. They do, however, make use of excavators on an occasional basis and are, at least partially, registered and formalized.

In the case of Uganda, there is currently no LSM in the gold sector, and therefore the right part of the illustration can be disregarded. In regard to competing land use with local subsistence farmers, the mines in Tiira are experiencing similar tensions, as some local farmers needed to move away as the mines expanded

While no instances of forced labor have been identified, prevalent issues such as the use of mercury, child labor, low wages, unskilled work, high poverty rates and low educational level seem to apply to the ASMOs in Tiira as illustrated above.

CHAPTER 7 SUCCESSFUL ASM INTEGRATION IN GLOBAL SUPPLY CHAINS

A rich body of literature and case study substantiates the idea that ASGM offers an opportunity for sustainable development. First of all, ASGM offers local employment to the unskilled and uneducated (Cordes, et al., 2016), who might otherwise struggle to find a job. Research, furthermore, suggests that the aggregate environmental impact of ASGM operations is less harmful than the average LSM impact regarding chemical pollution of soil and water, especially once mercury use is reduced through education of miners and the provision of mercury free production equipment (Tibbett, 2009). If managed correctly, ASGM can be a profitable business allowing upward mobility, slowing the trend of urbanization and fostering rural and infrastructural development and could serve as a source of government income through royalty payments, turning mineral wealth into prosperity for the society at large (Barreto, 2011).

Subsequent sections of this chapter will explore some positive examples of how ASM communities have already been integrated in global supply chains, outlining a number of approaches and learnings that have informed the suggested value chain model that will be introduced in the final chapter of this report.

7.1 Fairmined in South America

The examples of ASGM communities already supplying the international market are rare and mainly limited to certified producer groups audited against either the Fairmined Standard for Precious Metals of ARM or the equivalent standard of Fairtrade.

These mines are exclusively located in South America and Mongolia and are generally speaking of high organizational capacity. These ASMOs produce sufficient volume to have direct supply relationships with refiners located in the Global North. ARM reported that the minimum volume to break even on the transport and enable direct, international trade seems to lie at approximately 1.5kg per consignment.

As mentioned in Chapter 5.9, the gold is transported by armored, safe-transport, cash-transit vehicles, picking the gold up directly from the producers. The gold usually gets smelted at the ASMO's facility and is already in the form of doré bars.

It is worth noting that there are currently less than ten mines that are certified and directly linked to a refinery, none of which are located in Africa. African ASGM producers are usually less well developed in terms of infrastructure and organizational capacity and produce far smaller volumes. There does not seem to exist a more inclusive market mechanism, which would allow producers with less volume to sell their gold directly to refiners.



Figure 19 Number of ASMOs that obtained the Fairmined Certification (ARM, 2018)

7.2 Fully Traceable Diamond Supply Chain

Diamonds are associated with many of the same issues, for which conflict minerals and ASM gold are known. Wide-spread media attention, most prominently through the 2006-released thriller 'Blood Diamond', have put downstream producers under scrutiny to provide evidence for the provenance of the diamonds used for their jewelry. London-based traceability-solutions provider Everledger has pioneered the application of blockchain technology in the diamond sector, including more than a million individual diamonds in a reliable digital tracking system providing real-time data on the location and status of any one stone (Everledger, 2018).

Blockchain technology in itself is simply a way of storing and transmitting data in a way that various parties can be given permission to access data in real time, whilst being unable to alter any of the information recorded onto the Blockchain. In other words, it is a shared immutable and decentralized ledger for recording the history of transactions of any kind, be it payments, geolocation data, time stamps or the physical transfer of ownership. Everledger has successfully applied this technology to the diamond sector, making it possible for the end-consumer to revisit the entire journey of his or her stone from mine to jeweler.

In general, this system could be applied to any high value commodity and has even been used to make provenance claims for commodities such as single origin coffee, cotton or tuna. Blockchain is, however, only a way of storing and transmitting data, and relies on truthful data input along the supply chain in order to be of use. If deployed correctly, a Blockchain-based solution would enable any downstream company to receive and share reliable Chain of Custody (CoC) assurances with the next value chain actor.

7.3 The Lake Victoria Gold Program

As briefly mentioned in Chapter 1, the ASMOs in Tiira are part of a wider project run by The Impact Facility. As part of the effort to understand and improve the ESG performance and needs of the mines and gain an insight into the effectiveness and impact of the investment channeled through The Impact Facility, every mine is assessed against a holistic set of ESG criteria. These are noted down in The Impact Facility's ESG Criteria and Guidance (The Impact Facility, 2018).

Consequently, The Impact Facility receives quarterly updates on the current practices and any progress made with regards to social or environmental impacts of the ASMOs in Tiira. The assessment is paid for in part through the loan repayments for equipment leased to the ASMOs by The Impact Facility. This data can be utilized to inform any due diligence reporting required (see Chapter 8) at no extra cost. This system applies to any ASMO engaged with The Impact Facility.

CHAPTER 8 THE INTERNATIONAL MARKET FOR ASM GOLD

The jewelry and electronic sectors are highly dependent on gold and face growing pressure to demonstrate a positive impact on the supply chain actors involved in the creation of their products. Globally, the electronics industry is the third largest consumer of gold, following the jewelry industry and financial sector, comprising 7.3% of the global gold demand (World Gold Council, 2017).

Due to both the significance of global ASM production volumes as well as its high potential for sustainable development, an increasing number of governments as well as private and public-sector stakeholders, have embraced ASM in recent years, rather than pursuing a do-not-engage philosophy. In the second half of 2017, numerous Dutch companies expressed their commitment to source ethically produced gold from ASM communities in Africa, by signing the Gold Covenant (Dutch Government, 2017).

The initiation of the Fairtrade or Fairmined Gold in 2011 marked an important step in recognizing the possibility of ethical gold in the commercial world (Carter, 2011). Certification, however, is often cost prohibitive and there is only a small number of ASMO's currently enjoying certification status of either standard, highly concentrated in South America, or more specifically Peru, Bolivia or Colombia.

Downstream actors are facing public scrutiny and cannot risk being associated with the exploitation of children, destruction of the environment or sourcing of conflict minerals. This chapter tries to answer what assurances are required by the downstream actors, to include ASM gold in their supply chains.

The findings of this chapter are based on interviews with representatives of a refinery committed to supporting ASM communities and the uptake of ethical production and trading practices around the globe. A representative of the Dutch ethical smartphone manufacturer Fairphone provided insight into the requirements the electronics sector expects to be fulfilled. A review of The Impact Facility's Environmental, Social and Governance (ESG) Criteria concludes this chapter as The Impact Facility has already initiated quarterly assessments of the ASMO's against its ESG criteria.

8.1 The Requirements of a Refinery

Refineries are the next crucial step in the value chain, as they are the first step in the value chain to transform the gold and add value to the product. An interview with a refinery made clear, that any refinery, such as themselves, being a member of the London Bullion Market Association (LBMA)³, would need to meet the LBMA's internal sourcing criteria⁴. As most companies buying gold from the refinery are active in the jewelry sector, the sourcing criteria laid out by the Responsible Jewellery Council (RJC) CoC and Code of Practices standard (CoP) form another requirement. In addition, the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas would need to be considered, as this is a core requirement for any business active in the gold sector. The refinery, furthermore, stated the importance of providing door-to-door transport insurance coverage for the transport from the mines in Tiira up to the door of the refinery.

³ The LBMA is the pre-eminent body for the world's largest and most important market for precious metals. The London Bullion Market is centered in London with a global Membership and client base, including the majority of the central banks that hold gold, private sector investors, mining companies and others. The LBMA's Membership includes more than 140 companies, including traders, refiners, producers, fabricators, as well as those providing storage and secure carrier services" (LBMA, 2017)

⁴ Sub-section 7.3 explores what compliance with these standard means in concrete terms.

8.2 Requirements of Consumer-facing Companies

As almost all electronics components manufacturing happens in China, Fairphone explained the necessity of the refinery being linked to the Shanghai Gold Exchange, as this is necessary to accommodate the physical flow of gold to China.

In terms of mine site compliance, companies would want assurances that the gold in question did not originate from conflict areas, did not involve any human rights abuses and has not been subject to child labor. Other than that, it was laid out that many companies would be supportive of or interested in sourcing so-called 'green gold,' i.e., gold that has been produced without the use of mercury.

8.3 Relevant Industry Standards

This section briefly describes the concrete requirement of the three essential standards set by the OECD, the LBMA and the RJC respectively, before introducing The Impact Facility's Entry Level ESG Criteria.

8.3.1 OECD Due Diligence Guidance

The OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (OECD, 2013) is the most important reference standard for the sourcing of ASM gold. As gold, tin, tantalum and tungsten (3TG) from conflict regions such as the DRC have helped to either directly or indirectly finance conflict, the international community adopted the OECD DD Guidance as the minimum requirement for international gold trade across sectors.

This uptake can largely be explained by the passing of the US parliament passing the Dodd Frank Act. Section 1502 in 2012, requiring all companies in the US to declare the origin of the 3TG in their supply chain. By now, the EU and the British Parliament have passed further legislation also requiring companies to report on the origin of potential conflict minerals. The OECD Due Diligence Guidance serves an important reference point for all of them.

The OECD defines the nature of an acceptable due diligence process as an "on-going, proactive and reactive process through which companies can identify, prevent, mitigate and account for how they address their actual and potential adverse impacts as an integral part of business decision-making and risk management systems international law and comply with domestic laws, including those governing the illicit trade in minerals and United Nations sanctions". This means that any supply chain due diligence system should be based on an ongoing flow of reliable data regarding the mines of origin and the production process.

The OECD Guidance permits sourcing from legitimate ASM, being defined as "artisanal and small-scale mining that is consistent with applicable laws." Further explaining that "when the applicable legal framework is not enforced, or in the absence of such a framework, the assessment of the legitimacy of artisanal and small-scale mining will take into account the good faith efforts of artisanal and small-scale miners and enterprises to operate within the applicable legal framework (where it exists) as well as their engagement in opportunities for formalisation as they become available." The framework makes clear that ASM "cannot be considered legitimate when it contributes to conflict and serious abuses associated with the extraction, transport or trade of minerals."

By definition of the OECD, Uganda is a red flag country, requiring a thorough due diligence process, as it is a country through which gold from conflict-affected and high-risk areas, more specifically the DRC, is known or reasonably suspected of transiting. Being a red flag country, the OECD expects companies that are sourcing gold from there to conduct desk research regarding the producers and establish an on-the-ground assessment team “to generate and maintain information on the circumstances of gold extraction, trade handling, refining and export.” The Guidance recognizes the burden behind such an effort and continues to suggest establishing “such a team jointly in cooperation with their customers or other companies in the upstream supply chain supplying from, or operating in these areas, or via an Industry Programme or Institutionalised Mechanism.”

A chain of custody is one of the key pillars to ensure the legitimacy of the gold source. Chain of custody is defined as “a record of the sequence of entities which have custody of minerals as they move through a supply chain.”

The OECD specifies that companies shall “assist and enable artisanal and small-scale miners to build secure, transparent and verifiable gold supply chains.”

Capturing information, including but not limited to:

- The mine(s) of origin, transportation routes and points where gold is traded.
- Taxes, royalties and fees paid to government agencies and officials
- Methods of gold processing and transportation.
- Any instances, reports or suspicions that gold from other sources is being unknowingly introduced into the gold supply chain, and/or fraudulently represented.

The OECD further recommends companies to actively engage with the ASM community in an effort to drive formalization and legalization of their operations, incentivize multi-stakeholder involvement and explore options for the provision of financial services in an attempt to foster business development.

8.3.2 LBMA Responsible Gold Guidance

The LBMA Responsible Gold Guidance (LBMA, 2017) refers to the OECD Due Diligence Guidance for its requirements. The LBMA has been actively involved in the formulation of the OECD Due Diligence Guidance criteria. An in-depth analysis of both documents did not yield any additional requirements.

8.3.3 RJC – Code of Practices & Chain of Custody Standard

The RJC’s CoP (RJC, 2013) is the most widespread voluntary sustainability standards (VSS) in the jewelry sector and forms together with the organization’s CoC requirements (RJC, 2017) another core compliance requirement of the downstream for the design of the value chain.

Directly relevant CoP criteria are limited to the criteria on ASM sourcing. Specifying that:

- “members that source Diamonds, Gold and/or Platinum Group Metals directly from ASM producers that are not under the Control of the Member shall:
 - a. Regularly assess Risks of Forced Labour, Worst Forms of Child Labour, unsafe working conditions, uncontrolled mercury use, and other significant environmental impacts, and
 - b. Use best endeavours to positively influence practices and reduce or avoid the Risks and provide for or cooperate in remediation of adverse human rights and environmental impacts.”

The standard further expects members in the mining sector currently using mercury in ASM mines to “take steps to control, reduce, and where feasible eliminate the use of mercury and mercury compounds in, and the emissions and releases to the environment of mercury from, such mining and processing.”

It goes on to prohibit members the practice of “whole ore amalgamation, open burning of amalgam or processed amalgam, and burning of amalgam in residential areas; and cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury.”

The CoC requirements state that an organization “shall adhere to the OECD Guidance and the recommendations of its Supplement on Gold as applicable to their operations.” The standard continues to say that “an entity shall have systems in place to ensure that eligible mined material declarations are only issued for material sourced from the following:”

- b. Artisanal and small-scale mining (ASM) producers operating on the entity’s mining concessions that have participated in initiatives to professionalize and formalize ASM, and with documented due diligence confirming that the material comes from such ASM producers and not from illegitimate sources.
- c. Mines or producers certified under an RJC-recognised responsible ASM standard, with documented due diligence that confirms that the material comes from such mines or producers.

Once an ASM producer achieves certification status, the organization needs to “ensure that a CoC transfer document accompanies and, wherever possible, is physically attached to each shipment or transfer of CoC material dispatched to other certified entities, outsourcing contractors or service companies. “

8.3.4 The Impact Facility’s Basic ESG Criteria

As part of its effort to systematically drive sustainable mining practices at mine level, The Impact Facility has formulated a comprehensive catalog of continuous improvement criteria. Quarterly assessments help benchmark progress against said criteria, aiming to finally reach a level of compliance equivalent to both the Fairtrade and the Fairmined certification standard for precious metals.

A significant number of companies has declared The Impact Facility’s Basic ESG criteria to be in line with their expectations regarding ethical production. Joshua Read has conducted a number of stakeholder consultations through the format of online webinars during which a short presentation was given, explaining how the criteria were to be used, and how they had been designed. Prior to the webinar, the full list of criteria and guidance was sent to the attendees and, after the presentation, participants broke out into a discussion regarding different aspects of the criteria. The floor was opened to comments, followed by prompted questions. Those consulted were chosen on the basis of their position within the supply chain and as advisors or influencers on the topic of artisanal mining and supply chains.

The ESG criteria’s basic level has been designed to be in line with the minimum requirements for ASM gold, represented by the above-mentioned requirements expected by the OECD Due Diligence Guidance, the LBMA and the RJC.

More concretely an ASMO needs to:

- be legally registered in the application process

- keep production and sales records
- not employ any child laborers under the age of 15 in line with ILO Convention 182 and 137
- respect workers' rights
- attempt to abstain from mercury use
- provide proof of tax/royalty payment
- and commit to continuous improvement regarding a range of ESG risks & challenges.

An ASMO must be fully compliant with Basic criteria and demonstrate continuous progression towards advanced requirements to secure and maintain access to The Impact Facility's holistic set of services. This means that gold from mines with child labor, forced labor or any other disqualifier will not be permitted to enter the responsible gold supply channel at any point in time.

CHAPTER 9 OVERVIEW OF RESEARCH RESULTS

This research is the result of more than twenty stakeholder interviews with representatives of the subject-ASMOs, downstream actors and leading experts on the topic of ethical ASM. Previous chapters have analyzed the external environment of the project mines (Chapter 4), introduced the value chain actors currently involved (Chapter 5), briefly discussed the challenges associated with the ASGM sector (Chapter 6) and looked at the requirements of the downstream to engage in sourcing gold of ASM origin (Chapter 7).

This chapter provides concrete answers to the research question as formulated in Chapter 2, starting off by answering the underlying sub-questions, before introducing a comprehensive model for a value chain upgrade necessary to establish an *ethical value chain for ASM gold viable in the socio-economic context of the Busia region, Uganda*.

9.1 How is gold from the ASM sector produced, traded & transformed from mine to export?

Miners in the ASM sector are usually operating informally, with just 5% of organized mining associations having the licenses in place necessary to extract and process gold (Barreto, et al., 2018). In this regard, the subject-ASMOs Busia United and TISMA stand out as they have all necessary paperwork in order and are regularly conducting royalty payments.

Less organized ASM groups engage in individual gold sales at a local level, facing a lack of transactional transparency and the widespread use of adulterated scales (Barreto, et al., 2018). The subject-ASMO's, however, aggregate their gold in the form of gold sponges (post-amalgamation) until they reach sufficient volume to justify a trip to Kampala - usually between 50-200g - where they sell their gold for a much higher price than local traders could offer. None of the mines currently smelt their gold, so that average purity measures around 70-85%.

In order to access the traders traditionally further up the supply chain, the miners travel either publicly, under high risk, or privately, facing high costs, to Kampala to sell their gold directly to bulk traders, effectively circumventing the use of middle-men.

Currently, the miners sell their gold to either one of two traders, at a rate of roughly 97-98% of the LBMA price. However, the miners voiced concern about the accuracy of both purity and weight measurements. Furthermore, traders pay miners in US currency, requiring the miners to change the money received, from USD to UGX at a fee of approximately 1%. What happens to the gold after the Kampala traders acquire it is unclear, however, it may be assumed that they smelt the gold into doré bars to increase the value of it using either acid or borax in the smelting process. Smelting under rudimentary conditions can achieve a purity of 95-98%, however, for further purification, the gold needs to be refined.

The gold is likely to be aggregated by the Kampala traders to be either smuggled directly to Dubai, via Port Mombasa or Entebbe Airport or possibly processed at the AGR and (illegally) exported thereafter. As export process requires proof of both origin and royalty payment to be granted export permission, it is fair to assume that the traders operate as part of the shadow economy.

If the associations pay royalties, they do so independently from the trader, having to travel to Entebbe, where the DGSM analyzes a gold sample to determine the royalty due. Usually, this process takes 2-3 days.

9.2 Who are the principal actors in ASGM production and what are the economic, social and political relationships between them?

The graphic below attempts to visualize the dependencies and power relations of the value chain actors identified throughout this research, including the role of an external investor, even though only one of the four mines currently has an external investor as a stakeholder.

An even line connecting two actors would indicate total equality between the actors, whereas an uneven power relationship, based on dependencies or asymmetries in access to information would be displayed by a triangular shape gravitating towards the superior party.

The AGR and export destination Dubai have been included for the sake of creating a depiction of the entire chain. As, however, a chance to interview either the Kampala traders or the AGR did not materialize during this research, no specific information is available.

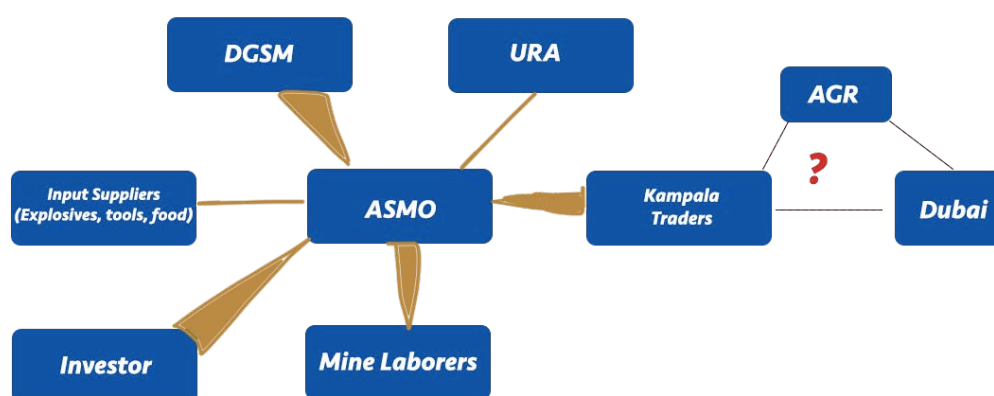


Figure 20 Power asymmetry analysis of value chain actors

The ASMO stands at the center of this diagram, showing various relationships coined by power asymmetry. The workers, for instance, work for just UGX 7,000 a day, a wage even the miners would like to raise to UGX 10,000. Youth unemployment rates of around 20% (based on data from 2014) (Uganda Bureau of Statistics, 2017), however, and a lack of options make the laborers highly dependent on the ASMOs. One of the ASMOs finds itself dependent on their investor, as their contractual agreement makes it impossible for the mine to make sustainable investments to increase its production capacity.

The relationship with the Kampala traders could be seen as equal, as the miners have no obligation to sell and a vast number of traders to choose from. The inability to verify purity estimates and weight measurements, however, creates an uneven power balance.

Even though the DGSM has the official mandate to support ASMOs in their efforts of formalization, turning ASMOs into sustainable businesses, systemic corruption makes it hard to receive the services needed in a reasonable time frame. The diagram also shows the ASMOs' link to the URA. As the procedure of paying royalties is conducted via official bank transfers and since the URA does not determine the number of royalties due, this relationship is an even one. The diagram also shows that the traders are operating without ties to either the DGSM or the URA. Should they hold an MDL, then at least part of their business is illegal.

Input suppliers of either equipment, explosives or food have not stood out to hold any particular advantage in relation to the ASMOs or vice versa. While traders and input suppliers are independent actors in the case of Tiira, many ASMOs find themselves in a position where they are sourcing inputs from the same party to which they are also selling their gold. In order to prevent the mine from suffering from inflated prices for inputs when selling to a new buyer, The Impact Facility will need to ensure input availability. This could be accomplished either by including the existing input providers as much as possible in the sourcing and distribution strategy, or by ensuring access to alternate routes of input provision.

The fact that none of the local financial institutions are willing to engage with the ASM community puts miners in an extremely weak bargaining position when negotiating private loan and investor agreements.

9.3 What value is created at the respective stages of the production chain?

The ASGM value chain turned out to be very short, due to the miners' effort of travelling to Kampala to sell to their gold directly to national traders rather than going through a network of local and regional traders as commonly the case in other regions in Uganda (Barreto, et al., 2018).

In terms of physical transformation, the ASMO's extract, crush and grind the ore, concentrate the minerals, pan it and use mercury amalgamation ending up with gold sponges, that are sold off to the Kampala traders. The traders most likely smelt the gold to create gold doré with a purity of about 95-98%, before smuggling it out of the country, most probably to Dubai, where it is likely refined and further processed.

Looking at value creation more broadly, the question might need to be inverted by asking, what value is currently lost at the respective stages in the production chain. Understanding value creation in line with Trienekens' framework more broadly, extrinsic product attributes such as 'modern transportation technology as well as improved communication facilities in the supply chain such as internet connection' or GPS systems could create additional value for the sustainability driven demand for ethical gold (Trienekens, 2011). In this regard, it can be said that under the current system most value is lost or at least foregone, when provenance and production data is not utilized the moment the gold is sold to informal or illegal traders. The international market relies heavily on reliable provenance data, rendering any gold detached from provenance assurances a reputational time bomb. Accordingly, from a downstream perspective, most value could be added through the creation of a reliable CoC system, passing on not only provenance information, but also production data.

Taking the perspective of the local community in Tiira, a lot of value is destroyed through the use of mercury and the health risk associated with that as well as the environmental and visual impact mining has on the community. Being able to assure that harmful activities are mitigated or reduced, would create further extrinsic value, in which downstream actors would be interested.

9.4 How is the financial value of the gold distributed among the value chain actors?

The research has produced the following estimations for the value distribution between an ASMO, its workers, suppliers and the Kampala Traders, as well as the government. A more detailed breakdown and explanation of the cost composition can be found in in Chapters 5.2.5, 5.6.1 and 5.6.2, respectively.

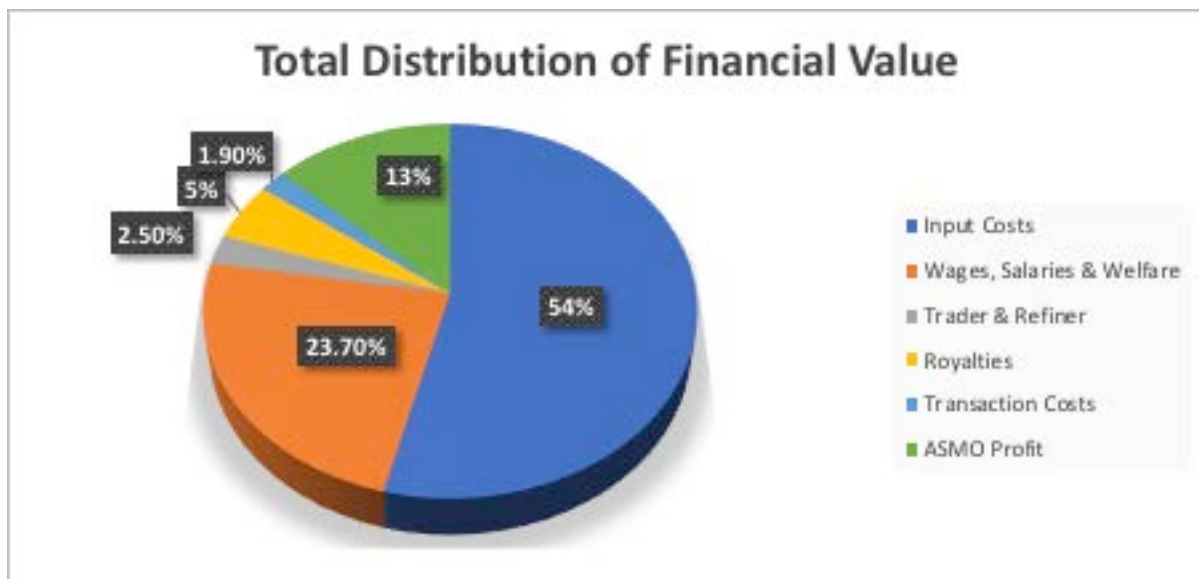


Figure 21 Pie-Chart visualizing value distribution (of LBMA price)

Evidence indicates that the miners receive as much as 97.5% of the LBMA price when selling at Kampala, even exceeding the Fairtrade Price of 95%; this number is substantiated by the findings of Patrick Schein (Barreto, et al., 2018). This number can only be explained if either, the traders operate illegally, as their margins do not allow them to pay 5% royalties (and they do not require proof of royalty payment either), or if they mislead the miners through the use of adulterated scales and low purity estimates. Alternatively, they could also afford making a loss, if they were involved in money laundering activities. Every one of these scenarios points to illicit and to some degree criminal activity.

As illustrated by the pie chart above, the trader and refiner operate on a margin of roughly 2.5% of the LBMA price, another 5% should be allocated to royalty payments, more than half (54%) are spent on inputs, a little less than 2% on transactional costs (money exchange and transportation) and almost a quarter on wages, salaries and 'welfare' (lunch for the workers), leaving the organization with a cut of roughly 13% profit. This number does not yet account for the division of profits within the organization, i.e. the cut of investors.

The breakdown of value as illustrated above makes clear that the final price, whilst important, is not the determining factor for the profitability of an ASMO. Rather, efforts should focus on boosting productivity and lowering expenses incurred for equipment rent, maintenance and operation. This can be achieved by investing in high quality equipment, less likely to break down, and a strict regime of regular maintenance to limit depreciation of machinery to a bare minimum.

In light of the large cut spent on inputs as well as lunch for the workers, the multiplier effect comes to mind. One of the interview partners estimated that for every job in a mine, the ASM sector creates around three to four jobs in the community, summarizing the thought by saying: "The only person sure to get rich from mining, is the person selling beer and food."

9.5 Which risks are associated with the different roles of the various supply chain actors?

The entrepreneurial risk in mining lies mainly with the ASMOs and investors, as they hold the risk of the production itself. Heavy rain, collapsing pits and low concentration of gold might require extensive financial

investment before, if ever, turning profitable. Once the gold is in the form of gold sponges, the miners need to safeguard the gold during the aggregation period, exposing the organization to the constant risk of getting robbed or individuals stealing the gold.

Since the miners sell their gold directly in Kampala, they take the additional risk of travelling with gold worth hundreds or even thousands of dollars, using public means of transport. Even though the miners have not had any bad experiences so far, it is difficult to quantify the risk to which they expose themselves.

International standards, as they are set by the LBMA or the OECD, would not permit gold transported like this to enter any supply chain. In comparison, the Kenyan government requires gold transport to be accompanied by no less than three armed police men, travelling with at least one other vehicle, to be present during the entire transport period. Miners face the choice of either selling locally, at a significantly lower price, or risking their physical wellbeing, travelling to and from Kampala.

The risk that the traders, refiners and subsequent supply chain actors hold is fairly limited. The trader faces the risk of overestimating the purity of the gold, by wrongly conducting a fire assay, risking having to pay too much for the gold he is buying. Security is a risk for every gold value chain actor, as gold is highly valuable; the higher the volumes an actor is dealing with, the more likely are the security measures in place to be sufficient.

While the upstream actors face mainly the risk of physical loss and violence, downstream companies are exposing themselves to reputational and legal risks when sourcing gold of ASM origin. International regulators and NGOs drawing attention to human rights abuses in international supply chains, pose a huge PR threat to companies that are unaware of the provenance of the gold used in their supply chains. Negative media outings would potentially cost a company's reputation and tarnish its brand image and might even open it up to legal claims against the company. Being able to demonstrate compliance to international standards and having full visibility on the entire value chain, would forego this risk. Due diligence usually requires great effort and financial investment on the side of the downstream actors. A system that could proactively provide relevant provenance and ESG data, would thus drastically reduce potential compliance costs.

9.6 What are the minimum requirements for 'ethically produced' gold of ASM origin from a down-stream perspective to guarantee product offtake?

As laid out in depth in Chapter 7, the downstream requirements are building largely on compliance with the OECD Due Diligence Guidance, the LBMA Good Delivery Guidance, the RJC CoP as well as the RJC CoC. The refinery involved will need to be able to supply gold to China, i.e. the refinery needs to be linked to the Shanghai Gold Exchange.

Consumer-facing companies interested in non-certified ASM gold will need an assurance that the worst forms of child labor, human rights abuses and extreme environmental impact can be excluded, as well as certainty that the value chain actors involved have neither directly, nor indirectly been linked to conflict. Being able to provide green gold will appeal to the widest client-base possible.

In order to link the Tiira ASMOs to the international market for responsible gold, a reliable CoC system needs to be in place, transmitting as much production data as possible. The system needs to document provenance of every batch, and all ASMOs need to be profiled and assessed as part of international due diligence criteria.

The Facility's Basic ESG Criteria suffice as a suitable barrier to market. Transportation routes and handling needs to be well documented and meet the criteria of the OECD to put nobody at risk.

The main requirements of the upstream are being paid on the same day as selling the gold. While more frequent opportunities to sell would be convenient, all mines agreed that bi-weekly, or even monthly selling opportunities would suffice.

9.7 Which aspects would need to change for a value chain upgrade establishing a reasonably risk-free 'ethical' ASM gold value chain?

The current value chain is very short as the mines are selling their gold in Kampala for a considerably high price. Potential ethical issues of the value chain are:

1. A lack of transparency and trust between the miners and the traders;
2. the assumed illegality of the value chain from the trader onwards;
3. a lack of accountability of the miners towards their workers and the local community; and
4. the systemic culture of bribery and corruption at the DGSM.

Accordingly, the value chain could become more ethical, by including an information system allowing actors along the value chain to follow the flow of goods and receive detailed information on purity and volumes. A proposed two-step payment system, as currently exercised by the refinery interviewed in the procurement of recycled gold, would allow the miners to be paid for the exact value of their gold. Using official bank transfers instead of cash payments, takes away the burden of having to exchange foreign currency, and would allow for financial traceability, possibly going through to the individual workers using the popular MPESA service.

As official export requires proof of royalty payment, the value chain would inevitably need to be fully compliant with all relevant (inter)national rules and regulations. Tracking ESG performance regarding child and forced labor, workers' wages, mercury use and general environmental impact, will suffice for any international due diligence system requirements. Traceability along the supply chain, or at least a closed CoC, will provide the necessary assurance to excluded conflict minerals from entering the supply chain.

CHAPTER 10 DISCUSSION

While the research findings were often in line with existing literature, there were some instances where the case of the Tiira ASMOs defied assumptions and preconceived ideas based on previous studies. In addition to that, only a very limited amount of relevant literature focused on VCAs for the ASGM sector, as the public debate around ASM focuses mainly on ESG related issues. This chapter discusses both similarities and discrepancies in comparison to previous academic work.

10.1 Level of Organizational Capacity

The level of organizational capacity of the subject-ASMOs stands out as exceptional, as they belong to just 5% of ASMOs operating with legal licenses in place (Barreto, et al., 2018). This makes comparisons to literature focused on illegal ASM difficult. The fact that miners in Tiira operate in a relatively organized manner, keeping records of production and sales and that they appear to be conscientious of ESG issues and committed to the adoption of responsible production practices can most probably be attributed to Fairtrade's capacity building efforts initiated in 2012. The miners expressed a strong commitment to Fairtrade as an organization, voicing their gratitude for the continuous support and engagement whenever possible.

In terms of setting up an ethical marketing mechanism for ASGM it is worth stating that it will be much easier to operate from an association level onwards, rather than interacting with individual ASM miners as they work in the Karamoja region. In an effort to assess existing solutions, the current value-chain set-up of Fairmined-certified producers has been assessed, in which producers are linked directly to a refinery. Substantially higher production volumes and better infrastructure make international transport relatively cost-effective and easy. A representative of ARM laid out, that this set-up of single-origin direct-supply required a minimum of 1.5kg of gold per consignment in order to operate cost covering. This substantiates the idea that it will be challenging to create a more inclusive sourcing mechanism allowing individuals to sell into the system. For now, it seems wisest to focus on ASMOs with a substantial production volume.

10.2 Competing with the Shadow Economy

Another challenge that became apparent throughout this research is that it will be difficult to compete with the illegal traders active in Kampala on a price level. A buying price of 97.5% of the LBMA price exceeds even the prices paid to already Fairtrade- or Fairmined-certified entities. However, these margins are substantiated by the findings of Barreto, et al. (2018) also analyzing the Ugandan gold sector and seem to be comparable to a case study focusing on the flow of contraband gold from Burkina Faso to Dubai (Alvarez, et al., 2016).

As pointed out at various points in this report, this price can only be explained, if the traders operate illegally, not paying royalties or if the miners are the victim of deceitful business practices in regard to the purity and weight assessment. Another aspect to consider when evaluating the current system is the effort and risk connected with selling the gold in Kampala, as well as the utter lack of trust in the business practices and honesty of the traders from the side of the miners. Given the value of and secrecy around the commodity at hand, any value chain upgrade intervention needs to be executed diligently and without putting anyone at physical risk.

Two of the expert interviewees provided anecdotal input regarding past interventions. In the first instance was a miner who travelled directly to Dubai in order to get a better price, realized for himself that the high level of corruption and the cost of air travel meant that it was better to sell his gold in Kampala.

The second story was about a similar intervention, set up to connect ASMOs to the international market, resulting in Kampala traders temporarily buying gold at a loss, until the intervention project was stopped, due to insufficient volumes entering the system.

Both stories suggest important requirements for the value chain upgrade:

1. Miners need to be incentivized to commit to the system, even if they could reap a short-term financial benefit selling at a higher price elsewhere. This could be accomplished through the provision of other services or trainings to them.
2. Any solution will only work once it reaches scale. The downstream actors investing need to show high levels of financial commitment and perseverance as setbacks and unforeseeable challenges are certain to appear.

One last consideration on the topic of unequal competition should be, that downstream actors in the Global North are in the unique position to incentivize better production practices, even if that comes at a premium price to them, as Ugandan traders are unlikely to foster ESG improvements. Thus, by potentially paying a premium, financing the set-up of a new value chain network, they might be able to fuel the miners' commitment to produce more sustainably and thus creating value or rather retaining value and quality of life for the local community currently paying the price of low ESG standards.

10.3 Navigating through Systemic Corruption

Literature is rich in examples for the culture of deceit, fraud and corruption embedded in the gold sector. From government institutions like the DGSM (Global Witness, 2017), to the African Gold Refinery (Mthembu-Salter, 2015), private investors and the above-mentioned traders (Barreto, et al., 2018) it appears impossible to set up a 100% legitimate and law-abiding operation without having to participate in paying bribes. This was also the experience conducting this research.

When discussing this issue with one of the interview partners, he recommended the practice of working out an MoU directly with the high-ranking officials, leveraging the names of important stakeholders interested in the success of the project in order to pave the way for undisturbed and legitimate business conduct. Having a cash-free system in place, reinforced by a control mechanism of checks and balances would be a good way to mitigate the risk of corruption systematically.

10.4 Price vs. Productivity

If the declared goal of downstream actors is to help the miners make a decent living and enable workers to earn a better wage, the discussion around price might be of secondary importance. Gold is a global commodity, subject to price fluctuations, where long-term reliance on any price premium will ultimately result in an unsustainable business model. Being able to boost productivity, through the provision of working capital either in cash or in kind, however, would alter the reality of the miners completely.

The introduction of mercury free processing equipment would not only result in the availability of more eco-gold (reaching a higher market price) but is also predicted to boost productivity by as much as 100%. Accordingly, the value chain upgrade envisioned, needs to include the provision of equipment and trainings needed to improve ASMOs' margins; this can be finance by downstream companies in return for the miners' commitment to selling their gold to the downstream actors providing financial services.

10.5 Developing Mutual Trust

A precondition to guarantee a sustainable, ethical and lasting value chain relationship is mutual trust between all value chain actors. The miners have repeatedly voiced concerns regarding the accuracy of the purity and weight measurements of the traders with whom they interact. This high level of distrust in the traders' practices is the result of an "perceived and behaviourally manifested assessment of great risks" based on previous interaction with them (Offe, 1999). In other words, their own experience and information they have received from their peers made the miners consider the traders as not trustworthy.

To prevent this lack of trust from manifesting in an upgraded value chain system, a reliable and transparent information system is needed to demonstrate to the miners that they receive a fair price for the gold and that all measurements are of high accuracy. A lack of trust can be compensated by the provision of assurances. Thinking about it this way, trust "is the opposite of "confidence" though the two are often used interchangeably. Confidence relates to trust as facts relate to acts." (Offe, 1999). Increasing the confidence of the actors in the mutual benefit of their transactions, will result in an increased level of trust for future transaction.

The proposed solution must thus offer guarantees to all parties involved that can initially mitigate the need for a trust-based system, building on the highest level of transactional transparency. This system will, over time, invoke confidence in the process and thus create an environment of trust between the ASMOs and the refineries sourcing from them. At the same time the system needs to provide concrete assurance regarding all and any of the ESG and provenance claims made regarding the gold entering the supply chain to the refinery.

CHAPTER 11 CONCLUSION & RECOMMENDATION

This chapter will attempt to answer the overall research question of:

Which key components, implementation mechanisms, and external conditions are necessary to ensure an ethical value chain for ASM gold viable in the socio-economic context of the Busia region, Uganda?

There is no one correct answer to this question, but rather an unlimited amount of possible value chain set ups that could be regarded as ethical, highly dependent on the actual actors involved. Before answering, it needs to be pointed out that one of the underlying goals of this upgrade is to provide downstream companies interested in the spread of responsible production practices, and an increase of availability of eco-gold, with input for their own supply chains. To achieve this, the downstream companies, starting with European refineries, have to invest in the development of innovative ASM support solutions. Existing local markets fall short of demanding more sustainable production practices from miners, as price is the only determining factors.

Conducting this research and experiencing the local reality first hand, made it evident, that a solely market based intervention approach would be insufficient for a value chain upgrade to be successful. Miners currently lack access to financial services urgently required to invest in more efficient and more environmentally sensitive production equipment. A lack of both awareness of the toxicity of mercury and alternative production options, has embedded mercury use deeply into the production system.

11.1 Proposed Value Chain Model & Direct-Supply Mechanism

Inspired by the Fairmined system in South America, the goal of the proposed value chain upgrade is to directly link the ASMOs to European refiners (linked to the Shanghai Gold Exchange). A direct supply relationship will reduce the number of value chain actors taking ownership of the gold, and allows a traceable, direct link and thus a reliable CoC.

A big challenge in setting up this link was to find a suitable transport provider, willing to transport gold of ASM origin. The current model assumes transport to Frankfurt Germany, from where the gold could easily be transported to any German refinery, or onwards to anywhere in Europe.

Scoping of the LBMA member refineries, with a link to the Shanghai Gold Exchange, located in Europe and seemingly open for ASGM supply concluded that the following three refineries would also be suitable to work with: Metalor Technologies SA and Pamp SA in Switzerland as well as Heraeus Deutschland GmbH & Co. KG. A tabular overview of these refineries can be found in ANNEX III. All of these refineries have been contacted and are open to learn more about The Impact Facility's plans and intentions to connect ASGM producer communities directly to the refiners.

It is the proposed solution to export gold from Nairobi International Airport in Kenya, as The Impact Facility is also involved with various ASMOs in Kenya, and because there is currently no airline at Entebbe Airport offering direct cargo flights to Europe that would allow gold to be transported. An international insurance company has agreed to provide door to door insurance coverage, from Tiira to any refinery in Europe, given that a traceability system is in place and assuming that the transport is handled by a professional safe-transit company.

11.1.1 Value Chain Actors Involved

Establishing a traceable, reasonably-risk-free and ethical value chain connecting mining communities directly with refineries in the Global North requires the following value chain actors to be directly involved:

- ASMOs
- A local buyer & smelter
- Secure transport providers
- Clearing agents
- An international airline
- A refinery

11.1.2 Operational Environment & Preconditions

As pointed out throughout this report, the downstream companies require credible assurances regarding the origin of the gold and the circumstances of production. The ESG assessment program of The Impact Facility, which is executed by local implementing partners and monitored by The Impact Facility staff meets criteria laid out by the relevant international standards discussed in Chapter 8.3. While such an effort requires significant financial investment, The Impact Facility finds itself in a position where the data is already readily available, due to its ongoing engagement with the mining communities.

This information will be kept and updated in a digital system, built on Everledger's Blockchain technology. With this system in place, the gold can be geo-tracked in real-time, providing information regarding the provenance, the selling party and the circumstances of production (using quarterly updated data). The underlying IT-system records every time the gold changes hands; with such a system in place an international insurance company voiced its willingness to insure the transport from Busia up to the location of the refinery against any form of loss or theft.

11.1.3 Step-by-Step Breakdown of Transport from Mine to Refinery

This sub-section describes the step by step how the proposed system would work. Before the mines can sell their gold through The Impact Facility the following steps need to take place:

- I. The Impact Facility engages with a mining community, offering access to its Impact Escalator program. Participation in the program will result in access to lease or rental equipment, capacity building and technical trainings as well as the opportunity to sell gold locally through The Impact Facility's channel.
- II. Should the community agree to the terms of The Impact Facility and commit to transparent communication and continuous improvement The Impact Facility will engage its local partner network to help the mines demonstrate compliance with the Basic ESG Criteria of The Impact Facility.
- III. Unless the mine meets the Basic ESG criteria, it will receive neither equipment, nor access to the buying mechanism.
- IV. In order to export, an export permit is needed. Exporting gold from several mines requires a **Mineral Dealers' License (MDL)**, while individual mines holding a location license also have the right to export. The Impact Facility's local service partner will hold the license and conduct the application for export permits for every consignment that needs to be exported.

The mines in Tiira have already demonstrated the level of compliance necessary. This means they could sell their gold directly to a refinery.

1. The ASMOs are offered the chance to **sell their gold at least once a month**, if volumes permit bi-weekly, or even weekly to The Impact Facility's local partner in Busia. This is in line with current practices, as miners stated that they aggregate their gold for a number of weeks before going to Kampala.
2. If possible, the miners would smelt the gold before selling it, otherwise, the gold will be **smelted in presence of the miners**, before **measuring both purity and weight**. The purity will be determined using the average of several measurements of an XRF-scanner. Both the smelting and the purity measurement will be conducted by a local service provider already identified, who is also in charge for the provision and maintenance of equipment provided to the miners as part of the Impact Escalator Program.
3. **Every transaction**, starting with the purity and weight measurements, will be **documented** separately and captured digitally, feeding it into a **blockchain based system**. Every mine has a profile in the system, including all data gathered during previous ESG assessments. This way every batch sold, can be linked to the correlating set of producer data.
4. Every doré bar will be bagged in a transparent bag, sealed with a **traceable RFID tag**, allowing a **full Chain of Custody** from that moment onwards. This bag will remain sealed throughout the gold's journey to the refinery. Custom officials will not need to break the seal to inspect the content. This system is based on international best practices to assure provenance of diamonds or gold.
5. The tagged bag is placed in a transport box equipped with various sensors, that registers every time it is opened as well as fluctuations in weight. This box **will be stored in a safe**, either at a bank or a secure location.
6. As the transaction is captured on the blockchain, a **first payment of roughly 70-80%** of the final price will be authorized, the second payment pending on final testing at the refinery. Payments will only happen via **bank transfers or MPESA**, using local currency. All ASMOs agreed with both the option of a two-step payment, and cash-free transactions.
7. In the meantime, a small sample of every batch needs to be taken to Entebbe, where the **DGSM will determine the purity** of the sample and calculate the royalty payment due. The DGSM is a chokepoint for the value chain, as it could refuse to process the application for an export permit. For the sake of ethical integrity, a clear policy regarding the refusal to engage in bribery or corruption needs to be in place. This means that the system requires enough working capital to allow a delay in the process of export permit application. In general, this process should not take longer than 2-3 days.
8. Only after the **royalty payment to the URA** has been processed, can the gold leave the country.
9. The **entire transport route** up to the door of the refinery will be **covered by a transport insurance** reimbursing The Impact Facility in case the gold gets stolen or lost.
10. With the export permit in place, **a forwarding agent will receive the box at the Busia border**, and confirm receipt, registered on the blockchain, before taking the box through customs.
11. The box may be opened at set locations, such as the border, so that **officials can verify the content**. Having bagged the gold in transparent bags guarantees that officials do not have to break the seal on the bag, allowing for an undisturbed CoC. As mentioned above, this is a common practice for the transport of materials with provenance claims. As the export permit specifies the weight of the gold to be exported, the officials can simply weigh the gold in the bag, compare and confirm. The forwarding agent will be trained to ensure that the process works flawlessly.
12. The box will be picked up on the Kenyan side of the Busia border by a **professional cash-transit transport company**. Wells-Fargo will take the gold all the way to **Nairobi Airport**, where another forwarding agent will be waiting to take the gold **again through customs**.

13. Gold from other sourcing hubs in Kenya would be added to the consignment, before being handed over to forwarding agent at Nairobi Airport.
14. **Batch traceability allowing provenance claims for every doré bar** will be guaranteed, since all bars were individually bagged and tagged.
15. Every time the box changes ownership **the system registers location and time**, creating an **unforgeable log book of all steps** taken. Actors handing over the gold to the next person in the chain have a direct interest in ensuring the validity of data input, as they might otherwise be liable for the loss of the gold.
16. From Nairobi Airport the gold is shipped on a **direct flight to Frankfurt** making use of Lufthansa Cargo's service offering 'safe/td1' specialized in precious metals cargo transport.
17. The buyer arranges **transport from Frankfurt to the refinery**, where the gold's purity is assessed, and the **second payment authorized**.

The entire process from buying the gold in Busia to arrival in Frankfurt will require about 8-9 days, as it is safest to calculate a week for the export permit to be granted.

11.2 Benefits of the Proposed Solution for ASMOs

The figure below illustrates the needs of the miners and the incentives that would be offered to sell through the proposed system. Miners always want a high price for their gold; the production of mercury-free gold is likely to yield a premium price on the international market.

It is important to communicate to the miners that rather than getting the highest possible price, they should focus on cutting costs by increasing productivity and production volumes. This is only possible with the right equipment requiring financial investment. The downstream has demonstrated a willingness to provide investment through The Impact Facility, expecting the produced gold to be channeled into its supply chains. Therefore, the ASMOs will need to commit to selling through this channel in order to reap wider benefits.

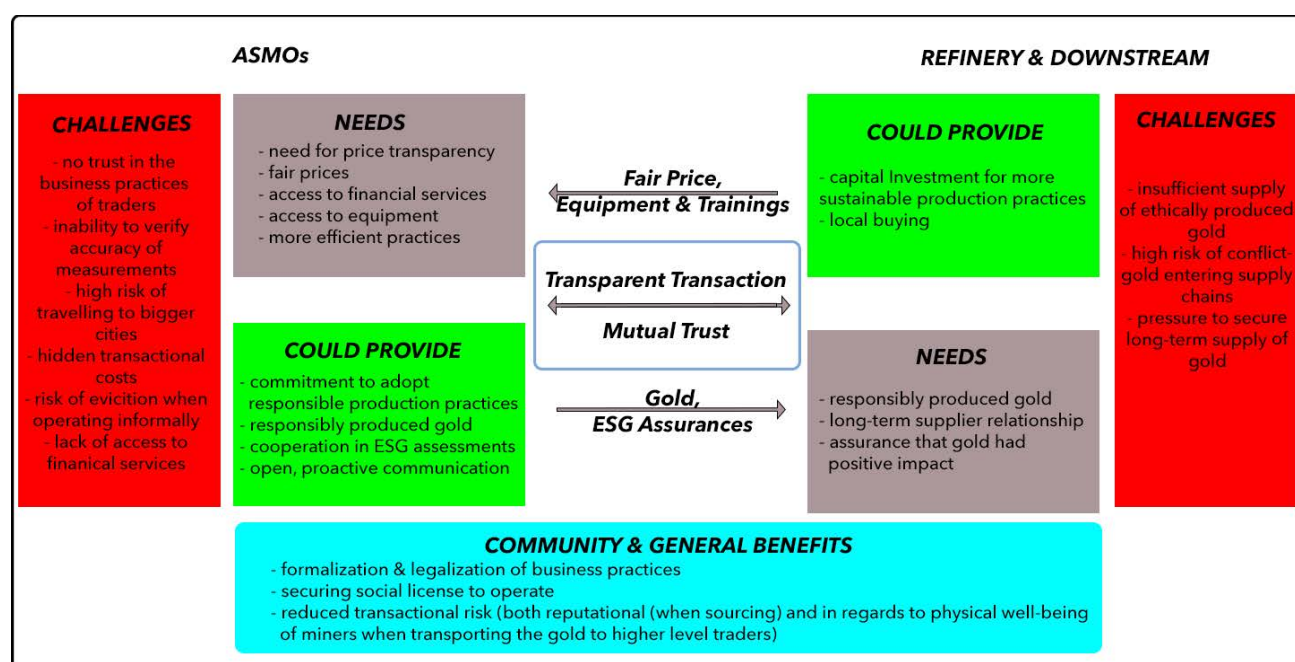


Figure 22 Illustration of Upstream & Downstream Needs & Challenges

11.3 Step-by-Step Illustration of Gold Export Process



Figure 23 Illustration of proposed value chain upgrade (original artwork by Emily Seffar, 2018)

11.4 Cost Estimates for Proposed Solution

All calculations are based quotes sent by the respective companies. The Impact Facility currently estimates an aggregate production volume of at least 3-4.5kg per month (from both Tiira and Migori).

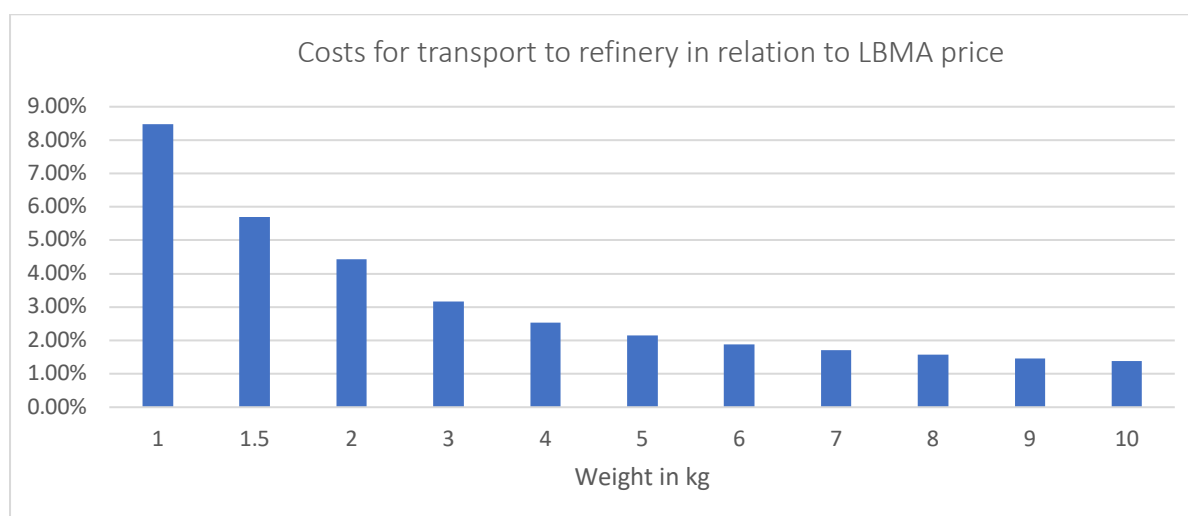


Figure 24 Bar chart visualizing costs for transport in relation to value at various weight points.

As can be seen in the graph above, it would take approx. 4kg to be able to compete with the price margins the Kampala traders presumably offer, without making a loss. Being able to sell locally, and not having to take the risk of travelling, however, might allow to buy gold at a lower price point.

The underlying calculations regard the costs of: forwarding agents in Busia and Nairobi, transport to Nairobi (from both Busia and Migori), transport insurance, flight costs as well as the use of the blockchain system and the provision of all tech-infrastructure and hardware needed.

These calculations exclude the costs of acquiring an MDL, setting up and renting local safe storage as well as the service fee for purity and weight measurements and the export permit application. Furthermore, this system will require investment into a smelting pot as well as calibrated scales, a computer and an XRF-scanner. The MDL costs 5,000,000 UGX per calendar year⁵, the service fee will be covered by a monthly flat fee yet to be negotiated and the set-up costs for the local buying unit will amount to roughly 20,000-25,000 USD for the scales, XRF-scanner, smelting pot, safe and computer.

ANNEX V provides a detailed breakdown of the costs in 1kg-intervals.

11.5 Final Recommendations & Next Steps

Even though the potential of ASGM to be a driver for development has been recognized by some, the market is yet to find an inclusive mechanism allowing ASMOs to enter the global market for responsible gold directly. This research was an attempt to find a scalable, business-led solution to international market access. One of the most important realizations of this research was the need for an easy to use information exchange system, empowering value chain actors to stay informed, develop trust and work together more efficiently.

⁵ 5,000,000 UGX = 1,275 USD = 960 GBP

Convincing the ASMOs in Tiira or elsewhere to opt for a legal route will only work if the miners' associations experience a real benefit from participating in the system, i.e. through the provision of financial services or active capacity building and most importantly, a better price when selling locally.

Throughout this research, during meetings with banks, insurances and transport companies, interest in the opportunity was considerable, but only few companies actually understood the risks involved to the degree they felt safe and able to engage. Further negotiations with said parties will be needed to position ASMOs as a trustworthy client-base.

As the transport costs of the current calculations are based on relatively high fees, more research trying to identify alternative partners could help make this system profitable from early on. Any aggregation and export system, will depend on scale, and might need to be subsidized in the beginning.

The next steps moving forward should be a follow-up stakeholder consultation, explaining the findings of this research and the proposed solution to the subject ASMOs. Should the ASMOs agree with the final concept, a pilot phase should be executed carefully, monitoring the effects of the new system on relationships with other stakeholders and regarding current traders to determine if the system causes unforeseen negative effects.

The Impact Facility will need to conduct similar VCAs wherever it wants to introduce this system, to make sure it meets the needs of the local mining community and accommodates the legal and customary requirements of the region.

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[downloads/research/External Sector Statistics/Trade Statistics/Composition-of-Exports Values-and-Volumes.xlsx](http://www.bou.or.ug/opencms/bou/bou-downloads/research/External%20Sector%20Statistics/Trade%20Statistics/Composition-of-Exports%20Values-and-Volumes.xlsx)

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ANNEX I - List of Interview Partners

Representatives of the Mining Associations:

Busia United: Stephen Padde (Chairperson)
Tiira Small-Scale Mining Association: Josephine Aguttu (Secretary)
Angariama: Josephine Mugala (Chairperson)
Tiira Landlords: Paul (Chairman)

Experts on Uganda's ASM Sector

Jonny Sasirwe
Chairman of Small Scale Miners in Uganda

Jennifer Hinton (PhD in Mining Engineering):
ASM Expert & Advocate

Patrick Schein (Co-Author of Karamoja Report)
Supply Chain Expert

General ASM-Gold Supply Chain
Yves Bertran Alvarez
Fairmined/ARM – Executive Director

Joshua Read – Mining Engineer
Responsible ASM Expert at TDI

Edward Mendelson
Everledger – Blockchain Based Supply Chain Traceability

Laura Gerritsen
Fairphone – Value Chain & Sourcing

David Finlay
Fairtrade Foundation - Partnerships Manager - Extractives

Other Stakeholders Interviewed:

Ministry of Mining of Uganda
A European Refinery
Various Forwarding Agents
Banks in Busia
Secure Transport Companies
Various Jewelers in Kampala
Airlines
Insurances

ANNEX II – List of Possible Refiners

Name	Metalor Technologies SA	Pamp SA	Heraeus Deutschland GmbH & Co. KG
First Listing of Refinery:	Pre 1934	10/06/1987	15/07/1958
Location:	Marin, Switzerland	Castel San Pietro, Switzerland	Hanau, Germany
LBMA Listing Date	01/01/2016	19/11/2008	15/07/1958
Last PAM Activity	Oct-14	June, 2015	Currently undertaking PAM.
Current Bar Mark:	METALOR® and assay mark showing Essayeur Fondeur along two sides of triangle and MP within. Patterned bottom surface. (Please note: Advanced Dot-Matrix Markings Introduced)	PAMP SA Switzerland with company logo (the letters P, A, M, P at the ends of horizontal cylinders) and Essayeur Fondeur in rectangle with company logo	Heraeus Hanau in rectangle (Formerly known as Heraeus Precious Metals GmbH & Co. KG)
LBMA Responsible Gold Certificate	Download Responsible Gold Certificate	Download Responsible Gold Certificate	Download Responsible Gold Certificate
Lnk to Company Website	http://www.metalor.com/en/node_59/ISO-RJC-LPPM-and-LBMA-certifications	http://www.pamp.com/sites/default/files/MKS%20PAMP%20GROUP%20Responsible%20Precious%20Metals%20Policy.pdf	https://www.heraeus.com/en/hpm/hpm_business_challenges/compliance/Compliance.aspx
Does also process silver:	SILVER	SILVER	SILVER
Shanghai Gold Exchange	Metalor Technologies SA	PAMP SA	Heraeus Metals Hong Kong Ltd.
Chinese Name	美泰乐科技集团	瑞士庞博贵金属公司	贺利氏金属(香港)有限公司
Engages with ASM	Fairmined certified 2017 - http://www.metalor.com/	In the case of Artisanal and Small-scale Mining (ASM), PAMP takes the extra step to support mines with limited resources and willing to progress towards an improved social and environmental impact. That PAMP undertakes such measures is evidence not only of its commitment to upholding its global reputation, but also, and most significantly, because doing so is the right thing to do. - http://www.pamp.com/aboutus	Promotes mercury free technology for ASM: https://www.unido.org/news/unido-and-argor-heraeus-sa-promote-mercury-free-technologies-artisanal-and-small-scale-gold-mining

ANNEX III – Trader Receipt Analysis

Date	Name	Gram	Net	Tola	Purity	Price (92%)	net Price	Amount	Price per gram	Trader 2 Price in UGX	Price per gram (including impurities)	LBMA Price	Value of Gold in pure form	Difference between Trader 2 and LBMA Value
05.02.2018	Seller 1	47.12	45.75	3.922	0.9525	447	462.79	1815.22	\$41.66	UGX 143,232.76	UGX 136,429.20	\$42.93	\$1,870.86	2.97%
05.02.2018	Seller 1	11.44	11.11	0.953	0.695	447	337.63	321.64	\$41.66	UGX 150,374.91	UGX 104,510.56	\$42.93	\$331.50	2.97%
24.03.2018	Seller 2	61.6	59.87	5.133	0.89	452.3	437.55	2245.9	\$42.15	UGX 152,844.60	UGX 136,031.69	\$43.23	\$2,303.26	2.49%
24.03.2018	Seller 2	21.96	21.38	1.833	0.815	452.3	400.68	734.44	\$42.15	UGX 152,844.55	UGX 124,568.31	\$43.23	\$753.20	2.49%
09.05.2017	Seller 2	37.51	36.53	3.132	0.773	411.6	345.83	1083.1	\$38.36	UGX 138,282.41	UGX 106,892.30	\$39.31	\$1,110.11	2.43%
09.05.2017	Seller 2	32.53	31.76	2.723	0.91	411.6	407.13	1108.57	\$38.36	UGX 138,283.00	UGX 125,837.53	\$39.31	\$1,136.21	2.43%
09.05.2017	Seller 2	32.42	31.74	2.721	0.67	411.6	299.75	815.68	\$38.36	UGX 138,282.00	UGX 92,648.94	\$39.31	\$836.03	2.43%
16.08.2017	Seller 3	4.16	4.19	0.359	0.822	425.3	380	136.5	\$39.63	UGX 141,560.62	UGX 116,362.83	\$40.88	\$140.79	3.05%
30.01.2018	Seller 1	67.79	67.12	5.754	0.79	450	386.41	2223.6	\$41.94	UGX 151,021.69	UGX 119,307.14	\$43.25	\$2,293.45	3.05%
27.01.2018	Seller 1	34.12	33.62	2.882	0.9	453	443.15	1277.33	\$42.21	UGX 151,810.11	UGX 136,629.10	\$43.52	\$1,316.95	3.01%

	Exchange Rate	LBMA Price am (per ounce)	LBMA Price pm (per ounce)	LBMA Price per gram average
	https://www.exchange-rates.org/history/UGX/USD/T	http://www.lbma.org.uk/precious-metal-prices		Grams per Ounce: 31.1034768
05.02.2018	3609.975	1337.1	1333.6	42.93249943
24.03.2018	3,626.26	1342.35	1346.6	43.22587499
09.05.2017	3605.185	1225.15	1220.4	39.31312914
16.08.2017	3571.87	1270.15	1272.75	40.87806672
30.01.2018	3601.32	1345.7	1344.9	43.25239936
27.01.2018	3596.15	1354.35	1353.15	43.52407317

ANNEX IV – Cost Estimate for Export in 1kg-Intervals

	Weight in kg	1	1.5	2	3	4	5	6	7	8	9	10
	Value of gold (95%)	\$39,545.82	\$59,318.73	\$79,091.64	\$118,637.46	\$158,183.28	\$197,729.11	\$237,274.93	\$276,820.75	\$316,366.57	\$355,912.39	\$395,458.21
Current Gold Price	\$41,627.18											
Forwarding Agent in Busia	180 USD	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00
Transport Busia-Nairobi	120000 KSH	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28	\$1,189.28
Transport Migori-Nairobi	92,636 KSH	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06	\$918.06
Clearance at Nairobi	Min. 430 USD	\$430.00	\$433.02	\$537.36	\$746.04	\$954.72	\$1,163.40	\$1,372.07	\$1,580.75	\$1,789.43	\$1,998.11	\$2,206.79
Insurance (0,095%)		\$37.57	\$56.35	\$75.14	\$112.71	\$150.27	\$187.84	\$225.41	\$262.98	\$300.55	\$338.12	\$375.69
Blockchain	600 USD	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00	\$600.00
	Total Cost	\$3,354.91	\$3,376.71	\$3,499.84	\$3,746.08	\$3,992.33	\$4,238.58	\$4,484.83	\$4,731.07	\$4,977.32	\$5,223.57	\$5,469.82
	Relative to Value	8.48%	5.69%	4.43%	3.16%	2.52%	2.14%	1.89%	1.71%	1.57%	1.47%	1.38%
	Weight in kg	1	1.5	2	3	4	5	6	7	8	9	10