



# Economic Contributions of Artisanal and Small-Scale Mining in Rwanda: Tin, Tantalum, and Tungsten

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## **About Pact and ARM:**

International not-for-profit organisations Pact and ARM are jointly responsible for this report's contents. Both organisations are independent yet partner on a project by project basis to promote and achieve excellence in natural resource management, improve social and environmental responsibility within artisanal and small-scale mining, and assist communities to gain lasting benefit from the more sustainable use of the natural resources around them.

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## Abbreviations and Acronyms

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3T	tin, tantalum, and tungsten
ADB	Asian Development Bank
AM	artisanal mining
AMDC	African Minerals Development Centre
AME	Asian Metals Exchange
AMV	Africa Mining Vision
APT	ammonium paratungstate
ARM	Alliance for Responsible Mining
ASGM	artisanal and small-scale gold mining
ASM	artisanal and small-scale mining
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (German Federal Institute for Geosciences and Natural Resources)
CFSP	Conflict-Free Smelter Programme
CIF	cost, insurance, and freight
cm	centimetre(s)
COMIKAGI	Coopérative Minière of Kababaru-Gikingo
DDG	OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas
DFID	U.K. Department for International Development
DGM	Department of Geology and Mines
DMFA	Dutch Ministry of Foreign Affairs
DRC	Democratic Republic of Congo
EARF	East Africa Research Fund
EDPRS II	Second Economic Development and Poverty Reduction Strategy
EIA	Environmental Impact Assessment
EITI	Extractive Industries Transparency Initiative
FDI	foreign direct investment
FECOMIRWA	Fédération des Coopératives Minières au Rwanda (Federation of Mining Cooperatives in Rwanda)
GDP	gross domestic product
GIS	geographic information system
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GLR	African Great Lakes Region
GMD	Forschungszentrum Informationstechnik GmbH (German National Research Centre for Information Technology)
GNI	gross national income
GOE	UN Group of Experts
GOR	Government of Rwanda
GRF	Gender Resource Facility
ha	hectare(s)
kg	kilogramme(s)
ICGLR	International Conference on the Great Lakes Region
ILO	International Labour Organisation
ITRI	International Tin Research Initiative
iTSCi	ITRI Tin Supply Chain Initiative
km	kilometre(s)

LME	London Metal Exchange
LSM	large-scale mining
m	metre(s)
M&E	monitoring and evaluation
MIFOTRA	Ministry of Public Services and Labour
MIGEPROF	Ministry of Gender and Family Promotion
MINECOFIN	Ministry of Finance and Economic Planning
MINEDUC	Ministry of Education
MINICOM	Ministry of Trade and Industry
MINIRENA	Ministry of Natural Resources of Rwanda
mm	millimetre(s)
NCCR	National Cooperatives Confederation of Rwanda
NGO	non-governmental organisation
NSC	National Steering Committee
OECD	Organisation for Economic Co-operation and Development
OHS	occupational health and safety
PAC	Partnership Africa Canada
PAYE	pay as you earn
PPE	personal protective equipment
Q	quarter
RCM	ICGLR Regional Certification Mechanism
REDEMI	Régie d'Exploitation et de Développement des Mines
REWU	Rwanda Extractive Industry Workers Union
RINR	ICGLR Regional Initiative against the Illegal Exploitation of Natural Resources
RMA	Rwanda Mining Association
RMPGB	Rwandan Mines, Petroleum and Gas Board
RNRA	Rwanda Natural Resources Authority
RWF	Rwandan franc
SSAMIR	Supporting Sustainable Artisanal Mining in Rwanda project
SSM	small-scale mining
SnO	cassiterite
Ta <sup>2</sup> O <sup>5</sup>	tantalum oxide
tpm	tonnes per month
TVET	technical vocational education and training
U.K.	United Kingdom
U.S.	United States
UN	United Nations
USD	United States dollar
USG	United States Government
VAT	value added tax
WBH	Wolfram Bergbau und Hütten AG
WHO	World Health Organisation
WIAMO	Women in and Affected by Mining Organisation
WMP	Wolfram Mining and Processing Ltd.
WO <sup>3</sup>	tungsten trioxide

# Executive Summary

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## Context

The mineral potential of Rwanda resides mainly in the tin, tantalum, and tungsten (3T) belt of east and central Africa that extends from eastern Democratic Republic of Congo (DRC), across Rwanda and into southwest and northern Burundi. This region produces half of the world's tantalum supply (Rwanda contributes approximately 30% of the region's total output), along with more modest production of tin and tungsten. Rwanda also produces niobium, some gold and gemstones as well as a range of construction minerals serving mainly in-country markets. 3Ts in the region are typically found in multiple, structurally controlled deposits (e.g., pegmatite fields), most of which are too small to be economically exploited via industrial means. As such, most production is carried out via artisanal or semi-mechanised mining methods attributed to artisanal and small-scale mining (ASM) licences. Given the nature of 3T mineralisation, even medium-scale operations throughout Rwanda rely heavily on artisanal workforces to profitably operate.

In 2010, the situation in Rwanda's mining sector became critically complicated, when the U.S. Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act. Section 1502 required publicly traded companies on the U.S. Stock Exchange to disclose their use of 3Ts or gold and to make an annual report if these minerals coming from the DRC or any adjoining country, such as Rwanda, were conflict free. Rwanda was the first country in the Great Lakes Region (GLR) to commit to nationwide implementation of a due diligence and traceability system, doing so via the International Tin Research Initiative (ITRI) Tin Supply Chain Initiative (iTSCi).

In order to make due diligence and traceability possible in Rwanda's ASM sector, formalisation was required. The Government of Rwanda (GOR) was proactive in that regard, including improving the management of mining activities at the governmental institutional level, developing mining programmes with specific targets and reforming the legal framework to promote and implement the legalisation of ASM sector. Beginning in December 2010, Rwanda quickly moved to have all its 3Ts mines covered by iTSCi.

Between 2011 and 2014, the number of companies engaged in mining and quarrying increased dramatically. By early 2014, Rwanda had issued 548 mining permits for mining companies or cooperatives. Of the 213 mining entities, 38 were cooperatives and members of the Fédération des Coopératives Minières au Rwanda (FECOMIRWA), five companies are either wholly foreign-owned or in joint ventures with government, and the remaining were 170 locally owned small companies or cooperatives not affiliated with FECOMIRWA.

## Purpose and Methodology

Based on this context, this study assesses and evaluates the economic contribution of the ASM sector at the national and sub-national levels, identifies specific barriers and opportunities for improved sectoral performance, and outlines key recommendations for pro-poor development and broad-based economic growth. In terms of economic contribution, the analysis covered issues such as exports and foreign exchange earnings, royalties, personal income tax, and other contributions (e.g., social security fund, value added tax [VAT]). The socio-economic impact of ASM on direct and indirect generation of employment and the economic impact of miner spending on local economy are also identified and quantified. Other themes were qualitatively assessed at the ASM operations level, including gender divisions of labour and inequalities, technical, work and safety conditions, organisational, and environmental performance. These themes were then analysed to identify the opportunities and constraints for the full realisation of ASM's socio-economic contribution.

Given that this study design did not allow for a comprehensive, countrywide ASM analysis or a supply chain analysis for all commodities, the researchers chose two representative supply chains (each starting out from one upstream ASM producer community) and two research areas and mines based on several criteria. The process led to the decision on the selection of the COMIKAGI cooperative for cassiterite/tantalum (tantallite) in the Gakenke district, where both minerals are extracted, and the Gifurwe company's operation for wolframite in the Burera district.

Field assessments were conducted at the two sites to obtain information that reflects the diversity of Rwanda's ASM sector and provides insight into the economic contributions of 3Ts at the local and national levels.

COMIKAGI is the largest and most productive ASM cooperative in the country and is an example of the economic significance of reasonably well-organised artisanal production of tin (cassiterite) and tantalum (tantallite). The Gifurwe Wolframite Mine is the country's second largest tungsten (wolframite) producer and, despite heavy reliance on an ASM workforce, which is found in most Rwandan 3T mines, it represents a comparatively advanced, semi-mechanised mining operation. The assessments also covered other important dimensions, using the supply chain, gender, and integrated analysis to examine organisational, social, economic, work and safety, environmental, and technical issues.

## Key Findings

This study produced important findings on the economic contribution of ASM. **In 2015, Rwanda's exports totalled USD 600 million, with 3Ts constituting USD 110 million or 19% of all exports, making them key contributors to export and foreign exchange earnings in the country** because exporters are required to repatriate export earnings.

In 2014, the mining sector reported having approximately 34,000 direct employees. With an estimated number of four family members per miner, **170,000 Rwandans (approximately 1.5% of the total population) are directly dependent upon the sector**. Because miners are mostly casual workers and the study estimated that the actual number of individual persons directly involved in mining was on a seasonal basis, **the number of employees may well have risen as high as 65,000 in 2014**.

**The study estimated that artisanal and small-scale miners contributed approximately USD 39.5 million in the form of expenditures to the local economies in 2015**. Miners' income spent on local goods and services, education, health care, acquisition of assets (e.g., land, livestock), and investment in small enterprises can have a significant impact on affected communities.

Despite this positive view of the economic contribution of ASM in Rwanda, several important issues were identified.

- **The improvement of working conditions and labour relations**, particularly in terms of rights for the workers, gender equality, and safety merit further attention. No evidence of child labour was found in the sites visits, although this does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors, who may rely on family members to carry out work.
- **Methods of extraction and processing can also be upgraded, which could promote better productivity and recovery of minerals**. These improvements in extraction and processing, in turn, have the potential to create a virtuous cycle of environmental protection and promote safer working conditions.
- **Progress is needed toward better distribution of revenues generated by the mines for the miners and for the districts and provinces where these minerals are produced**. These advancements would result in a more responsible ASM sector and could promote the full economic realisation of the ASM sector in Rwanda, while supporting inclusive, pro-poor development.
- **Rwanda has achieved an important level of legalisation of ASM operations through the attribution of mining licences to companies and cooperatives, but more needs to be done to accomplish the complete legalisation of the existing and new mining operations**. The main drawback of the current legal framework is that, while it acknowledges the different sizes of mining operations, it does not bring the recognition of differences to the administrative procedures and the associated obligations for the legalisation of ASM operations. Consequently, only a few mining operations may can comply with the legalisation requirements and the majority will experience major hurdles for full compliance with the law.
- **The system could promote legalisation of the commercialisation of the minerals, but not of the actual mining operations, because of the complexity and costs associated with obtaining and maintaining the artisanal and small-scale licences and respective obligations**. This situation already is starting to occur and may result in negative consequences, especially for artisanal mining (AM). Additionally, it creates a false impression that the sector is legalising, when in fact it is only the commercialisation of the minerals, under the umbrella of



mining companies and cooperatives, without the legalisation of the mining operations and its workforce and sub-contractors.

## Recommendations

Based on the assessment of the two case studies, several recommendations are provided for a more effective and integrated process of formalisation of the 3T supply chains, where legalisation is only one (important) dimension among several others. It is important to acknowledge that **formalisation of ASM involves a long and continuous process of integration of ASM into the formal economy, rather than simply controlling extra-legal enterprises.** Formalisation invariably requires even more extensive institutional commitments to support access to finance and appropriate, intermediate technologies to strengthen capacity to employ more responsible, safe and efficient methods, address gender-related issues and to ensure ASM cooperatives, companies, or other entities are structured and operating in a sustainable and profitable manner.

### Formalise Labour Relations and Balance Distribution of Benefits and Risks in the supply chain

**Labour relations between employers and miners must evolve.** At present, these relations prevent artisanal and small-scale miners from acquiring the legal rights that they deserve.

**Address the current imbalance of costs and benefits in which the distribution of benefits favours downstream actors, while the most significant financial risks and burdens are concentrated upstream.** Although the artisanal mining workforce as a group captures a large proportion of revenues (41–55%), most are living at the poverty line and lack means to access external technical support to improve productivity, safety, and overall performance.

**Local economic contributions from ASM are substantial and should be better captured, disseminated and distributed.** The injection of approximately USD 39.5 million in 2015 into local economies via miners' incomes represents a major stimulus for micro-, small, and medium enterprise development and related employment. These contributions should be highlighted in government reports and shared with multiple stakeholders, providing a basis to advocate for more services and support to ASM areas. According to international best practice, **local provinces and districts should be allocated an adequate part of the collected taxed** (e.g., royalties) because they are directly impacted by the extraction.

**A more comprehensive survey instrument that captures livelihood, economic, and gender dimensions of the sector should be developed** by or with Ministry of Natural Resources of Rwanda (MINIRENA\_ and the Bureau of Statistics to lend greater insight.

**The organisational functioning and fairness of mining companies and cooperatives should be improved.** A review of organisational arrangements and contracts therein and of capacity building is needed to ensure cooperatives in particular function in a more inclusive manner.

### Gender Inclusion is Essential

Rwanda has a Gender Policy with specific targets, which is a very important starting point. However the mining sector, as a traditional male-dominated sector, requires special attention to gender policy issues. **Based on the Rwanda Gender Policy, develop a national mining programme to promote cultural shifts in terms of the roles of women in ASM, make improvements on rights related to gender (e.g., maternity benefits), and provide training in areas that will enable women to have access to better quality jobs.**

### Health and Safety and Efficient Extraction and Processing Training is Needed

**Specific technical training is needed in a range of critical safety and operational topics,** from underground risk identification and timbering, to mining methods, to basic mine planning and occupational health and safety systems.

**Address poor environmental management practices because they pose multiple risks to human health, livelihoods, and economic development**, with attention to mine waste and water management through introduction of basic systems within the workforce in order to ensure responsible practices proliferate across sites.

**Increase production through the introduction of and training in appropriate, intermediate mineral processing technologies**, with special attention to poor liberation (under-grinding) or over-grinding of ore, fixed angle sluices operated with highly variable water flow and agitation rates, and separate concentrate products and/or remove iron.

**Predict and mitigate potential negative implications of new technologies at different sites with attention to company and gender risks.** The main avenue to supplement revenues is via semi-mechanised processing of tailings and low-grade ore, which would increase competition for this material and increase financial risks for these operators, if technology improvements were introduced to artisanal and small-scale miners. A gender impact analysis of the proposed technical interventions and targeted, preferential training of women in any new methods is needed, coupled with efforts to counter discriminatory beliefs and challenge barriers to entry to different jobs.

**Support access to training via technical vocational education and training (TVET) administered by the Ministry of Education (MINEDUC).** Ideally this training should be coupled with mechanisms for financing basic improvements and with more advanced technical support.

**Strengthen relationships with committed partners**, e.g., the German Federal Institute for Geosciences and Natural Resources (BGR), local gender-focused NGO Women In/And Mining Rwanda, and Pact, the international NGO and implementer of iTSCi.

**Disseminate emerging best practices**, including gender strategies and model mines as best practice demonstration sites.

**Build a decentralised network to facilitate coordination and capacity building, based on local government offices mandated to address environmental, health, gender, and social issues.**

## **The Permitting and Administrative Process should be Improved**

**Strengthen the legal framework.** Rwanda has a relatively new legal framework, which takes into consideration the full diversity of the mining sector. While this is a good foundation, it can be improved in ways that more efficiently promote the development of the different sizes of the mineral deposits and mines, with the objective of better using the mineral resources of the country.

**Prior to promoting any change in the existing legal framework, it is critical that the informed participation of economic activities across the supply chain be supported, concerning the main barriers posed by the current framework.**

Key specific recommendations regarding the improvement of the legal framework include:

- **Simplify the licence criteria related to the size of the mines.** Consider introducing one criterion such as the installed capacity of extraction and processing.
- **Grant the right to process minerals for artisanal licences.** This right would increase the economic return for the artisanal miners from this profitable aspect of the mineral development cycle.
- **Consider allowing larger areas for artisanal and small-scale licences.** Attribution of large areas for ASM licences will bring stability, long-term vision and promote investment in the mining operations. It is also important for the feasibility and efficiency of the extraction and processing activities.
- **Revisit requirements for licence attribution and maintenance.** Ensure that the requirements for licence attribution follow the same approach as the categorisation of licences based on the size of the mine.

# 1. Introduction

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## 1.1. Context

Located at the nexus of two regions renowned for their extensive mineral wealth, Africa's Great Lakes region and East Africa, Rwanda is globally recognised as a prominent source of the world's tin, tantalum, and tungsten minerals (3Ts), particularly tantalum, for which the country is the largest producer by far<sup>1</sup>. The 3Ts, which constitute three of Rwanda's top five exports, are the backbone of the country's minerals sector and the main drivers of the sector's contributions to Rwanda's long-term development strategy, Vision 2020<sup>2</sup>. The full extent of these contributions is not fully understood, yet the 3Ts are believed to hold significant promise to support the necessary growth acceleration and poverty reduction for Rwanda to achieve middle-income country status.

All 3T production in Rwanda is attributed to artisanal and small-scale mining (ASM), an important segment of the minerals sector that is both *disparaged* for its often crude methods and occupational, environmental, and social risks and *commended* for its purported, yet inadequately quantified, employment and local development contributions. In most ASM economies around the world, ASM largely operates informally and outside of the legal framework, creating extensive challenges for the realisation of ASM's development potential to contribute to the national economy. Informality is costly for the country and for the person in the situation of informality. 'Informality limits the potential for developing countries to benefit fully from their integration into the world economy. In particular, large informal economies prevent countries from developing a sizeable, diversified export base, as the capacity of companies and economic projects to grow is constrained'<sup>3</sup>.

Rwanda has taken significant steps toward ASM legalisation, much of which has been prompted by initiatives that the Government of Rwanda (GOR) and its partners, such as Pact, have implemented, as part of international requirements for 3T supply chain traceability<sup>4</sup>. These efforts have resulted in a majority of artisanal and small-scale miners working under legally registered cooperatives or small to medium-scale companies, and most of 3T minerals exported through official channels. Therefore, Rwanda provides particularly useful insights into how formalisation of 3T supply chains can bolster the microeconomic contributions of ASM and yield substantial macroeconomic benefits, including via royalties, taxes, foreign exchange earnings, and economic and employment multiplier effects<sup>5</sup>.

## 1.2. Purpose of the Study

It is against this backdrop that the U.K. Department for International Development (DFID), through its East Africa Research Fund (EARF), identified Rwanda's 3T ASM sector as one of three East African case studies to assess the current and potential economic contributions of ASM at the national and sub-national levels, identify specific barriers and opportunities for improved sectoral performance, and outline key recommendations for pro-poor development and broad-based economic growth.

Together with parallel case study reports in Uganda and Kenya, this work informs a global analysis on the 'Impact of Small-Scale Mining Operations on Economies and Livelihoods in Low to Middle Income Countries', thereby providing an invaluable contribution to the ASM discourse and clear direction for increasing ASM's contribution to economic growth, inclusive development and good governance of the sector.

This study aims to bolster evidence on the economic contributions of ASM in Rwanda, provide insights into how the sector is formally and informally coordinated, and profile the nature and extent of associated risks and benefits and how and to whom they are distributed. With a focus on two

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<sup>1</sup> Approximately one-third of the world production: in 2014, 530 of 1,500 tonnes. (Reichl et al. 2016)

<sup>2</sup> For more information about the Rwanda Vision 2020 consult:

[http://www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/Vision\\_2020\\_.pdf](http://www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/Vision_2020_.pdf)

<sup>3</sup> Bacchetta; Ernst & Bustamante 2009

<sup>4</sup> International, regional and state responses to the prolonged conflict in eastern DRC, resulting inclusion in the Dodd-Frank Act Section 1502, the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (DDG), related ICGLR Regional Certification Mechanism (RCM) and resulting traceability schemes.

<sup>5</sup> Hinton 2016b

economically significant mineral commodities, the study specifically seeks to identify ways in which the economic development potential of ASM can be realised as economic, environmental, health, and social risks are mitigated.

## 1.3. Methodology

The methodology to develop this study built on existing research and was informed by two field studies. Several methods, tools, and approaches were used, including stakeholder engagement, gender analysis, child protection policy, supply chain analysis, and community and research uptake strategy.

### 1.3.1. Limitations

The country case study makes no claim of reflecting a comprehensive country-wide ASM sector analysis, nor supply chain analysis for all commodities. As cited throughout the report and detailed in the annexes, estimations of employment, production, production value, and related multiplier effects (e.g., spin-off employment) were extrapolated to national levels using a combination of primary data collected in the field, best available data from prior research, and, where available, statistics from reliable government sources. By definition, any extrapolation bares the fact that it approximates the reality, rather than being 100% correct. These extrapolations are valuable because they give the general magnitude of the economic impact of ASM nationally.

Given that this study design in Rwanda did not allow for a comprehensive, countrywide ASM analysis or a supply chain analysis for all commodities, the researchers chose two representative supply chains each starting out from one upstream ASM producer community. Based on that decision and in consultation with DFID, two minerals were selected using diverse criteria, including their economic contribution expressed in existing sales and export value, employment generation, potential negative externalities relevant to social development, long-term resilience, readily available data, and relevance to DFID programming. The process led to the selection of Coopérative Minière of Kababaru-Gikingo (COMIKAGI), the cooperative for cassiterite/tantalum (tantalite) in the Gakenke district (both minerals are extracted at this mine site), and the Gifurwe company's wolframite operation in the Burera district.

The two research areas and mines identified for the Rwanda case study were based on criteria that also allowed comparative analyses, including the type of organisation, number of miners, production, presence of women and level of mechanisation. Other important criteria were the acceptance by representatives of the mines to receive the project team and share information, along with the manageability of geography within a time-constrained study. The selection process for the minerals and research areas incorporated the recommendations of Pact's country office and the Rwandan Ministry of Natural Resources (MINIRENA).

Primary data collection for the country case study was assessed for the two mining sites. These assessments provided an overview of qualitative and semi-quantitative information obtained through interviews with key stakeholders and the appraisal of the economic, technical, and environmental performance of the operations.

Where possible, and to fill existing gaps, primary data collected at the study sites were complemented with official and previously published data. All primary data and information gathered were triangulated with different sources when possible and then checked for consistency alongside observations made during the field studies. It is important to highlight that basic official data for the 3Ts supply chains for Rwanda exists and provides a high level of confidence in the economic analysis of this study. Nevertheless, a survey could be developed to delve more deeply into certain aspects of the ASM sector, including data related to gender, child labour, health and safety issues, and environmental impacts. This survey should not be restricted to the 3Ts, but rather should also include other segments in the sector, for example the artisanal and small-scale gold mining (ASGM) supply chain.

## 2. The ASM Context in Rwanda

### 2.1. Country Overview

Rwanda is a landlocked country in Central-East Africa, bordered by Uganda, Tanzania, Burundi, and the Democratic Republic of Congo (DRC). With approximately 25,000 km<sup>2</sup> of land and 1,400 km<sup>2</sup> of water, it is one of the smallest countries on the African mainland. Located in the African Great Lakes Region (GLR), Rwanda is highly elevated, with a geography dominated by mountains in the west and savannah to the east. The climate is temperate to subtropical, with two rainy seasons and two dry seasons each year.

Although Rwanda is home to a relatively small population of 12.9 million<sup>6</sup>, it has a population growth rate of 2.53% per year and one of the highest population densities in Africa (490 people per km<sup>2</sup>). With a heavy reliance on subsistence agriculture and increasing land pressures, Rwanda aspires to overcome the limitations of its small, landlocked economy by leveraging regional trade. Rwanda joined the East African Community in 2009 and is aligning its budget, trade, and immigration policies with its regional partners.

**Figure 1: Rwanda location map**



#### 2.1.1. Political Context

Rwanda is a presidential republic. Early years of independence from a Belgium-administered United Nations (UN) trusteeship in 1962 were dismal due to armed conflicts between the two main ethnic groups, Hutu and Tutsi, resulting in several million casualties and a refugee crisis. Since the end of the civil war in 1994, Rwanda has maintained political stability. The last parliamentary elections held in September 2013 saw 64% of the seats taken by female candidates and the Rwandan Patriotic Front maintain absolute majority in the Chamber of Deputies. President Paul Kagame is serving his third term in office under changes that technically allow him to remain in power until 2034, which were approved in a December 2016 referendum by a 98% majority.

<sup>6</sup> Hutu (Bantu) 84%, Tutsi (Hamitic) 15%, Twa (Pygmy) 1%. (CIA 2016)

The Rwandan mining administration has undergone significant changes in 2016/2017, with the disbanding of the Rwanda Natural Resources Authority (RNRA)<sup>7</sup> and the creation of the Rwanda Mines, Petroleum and Gas Board (RMPGB)<sup>8</sup> under the leadership of Chief Executive Francis Gatare.

The RNRA was an authority that led the management of the promotion of natural resources that are composed of land, water, forests, mines, and geology. It was entrusted with supervision, monitoring, and ensuring the implementation of issues relating to the promotion and protection of natural resources across programmes and activities of all national institutions. A key legacy issue is the previous administration's decision to suspend mining activity at all sites that were operating under exploration permits instead of exploitation permits, which created significant upheaval in the sector, simultaneously making many operations illegal, but not policing them sufficiently to ensure that production stopped. At the end of 2016, 77% of Rwandan 3Ts mines were considered inactive<sup>9</sup>. Unfortunately, this does not mean that the sites were inactive in reality, as informal mining can continue if there are limited government control or prevention measures<sup>10</sup>. Where previously there were few, if any, reports of child labour in Rwanda's mines, reports of such activities in informal sites have increased.

The RMPGB was created to oversee matters related to mining, petroleum and gas. This Board is considered as a Ministry in itself. The RMPGB focuses on exploration, licensing, inspection, and regulation of the sector, but also addresses certain legacy and reputational challenges that range from international perception of conflict minerals to very basic domestic issues of infrastructure and capacity. The CEO is a member of the Cabinet and reports directly to the President's office.

Other changes include splitting the former Ministry of Natural Resources into two other Ministries: the Ministry of Environment and the Ministry of Lands and Forestry. The Rwanda Land Management Authority and the Rwanda Water and Forestry Management Authority are now organized under the Ministry of Land and Forests. It is likely that these changes will negatively affect the implementation timeframe of some projects. Some previously approved projects may end prematurely or be limited and new ones may begin.

Another key challenge is that the minerals sector in Rwanda is heavily dependent on ASM production. Even international investors are still largely dependent upon manual methods for their production through sub-contractor arrangements with artisanal and small-scale miners. As such, the sector faces an array of significant challenges including limited geological data, low capitalisation of the sector, scarce localisation of mining investment, low productivity and production, poor occupational health and safety practices, and limited human and institutional capacity. Like its neighbours, land and surface rights can be a flashpoint. Some mining investors have run into problems in resettlement efforts as they underestimate cultural attachments to land that has been passed down through generations and that also serves a central role in livelihoods.

External political dynamics are also likely to impact on the Rwandan mineral sector in the coming years. Tensions in the GLR are always an issue for the countries of the region. These tensions often surface in matters of cross border trade, with minerals being a key point of contention.

The United States Government (USG) is discussion potentially repealing the 2010 Dodd-Frank Act, and it is unclear whether or not traceability requirements will be maintained and if European Union legislation would be sufficient to drive compliance without the United States. Other issues contributing to this uncertain landscape are whether Rwandan authorities will decide to maintain the due diligence and traceability system due to its inherent value to the country, who will be willing to pay the costs of implementation, and whether the formalisation that has emerged from traceability will be sustainable in the absence of a legislative driver of market requirements. Rwanda's neighbour, the DRC, already has publicly committed to maintaining mineral traceability regardless of international requirements (and indeed is discussing expanding to other minerals outside the conflict minerals list).

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<sup>7</sup> The former Minister of Mines and officials of RNRA were arrested in early 2017 on charges of 'favouritism, falsification of documents and usurpation of powers'.

<sup>8</sup> Three new bodies (Rwanda Land Management Authority, Water and Forestry Management Authority, and Oil, Petroleum and Gas Board) now sit under MINIRENA.

<sup>9</sup> 'Inactive' meaning that a mine does not have an exploitation permit from the government, therefore the government does not implement traceability at the site.

<sup>10</sup> iTSCi Programme Incidents and Outcomes: 2011 to 2016. (ITRI, March 2017)

## 2.1.2. The Economy

Rwanda has been the region's top economic performer the last decade. Its macro-economic performance during this period has been consistently impressive, with the economy growing between 2001 and 2011 at a rate of 8.2% per year and an average real gross domestic product (GDP) growth between 2001 and 2015 of approximately 8%. Recovering from the 2012 aid shortfall (see next paragraph), the economy grew by 7% in 2014 and 7.5% in 2015, up from 4.7% in 2013. This strong level of growth was accompanied by significant progress in poverty reduction, dropping from 59% in 2001 to 45% in 2011. However, with a gross national income (GNI) of USD 700 per capita in 2015, Rwanda is still a low-income country<sup>11</sup>.

The resumption of hostilities in the eastern DRC in 2012 and Rwanda's alleged role therein caused some donors to withdraw their support, resulting in a significant negative aid shock of about 3% of GDP and introducing considerable uncertainty. However, recent developments have been more positive. Most donors resumed bilateral and multi-lateral aid disbursements following a peace accord signed by 11 GLR and southern African countries in February 2013<sup>12</sup>.

Rwanda's long-term development goals are defined in its Vision 2020. The strategy seeks to transform the country from a low-income agriculture-based economy to a knowledge-based, service-oriented economy with middle-income country status by 2020. To achieve these long-term development goals, the GOR has formulated a medium-term strategy. The second Economic Development and Poverty Reduction Strategy (EDPRS II)<sup>13</sup> outlines an overarching goal of growth acceleration and poverty reduction through four thematic areas—economic transformation, rural development, productivity and youth employment, and accountable governance—and aims to achieve the following goals by 2018: raise GDP per capita to USD 1,000, have less than 30% of the population below the poverty line, and have less than 9% of the population living in extreme poverty<sup>14</sup>. The EDPRS II considers mining to be one of the important sectors in terms of its contribution to increased employment, exports, and foreign direct investment (FDI). The specific targets for the mining sector are very ambitious for 2017/2018, relative to 2011/2012<sup>15</sup>. They include:

- Contribution of mining to GDP growing from 1.2% to 5.27%
- The mining work-force growing from 20,000 to 60,000 members
- Total investment (cumulative) in the sector growing from USD 150 million to USD 500 million
- Export earnings growing from USD 158 million to USD 400 million
- Certified mine sites with efficient water and waste management systems growing from 20% to 100%
- Certified mine sites with safe and secure working conditions growing from 25% to 80%

## 2.1.3. Human Development

In 2014 Rwanda ranked (jointly with Uganda) 163 of 188 countries, with a Human Development Index of 0.483<sup>16</sup> (ranking number 32 in Africa). Despite low ranking in human development, Rwanda met most of the Millennium Development Goals by the end of 2015. Strong economic growth was accompanied by substantial improvements in living standards, evidenced by a two-thirds drop in child mortality and the attainment of near-universal primary school enrolment. A strong focus on home-grown policies and initiatives contributed to a significant improvement in access to services and in human development indicators. The poverty rate dropped from 44% in 2011 to 39% in 2014, while inequality measured by the Gini coefficient reduced from 0.49 in 2011 to 0.45 in 2014<sup>17</sup>.

<sup>11</sup> World Bank 2014, Cook & Mitchell 2014, World Bank 2016a

<sup>12</sup> IMF 2014, World Bank 2014

<sup>13</sup> Rwanda 2013a

<sup>14</sup> World Bank 2016a

<sup>15</sup> Information retrieved from <http://www.rdb.rw/rdb/mining.html>

<sup>16</sup> UNDP 2016

<sup>17</sup> World Bank 2016a

## 2.2. The Minerals Sector

### 2.2.1. Sector Overview

Extending from eastern DRC across Rwanda and into southwest and northern Burundi, the 3T belt of east and central Africa produced 51% of the world's tantalum supply (28% of which is produced in Rwanda), 3% of the world's tin, and 2% of its tungsten in 2013<sup>18</sup>. These products are largely exported in the form of mineral concentrates of cassiterite (tin), tantalite<sup>19</sup>, (tantalum), and wolframite (tungsten). In addition to the 3T minerals, Rwanda also produces niobium, some gold and gemstones, and a range of construction minerals serving mainly in-country markets (e.g., limestone used in cement production, clay bricks, stone aggregate)<sup>20</sup>.

Like its neighbours, Rwanda's 3T mineralisation (2.2.2. ) is largely associated with granites hosted within Kibaran belt rocks formed approximately 1.3 billion years ago<sup>21</sup>. The 3Ts in the region are typically found in multiple, structurally controlled deposits (e.g., pegmatite fields), most of which are too small to be economically exploited by industrial means<sup>22</sup>. As such, most production is carried out via artisanal or semi-mechanised methods, with more than 82% of 3T production in 2015 attributed to ASM licences<sup>23</sup>. Given the nature of 3T mineralisation, even medium-scale operations throughout Rwanda rely heavily on artisanal and small-scale workforces to profitably operate.

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<sup>18</sup> Cook & Mitchell 2014

<sup>19</sup> Tantalite is the common term for ore from which the elements niobium and tantalum are extracted, named after its mineral components columbite and tantalite. Often, regardless of niobium content, the ore is called tantalite. In this report, the term 'tantalite' is used.

<sup>20</sup> Yager 2016

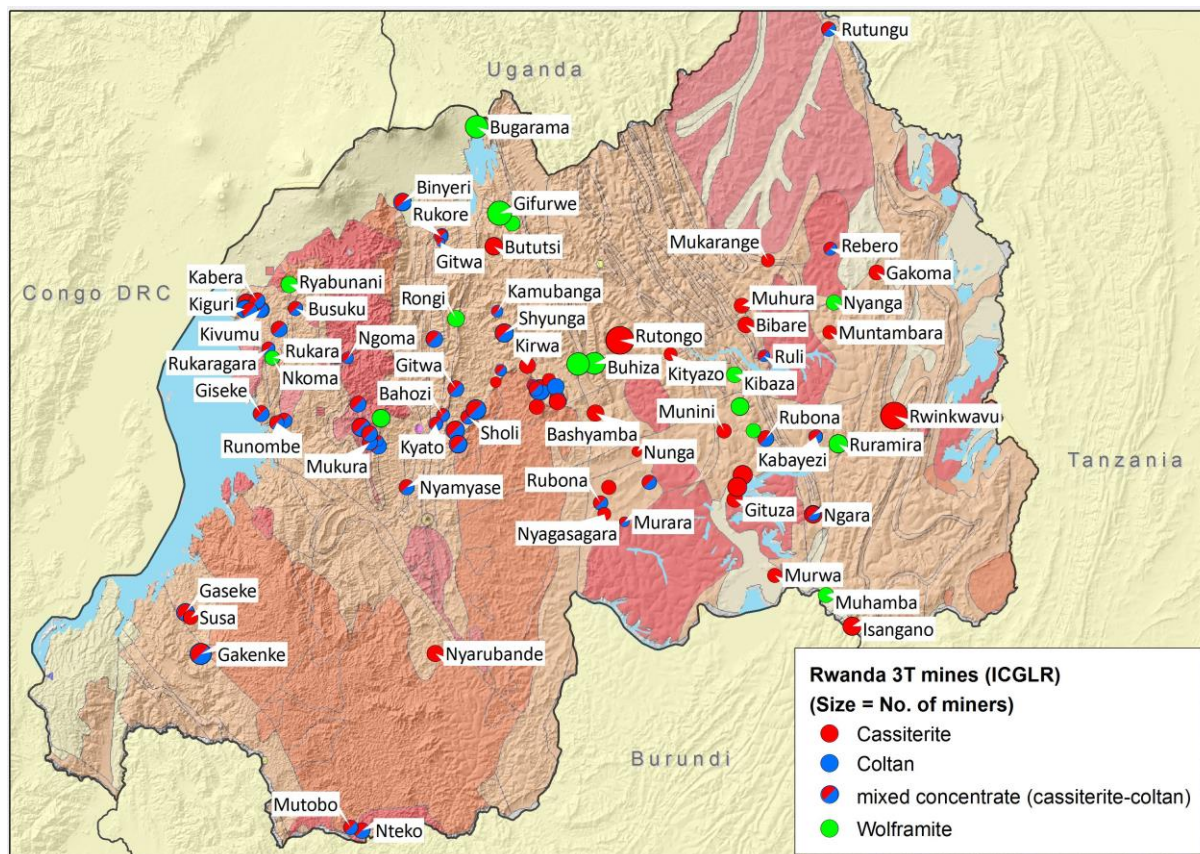
<sup>21</sup> Pohl et al. 2013, Kanyangira 2013

<sup>22</sup> Hinton 2016b

<sup>23</sup> Artisanal production is classified as operations producing 3 tonnes per month (tpm) or less of pre-concentrate, while small-scale production is more 3 metric tonnes and up to 15 metric tonnes. Large-scale production is categorised as more than 15 metric tonnes.



**Figure 2: Geology and distribution of 3T production sites in Rwanda<sup>24</sup>**



## 2.2.2. Political and Security Context of the Mining Sector

Starting in the early 2000s, the UN Group of Experts (GOE) and non-governmental organisations (NGOs) drew attention to the complex conflict in the GLR and the devastating impact of the illegal mineral trade<sup>25</sup>. To mitigate these effects, in 2005, the GOE on the DRC proposed that traceability systems should be developed for all relevant natural resources sourced from the DRC, including the 3T minerals and gold<sup>26</sup>. In 2006, the GLR countries signed a Protocol against the Illegal Exploitation of Natural Resources, and in 2008, the International Conference on the Great Lakes Region (ICGLR) launched the Regional Initiative against the Illegal Exploitation of Natural Resources as a means of implementing the Protocol. A special summit of the GLR countries was held in 2010 in Lusaka, where the six tools of the Regional Initiative against the Illegal Exploitation of Natural Resources, among them the ICGLR Regional Certification Mechanism (RCM), were approved. The summit also affirmed the ICGLR's endorsement of the Organisation for Economic Co-operation and Development (OECD) Due Diligence Guidance on Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas<sup>27</sup> (DDG).

Consumer companies and others in industry were highly sensitive to the negative publicity. Due diligence and traceability mechanisms like the International Tin Research Institute (ITRI) Tin Supply Chain Initiative (commonly referred to as iTSCI), iTSCI's the Conflict-Free Smelter Programme (CFSP), and others emerged. The situation became critical for Rwanda, when the U.S. Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010<sup>28</sup>. Section 1502 of the Dodd-Frank Act required publicly traded companies on the U.S. Stock Exchange to disclose their use of the 3Ts or gold and to report annually if 3Ts or gold minerals coming from the DRC or any adjoining country such as Rwanda are conflict free. The Dodd-Frank Act and the resulting threat of a

<sup>24</sup> Map produced by project, based on geologic data from MINIRENA and production data from ICGLR. (ICGLR 2016)

<sup>25</sup> Pact 2015

<sup>26</sup> GOE 2005

<sup>27</sup> ICGLR & PAC 2012; ICGLR 2011; OECD 2016 (in its first edition); UNECA 2013

<sup>28</sup> United States 2010

de facto embargo on the sector caught Rwanda off guard; the livelihoods of tens of thousands of 3T miners and other operators were at risk, with few alternative sources of employment available<sup>29</sup>.

In response, Rwanda became the first GLR country to commit to large-scale implementation of a due diligence and traceability system, doing so via iTSCi. Starting in December 2010 (before CFSP came into force in April 2011 and RCM was launched in 2012), the GOR quickly moved to have all its 3Ts mines covered by the system<sup>30</sup>. Since April 2011, CFSP covers all existing legal mines and exporters in Rwanda, based on a joint implementation agreement between ITRI and the GOR and implemented by Pact. As such, Rwanda is the only significant 3T producer in the region, which continuously managed to maintain largely unrestricted market access since the enactment of Dodd-Frank Act<sup>31</sup>.

Minerals have become an increasingly important source of revenue for Rwanda. In 2011 and 2012, combined export revenues of 3T ore concentrates (cassiterite, tantalite, and wolframite) reached USD 156 million and USD 136 million, respectively. Although the mineral sector accounted for less than 2% of Rwanda's GDP in 2013<sup>32</sup>, amounting to USD 228 million, it was double the export value of coffee and tea combined, the traditional agricultural mainstays of Rwanda's export economy<sup>33</sup>. Even as domestic prices of 3Ts declined by 18–20% between 2013 and 2015<sup>34</sup>, 3Ts combined with tea and coffee exports in 2015 were valued at USD 600 million. 3Ts still constituted approximately 20% of the country's total exports, positioning 3T minerals in the top five of Rwanda's biggest exports together with tea and coffee<sup>35</sup>. Annex 2 shows 3T production for 2015 by value and volume and disaggregated by district.

Between 2011 and 2014, the number of companies engaged in mining and quarrying increased by 479%<sup>36</sup>. However, since 2013, the growth rate of the mining sector has been decelerating and became negative in the second quarter of 2015, reflecting the decline in global commodity prices that resulted in negative growth rates (Figure 3), both in terms of volume (Figure 4) and price<sup>37</sup>. In the first seven months of 2016, cassiterite exports dropped by approximately 19% in value and approximately 15% in volume, while tantalite exports dropped by approximately 40% in value and approximately 20% in volume<sup>38</sup>. Both commodities totalled 19% of the exports from Rwanda and are ranked first in exportation of minerals; thus, they are key contributors of foreign currency for the country. In the first seven months of 2016, wolframite exports dropped approximately 46% in value and approximately 12% in volume<sup>39</sup>, totalling 2% of the total exports (ranked third of the exported minerals in value).

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<sup>29</sup> Pact 2015

<sup>30</sup> Ibid

<sup>31</sup> Cook & Mitchell 2014

<sup>32</sup> Yager 2016

<sup>33</sup> Cook & Mitchell 2014

<sup>34</sup> Calculated from average export values for each of cassiterite, tantalite, and wolframite from MINIRENA database for 2015.

<sup>35</sup> Ibid.

<sup>36</sup> NISR 2015

<sup>37</sup> World Bank 2016b

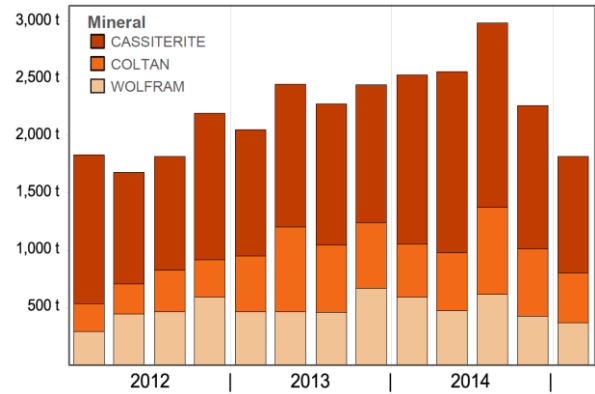
<sup>38</sup> Calculated from MINIRENA data 2016.

<sup>39</sup> World Bank 2016b

Figure 3: Decelerating mining sector growth<sup>40</sup>



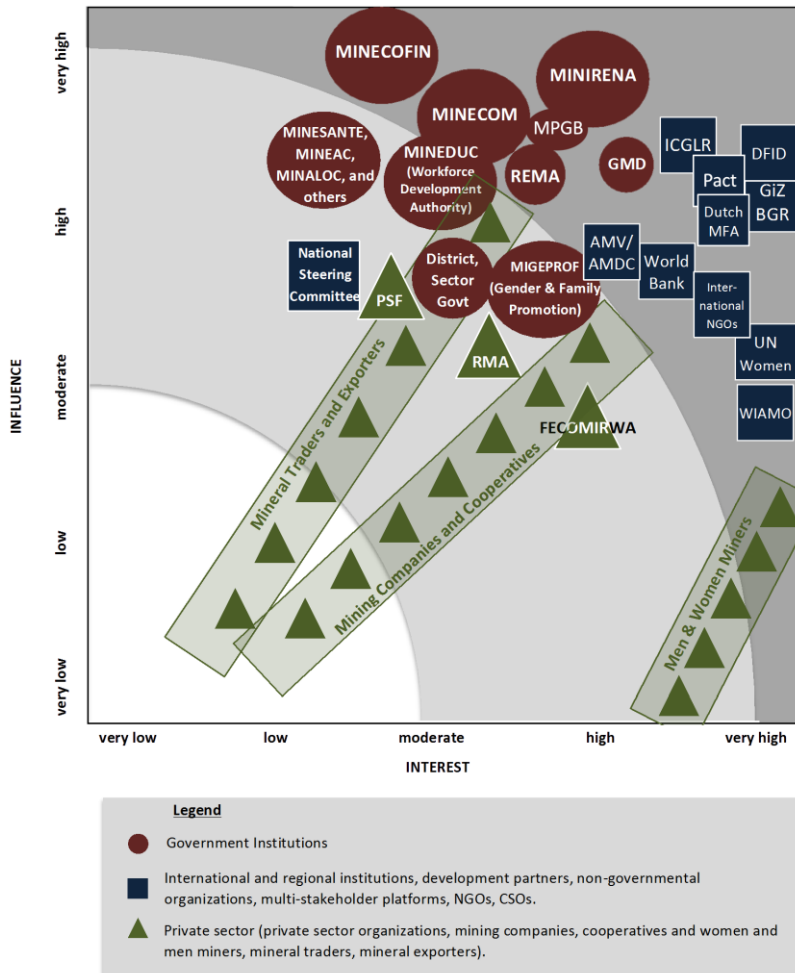
Figure 4: Quarterly mineral exports, in tonnes Q1 2012 to Q1 2015<sup>41</sup>



### 2.2.3. Mining Sector Stakeholders

Multiple stakeholders play key roles in supporting development of Rwanda's minerals sector. The main actors are highlighted in the stakeholder map (2.2.4. ), indicating their expressed or perceived level of interest and influence in sustainable ASM in Rwanda. A detailed description of key stakeholders is provided in Annex 3.

Figure 5: Stakeholder map<sup>42</sup>



<sup>40</sup> Ibid, figure 1.9 on p.13

<sup>41</sup> Adapted from ITRI 2015

<sup>42</sup> Level of Stakeholder Interest and Influence in Sustainable ASM in Rwanda, adapted from Hinton (2016b).

## 2.2.4. ASM Policy and Legal Framework

This sub-section analyses the main legal aspects influence on the legalisation of mining operations and supply chain. It is not intended to be an exhaustive analysis of the regulations identified below. Further details are discussed in Annex 4.

The Law (13/2014) on Mining and Quarry Operations is the main piece of legislation that defines the mining legal framework of the country. Additional legislation completes the legal framework for the mining sector, including:

- Ministerial Order (002/2015), on Criteria Used in Categorisation of Mines and Determining Types of Mines
- Ministerial Order (003/2015), determining Modalities for Application, Issuance and Use of Mineral and Quarry Licences
- Ministerial Order (001/2015, determining Modalities and Requirements for the Financial Guarantee of Environmental Protection and its Use in Mining Operations
- Ministerial Regulations (002/2012), on the Regional Certification Mechanism for Minerals
- Ministerial Order (003/2010), on Requirements for Granting the Licence for Purchasing and Selling Mineral Substances in Rwanda
- Ministerial Instructions (010/2016), determining Types, Size Limits and Modalities for Exporting Mineral Ore Samples
- Law (55/2013), on Minerals Tax

It is important to also include other laws and documents that are not specific to the mining legal framework, but are important to the sector in this list:

- Law N° 50/2007 of 18/09/2007, determining the Establishment, Organisation and Functioning of Cooperative Organisations in Rwanda
- Compilation of Fiscal Laws and Regulations in Use in Rwanda. 2014 (that comprises 23 laws and regulations)

### Artisanal and Small-Scale Mining Titles

Ministerial Orders 002/2015 and 003/2015 clearly define the criteria for the classification of the size of the mines that are fundamental to understanding the mining licences system in Rwanda. The regulations use four criteria for all mines, except for commercial small-scale quarry (Table 1).

**Table 1: ASM mine size criteria<sup>43</sup>**

Mine size	Quantity of Reserves (est. minimum)	Capital Investment (minimum during five years)	Production of Minerals (estimated)	Depth of the mine and/or technologies criteria
Artisanal mine	30 tonnes	RWF 70,000,000 (~USD 87,600)	0.5–3 tonnes per month (tpm)	<ul style="list-style-type: none"> <li>• 40 m calculated between the surface of the site and the bottom of the pit; the distance is calculated vertically</li> <li>• Using mining equipment and techniques which preserve health, security of people and environment</li> </ul>
Small-scale mine	200 tonnes	RWF 700,000,000 (~USD 876,000)	3 tpm minimum	<ul style="list-style-type: none"> <li>• Using mining equipment (extracting and processing machines)</li> <li>• Skilled personnel with technical know-how</li> </ul>
Commercial small-scale quarry		RWF 5,000,000 (~USD 6,250) (the timeframe is not defined)		<ul style="list-style-type: none"> <li>• Using equipment and techniques that comply with environmental, health, and safety standards</li> </ul>

Several aspects related to the use of the criteria to define the size of the mines deserve consideration.

The majority of the criteria are objective and allow for a clear measurement of the size of the mine. However, the subjectivity of the technology criterion is a weakness of the classification system

<sup>43</sup> MINIRENA 2015a, MIRENA 2015b

because it cannot be properly assessed without sufficiently clear guidance from the law (e.g., there is little clarity on what constitutes a 'skilled person').

The differentiation between artisanal mines and small-scale mines in terms of the volume of production is clear. However, in the differentiation between small-scale mines and large-scale mines, the minimum is defined, but not the maximum. The minimum production for a large-scale mine is 15 tonnes, but it is unclear whether that is the maximum production allowed for a small-scale mine.

The same problem occurs with the investment criterion. This is less of a problem from the point of view of the government policy, which seeks to increase investment. Nevertheless, when the size of the mine is only based on this criterion (without a maximum) it can be problematic, in that it could allow for large-scale size operations to fall under the ASM licensing system.

The other aspect that is a cause for concern is the estimation of reserves, particularly for ASM. This issue is discussed in Annex 4. The analysis concludes that estimated reserves are not an objective measure and are difficult to contradict or question.

**Lesson learned:** A broader concern related to the use of multiple criteria for defining the size of the operations is that there are too many criteria that need to be met simultaneously. The path of simplification around the criteria has already been achieved in the case of the commercial small-scale quarry, which has defined only one objective criterion.

The installed capacity of extraction and processing of mineralised material could be one way to simplify and indirectly would have implications in the amount of investment and volume of production that the operations can meet.

Table 2 identifies the main characteristics of the mining titles in terms of rights attribution that apply to ASM operations. The importance of these characteristics is that they define the various qualities of the mining title and have implications related, for example, to access to finance, such as credit and loans.

**Table 2: Characteristics of ASM mining licences<sup>44</sup>**

Type of licence	Max. Size of area	Max. Duration	Mining rights grant	Exclusivity	Renewed periods	Transfer (total and partial)
Artisanal licence	49 ha	5 years	Exploration and exploitation and sell	Yes (except for quarry licences)	Every 5 years	Yes
Small-scale licence	100 ha	15 years	Exploration or exploitation, process minerals, sell	Yes (except for quarry licences)	Every 10 years	Yes
Commercial small-scale quarries licence	5 ha	5 years	Explore, use, sell and add value to quarry products	It is not clear	Every 5 years	Yes

It is notable that the three licences grant rights to exclusivity, renewal, transfer, and upgrading. These are basic rights for mining licences that promote and protect the investment realised at mining operations. It is becoming more common in different jurisdictions to recognise these rights for ASM licences, given that without these rights the regulatory framework offers little incentive to legalise a mining operation. Without these rights, from the point of view of the mining operation, legalisation becomes a cost without protection of the investment, also restricting the ability to develop different business models. From the point of view of public policy, the lack of recognition of these rights prevents ASM operations from fully realising their economic potential<sup>45</sup>.

Exclusivity to operate in the mining area is also an important right, and the only exception in the law is where a quarries licence can be granted in an area of exploration or other mining licences if the Minister authorises it.

<sup>44</sup> Rwanda 2014, MINIRENA 2015b

<sup>45</sup> Barreto 2011

The size of the licence area is another issue with the licensing system that is worth highlighting. The permissible sizes are small, and because the law does not have restrictions in terms of the number of licences per person (legal person), different licences can be requested in the same area as a means to get around this limitation. For example, the cooperative visited during the fieldwork has a total licence area of 812 ha based on four different licences. The consequence of this is an additional cost for the holder of the licences in terms of acquisition of the licences, renewal, and other related administrative processes, and it does not allow proper organisation of the mining activities, nor rationalisation of infrastructure.

The other issue is related to the rights granted by the different ASM licences. The artisanal licence does not allow for the processing of minerals, which constitutes an important limitation<sup>46</sup>. In the case of cassiterite and tantalite, processing is simple, based on magnetic separation. Some of the artisanal operations could introduce appropriate, intermediate technologies to improve their recovery and, thus, their incomes if that restriction were not in place.

## Barriers to Legalisation

Certain ambiguities and incongruences still constitute barriers to Rwanda's ASM legalisation efforts. This refers to:

1. The role of exploration in the context of ASM licences
2. Levels of requirements for different licence types
3. Financial guarantee for environmental protection
4. Uniform tax rates for all scales of mining and timing of the tax payments

Annex 4 covers these aspects in more detail.

## Progress toward Formalisation of ASM

In 2012, Rwanda promulgated Ministerial Regulation (002/2012), which outlined the main requirements for compliance with the RCM, thereby enabling Rwanda to continue to export 3T compliant minerals. Following this situation, CSFP scaled up efforts to increase its coverage, alongside GOR efforts, as needed, to licence ASM activities.

By early 2014, Rwanda had issued 548 mining permits, varying in size up to 400 ha, to 213 registered mining companies or cooperatives. Of the 213 mining entities, 38 were cooperatives and members of Fédération des Coopératives Minières au Rwanda (FECOMIRWA), five companies were either wholly foreign owned or in joint ventures with government, and 170 were locally owned small companies or cooperatives not affiliated with FECOMIRWA<sup>47</sup>.

In 2016, with the adoption of instruments specifying the classification of mines and procedures for licensing (Ministerial Orders 002 and 003), 570 licences were registered in the MINIRENA mining cadastre. These included 49 artisanal mining (AM) licences, 21 small-scale mining (SM) licences, and seven large scale mining licences, with an additional 47 'mining licences' continuing to operate under the old licencing system and the remainder attributed to mineral exploration (211) and quarrying<sup>48</sup>.

While attribution of ASM titles is a critical precursor for improving the sector's economic performance, it marks only one step in the sector formalisation process. **Formalisation of ASM involves a long and continuous process of integration of ASM into the formal economy rather than simply controlling extra-legal enterprises** by recognising existing arrangements in legislation, reducing legal barriers beyond those related to the licensing regime, and creating clear benefits from participation in the formal system, including by addressing needs of miners<sup>49</sup>. Formalisation invariably requires even more extensive commitments to support access to finance and appropriate intermediate technologies to strengthen capacity to employ more responsible, safe, and efficient methods and to

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<sup>46</sup> Technically, artisanal miners do mineral processing at the mine site level (manual crushing, grinding, and gravity separation via ground sluicing and panning). These processing steps are an integrated part of the mineral extraction process. The restriction refers therefore implicitly to advanced processing as carry outcarried out at the export level (if and when required to meet external contract requirements of buyers), by methods such as magnetic separation removing iron-minerals and/or separating cassiterite from tantalite in the case of mixed-concentrate products.

<sup>47</sup> World Bank 2014

<sup>48</sup> MINIRENA Mining Cadastre (Interview 10 September 2016)

<sup>49</sup> Pelon & Martel-Jantin 2006

ensure ASM cooperatives, companies, or other entities are structured and operating in a sustainable and profitable manner<sup>50</sup>.

In all cases, formalisation is not just about legalisation of ASM operations; the institutional obligations and responsibilities to support this process are crucial to success. Based on the assessment of the two case studies, we provide several recommendations for a more effective and integrated process of formalising the 3T supply chains, where legalisation is only one (important) dimension among several others. These recommendations include access to finance; access to and dissemination of information; technical, environmental, health, and safety considerations; and gender-related improvements through training and capacity building. Section 5.2 explains these recommendations in detail.

#### *International coordination*

Rwanda is typically the fastest amongst GLR members to coordinate with international initiatives provided that there is a clear rationale to do so. Particularly with regard to conflict mineral developments, Presidential-level support ensures formal alignment is done swiftly, Rwanda is seen as a leader in this space, trade is not interrupted, and that the country remains a dominant player in evolving regional conversations.

#### *Minamata Convention on Mercury*

Rwanda ascended to the Minamata Convention in 29 June 2017. While there are some artisanal gold miners operating in the country, mercury use is presumed to be minimal due to the strong state apparatus. Mercury use is forbidden, environmental regulators have high capacity, and sites are carefully watched.

#### *Extractive Industries Transparency Initiative (EITI)*

The EITI is not an immediate priority for the country. This is due largely to the lack of clear rationale for leadership, the reality that the government has only recently focused on organizing regulation of its mining sector in the past ten years, and, possibly, due to the potential for causing setbacks in Rwanda's international image. If framed as a foreign investment tool for its developing mining sector and with compelling evidence, the authorities may be open for engagement on this topic.

## 3. Case Studies

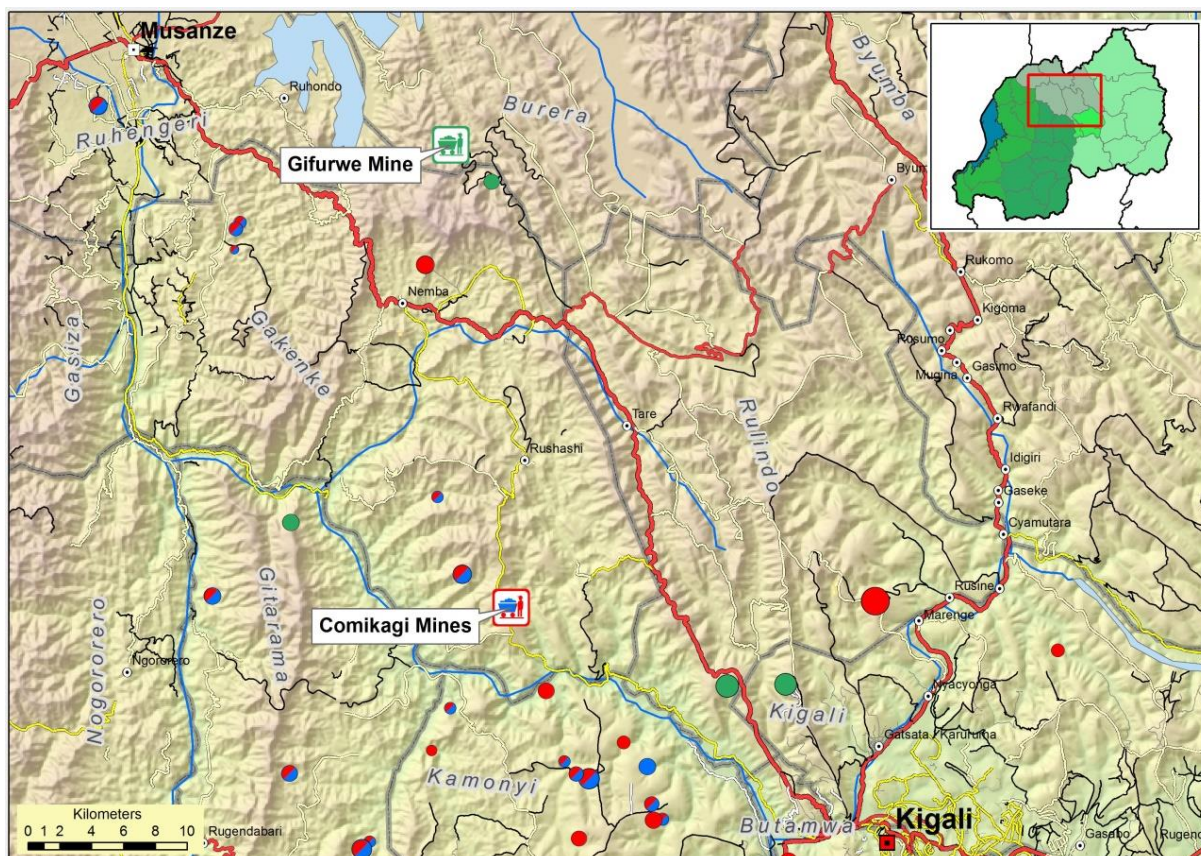
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Field assessments were conducted at two sites that reflect the diversity of Rwanda's ASM sector and provide insight into the economic contributions of 3Ts at local and national levels. COMIKAGI is the largest and most productive ASM cooperative in the country and is an example of the economic significance of reasonably well-organised artisanal production of tin (cassiterite) and tantalum (tantalite). The Gifurwe wolframite mine is the country's second-largest tungsten (wolframite) producer in the country and, despite heavy reliance on an ASM workforce found in most Rwandan 3T mines, it represents a comparatively advanced, semi-mechanised mining operation. The location of both case study sites is shown in 3.1.

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<sup>50</sup> Hinton & Levin 2010

Figure 6: Case study sites in Rwanda<sup>51</sup>



### 3.1. Case Study: COMIKAGI Cassiterite-Tantalite Mines

This section summarises the assessment of the COMIKAGI cassiterite-tantalite mines. Further details, including references, where applicable, are provided in Annex 5.

Located in Ruli sector of Gakenke District in Rwanda’s Northern Province (3.1. ), the COMIKAGI is one of the most significant cassiterite-tantalite mining producers of the district. COMIKAGI oversees production across its 812 ha, five-year renewable licences in four main areas.

#### 3.1.1. Supply Chain Actors, Activities, and Employment

##### Main Supply Chain Actors

The cooperative **COMIKAGI** consists of 39 members, each of whom owns a single share in the entity. As the holder of the mining title, COMIKAGI has multiple roles and responsibilities, such as reporting requirements, compliance obligations as needed to maintain licences, approval of allocation of areas requested by sub-contractors, occasional advance payments to sub-contractors, purchase of pre-concentrate from sub-contractors, registration of workers and headcounts of casual labourers, payment of workers’ accident insurance, and sale of consolidated production to (typically) FECOMIRWA. Once it has received payments, COMIKAGI remits payments to sub-contractors.

<sup>51</sup> Symbols of adjacent mines as in 2.2.2.



**Figure 7: FECOMIRWA Concentrate Grinding**



There are 70 active **sub-contractors** working under COMIKAGI (10 of whom are women), who oversee 5–20 workers each. Only a portion of sub-contractors are cooperative members and all either own the land on which they work or have an agreement (e.g., monthly rent) with landowners. Sub-contractors hire **workers** either in teams or as individuals. Relationships between sub-contractors and their workers are based on verbal agreements, providing uncertainty concerning working obligations and increasing risks of disputes.

FECOMIRWA receives pre-concentrate from COMIKAGI and other suppliers at their facility in Kigali and, in the case of mixed tantalite-cassiterite products, conducts further processing to meet the market specifications. An x-ray fluorescence laboratory provides analytical results on grades of processed concentrate, which serve as the basis for payment to suppliers. Concentrates are exported to Asian markets: tin to Thailand and tantalite to Hong Kong.

### Mineral Production Methods and Environment

The process begins with manual excavation of shafts to depths of approximately 6–10 m until ore-bearing veins are encountered. This development phase typically requires 20–25 days of investment by the sub-contractor in the form of tools, timbers, labour, and, in few cases, provisions for lunch.

Once ore is found, it is extracted by teams of five to eight men via digging of horizontal or semi-horizontal tunnels that follow hard or weathered veins and can extend to 500 m or more. The host rock (pegmatite) can be readily broken using hand tools (e.g., pickaxes, spades) and is hauled to the surface using sacks. Ore, low-grade material, and waste rock is manually carried to processing areas.

The processing areas consist of a series of trenches dug into the hillside, where one of eight designated teams of five to eight men pre-concentrate the ore by ground sluicing. Heavy minerals at the bottom of the trench are collected and then panned to recover the cassiterite-tantalite pre-concentrate. Each sluicing team can process approximately 6 tonnes of ore per day, yielding 60–70 kg of material that panned down to 30–37 kg of pre-concentrate grading approximately 93% cassiterite and 7% tantalite pre-concentrate. The pre-concentrate subsequently is transported in sacks to the COMIKAGI office in nearby Mududu Village, weighed, and logged as the sub-contractor's production.

**One of the main environmental concerns at the COMIKAGI sites relates to inadequate management of tailings (waste from processing), potentially creating siltation issues in downstream streams and rivers.** During the processing, most of the ore drains quite haphazardly from the multiple trenches spanning the hillsides of processing areas into sometimes marshy valley bottoms. **Based on 2015 production values, an estimated 110,000 tonnes of tailings was discharged into the environment in that year alone**<sup>52</sup>.

**Another important environmental concern relates to land degradation associated with operating and abandoned extraction sites and the multiple trenches and small water impoundments found across area hillsides.** This can impact residents by reducing land available for farming, while the visibly numerous open and un-fenced shafts and pits scattered across the area can pose hazards for livestock and humans.

### Employment and Gender Division of Labour

COMIKAGI maintains records of employment according to monthly reports from sub-contractors. In August 2016, 491 miners, 121 of whom are women (25%), and 70 sub-contractors, 10 of whom are women, were employed, totalling 561 (23% women).

<sup>52</sup> Mineral processors report that 1-1.1 kg of concentrate is generated per tonne of ore washed.

### **Occupational health and safety**

All workers are required to be enrolled in the voluntary social health insurance programme called Mutuelles de Sante<sup>53</sup>, often paid by sub-contractors on their behalf, then deducted from wages. The majority of casual workers are covered under COMIKAGI's workers' compensation insurance plan.

**Occupational health and safety (OHS) hazards and risks are associated with specific jobs, tasks, and functions at the mine.** The primary OHS issues observed relate to risks of collapse of underground tunnels and shafts, repeated stress on musculoskeletal systems associated with carrying heavy loads (e.g., 50–70 kg bags of ore) and repeated motion in awkward positions (e.g., during sluicing), respiratory illness (kaolinosis), and inadequate use of personal protective equipment (PPE).

### **Women's participation**

**The organisation of labour may be one factor contributing to women's low participation in the production process.** Although some women perform casual jobs in hauling ore or panning, these tend to be the lowest paid positions in operations. Women face challenges in joining teams of men due to multiple factors, which range from failing to obtain the requisite approval from team members due to the belief that women are incapable of carrying out the work, to limited access to capital needed to buy a spot on a team, to perceptions of family and community members equating work in the mines with sex work, among many others. **Women also face barriers to taking on more profitable positions in the management of the operation**, which are sub-contractors, because women are less likely to own land and COMIKAGI requires that sub-contractors have an agreement with landowners or own land in their selected area. This is one of the important reasons that only 10 of 70 sub-contractors are women.

### **Child labour**

**Child labour is not visibly present at COMIKAGI<sup>54</sup>.** However, some male workers seem to have started working in the mines as teenagers, and the secondary school enrolment rate in Gakenke District is only 26.5%<sup>55</sup>. Despite this, in recent years Rwanda has put in place strict and widely known policies concerning education of boys and girls, with their absence from school often resulting in harsh penalties for parents. COMIKAGI supervisors and security guards (whose roles include keeping unauthorised persons away from worksites) may play a role in this respect.

In ASM countries around the world, children engaged in ASM experience the same occupational risks as adults, but they are far more susceptible to its negative impacts due in large part to their rapid rate of emotional and physical development and relative inefficiency in detoxification<sup>56</sup>. Psycho-social, physical, and educational impacts can significantly impact the healthy development of boys and girls, with effects extending into adulthood.

## **3.1.2. Distribution of Economic Costs and Benefits across the Supply Chain**

### **Production Value and Sales**

COMIKAGI records sub-contractors' production, including in accordance with RCM requirements. In 2014 and 2015, the cooperative produced 76.2 tonnes and 108 tonnes, respectively, of mixed cassiterite (SnO; tantalite pre-concentrate), at an average composition of 72% of tin oxide and 28% of tantalite. Tin value depends on the London Metal Exchange (LME) price. Tantalum is priced via a series of metal exchanges and ultimately is determined by a contract price. As calculated in detail in Annex 5, monthly domestic production value is on the order of USD 100,000. Based on the average

<sup>53</sup> See [www.moh.gov.rw/fileadmin/templates/Docs/Mutual\\_policy\\_document\\_final1.pdf](http://www.moh.gov.rw/fileadmin/templates/Docs/Mutual_policy_document_final1.pdf).

<sup>54</sup> No child labour was observed or reported during the authors' field missions in September 2016. The authors' prior experiences at *other* Rwandan sites suggests that child labour is typically not an issue at organised, more advanced sites, but *is* more commonly encountered at less organised, informal operations not assessed for this research. Furthermore, although boys and girls were not observed working in COMIKAGI mining areas during field research, it does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors who may rely on family members to carry out work.

<sup>55</sup> Gakenke District Local Government (2013) reports this rate, albeit low, is the highest of any district in the Northern Province and above the national average of 21%.

<sup>56</sup> Hinton 2006, WHO 2005, ILO 1999

monthly production and number of workers in 2016, an average mine worker contributes 11–12 kg of concentrate per month, equivalent to approximately USD 200.

## Expenditures

For the purposes of revenue distribution analysis, the main operating costs include:

- **Salaries and wages:** Salaries constitute approximately 70% of sub-contractors' operating costs. COMIKAGI reports that mine workers are paid according to a daily fixed salary ranging from RWF 1,500–2,000 or USD 1.75–2.50 per day, depending on the task and function performed. This set-up differs somewhat from many other 3T sites in Rwanda, where workers are more commonly (but not always) paid based on production.
- **Social, health, and other insurance:** All mineworkers are subject to 8% social security (4% by worker, 4% by employer), which are deducted and paid on behalf of the worker by the sub-contractor.
- **Traceability costs:** The 3T mining sector in Rwanda bears the cost related to meeting the due diligence requirements imposed on the supply chain via the Dodd-Frank Act<sup>57</sup>. Apart from costs related to internal traceability, each tonne of cassiterite concentrate generates a levy for the GOR through the Department of Geology and Mines (DGM), paid nationally (relating to the RCM), and a fee paid to ITRI per tonne of metal contained in the concentrate at the point of export to finance the CFSP. For a mix concentrate, COMIGAKI's combined costs (of iTSCi and RCM) represent a total amount of approximately 3% as direct cost of DDG.
- **Taxes and royalties:** Taxes and royalties (except traceability levies) paid by various actors total 8.1% and encompass mainly royalties (4% of export value) and personal income tax (4.1% of workers' salaries/wages). In addition:
  - Corporate income tax and COMIKAGI contributions in 2015 represented 8.5% of the generated commissions and 0.6% of the export value of the concentrates.
  - Sub-contractors' profits are also taxed. Considering the prevalent levels of informality in the Rwandan economy, an average 15% effective personal income tax rate can be assumed, representing 2.1% of the export value of the concentrate.
  - Processors/exporters' corporate income tax, based on an estimated net margin at 4% and a 30% corporate income tax rate, represents a direct profit tax contribution of 1.2% (without considering other taxes such as businesses pay).
- **Commissions:** Cooperative gross margin is 10% of the local sales of the concentrates. Sub-contractors generate 20% margin after deducing their costs. Processor exporters generate a 20% gross margin.

## Distribution of Revenues

Based on the above parameters, concentrate export revenues are distributed as follows (Figure 8).

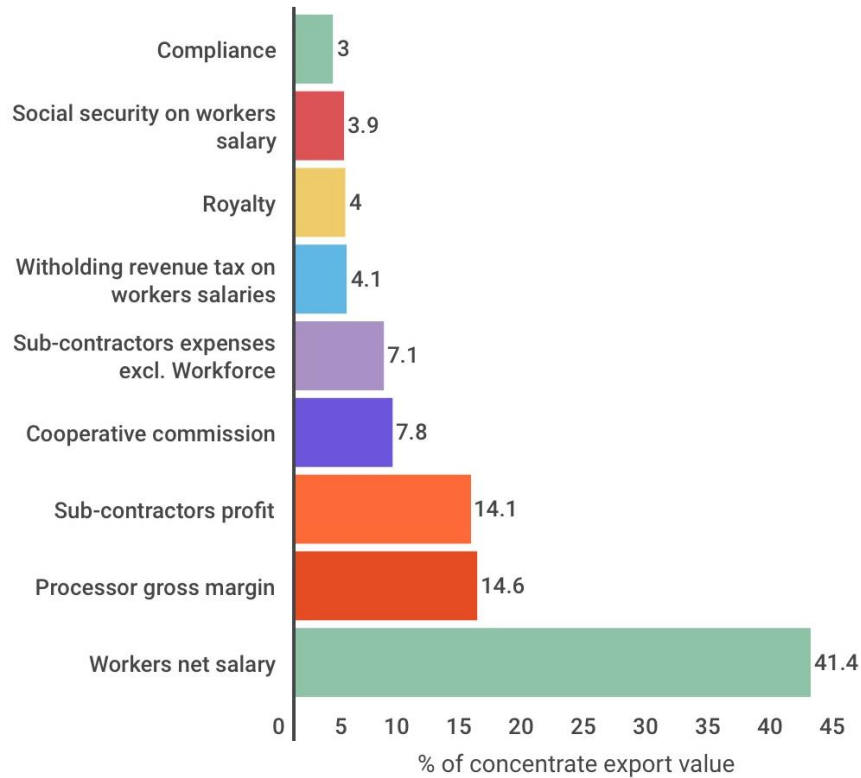
- **Workers** (477) retain 41.4% of production value as their wages. The average worker net monthly salary (after deductions) is USD 86.
- **Sub-contractors** (70) retain 21.2% as gross profit and 14.1% after major operating expenses are deducted.
- **COMIKAGI** (39 members) retains 7.8% as gross profit (i.e., 10% on sales equivalent to 7.8% of export price).
- **Processors/exporters**, including FECOMIRWA, retains 14.6% as gross profit.
- **Traceability services**, including iTSCi and RCM, together constitute about 3% in total as levies.
- **GOR** retains 12% as taxes, i.e., 4% royalties, 3.9% social insurance, and 4.1% personal income tax on workers.

Notwithstanding these revenue distribution figures, gender imbalances seem to extend beyond the quantity of jobs to the quality of work and its resulting economic benefits. While mine workers are aggregated in the above analysis, it is important to recognise differences in earnings by position. Women comprise approximately 19% of the overall workforce as sub-contractors and workers, yet receive only 14.2% of the revenue share accrued to the local economy.

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<sup>57</sup> United States 2010

**Figure 8: Distribution of revenues across the COMIKAGI supply chain (2016)**



### Economic Impact

The economic impact becomes visible in mining areas, such as Ruli or Mududu Village, where COMIKAGI headquarters is located. The village has a somewhat diversified economy of small shops, canteens, and restaurants, with a significant number (given the population) of relatively new *boda taxis* (motorcycles). Furthermore, individual sub-contractors report that mining has enabled them to significantly improve their socio-economic status, with contributions ranging from buying land and building a house for themselves or their parents, to paying children’s school fees (including up to university level), to investing in other income-generating activities (e.g., purchasing lorries for hire, carpentry businesses), thereby further extending employment contributions to the wider economy.

**Figure 9: Ruli pharmacy**



**Figure 10: Ruli hairdresser**

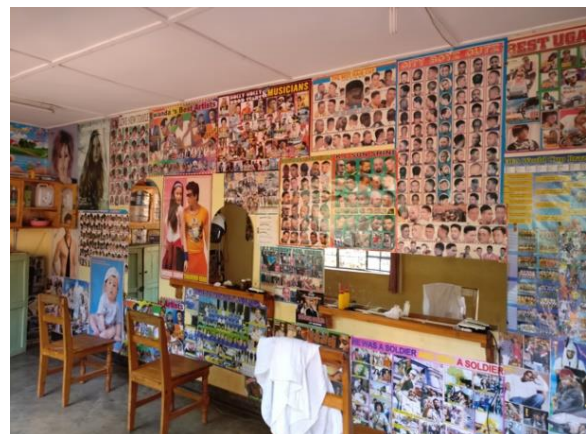


Figure 11: Ruli church



The cumulative effect of multiple 3T mines in Gakenke District is significant. The town is a hub of bustling shops and restaurants and boasts several impressive, modern houses, as well as a new health centre and several schools. Applying revenue distributions found in COMIKAGI to the Gakenke District, **more than USD 3.2 million was injected in the local economy in 2015.**

### 3.1.3. Findings from the COMIKAGI Case Study

The primary conclusions from the COMIKAGI case study are summarised as follows.

**Most revenues are retained in the local economy.** Based on a 77% revenue share, COMIKAGI operations injected approximately USD 1.6 million into the local economy in 2015, spurring local business development, inducing employment generation and supporting health, education, and development of direct and indirect beneficiaries.

**State revenues derived from this single cooperative are significant and have been estimated for 2015 at approximately 15.9% of the minerals' value.** This estimate is attributed to royalties, corporate income tax, personal income tax, and value added tax (VAT) contributions of mineworkers.

**Mineworkers, as a group, are the most significant beneficiaries** of production revenues (41.3%). As agriculture and mining visibly co-exist around COMIKAGI, much of the food consumption component of poverty line determination is likely to be met through subsistence agriculture, much of which is provided through the labour of female household members, and potentially providing some (although not all) explanation for women's low participation in the sector. Despite their levels of poverty, **mineworkers cumulatively make the most significant tax contribution of all economic actors, amounting to 61% of all taxes in 2015, basically double the royalty contribution.**

**Sub-contractors, who bear much of the investment risks, are the second most significant beneficiary group**, at 14.1% of production revenues. Sub-contractors have reported significant improvement in terms of economic status, including through land purchases, paying school fees, small business development, and others.

**COMIKAGI and processors/exporters hold a revenue share of 7.2% and 13.4%, respectively** before corporate income tax. Importantly, this excludes main capital and operating costs; *before expenses*, COMIKAGI earns gross revenue of approximately USD 7,100 per month (with cooperative members shares amounting to only USD 186 per member per month), while the processors/exporters (including FECOMIRWA) gross revenues amounts to USD 13,320 per month.

**Obligations to sell to a single entity pose risks of reducing local incomes further.** COMIKAGI is currently selling to both FECOMIRWA and other processors and exporters. Currently, there is only one mining federation in Rwanda, FECOMIRWA. Where cooperatives are obliged to sell all production to the federation, risks of monopolistic pricing and excessive commissions can have significant implications for the incomes of miners, local economic development contributions, and state revenues. Furthermore, there is a potential conflict of interest between the role of the federation to represent and defend the interests of the cooperatives and the role of the federation as a trade platform.

**Distribution of benefits clearly favours downstream actors, while the main financial risks are concentrated upstream.** The organisational structure exists as a practical response to functional operating needs, including in marketing and trade (processors/exporters), acquisition and maintenance of titles (COMIKAGI), investment and supervision (sub-contractors as small enterprises), and labour (individuals and teams as micro-enterprises). Nevertheless, some improvements of labour relations and reduction of legal restrictions can promote a better and more-fair distribution of benefits, such as:

- Upstream, for instance via contracts between sub-contractors and COMIKAGI and between sub-contractors and teams or workers, the institution of internal by-laws and codes of conduct, and inclusion of practices to increase the voice of workers in COMIKAGI would result in a more equitable distribution of risks (financial, occupational, environmental) and benefits (incomes, employment), particularly if coupled with measures to rectify gender inequalities in the system.
- Although COMIKAGI is operating under a small-scale licence, the operation provides useful insights for operations classed as artisanal. The current legal restriction on mineral processing by cooperatives (or companies) with artisanal licences potentially promotes a concentration of the supply chain in the hands of few processing plants. A broad range of appropriate, intermediate, low-cost mineral processing technologies could be easily introduced, resulting in increased recoveries and incomes of mine workers.

**Women yield fewer benefits but bear greater costs.** Until measures are put in place to increase individual women and men miners' incomes, the co-reliance of miners on agriculture appears to be crucial to meeting basic nutritional needs. However, women's responsibility for household food security, including by subsistence farming, is only one factor that contributes to their low participation in and disparate economic benefits from ASM.

**Investment in improving the local production system would yield the greatest returns.** The analysis of the COMIKAGI supply chain suggests that introducing low-cost, safer, more environmentally responsible and efficient processing and mining methods would increase local incomes and sectoral contributions to the local economy and state revenues. An emphasis on training women and instituting policies to increase their access to lucrative work would amplify development yields further. Working arrangements should be formalised (e.g., contracts between sub-contractors and workers that include rights and benefits) to address the distribution of economic benefits and environmental, occupational, and financial risks.

- **One of the main environmental concerns at the COMIKAGI sites relates to inadequate management of tailings (waste from processing), potentially creating siltation issues in downstream streams and rivers.** During the processing most of the ore drains quite haphazardly from the multiple trenches spanning the hillsides of processing areas into sometimes marshy valley bottoms.
- **Another important environmental concern relates to land degradation associated with operating and abandoned extraction sites and the multiple trenches and small water impoundments found across area hillsides.** This can impact residents by reducing land available for farming while the visibly numerous open and un-fenced shafts and pits scattered across the area can pose hazards for livestock and humans.
- The primary OHS issues observed relate to risks of collapse of underground tunnels and shafts, repeated stress on musculoskeletal systems associated with carrying of heavy loads and repeated motion in awkward positions, respiratory illness, and inadequate use of PPE.
- **No child labour was observed or reported during the author's field missions in September 2016.** This does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors who may rely on family members to carry out work.

## 3.2. Case Study: Gifurwe Tungsten Mines

This section summarises the assessment of the Gifurwe Tungsten Mines. Further details, including references where applicable, are provided in Annex 6.

Located in Rwengabale Sector of Burera District in the Northwestern Province of Rwanda (see 3.1. , above), the Gifurwe Mine commenced operations in 1937. Following sporadic operations by a series of companies and nationalisation in 1989, the 20 concessions were acquired in 2007 by Wolfram Mining and Processing Ltd. (WMP).

### 3.2.1. Supply Chain Actors, Activities, and Employment

#### Main Supply Chain Actors

WMP, the concession owner, is a Rwandese company headquartered in Kigali, with close economic linkages to its refiner Wolfram Bergbau und Hütten AG (WBH) in Austria, one of the subsidiaries of the Swedish group SANDVIK. The company is responsible for technical, administrative, and legal management of the mining operations. For that purpose, WMP employs 40 people, including the tailing processing plant and the heads of exploitation (extraction), explosives and blasting teams and other technicians, and captains.

Each of the seven **captains** (including four women) works on contract with the company and oversees the activities of the sub-contractors assigned to him/her. Each of the 15 extraction sites in the mine is run by a **sub-contractor** (including four women). The company defines the areas where sub-contractors are to conduct extraction activities, provides heavy machinery (excavator, bulldozer), and avails PPE and certain tools as needed for their activities. The company also purchases all production and inspects sub-contractors' work.

Currently, 660 **miners** work under sub-contractors in teams ranging 5–30 workers. Although sub-contractors are involved in recruitment of **team leaders** and sometimes workers, team leaders, and members typically determine who can work on their teams and the criteria for joining (e.g., approval by and payment to other members). The relationships between sub-contractors, team leaders, and miners are usually based on verbal agreements.

#### Mineral Production Methods and Environment

Reserves for surface mining are becoming depleted, but mineral extraction continues underground. Workings mainly consist of a series of tunnels and shafts branching from six main adits<sup>58</sup>, constructed by a combination of company employees or direct contractors who conduct planning, explosives and blasting, inspection, and timbering activities. Once ore-bearing veins are discovered, production is carried out by teams dedicated to extraction, which haul and process the ore using common manual ASM technology. Veins are wide (approximately 80–100 cm) and grades are exceptionally high (4.5–8% WO<sub>3</sub> [tungsten trioxide]). Lower-grade material subsequently is recovered, hauled, and processed by women, many of whom work independent of teams, or by mine workers feeding the company processing plant. Ore is hauled to nearby areas, where it is crushed with hammers and manually sorted (i.e., visible wolframite is hand-picked for sale), with the remaining material subjected to coarse grinding in advance of washing using ground sluices. Production by teams varies widely, but was reported to range 5–6 kg per day, while individual workers (more commonly women) report production of about 4–5 kg per day.

WMP processes the pre-concentrates it purchases from sub-contractors. The plant typically handles 5–8 tonnes of material from tailings and produces 30–40 kg of WO<sub>3</sub> concentrate per day. The final concentrate ranges 62–67% WO<sub>3</sub>.

Although WMP collects tailings from the plant in basic impoundments and has made efforts to stockpile waste rock in specific areas of the mine, the overall mine waste management system has room for improvement. In areas where sub-contractors conduct pre-processing, tailings appear to flow somewhat uncontrolled downslope from sluicing areas. Siltation risks to downstream watercourses and impacts on water quality through release of deleterious elements (e.g., arsenic) are assumed. To offset the footprint of area impacted by the mine and provide a source of timber used to stabilise underground workings, WMP has conducted extensive tree-planting activities, with 135,000 trees planted as of September 2016, and allocated 90 ha for forestry.

#### Employment and Gender Division of Labour

WMP maintains a registry of all workers derived from records provided by sub-contractors. In September 2016, mineworkers totalled 660 (approximately 20 women), well below employment levels during periods of high prices (1,000–1,300 mineworkers). Most workers and employees work from 7 am to 3 pm daily, though two shifts may operate in a day when preparation/development work (e.g.,

<sup>58</sup> An adit is an entrance to an underground mine that is horizontal or nearly horizontal.

blasting, inspection, timbering) is underway, and the processing plant typically runs for two shifts daily. All workers are covered by social insurance.

Several senior workers reported that conditions have improved substantially since WMP has taken over Gifurwe. The most commonly cited improvement relates to changes in OHS, including widespread use of PPE; frequent and on-going inspection, supervision, and timbering activities; availability of first aid treatment; and a vehicle to transport injured workers, among others.

WMP's efforts to employ women have impressively challenged prevailing beliefs in Rwanda that women can't work underground. In efforts to challenge gender discrimination, WMP has recently supported a team of seven women and three men to develop an 800 m shaft into un-exploited vein sets. In the two months since they commenced their activities, much work has focused on development, but the team has already produced approximately 2.5 tonnes of concentrate.

While no child labour was observed or reported during the authors' field missions in September 2016, the authors' prior experiences at *other* Rwandan sites suggests that child labour is typically not an issue at organised, more advanced sites, but *is* more commonly encountered at less organised, informal operations not assessed for this research. Furthermore, although boys and girls were not observed working in the WMP mining area during field research, it does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors who may rely on family members to carry out work.

### 3.2.2. Distribution of Economic Costs and Benefits across the Supply Chain

#### Production Value and Sales

Between 2013 to middle 2016, wolframite concentrate production declined from 8-12 tpm to 3.5-6 tpm. In July and August 2016, mine production averaged 5.85 tpm. On average, Gifurwe concentrate contained 65% WO<sub>3</sub>. Concentrate is valued based on metric tonne units of ammonium paratungstate, wherein 1 metric tonne unit equalling 10 kg contains approximately 7.93 kg of tungsten.

The ammonium paratungstate (APT) base-price in July 2016 was USD 188.5 per metric tonne unit (European cost, insurance, and freight [CIF]). Export prices were USD 8.4 per kg of concentrate, corresponding to 68.5% of European APT price. Although linked to international market prices, actual sale prices depend on the contract between the seller and buyer.

#### Expenditures

For the purposes of revenue distribution analysis, main operating costs are considered, such as:

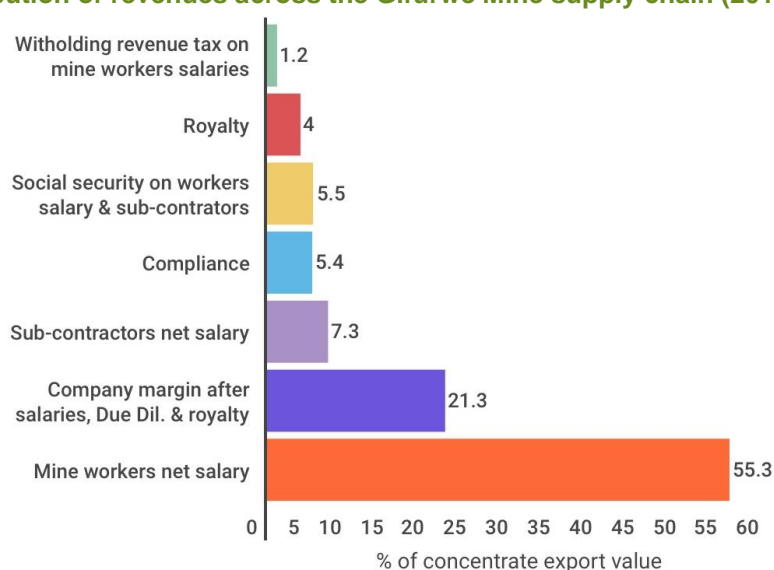
- **Salaries and wages:** Workers carrying out mine development are paid daily, while those in production (extraction, processing) are paid by production. Average daily wages range from RWF 800 or USD 1 for supporting miners (helpers), RWF 1,150 or USD 1.44 for ordinary team members, to RWF 1,500 or USD 1.75 for team leaders. Production team members are paid RWF 1,660 or USD 2.1 per kg of concentrate produced.
- **Social, health, and other insurance:** All mineworkers, employees, contractors, and sub-contractors are subject to deductions of 8% social security (4% by worker, 4% by employer), which is deducted by WMP as electronic payments are processed.
- **Traceability costs:** The 3T mining sector in Rwanda bears the cost related to meeting the due diligence requirements imposed on the supply chain via the Dodd-Frank Act<sup>59</sup>. Apart from internal costs related to internal traceability, each tonne of wolframite concentrate generates a levy for the GOR through the DGM, paid nationally (relating to the RCM), and a fee paid to ITRI per tonne of metal contained in the concentrate at the point of export to finance the CFSP. For Gifurwe, these combined costs (of iTSCi and RCM) represent approximately 5.4% of the value of the concentrate produced.
- **Taxes and royalties:** Taxes, royalties, and levies paid by various actors consist of:
  - Workers are required pay a 15% pay as you earn (PAYE) income tax, including for casual workers, on the monthly portion above RWF 30,000 or USD 37.5.

<sup>59</sup> United States 2010



- Each sub-contractor is taxed according to the legal micro-enterprises scheme. Under this, an annual flat amount of RWF 60,000 or USD 75 is paid.
- Corporate income tax amounting to 30%
- **Distribution of revenues:** Based on the above parameters, concentrate export revenues are distributed as follows (Figure 12).
  - **Workers** (660) retain 55.3% of the total export value. While mine workers are aggregated in the analysis, it is important to recognise differences in earnings by position and nature of work. For instance, workers involved in mineral production earn approximately 32% more than those in preparation and development.
  - **Sub-contractors** (15) obtains 7.3% of the total export value before deductions (social insurance, personal income tax).
  - **WMP** obtains 21.3% of the concentrate export value as margin after payment of royalties, due diligences fees, and mine workers' costs, but before corporate incomes tax (and excluding capital and operating expenditures).
  - **Processors/exporters:** not applicable (WMP is supposed to export directly to WBH).
  - **Traceability costs**, including iTSCi and RCM, together constitute 5.4%.
  - **The GOR** obtains 10.7% of the concentrate export value as royalties (4%), social insurance (5.5%), and personal income tax (1.2%) on workers.

**Figure 12: Distribution of revenues across the Gifurwe Mine supply chain (2016)**



## Economic impact

The significance of the economic impact is best expressed by mine workers and sub-contractors themselves within this agriculture-reliant community. Women miners conveyed how their work in the mines enabled them to buy livestock, provide financial support to their parents, and other benefits that they saw as an improvement from their previous work in farming. One sub-contractor, a miner at Gifurwe since 1974, now owns 16 plots of land, which he employs others to work, built a house, and owns a motorcycle and livestock, while putting three children through school.

Gifurwe workers and sub-contractors (who reside in and mainly originate from nearby communities) yield 62.7%, after deductions. Approximately USD 370,000 could be injected annually into the local economy. Based on these ratios and Burera District's wolframite statistics, **approximately USD 1.8 million was injected into the local economy from miners' and sub-contractors' incomes in 2015 alone**. Multiplier effects were not quantitatively determined from Burera District, but based on factors employed in other ASM countries (and similar production systems in adjacent mines), direct and induced employment may amount to 2,487 and 6,216 jobs, respectively, with the economic contributions totalling approximately USD 6.3 million per year.

### 3.2.3. Findings from the Gifurwe Case Study

The main conclusions from the Gifurwe case study are summarised as follows.

**Local economic contributions can provide the foundation for broader employment and development benefits.** Based on a 62.7% revenue share accrued to miners and sub-contractors' incomes, Gifurwe workers were contributing approximately USD 1.8 million into the local economy in 2015, spurring local business development, inducing employment generation, and supporting health, education, and development of direct and indirect beneficiaries. Based on multiplier effects, as many as 8,700 Burera District residents may benefit from direct and induced employment from wolframite mining alone.

**State revenues derived from this operation are significant.** These have been estimated for 2015 at approximately 16% of the minerals' value. This estimate is attributed to royalties and personal income tax of mineworkers and sub-contractors, but excludes corporate income tax, which is expected to be significant. If VAT on applicable goods purchased by mineworkers alone are considered, an additional 1.75% as a minimum of total concentrate export value is contributed to state coffers (almost half that recovered from royalties).

**Traceability costs are significant.** In the case of Gifurwe, compliance costs amount to 5.4% of the export value (which is higher than royalties). This highlights the efforts producers must make to comply with Dodd-Frank Act requirements and to access international markets. Because traceability costs are fixed, they became a substantial part of the production costs when the 3T prices dropped in the last years.

**Gifurwe provides positive examples of ways to support women's economic empowerment,** including through efforts to counter harmful beliefs concerning women's capacity to work in non-traditional roles (e.g., underground work, targeted efforts to recruit and train women, prior though less currently active support for women's savings and loans associations, recognition of the relevance of safe working conditions). Prevailing local norms and beliefs (e.g., women must leave mines upon marriage) and protective legal prescriptions (e.g., relegating all jobs in mines off limits during pregnancy with little clarity concerning return to work) put such efforts at risk and are likely to impede achievement of Rwanda's 2020 target of 30% women's employment in all sectors for Gifurwe and other operations.

**An investment in improving the local production system would yield the greatest returns.** Introducing low-cost, safer, more environmentally responsible and efficient processing and mining methods would increase miners and sub-contractors' incomes, thereby augmenting development contributions further. However, company capital and operating costs (not fully accounted for in the analysis) are believed to be high and profit margins narrow, with the main means to supplement revenues derived from processing tailings (i.e., relying on inefficiency of artisanal production). A more comprehensive cost-benefit analysis is needed to ensure that such operations that seek to employ better standards (e.g., OHS, gender equity) are not impeded through such measures.

- Although WMP collects tailings from the plant in basic impoundments and has made efforts to stockpile waste rock in specific areas of the mine, **the overall mine waste management system leaves room for improvement.**
- **Siltation risks to downstream watercourses and impacts on water quality through release of deleterious elements (e.g., arsenic) are potential problem.**
- **WMP conducts reforestation activities to offset the footprint of area impacted by the mine** and provide a source of timber used to stabilise underground workings.
- **No child labour was observed or reported during the author's field missions in September 2016.** This does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors who may rely on family members to carry out work.

## 4. Economic Contributions of 3T Mining

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Rwanda has received international recognition for its efforts to implement the RCM and for the GOR's associated attention on the formalisation of 3T supply chains. This has resulted in the capture of state

revenues vis-à-vis royalties and taxes, while generating foreign exchange earnings and other national development benefits. This section seeks to profile the magnitude of these contributions alongside the benefits obtained in terms of employment and local development via the injection of capital into rural and largely agriculture-reliant economies.

Importantly, **artisanal and small-scale licences accounted for 82% of 3T production**. Large mining licences areas (as found in Gifurwe) are only semi-mechanised and rely heavily on artisanal workforces. Fully mechanised, industrialised 3T mines are yet to be developed in the country. As such, both macro- and micro-economic contributions to 3Ts can largely be attributed to ASM. Though benefits of increased investment by the larger, private sector can yield obvious development benefits, as was observed in Gifurwe. These benefits particularly are related to OHS, gender, as well as mineral production, given their capacity to recover concentrate from lower grade ore and tailings.

Most calculations are based on 2015 production and export statistics. It is therefore critical to highlight that **2016 was marked by low mineral prices and sharp declines in production, sales, and tax revenues**. The International Monetary Fund attributes these events in the minerals sector as one of the key factors contributing to the depreciation of the RWF against the USD, declines in commercial banks' foreign exchange reserves, a worsening trade deficit, and corresponding impacts on employment and household incomes, with implications (including increased inflation) expected throughout 2016<sup>60</sup>. Therefore, contributions would be substantially higher if and when 3T prices fully recover or fiscal and other measures are taken to stimulate the sector.

## 4.1. State Revenues

Contributions to state revenues are summarised below in terms of foreign exchange and export earnings, the main tax contributions, royalties, and the social security fund.

### 4.1.1. Foreign Exchange and Export Earnings

In 2015, Rwanda's exports totalled USD 600 million, with **3Ts constituting USD 110 million, or 19% of all exports, making them key contributors to export and foreign exchange earnings in the country**, as exporters are required to repatriate export earnings<sup>61</sup>. Cassiterite represented the second most exported product of the country, with a total of 3,846 metric tonnes in 2015, for a value of USD 72 million, while tantalite (1,652 metric tonnes) summed USD 66 million during the same period. These two commodities represented 17% of the overall exports and are in the top four of most exported products from Rwanda, together with tea and coffee. In the first seven months of 2016, cassiterite exports dropped 19.2% in value and 15.3% in volume, while tantalite exports dropped by 41.4% in value and 21.3% in volume<sup>62</sup>.

### 4.1.2. Taxes and Royalties

Even with the exclusion of corporate income tax, **other taxes and royalties from the 3T sector make significant contributions to state coffers**. As shown in Table 3, contributions of artisanal miners to VAT expenditures on local goods amounts to 63% of paid royalties and are almost four times what will likely be paid in income taxes, suggesting that even informal ASM contributions can be substantial, yet they are rarely considered.

**Table 3: Royalty, income tax, and social security fund contributions of 3Ts (in USD, 2015)**

Contribution	Cassiterite	Tantalite	Wolfram	TOTAL
Value of Exports <sup>a</sup>	51,127,749	10,650,317	21,075,592	<b>82,853,658</b>
Royalties (4% of export value)	2,045,110	426,013	842,024	<b>3,314,146</b>

<sup>60</sup> IMF 2016

<sup>61</sup> 'Exporters are required to repatriate all export earnings within three months of their export. Repatriated foreign exchange should match the value stated in the export declaration'. Retrieved from: <https://www.export.gov/article?id=Rwanda-Foreign-Exchange-Controls>). Regarding dividends to non-residents (case of traders and exporters) there is a withholding tax of 15%: 'Dividends and similar distributions received from an investment in Rwanda by a resident or non-resident person are subject to final withholding tax at 15%'. (source: PWC)

<sup>62</sup> Data Source: External Trade Statistics Department of the National Bank of Rwanda. Retrieved from <http://wits.worldbank.org/countrysnapshot/en/RWA>.

Contribution	Cassiterite	Tantalite	Wolfram	TOTAL
Personal income tax (miners) <sup>b</sup>	339,218	70,676	139,858	<b>549,817</b>
VAT (miners) <sup>c</sup>	1,293,892	269,528	533,361	<b>2,096,782</b>
<b>Subtotal (USD)</b>	<b>3,678,220</b>	<b>766,217</b>	<b>1,515,243</b>	<b>5,960,745</b>
Social security fund (artisanal workers) <sup>b</sup>	2,261,892	471,170	932,384	<b>3,665,446</b>

<sup>a</sup> Based on MINIRENA production and export database. Notably, these statistics provided by MINIRENA are well below those provided by the National Bank of Rwanda.

<sup>b</sup> Extrapolated from case study distribution of revenue shares and respective personal income tax and 8% social security fund contributions. Note: refers to mine workers, employees, and sub-contractors.

<sup>c</sup> VAT contributions for Rwanda derived from: Asian Development Bank (ADB), 2012, *A Comparison of Real Household Consumption Expenditures and Price Levels in Africa*, African Development Bank publ., 92p. Note: refers to mine workers, employees and sub-contractors.

### 4.1.3. Social Security Fund of Rwanda

Through management and investment of social insurance funds, the Social Security Fund of Rwanda ensures social security benefits to participating Rwandans, thereby contributing to the long-term well-being of participating members. If all were registered in the system, artisanal mine workers would have contributed approximately USD 1.8 million to the Social Security Fund of Rwanda in 2015.

## 4.2. Local Economic Development

The ASM sector's local economic development contributions largely stem from informal and formal employment and capital injected into local economies.

### 4.2.1. Formal and Informal Employment

In 2014, the mining sector directly employed approximately 34,000 people<sup>63</sup>. With an estimated four dependents per miner, a total of 170,000 Rwandans (approximately 1.5% of the total population) are directly dependent on the sector. This compares to 3.02 million people employed in the agriculture, forestry, and fisheries sectors and 142,000 people employed in the construction sector<sup>64</sup>.

#### These statistics likely do not fully capture the employment contributions of the minerals sector.

The national survey on the informal sector conducted in 2007 resulted in a 73% share of persons employed in the informal sector in total non-agricultural employment<sup>65</sup>. Regarding constraints affecting the informal sector, the survey indicates that 75% of the problems affecting the informal sector are due to lack of capital. The survey further reveals that the informal sector has a significant number of operators who reported not paying any form of tax, with the informal mining sector having the highest percentage of 34.2%. From the perspective of the transition from informal to formal, the survey reveals that there are many of units that responded reluctantly to formalisation for reasons such as less red tape with public authorities (73%), independence (45%), ease of access to the minimum requirements to start activities (50%), ease of having low-cost labour (39%), ease of engaging buyers (32%), ease of production (25%), lack of awareness of the benefits of being formal (38%), and lack of information on the requirements to become formal (55%)<sup>66</sup>.

Cook and Mitchell (2014) indicate that most mine workers are paid on a production basis (i.e., per kg of pre-concentrate produced), and only in rare cases are workers salaried<sup>67</sup>. Some sites differentiate casual workers (developing tunnels or cleaning waste), who are paid a fixed amount per day, from miners who are paid based on production; after having had some experience, 'casual workers' might be promoted to 'miners'<sup>68</sup>. This finding is aligned with the high prevalence of informal employment and underlines that reported numbers of miners or people employed in the mining sector are subject to varying definitions on what actually constitutes an 'artisanal and small-scale miner'.

<sup>63</sup> An extract from the ICGLS mine site database reports 19,500 miners.

<sup>64</sup> World Bank 2014, Cook & Mitchell 2014

<sup>65</sup> ILO 2016

<sup>66</sup> NISR 2007

<sup>67</sup> Cook & Mitchell 2014

<sup>68</sup> Ibid

The productivity of miners extracting 3T minerals is reported as 0.1–6 kg per day. The average productivity from a sample of 97 mines<sup>69</sup> in 2015 was approximately 1.3 kg per person per day (low average: 0.96, high average: 1.64). To achieve 2014's exported production of approximately 10,300 tonnes with the reported workforce of 34,000 miners, an average of 230 workdays per miner would be required. This explains the variance between reported numbers of workers. For the mines operating all year, approximately 20,000 workplaces are required. As miners are mostly casual workers, the approximately 34,000 miners correspond to an assumption of miners being employed at nominal work time. However, because seasonal, casual work may involve fewer work days per month dedicated to mining (estimate: 10 days per month = 120 days), **the actual number of individual persons directly involved in mining on a seasonal basis may well have increased to 65,000 in 2014.**

Estimates compiled herein suggest that production per individual miner could be much lower than prior estimates, particularly when accounting for work stoppages (e.g., due to collapse, flooding), time spent on development of workings and other factors. If daily individual production averages of 0.35 kg, 0.37 kg, and 0.13 kg for cassiterite, tantalite and wolfram, respectively, are used<sup>70</sup>, national formal and informal employment contributions may be nearer to 77,000. **If common multiplier effects are applied<sup>71</sup>, spin-off employment in mining areas may amount to an additional 192,890 induced jobs and, accounting for both direct and induced employment, suggests that in the order of 1.1 million Rwandans may rely on the mining sector<sup>72</sup>.**

#### 4.2.2. Stimulus into Local Economies

Although some in-country migration is possible, artisanal and small-scale miners in Rwanda are most commonly residents of communities where mines are located and often originate within or near areas hosting mines<sup>73</sup>. As such, miners' incomes spent on local goods and services, education, health care, acquisition of assets (e.g., land, livestock), and investment in small enterprises can make significant impacts on mining-affected communities.

As shown in Table 4, **artisanal miners were estimated to contribute approximately USD 39.5 million in 2015.** At a district, sector, and village levels, this economic contribution makes a significant impact in terms of buttressing the cash component of households by providing markets for agricultural and other goods, thus stimulating small enterprise development and improving the potential for increasing health, educational status, and overall well-being of those benefiting directly or indirectly from the sector.

**Table 4: Artisanal miners direct contributions to local economy (in USD, 2015)**

Province	Miners estimated incomes <sup>a</sup>	Deductions Social Security Fund of Rwanda <sup>b</sup>	VAT <sup>c</sup>	Total est. local expenditures (after deductions)
Eastern	9,151,688	841,955	418,811	7,890,922
Western	15,354,600	1,412,623	702,676	13,239,301
Northern	9,620,607	885,096	440,270	8,295,241
Southern	7,402,225	681,005	338,749	6,382,471
Kigali	2,328,225	214,197	106,547	2,007,481
<b>Total (USD)</b>	<b>45,818,073</b>	<b>4,215,263</b>	<b>2,096,782</b>	<b>39,506,029</b>
Attributed to men <sup>d</sup>	39,403,543	3,625,126	1,803,233	33,975,185
Attributed to women <sup>d</sup>	6,414,530	590,137	293,549	5,530,844

<sup>a</sup> Estimated based on calculated revenue shares and value of export derived from MINIRENA production and export database. Notably, these statistics provided by MINIRENA are well below those provided by the National Bank of Rwanda.

<sup>69</sup> Data source: Extracted from ICGLS mine site database.

<sup>70</sup> Based on 2015 production statistics.

<sup>71</sup> In the absence of a calculated multiplier in Rwanda, a multiplier of 2.5 has been applied as in Liberia, Central African Republic, and Uganda (Hinton 2009, Hinton 2011, Hinton & Levin 2010).

<sup>72</sup> Based on average household size of four family members. (World Bank 2014)

<sup>73</sup> Based on interviews with miners at sites in September 2016 and prior qualitative research in Rwanda (Hinton 2016b). In the absence of quantitative research, the extent of migration cannot be verified.

Province	Miners estimated incomes <sup>a</sup>	Deductions Social Security Fund of Rwanda <sup>b</sup>	VAT <sup>c</sup>	Total est. local expenditures (after deductions)
<sup>b</sup> Local contributions assume deductions for personal income tax and social security fund have been paid. Data nevertheless suggests that even informal miners' incomes can make substantial contributions to local economic development. <sup>c</sup> VAT contributions for Rwanda derived from: ADB, 2012, <i>A Comparison of Real Household Consumption Expenditures and Price Levels in Africa</i> , African Development Bank publ., 92p. <sup>d</sup> Based on formal employment statistics provided in the MINIRENA production and export database indicating that 14% of the workforce in 2015 was composed of women.				

## 5. Conclusions and Recommendations

As the backbone of Rwanda's minerals sector, 3Ts are positioned to make significant contributions to the nation's long-term development strategy, Vision 2020, by supporting the growth acceleration and poverty reduction needed for Rwanda to achieve middle-income country status. With 82% of production attributed to ASM licences and the large-scale mining (LSM) sector's heavy reliance on ASM, it represents a major contributor to economic development.

This section outlines these contributions, highlights constraints and opportunities for advancement of the sector, and makes recommendations for how economic contributions can be bolstered while supporting inclusive, pro-poor development.

### 5.1. Conclusions

The 3T sector is an ASM sector. Even if artisanal and small-scale extraction methods are performed by companies that are legally qualified as large scale, according to the definition in the legislation<sup>74</sup>, the sector is based on ASM extraction. Low levels of exploration, mechanisation, and investments are characteristics of ASM that prevail in the Rwandan mining sector.

As seen in the economic distribution of the ASM sector, most of the value created goes to artisanal and small-scale miners. The first resource used is manpower, and 3T extraction has a very high social impact. Those characteristics are typical of ASM mining all over the world.

Aside from the social impacts of ASM, the sector is also fundamentally important for the Rwandan economy. In 2015, it employed 30,000 workers (down from 38,000<sup>75</sup> in 2014) and represented USD 118 million<sup>76</sup> in exports, contributing significantly to the country's foreign reserves (21% of the total exports<sup>77</sup>). ASM offers rural populations an alternative livelihood where the main economic activity remains subsistence farming<sup>78</sup>, and the revenues generated by the miners trickle down into rural territories through local miners' spending.

The 3T supply chain is highly formalised, considering that almost all three minerals are exported legally, the miners are paid through the banking system (there is a high rate of use of the banking system in the sector), and taxes and social security on their revenue are collected. The social and taxation systems are quite advanced for the continent and performed effectively in the mining sector. This study identified that the direct tax contribution is very important for cassiterite. In the COMIKAGI case study, for example, nearly 16% of the exported value of the mineral contributed directly or indirectly through VAT payments by mine workers to the national economy.

With its formalised and traceable supply chain, a high local and employment impact, an important tax and social contribution and a massive foreign reserves generation, the sector is economically virtuous for Rwanda.

<sup>74</sup> Artisanal: ≤ 3 tonnes /month; Small-scale: ≤ 15 tonnes/ month; Large-scale: > 15 tonnes /month.

<sup>75</sup> Rwanda Natural Resources Authority interview.

<sup>76</sup> National Bank of Rwanda, External Trade Statistics, Formal monthly exports 2015

<http://wits.worldbank.org/countrysnapshot/en/RWA>.

<sup>77</sup> Ibid.

<sup>78</sup> 71% of 2005 employment in Rwanda was subsistence farming. (Ulandssekretariate 2015)

Despite this positive view of the economic contribution of AM operations in Rwanda, several issues were identified. For example, the improvement of working conditions and labour relations, particularly in terms of rights for the workers, gender equality, and safety merit further attention. Additionally, there needs to be a more equitable distribution of revenues generated by the mines for the miners and for the districts and provinces where these minerals are produced. Implementation of such reforms will require commitment of support institutions, typically government agencies, recommendations for which are provided in section 5.2.

Specific entry points for action are highlighted below.

**A major problem that the 3T supply chain must address lies frequently in labour relations between employers and miners.** As other studies already identified, some employers in the mining sector sub-contract managers to avoid hiring workers with bargaining rights or paying benefits required by law. Workers in labour relations with sub-contractors and those in mineral processing may be especially vulnerable to hazardous or exploitative working conditions. Statistics on workplace fatalities and accidents were not available, but Ministry officials singled out mining as a sector with significant challenges in implementing OHS standards<sup>79</sup>.

**Poor underground methods represent a major constraint to increased ore production and poses major safety risk.** Collapse of weak, unsupported tunnels; flooding of workings; and rock falls pose risks that can cause injury or fatalities and cut off access to, ore which can lead to suffocation caused by poor airflow and tunnel closure. Furthermore, although emphasis is often on processing methods, the ore extraction rate at many sites is typically much slower than processing, impeding overall production increases.

**Poor environmental management practices pose multiple risks to human health, livelihoods, and economic development.** The most pressing concerns are tailings mismanagement, waste rock, and water.

Rwanda has impressive commitments regarding gender equality, including via its National Policy on Positive Discrimination towards Women, entrenched sensitisation processes from local to national levels and ambitious targets of 30% women's employment in all sectors by 2020, among many others. Despite these positive developments, **women yield fewer benefits from the AM sector (e.g., employment, incomes), but bear greater costs (e.g., land degradation affecting crop land, impacts on water sources, caring for ill family members)**<sup>80</sup>. Nevertheless, women miners report achievement of multiple gains from their work in mines.

**Supply chain stakeholders are complaining about the cost of traceability.** It is an undeniable paradox that, despite the good intentions of the policy-makers who introduced Dodd-Frank Section 1502 to de-link minerals and conflict, mineral traceability and due diligence costs are ultimately at the expense of poor (artisanal and small-scale miners) because even if the system is free for artisanal and small-scale miners and fees/levies are paid at the point of export, they are inevitably passed up the chain to the point of production. Traceability is a requirement of the downstream end-users, but this end of the supply chain does little to bear the cost burden that applies to the miners. Yet, despite this burden, traceability must be acknowledged as the driver which differentiates the 3Ts sector in Rwanda from the other ASM minerals and countries.

**Contributions from mining companies and cooperatives to local communities through payment of local taxes seem relatively negligible,** which confirms earlier findings<sup>81</sup>. Many other jurisdictions have given an imbalanced emphasis on obtaining formal macro-economic benefits (e.g., state revenues) by legalising mineral production and trading chains without establishing the lines of support and incentives needed to address broader constraints and issues through longer-term commitments to formalisation. Creating conducive conditions via the legal framework and a system through which mining titles are granted and maintained is a critical precursor for the process.

<sup>79</sup> USDOS 2016

<sup>80</sup> Factors range from discriminatory beliefs and cultural norms, including those prompting women to leave the mining workforce upon marriage, women's lower participation and bargaining power in ASM organisations to lower socio-economic and educational status, among many others (Hinton 2016b).

<sup>81</sup> Cook & Mitchell 2014

**The main drawback of the current legal framework is that, while it acknowledges the different sizes of mining operations, it does not bring the recognition of differences to the administrative procedures and the associated obligations for legalising ASM operations.** The consequence of this limitation in the approach is that only a few mining operations actually achieve legalisation and the majority will experience real difficulty in overcoming the hurdles for full legalisation. **Another potential consequence is that the system will promote the legalisation of the trade of the minerals, but not of the actual mining operations** because of the complexity and the costs associated with obtaining and maintaining the artisanal and small-scale licences. This situation is already starting to occur and may result in negative consequences, especially for the mineworkers. Additionally, it creates a false sense that the sector is legalising, when in fact it is only the commercialisation of the minerals without the legalisation of the mining operations.

It is not complicated to make improvements in the legal framework to prevent these situations from becoming the norm. Indeed, most issues are related with legal dispositions that can be modified through Ministerial Order.

## 5.2. Recommendations

Despite its substantial economic contributions, the ASM sector is frequently characterised by inefficient methods, hazardous working conditions, poor environmental management, gender inequality in the distribution of benefits, and child labour. Numerous countries tackle these issues through formalisation, a process that includes but extends beyond ASM's organisation and granting of legal status. Given that approximately 60% of artisanal and small-scale miners in Rwanda work under legally registered cooperatives or small-to-medium-scale companies and that most 3T mineral supply chains are reportedly exported through official channels, the country has a solid platform on which to address these challenges and deepen the sector's development contributions.

It is important to emphasise that Rwanda has other ASM sectors that are not in the same level of formalisation as the 3T mineral supply chains. For example, ASGM extraction reportedly exists in the country, but no national transactions or exports are recorded, meaning that the sector is still informal. It would be strategic to attract this sector into formality and, to achieve this objective, further research is recommended on the Rwandan ASGM sector.

In this sense, the recommendations summarised in the following sections for a comprehensive, integrated process of formalisation apply only for 3T mineral supply chains.

### 5.2.1. Formalise Labour Relations and Balance Distribution of Benefits and Risk in the Supply Chain

Labour relations between employers and miners must evolve. At present, these relations prevent artisanal and small-scale miners from acquiring the legal rights that they deserve. One way to formalise these labour relations is through a bonus/penalty system on mineral royalties that would penalise the mining organisations with a high ratio of short term/no benefit labour force to actual employees.

**The current imbalance of costs and benefits, in which the distribution of benefits favours downstream actors while the main financial risks and burdens are concentrated upstream, must be addressed.** Although the AM workforce as a group captures a large proportion of revenues (41–55%), most are living at the poverty line and lack means to access external technical support to improve productivity, safety, and overall performance. Specific efforts need to be carried out to reduce traceability costs for producers and to distribute the cost of due diligence compliance in a more balanced manner for all actors of the supply chain. Due diligence must be a system that facilitates the formalisation of the supply chain, thus allowing for better tax and social contributions collection. The GOR and, to a wider extent, the country whose international image benefits from this formalisation also have a moral responsibility to bear part of the cost burden.

**Local economic contributions from ASM are substantial and should be better captured, disseminated, and distributed.** The injection of approximately USD 39.5 million in 2015 into local economies via miner incomes represents a major stimulus for micro-, small, and medium enterprise development and related employment, helps stem rural-urban migration, provides markets for agricultural products, and enables households to meet family needs, often in the poorest and most



remote reaches of the country. These contributions should be highlighted in government reports and shared with multiple stakeholders, including local government, providing a basis to advocate for more services and support to ASM areas. A more comprehensive survey instrument that captures livelihood, economic, and gender dimensions of the sector should be developed by or with MINIRENA and the Bureau of Statistics to lend greater insight. According to international best practice<sup>82</sup>, local provinces and districts should be allocated an adequate part of the collected taxed (e.g., royalties) because they are directly impacted with the extraction.

**The organisational functioning and fairness of mining companies and cooperatives should be improved.** A review of organisational arrangements and contracts therein and of capacity building is needed to ensure cooperatives, in particular, function in a more inclusive manner. More formal cooperatives and companies (e.g., COMIKAGI, WMP) are seeking to improve their activities and some are better positioned than other to provide such support. However, most companies are reportedly less formal, and many in the GLR are subject to ‘elite capture’, with the workforce having little influence and bargaining power to influence production-sharing arrangements and to lobby for requisite support<sup>83</sup>.

**Investigate the degree to which child labour may be an issue in less organised, informal sites.** While no child labour was observed or reported during the authors’ field missions in September 2016, the authors’ prior experiences at other Rwandan sites suggests that child labour is typically not an issue at organised, more advanced sites, but is more commonly encountered at less organised, informal operations not assessed for this research. Furthermore, although boys and girls were not observed working in COMIKAGI or WMP mining areas during field research, it does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors, who may rely on family members to carry out work.

### 5.2.2. Gender Inclusion Is Essential

Rwanda has a Gender Policy with specific targets; this is a very important starting point. However, the mining sector, as a traditionally male-dominated sector (including when the men are not the majority of the labour force), has its own unique issues related to gender that require special attention. **A national mining programme should be developed to promote cultural shifts regarding the roles of women in ASM sector, improvements on rights related to gender specifically (e.g., maternity benefits), and training in areas that will empower women to have access to better quality jobs.**

### 5.2.3. Training on OHS and Efficient Extraction and Processing is Needed

**Specific technical training is needed in a range of critical safety and operational topics**, from underground risk identification and timbering to mining methods (rock breaking, hoisting systems) to basic mine planning and OHS systems (e.g., communication, incident management).

**Poor environmental management practices also need to be addressed because they pose multiple risks to human health, livelihoods, and economic development.** Training and technical expertise related to mine waste and water management and introduction of basic systems within the workforce (e.g., concerning basic rules, inclusion within contracts) are needed to ensure responsible practices proliferate across sites.

**Production can be substantially increased through the introduction of and training in appropriate, intermediate mineral processing technologies.** Current methods result in losses more than 40% and rely heavily on high-grading. This can be attributed to different factors, including:

- **Poor liberation (under-grinding) or over-grinding of ore:** This requires a means of sizing (e.g., screens, sieves) ground ore and potentially using small crushers and mills (if warranted by ore production rates and considerate of gender dimensions).
- **Fixed angle sluices operated with highly variable water flow and agitation rates:** Cheaper than a cement-lined sluice, locally fabricated sluice boxes can be optimised for local conditions by width, angle, and different mat-and-riffle systems. Other gravity separation techniques (e.g.,

<sup>82</sup> Söderholm & Svahn 2015. Concerning the experience of Ghana around distribution of royalties consult: <https://eiti.org/blog/improving-impact-of-mining-royalties-at-local-level-in-ghana>

<sup>83</sup> Matthysen 2015; Perks et al. 2015

manual jigs), potentially in line with sluices, would support recovery of coarser mineralisation and reduce grinding volumes.

- **The inability to separate concentrate products and/or remove iron:** Most wolframite concentrate already meets market requirements (the exception being when iron is exceptionally high), while the introduction of small magnetic separators would aid in separating mixed cassiterite-tantalite concentrates and presumably enable mining cooperatives, small companies, and workers to obtain a higher selling price. This is somewhat controversial, given that exporters are legally required to add value to concentrate and typically perform this function, which in many cases is not technically necessary to achieve market specifications.

**Potential negative implications of new technologies must be predicted and mitigated at different sites.** The main risks include the following:

- **Company risks:** The nature of 3T mineralisation in the GLR suggests that most deposits may only be economically exploitable via ASM or a combined company-ASM production system. Larger operators yield a substantial share of export value, yet bear high capital and production costs (including that allocated to OHS and environmental management), likely resulting in narrow profits margins, a situation compounded by low metal prices and volume-fixed due diligence costs. Their main avenue to supplement revenues is via semi-mechanised processing of tailings and low-grade ore, which would increase competition for this material and increase financial risks for these operators, if technology improvements were introduced to artisanal and small-scale miners.
- **Gender risks:** Throughout the GLR, the introduction of mechanised or improved methods, including those proposed above, can render much of women's work at mines obsolete, resulting in even greater gender disparity in terms of the distribution of benefits<sup>84</sup>. A gender impact analysis is needed on the proposed technical interventions and targeted, preferential training of women in any new methods, coupled with efforts to counter discriminatory beliefs and challenge barriers to entry to different jobs. Rwanda is unlikely to achieve its 2020 target of 30% female employment in the minerals sector unless such actions are prioritised.

**Support access to training** including via technical vocational education and training (TVET) administered by the Ministry of Education (MINEDUC). Currently, this Ministry is coordinating with some Rwandan companies to establish ASM training programmes in TVET centres, providing an additional opportunity for women's employment, while supporting professionalisation of the sector<sup>85</sup>. Ideally this training should be coupled with mechanisms for financing basic improvements and with more advanced technical support<sup>86</sup>.

**Strengthen relationships with committed partners.** For example, the German Federal Institute for Geosciences and Natural Resources has extensive expertise in the technical dimensions of ASM in Rwanda and is well-placed to provide technical support, while a local NGO, Women In/And Mining Organisation, has experience conducting gender analysis. Several Rwandan organisations are well-positioned to provide business development services for ASM. A more comprehensive analysis of stakeholders and related opportunities is outlined in Annex 3.

**Disseminate emerging best practices**, including by companies and government, such as Gifurwe's gender strategies, the German Federal Institute for Geosciences and Natural Resources (BGR)'s Gender and Mining Policy for companies, and MINIRENA's efforts to establish model mines as best practice demonstration sites.

**Build on the decentralised network** to facilitate coordination and capacity building based on local government offices mandated to address environmental, health, gender, and social issues and on decentralised MINIRENA officers based on or near multiple sites and mandated to oversee the RCM.

<sup>84</sup> Hinton 2016a; Hinton 2016b. For example, shaking tables to reprocess tailings are being introduced in some sites where women are heavily reliant on panning the waste material as their main source of employment and income. Small jaw crushers (e.g., 250 kg per hour) operated by a few men have been observed in 3T sites where work was previously carry out by 10–15 women. In the absence of alternative and ideally equal or better paying work, which many women are excluded from (e.g., operation of ground sluices) due to gender discrimination, beliefs, and power inequalities, such technical 'improvements' can actually exacerbate inequalities further.

<sup>85</sup> The Technical and Vocational Training (TVET) Policy was recently adopted in 2015 and provides greater emphasis on promoting the role of private sector.

<sup>86</sup> Simplification for artisanal miners of BGR's 'Occupational Safety and Health Systems for Small-scale Mines in Rwanda' (Drechsler et al. 2010) would provide direction.

## 5.2.4. The Permitting and Administrative Process Should be Improved

**Strengthen the legal framework.** Rwanda has a relatively new legal framework that takes into consideration the full diversity of the mining sector. While this is a good foundation, it can be improved in ways that more efficiently promote the development of the different sizes of the mineral deposits and mines, with the objective of better using the mineral resources of the country. Experience in multiple jurisdictions has shown that prior to promoting any change in the existing legal framework, it is critical that the informed participation of economic activities across the supply chain be supported, concerning the main barriers posed by the current framework. This includes the participation of the stakeholders involved with extraction and pre-processing of the minerals, including the miners and sub-contractors. Additionally, it is crucial to engage the licensees, ASM companies, and cooperatives. The main recommendations concerning mining titles are summarised as follows.

**Simplify the criteria related to the size of the mines.** Consider introducing one criterion such as the installed capacity of extraction and processing. This measure would have indirect implications for capital investment and the volume of production that the operations can realise and achieve. Limitations of capital investments also indirectly impact the volume of production and the technology that can be used. But if not well balanced, this criterion can also have negative implications in terms of environmental protection, improvements in technology, and poor conditions for the work force.

**Maintain the rights of exploration and exploitation in artisanal and small-scale licences.** It is important that exploration continue to be granted as part of the ASM licences and there is allowance for using the artisanal and small-scale practices and methods to do so, which have proven very effective for this scale of operations. Related to this point, consider removing the quantity of reserves as a criterion of the size of the mines (given that most miners lack the capacity to fulfil this requirement) and clarify that the activities of ASM exploration do not require an exploration licence. More specifically, eliminate the requirement for the exploration report as part of the licence attribution for ASM.

**Grant the right to process minerals for artisanal licences.** This right would increase the economic return for the artisanal miners from this profitable aspect of the mineral development cycle. As observed from revenue distributions across supply chains, artisanal miners accrue the greatest percentage share, yet their individual incomes are extremely limited.

**Consider allowing larger areas for artisanal and small-scale licences.** Attribution of large areas for ASM licences will bring stability and long-term vision and will promote investment in mining operations. It is also important for feasibility and efficiency of the extraction and processing activities because it allows for better management of resources and infrastructure without the need for artificial business and management arrangements to overcome the size limitations (e.g., requesting several continuous licences) that become more costly and complex to meet the licences' administrative, environmental, and social requirements. From the GOR's point of view, there are also some advantages in terms of licence management, accountability and audit, and improvements of the traceability of production.

**Revisit requirements for licence attribution and maintenance.** The requirements for licence attribution should follow the same approach as the categorisation of the licences based on the size of the mine.

- Simplify the requirements for ASM licences based on differentiating the technical and environmental obligations in terms of plans, programmes, studies, reports, and level of exigency.
- Improve the consistency between the different legal diplomas of the technical, financial, and environmental instruments (programme, plans, studies) in terms of the requirements for licence attribution and post-licence obligations. Define when and in what form these requirements and obligations need to be submitted to the relevant authorities for approval.
- Extend the exception for financial guarantees for environmental protection to ASM operations.
- Consider differentiating the percentage on taxes on minerals by type of licence.

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## Annex 2: 3T Production by Districts

Figure 13: Volume of 3T mineral production by district

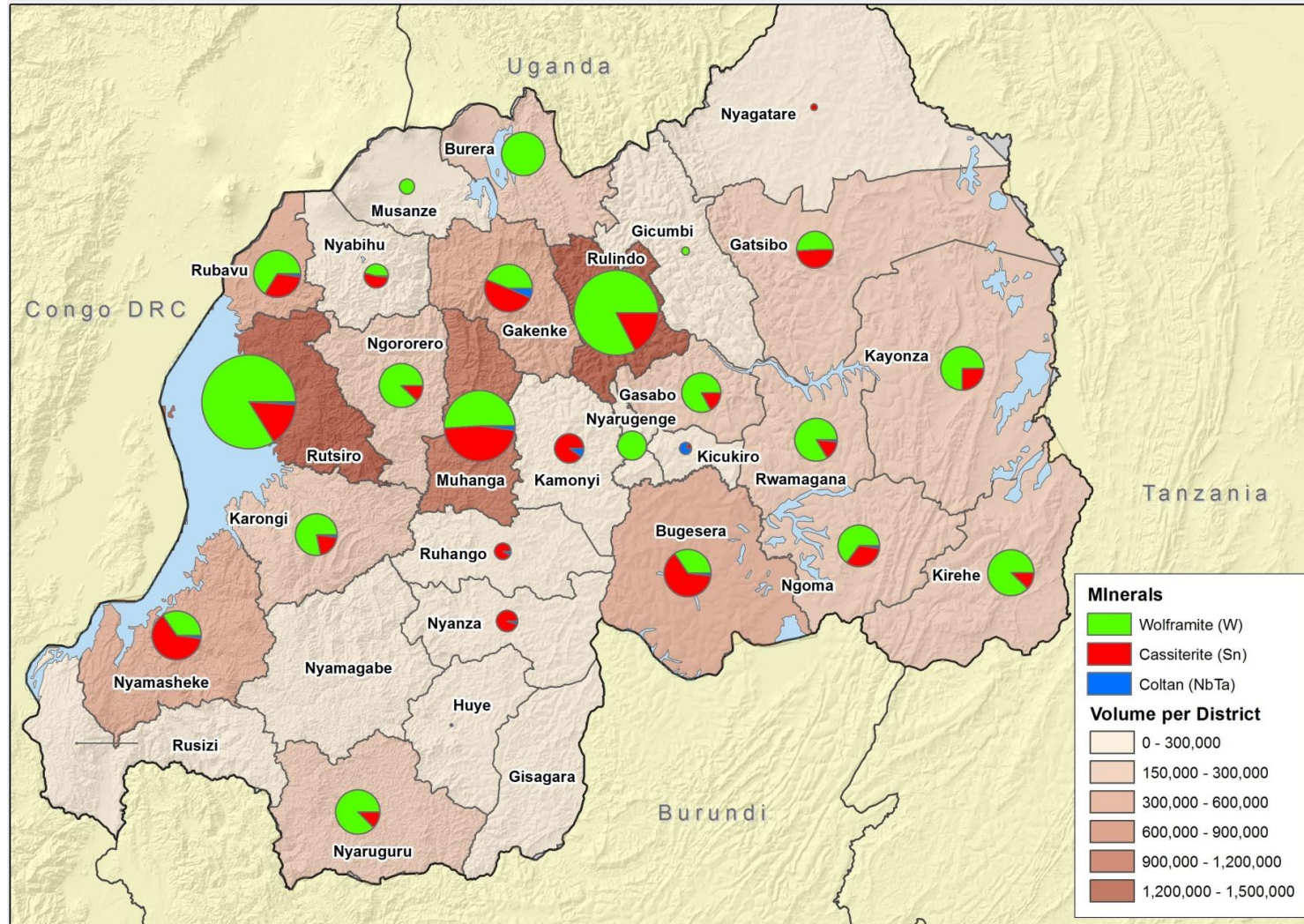
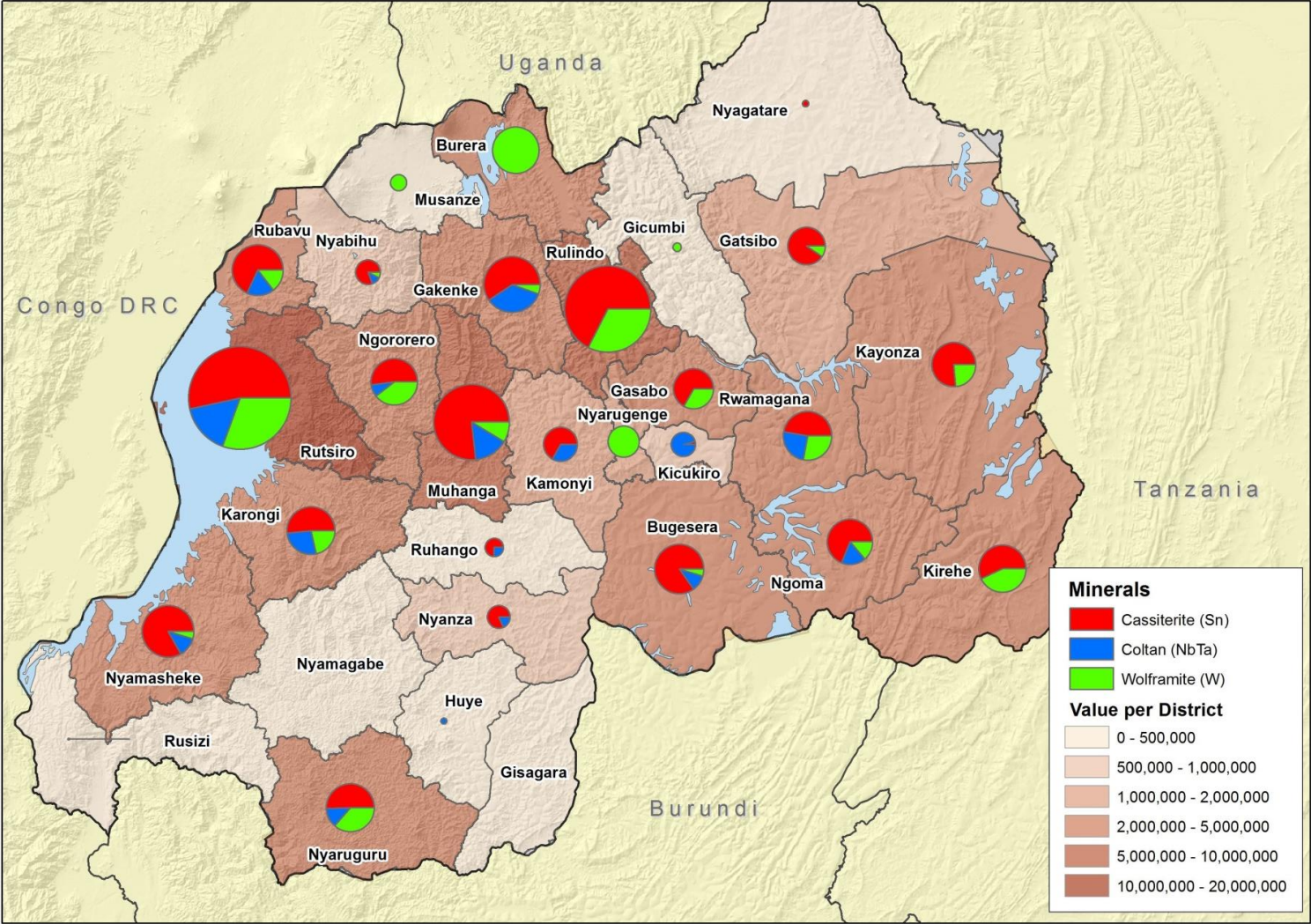


Figure 14: Value of 3T mineral production by district



## Annex 3: Stakeholder Analysis

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This annex describes the stakeholders mapped in 2.2.4. (section 2.2.3).

### A3.1. Government

Several key government agencies have significant influence on establishing sustainable ASM but with variable interest, as demonstrated by levels of action or prioritisation of ASM-related issues.

#### A.3.1.1. MINIRENA

MINIRENA's role in sustainable ASM is paramount given its functions in elaboration of sectoral policies, projects and programmes; oversight of institutions engaged in implementation and related resource mobilisation; and others central to sectoral development. Functional departments and units key to the success of ASM.

- **Office of the Director General**, inclusive of its legal affairs and public relations and communications officers.
- **Planning, Monitoring and Evaluation Unit**, whose roles include policy coordination, elaboration of action plans, monitoring and evaluation (M&E) implementation (and inclusion of gender therein as per government policy), monitoring private sector interventions and overall sector performance, and others.
- **Mine Regulation and Inspection Unit**, whose officers include small-scale mining engineers, mines inspectors, minerals traceability, and certification officers.
  - Under this unit: The **ICGLR Mineral Certification Unit**, located in the Rwanda Bureau of Standards (but overseen by DGM), was set-up following Ministerial Orders to fight smuggling in 2011 and to domesticate the RCM in 2012. All traceability information (logbooks, tags, and mine site inspection booklets) are centralised in the unit and certificates granted therein. They would play a key functional role in ensuring piloted models (e.g., aggregation centres) are operating in-line with ICGLR requirements.
- **Mining Cadastre and Licencing Unit**, which notably is using Flexi-Cadastre (excellent/critical for investors/transparency, etc.).
- **Geological Surveying and Exploration Unit. Other MINIRENA departments:** Lands, Mapping and Registrar of Land Titles; Integrated Water Resources Management; and Forestry and Nature Conservation Department. Consideration of overlapping legislation, regulations, and procedures (including for permitting, inspection, related to titling including of forest resources, etc.). Because they are under the same Ministry, there is an excellent opportunity for coordination and harmonisation.

#### A.3.1.2. RMPGB

RMPGB was created in 2017 to oversee matters related to mining, petroleum and gas. It also focuses on exploration, licensing, inspection, regulation of the sector, and reputational challenges stemming from conflict minerals to very basic domestic issues of infrastructure and capacity.

#### A.3.1.3. MINECOFIN

The Ministry of Finance and Economic Planning (MINECOFIN), which includes the Rwanda Revenue Authority, is a critical body to have on-board to ensure sufficient resourcing of ASM governance and regulation and of fiscal provisions conducive to minerals sector investment.

#### A.3.1.4. MINICOM

The Ministry of Trade and Industry (MINICOM)'s main role in the ASM sector seems to be its direct involvement in issuance of mineral trading licences for mineral dealers (applications reviewed and approved in coordination with DGM).

#### A.3.1.5. MINEDUC

MINEDUC oversees the Workforce Development Authority, whose services are structured around vocational training, entrepreneurship development, setting industry standards and regulation and

accreditation. The recent Technical and Vocational Training (TVET) Policy (2015) emphasises the role of the private sector.

### A.3.1.6. MIGEPROF

The Ministry of Gender and Family Promotion (MIGEPROF) is mandated to play a leading role in implementing the national gender agenda, inclusive of support to other government institutions in gender-responsive budgeting, planning, implementation, and M&E, building gender competence and promotion of related targets, inclusive of Rwanda's 2020 target of 30% women's employment in *all* sectors, including the mining sector. MIGEPROF guides and supervises the National Women's Council (key roles relate to women's participation, advocacy, mobilisation), and associated Women's Committees are reportedly in place at each decentralised level of government (see sub-section A.3.1.8).

### A.3.1.7. Other Stakeholders

Other potential stakeholders include the **Ministry of Health**, **Ministry of East African Community** (regional discussions on minerals sector legislation harmonisation, including fiscal provisions to support investment, reduce smuggling, etc.), and **Ministry of Local Government** (given roles of decentralised offices, see below as well as with respect to return of and often overlooked management of use of royalties/other revenues returned to local governments).

### A.3.1.8. Decentralised Units of Government

The decentralised units of government include multiple offices whose mandates may overlap those related to ASM:

- **Provinces:** With positions including Governor, an Executive Secretary (responsible for finance), and Director of Good Governance
- **District:** Inclusive of but not limited to a Mayor, two Vice Mayors (who are also responsive for economic oversight), Executive Secretary, **Gender Officer**, and **Environment Officer**
- **Sector:** Inclusive of an Administrator responsible for budgeting, planning, and administration; Education Officer; **Agronomist/Environment Officer**; **Social Affairs and Development Officer**
- **Cell:** Inclusive of an Executive Secretary responsible for finance and administration, Social Affairs Officer; seem to play some roles if and when conflict (e.g., land) arises and in sensitisation campaigns (e.g., health, gender)
- **Village:** Positions include a Chairperson and Secretary. Unpaid position but plays key roles in community mobilisation, communication, and engagement.

## A3.2. Private Sector Actors and Organisations

### A3.2.1. Women and Men Artisanal Miners

Women and men miners are primary stakeholders in advancing the ASM sector and have expressed interests in increased incomes and safer, more secure employment. Given Rwanda's target of 30% women's employment in all sectors by 2020, the need to increase women's engagement through sector strategies is critical. Women and men miners can have a high degree of influence on ASM at an individual, site, and household levels, but unless a critical mass of actors are mobilised, miners currently tend to have limited influence on broader-based change (e.g., government policy, company practices).

### A3.2.2. Mining Companies and Cooperatives

Rwandan mining companies and cooperatives have widely varying attitudes towards and vested interests in ASM and diverse capacities to advance it. All companies and cooperatives rely heavily on ASM workforces. Some companies have advanced their operations via fixed selling agreements with national and foreign investors via off-take or joint venture agreements. Smaller, less formal cooperatives face great challenges in meeting current legal requirements and likely would benefit considerably from increased access to financial and technical support.

### **A3.2.3. Mineral Dealers and Exporters**

The mineral trade ranges from low-level dealers to high-level, well-financed exporters.

### **A3.2.4. Rwanda Mining Association (RMA)**

The RMA is a private sector association comprised on mining companies, some cooperatives, and exporters in the country. Mainly in their roles in lobbying and advocacy, it is active in formulating government policy, strategies and projects in response to their members' priorities and interests. Although it may, in principle, be interested in carrying out specific interventions related to sustainable ASM, the positions of members vary and it seems to have limited resources for implementation as an entity.

### **A3.2.5. FECOMIRWA**

FECOMIRWA was created in 2009 by four union cooperatives (UCOMIMU, ICOMIGABU, UCOMIRU, and RUMICO) considered as the founders of the Federation. FECOMIRWA is the federation of all mining cooperatives in Rwanda and oversees supervision. The federation operates under the umbrella of the Rwanda Cooperative Agency.

FECOMIRWA also acts as a trader, processor, and exporter of tantalite, cassiterite, and wolframite. The Federation buys, processes, and exports the minerals from the cooperatives and small-scale companies, which evenly split production.

All mining cooperatives must register with FECOMIRWA. The Foundation supports cooperative organisation and registration and takes on an additional role of consolidating production by purchasing, minor processing (via magnetic separation only), and facilitating sale of cassiterite-tantalite and the 3Ts. While this model supports the Foundation's financial sustainability, some cooperatives nevertheless choose to sell to other exporters for various reasons (e.g., provision of pre-financing, higher purchase prices).

### **A3.2.6. Rwanda Extractive Industry Workers Union (REWU)**

REWU was created in 2014 with the mission of organising mining and quarry workers and of defending their rights. One of the issues that they are targeting with some success is the employment agreement method used in the two models, aiming to transform the verbal contact into an actual written contact. They are working in coordination with Ministry of Public Services and Labour (MIFOTRA). The contract has the potential to bring stability to the mining sites, provide clarity of rights including social security rights, and to create the legal requirement to obtain credit.

REWU is carrying out capacity building activities and conflict resolution related to workers' rights. REWU produces annual activities reports where recommends specific improvements to the miners' labour rights situation. The reports are distributed among relevant ministries, agencies, and institutions that deal with the mining sector (e.g., MINIRENA, RNRA), NEMA, MIFOTRA, RMA).

### **A3.2.7. Better Sourcing Program (BSP)**

BSP is an emerging mineral supply chain due diligence implementation and assurance service focused on assurance of 3T materials in the GLR. It is now active in Rwanda, where it operates on five mine sites. The program certified its first shipment in August 2016 and expanded into tungsten in January 2017.<sup>87</sup>

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<sup>87</sup> BSP, 2017.

## **A3.3. International and Regional Implementing, Non-Governmental, and Civil Society Organisations**

### **A3.3.1. ICGLR Secretariat**

The Secretariat's main role with respect to natural resources is to support implementation of the 2010 ICGLR Regional Initiative against the Illegal Exploitation of Natural Resources (RINR). The Secretariat's mandate includes:

1. Supporting 11 member states to establish and adopt the RCM
2. Establishing a regional database on mineral flows
3. Providing guidance for ASM formalisation
4. Creating an EITI peer learning mechanism
5. Establishing a whistle-blowing mechanism

### **A3.3.2. GiZ and BGR**

GiZ has been the main supporter of the ICGLR Secretariat and advancement of the ICGLR pillars under the RINR. As the technical arm of German development aid in the minerals sector, BGR has been providing direct technical support to the German National Research Centre for Information Technology (GMD) in Rwanda, including through training of government officers related to mine inspection and provision of direct facilitation to aid them in fulfilling their traceability mandates. They additionally conduct fieldwork, sample and analyse in association with their 3T fingerprinting efforts, and provide technical support for mine standards, mine planning, and improvements needed to advance artisanal miners to the small-scale status.

GiZ also supported development of *ICGLR Guidelines on Mainstreaming Gender in the Minerals Sector* to support compliance with Article 16 of the 2011 Kampala Declaration, which commits all ICGLR Member States to mainstream gender in its natural resources sector policies, including that governing the minerals sector.

### **A3.3.3. Africa Mining Vision (AMV) and African Minerals Development Centre (AMDC)**

In response to widespread discontent that Africa's vast mineral wealth has not translated into broader growth and development, the African Union Heads of State and Government endorsed the AMV and establishment of the AMDC to provide strategic guidance and support development of country and continental visions and action plans. SSAMIR touches on each of the nine pillars of the AMV<sup>88</sup> and can support Rwanda's country mining vision through alignment with AMV principles, while providing an additional framework for M&E and related reporting.

### **A3.3.4. DFID**

DFID is supporting the Sustainable Development of Mining in Rwanda Project, formerly known as Supporting Sustainable Artisanal Mining in Rwanda (SSAMIR). Implemented by a Cardno-led consortium it aims to create an enabling environment for increased private sector investment in mining in Rwanda and will test the a services aggregation model to achieve a viable and sustainable mining sector in which more than 40,000 Rwandans are currently involved.

### **A3.3.5. Dutch Ministry of Foreign Affairs (DMFA)**

DMFA has been providing some direct support to Pact related to fulfilment of minerals traceability in the GLR. Via the Scaling Up Minerals Traceability Project in the GLR, DMFA seeks to expand support for other aspects of formalisation in region. In light of Government of Netherlands commitments to prioritise gender equality in its foreign policy, it has supported a comprehensive assessment under the

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<sup>88</sup> The nine pillars of the AMV are: (1) mineral revenues and mineral rents management, (2) geologic and mining information systems, (3) building human and institutional capacities, (4) ASM, (5) minerals sector governance, (6) research and development, (7) environmental and social issues, (8) linkages and diversification, and (9) mobilising mining and infrastructure development.

Gender Resource Facility (GRF) of the *Gender Dimensions of Tin, Tantalum and Tungsten Mining in the Great Lakes Region*, which drew upon field assessments in Rwanda and DRC.

### **A3.3.6. World Bank**

Currently, the World Bank does not support a major minerals sector lending project in Rwanda but has supported a 2014 assessment of mining's contribution to Rwanda's national development.

### **A3.3.7. UN Women**

UN Women, particularly via the East and Southern Africa Office in Nairobi, has taken on gender and extractives as a priority theme. Rwanda country office staff already have received training on gender and ASM, seem to be in the process of defining their strategic points of entry into ASM, and seem likely to play an increasingly more influential role in the coming years.

### **A3.3.8. National Steering Committee (NSC)**

The NSC is composed of representatives of government, police, military, civil society organisations, the RMA, and FECOMIRWA. This multi-stakeholder committee was formed to monitor, oversee, and report on compliance with DDG, RCM, and related security issues.

### **A3.3.9. Pact**

Pact is the main implementing partner of iTSCi in the GLR and oversees scheme implementation on more than 800 ASM sites via decentralised (regional) officers and coordination with government and other sector stakeholders. With support from DMFA and in collaboration with GRF, Pact is carrying out the Scaling Up Minerals Traceability Project, focused primarily on DRC, but with some activities in Rwanda, Burundi, and Uganda. Pact also has a range of projects addressing government capacity, women's economic empowerment, reduction of child labour, OHS in ASM, and other issues with multiple donors and partners throughout the GLR. In 2017 it will begin work on the DFID funded Sustainable Development of Mining in Rwanda Project led by Cardno. Pact will focus on components aiming to improve the enabling environment for private mining investment, piloting model aggregation centres for ASM, and contributing to learning and development ambitions of the mining sector.

### **A3.3.10 Partnership Africa Canada (PAC)**

PAC has a number of mainly Canadian-government supported initiatives targeting ASM in the GLR, including technical support, training, and guidance to the ICGLR Secretariat and Member States; creation of a civil society platform; and support for related dialogues and forums, among others.

### **A3.3.11. Women in and Affected by Mining Organisation (WIAMO)**

WIAMO is the most active NGO working at the nexus of gender, mining, and traceability in Rwanda. It is deeply engaged in dialogues at national and local levels and is widely known and respected in the country.

## Annex 4: Specific Legal Aspects

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### A4.1. Legal and Technical Comments on Required Minimum Reserve Quantities for ASM

One aspect that creates ongoing challenges is related with estimation of reserves, in particular for artisanal and small-scale mines.

Law N° 13/201, defines the criteria for the six categories of exploration and mining licences: exploration licence, artisanal licence, small-scale licence, no-commercial quarries licence, commercial small-scale quarries licence, large-scale licence, and large-scale quarries licence.

Table 2 (in section 2.2.4) only identifies the licences that apply to the ASM sector. The exploration licence is not included because it is not clear if it is a pre-requisite for ASM licences, though it is clear that exploration needs to be done for all mining licences. The lack of clarity stems from artisanal and small-scale licences already granting rights of exploration. On the contrary, the LSM licence does not give the right to exploration, meaning that mining companies need to apply for an exploration licence first and subsequently the large-scale licence.

This interpretation aligns with recent evolution of mining titles for ASM worldwide. The reason for that evolution and approach is since ASM does exploration work very differently from LSM. The methods are very simple and based on traditional knowledge and the quantification of the reserves is based on empirical and simple sampling methods. The other characteristic of the exploration work from ASM is that it is not compressed in one phase but is a constant activity based on the needs and the financial capacity<sup>89</sup>.

This means that the criterion of estimation of reserves can be met using the mining licence but it will be not possible to classify the size of the operation using this criterion when the candidate applies for the artisanal and small-scale licences. If the interpretation is that a candidate to a mining licence needs to apply first for an exploration licence then it will limit very much the number of operations that can request an exploration and mining title. The process of legalisation of ASM operations will become more complex and costlier.

The exploration licence grants rights to do exploration activities but also the right to sell the production with prior authorisation and the payment of taxes. This approach can help ASM operations to finance the exploration activities but it has a risk that under an exploration licence a full mining operation could be developed including a large-scale mine. Medium and large companies could come to the country and finance their exploration activities by extracting and selling minerals without a proper exploitation (mining) licence.

This scenario can become even more problematic if they use artisanal miners to do the extraction activities, but never legalise the work force as part of the company. This kind of scenario apparently is a reality in Rwanda.

Additionally, exploration licences require less technical and economic requirements including those related with environmental obligations. This approach creates a series of distortions in the mining sector that would be very difficult to undo when it becomes a current practice in the country.

Returning to the issue of the exploration licence for artisanal and small-scale operations, it is recommended to maintain the right to perform exploration and exploitation through the artisanal and small-scale licences but eliminates the characterisation of the size of the operation through criterion of estimated mineral reserves. Estimated reserves are not a very objective measure and are difficult to contradict or question. In other words, it is very easy to claim that in an area only 30 tonnes of estimate reserves were identified and very difficult to prove differently except if the government performed its own exploration in the area.

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<sup>89</sup> Barreto 2011



## **A4.2. Legal Comments on Apparent Incongruences of the Legal and Regulatory Framework for ASM**

### **A4.2.1. Role of Exploration in the Context of ASM Licences**

One of the requirements for the ASM licences is the generation of an exploration report (see table below) and this may imply that they need an exploration licence prior to getting the ASM licences. But the ASM licences do grant both exploration and exploitation rights. This incongruence needs to be addressed to improve clarity.

### **A4.2.2. Levels of Requirements for Different Licence Types**

The requirements of licence attribution do not follow the same approach as the categorisation of the licences based on the size of the mine. The regulation requires almost the same technical and environmental obligations for all mining licences in terms of plans, programmes, studies, reports, and the same level of exigency.

This approach is problematic because of the costs for an artisanal or a small-scale mine to meet the same requirements of large-scale mines. The trend in other jurisdictions is to simplify the requirements for artisanal and small-scale mining licences.

The main difference between the mining licences is not in the operational and reporting requirements but in the fees and some taxes.

Even though the specific requirements are outlined in a dedicated legal diploma (Ministerial Order 003/2015) there is some ambiguity that should be clarified. The main problem is that in some legal diplomas (e.g., Law N° 13/2014) the requirements are often not consistent with the Ministerial Order. This happens for example for the Environmental Impact Assessment. It appears that this is an obligation for all mining licences under the Ministerial Order, when the Law only mentions the requirement to present environmental management plans for artisanal and small-scale licences. An identical situation happens with Program of Mining Operation that in principle only applies for Small-Scale Licence but the Ministerial Order mentions an Investment Plan as an obligation for all licences. It is also not clear when this investment plan should be presented, whether in the application for the licence or after the granting of the licence. The obligation of rehabilitation and reclamation for all licences is clear but it is not clear where and when the activities will be approved or laid out.

### **A4.2.3. Financial Guarantee for Environmental Protection**

Another issue that cause some interrogation about their applicability for artisanal and small-scale licences is the financial guarantee for environmental protection. It appears that this applies for all licences except for non-commercial small-scale quarry licences and commercial small-scale quarry licences. The rationale of one of the exceptions is understandable but the commercial small-scale quarry licence causes some doubts as to why this exception was not extended to the artisanal and small-scale licences.

The financial guarantee is calculated based on 20% of the amount budgeted for the environmental protection plan for 5 years. The licensee pays the guarantee in the following phases: 50% upon approval of the licence; 20%, 1 year after acquisition of the licence; 20% after 2 years of acquisition of the licence; 10% after 3 years of the acquisition of the licence. The 20% can be reduced to 5% of the total planned investment budget in some situations. Note that this does not necessarily mean a reduction of the value of the guarantee and it is not clear what these exceptional situations may be.

The licensee pays the financial guarantee to the National Fund for Environment in Rwanda 'FONERWA'. The guarantee is refunded when the holder of the licence completes the closing of the mine and after the competent authority approves successful completion of the rehabilitation works. In other jurisdictions, the financial guarantee is an instrument that has been used for safeguard that the mining area will be fully recovered after the closing of the operations. Used mainly for large-scale mining projects, because the characteristics of the rehabilitation of these kinds of long term with a high technological intensity projects where the rehabilitation phase is very often measurable in years and after the closure of the mining activities. The design of the guarantee, in terms of its realisation over the years and the refund, is indeed appropriate for large mining projects. But it is not for small-scale for

two main reasons; the undercapitalised nature of these operations and the fact that the rehabilitation on ASM mining areas when it happens is done simultaneously with advancement of the activities in the area. This means that in fact the guarantee can prevent the ASM operation to perform rehabilitation, because the lack of financial capacity and the fact that the refund of the guarantee presupposes that the activities of rehabilitation will happen after the paralysation of the mining activities. Therefore, it is recommended that the financial guarantee does not apply for ASM licences.

#### A4.2.4. Requirements for ASM Licences

Table 5 identifies the main requirements for ASM licences attribution and as mentioned before these requirements also apply for large-scale licences and the exceptions to that role are related with some of the fees.

**Table 5: Requirements for artisanal and small-scale licences attribution<sup>90</sup>**

General Requirements	Additional requirements for mining licence	Additional requirements after the approval of the mining licence
<p>The application form information:</p> <ul style="list-style-type: none"> <li>• Identification of the applicant</li> <li>• Proposed location of activities</li> <li>• Document describing the action plan, its implementation and costs</li> <li>• Strategies and timeframe for the execution of each activity</li> <li>• Investment plan and proof of its source</li> <li>• Employees and the level of their qualifications</li> <li>• Proof of tax clearance</li> <li>• Information on pending litigation cases if any</li> </ul>	<ul style="list-style-type: none"> <li>• Approved mineral exploration report</li> <li>• Map indicating the mining area in a format provided by the institution</li> <li>• Program of mining operations;</li> <li>• Investment plan</li> <li>• A copy of the environmental impact assessment and a certificate of approval issued by a competent authority</li> <li>• Environmental management plan</li> <li>• Application fee: <ul style="list-style-type: none"> <li>– ASM licence fee of RWF 200,000 (USD 250)</li> <li>– commercial small-scale quarry licence RWF 50,000 (USD 62.50)</li> </ul> </li> <li>• Environmental audit report approved by competent authority if the area was subject to prior mineral exploitation</li> </ul>	<ul style="list-style-type: none"> <li>• Corporate social responsibility plan in consultation with sector</li> <li>• Rehabilitation and reclamation requirements, including a receipt of the deposit of the financial guarantee of environmental protection</li> <li>• Land owner compensation</li> <li>• Licence fee: <ul style="list-style-type: none"> <li>– RWF 300,000 (USD 375) for artisanal mining licence</li> <li>– RWF 500,000 (USD 625) for small-scale mining licence</li> <li>– RWF 200,000 (USD 250) for commercial small-scale quarry licence</li> </ul> </li> <li>• Surface mining area fee: <ul style="list-style-type: none"> <li>– RWF 300 (USD 0.38) per year for each ha for ASM licence</li> <li>– RWF 300 (USD 0.38) per year for each ha for commercial small-scale quarry licence</li> </ul> </li> <li>• Tax on minerals</li> </ul>

#### A4.2.5. Uniform Tax Rates for All Scales of Mining and Timing of the Tax Payments

The last comment, it is related with tax on minerals (royalty), (Law55/2013). The variation of the rate is based on the type of minerals, such as:

- 4% of the norm value for base metals and other mineral substances of that kind
- 6% of the norm value for precious metals of gold category and other precious metals of that kind
- 6% of the gross value for precious stones of diamond category and other precious stones of that kind<sup>91</sup>

Contrary to the fees that have different rates depending on the category of the licence, the regulation on taxes on minerals does not differentiate, but rather defines a flat percentage independent of the type of licence. The trend of more recent legislations is to have different levels for fees and royalties

<sup>90</sup> Consultant summary interpretation from the different diplomas noted below. Application fees, licence fees, and surface mining area fees only include the amount for ASM. Sources:

Republic of Rwanda. Law N° 13/2014 of 20/05/2014 On Mining and Quarry Operations. Official Gazette n°26 of 30/06/2014; Republic of Rwanda. Ministerial Order N°003/MINIRENA/2015 of 24/04/2015 Determining Modalities for Application, Issuance and Use of Mineral and Quarry Licenses. Official Gazette n°19 of 11 May 2015; Republic of Rwanda. Ministerial Order N°001/MINIRENA/2015 of 24/04/2015 Determining Modalities and Requirements for the Financial Guarantee of Environmental Protection and Its Use in Mining Operations; Republic of Rwanda. Law N°55/2013 of 02/08/2013 On Minerals Tax.

<sup>91</sup> The French and English versions have small translation problems related to this article; the version presented here is adjusted by the author of this report.

according to licence types<sup>92</sup>. It is also important to note that it is not clear what the percentage of tax is on the minerals produced by quarry mines.

Another aspect of the tax on minerals that creates some ambiguous interpretation is the timing of the tax payments related with the 'chargeable event'. The law defines that 'Any person who sells minerals shall pay a tax on such minerals'. It is not clear in which sales transaction the taxes should be paid and how many times this applies.

Another article of the same law determines that 'The tax on minerals is due at the date of exportation of minerals'. This article reinforces the difficulty in interpretation, but also creates another problem regarding the minerals that are not exported.

It appears that the Legislature is assuming that there is only one route for the minerals—to export them—and that only one sales transaction will be performed in the mineral's domestic supply chain. Neither of these assumptions seems to be consistent with the reality on the ground.

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<sup>92</sup> Barreto 2011

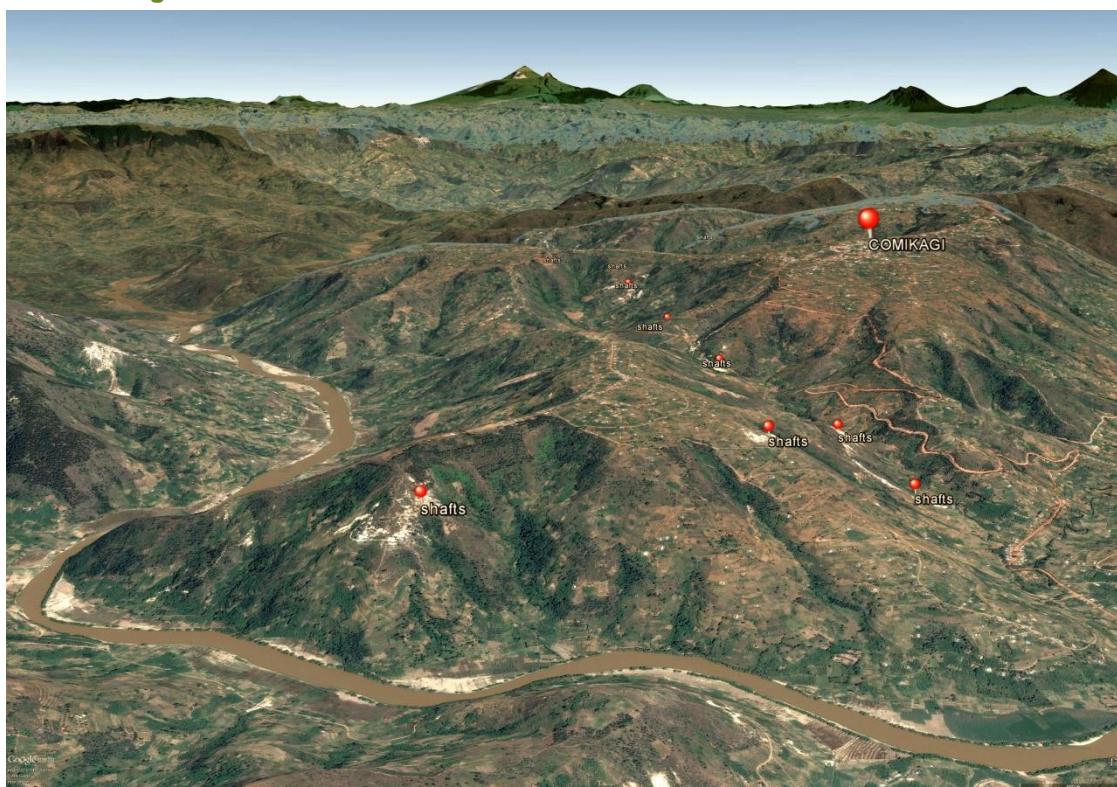
## Annex 5: Detailed Case Study on COMIKAGI Cassiterite-Tantalite Mines

### A5.1. Area Overview

Located in Ruli Sector of Gakenke District in Rwanda's Northern Province, the cassiterite-tantalite mining area held by COMIKAGI is the fifth-most significant producer (by volume) of the 16 main entities mining in the District<sup>93</sup>. COMIKAGI oversees production across its 812 ha, five-year renewable concessions in four main areas: Muvehe (Simba, Nyerasi, Gasizi, and Kanyiramano sub-sites), Kabarara (Byemwa sub-site), Nyamugali (Kabaronbe), and Nyamugali (Kabumbogo).

The area is characterised by gently rolling hills to steeper topography, most of which are covered in grasses, interspersed by stands of planted trees and smallholder farms rearing livestock and growing crops of maize, beans, potatoes, and some plantains, among others. Valleys are composed of marshlands and small streams served by rainfalls amounting 1,100–1,500 mm per year, mainly falling in the two rainy seasons (March to May and September to December) and contrasting dry periods (January to February and June to August)<sup>94</sup>. Although most residents of Gakenke are primarily reliant on subsistence agriculture<sup>95</sup>, mining and farming, which are closely interconnected in mining areas, as found in the area immediately surrounding COMIKAGI (Figure 16: COMIKAGI Area

Figure 15: Google Earth view of COMIKAGI area



<sup>93</sup> dbFusion Financial, 2016, Mining Sector Consolidation, unpubl. Presentation to MINIRENA and GMD.

<sup>94</sup> Rwanda 2013b

<sup>95</sup> The employment rate in Gakenke District is 89.1%, 75% of which is attributed to working in farming (Rwanda 2013b).

**Figure 16: COMIKAGI Area**



## **A5.2. Supply Chain Actors, Activities, Employment, and Production**

This section outlines the main players engaged in the cassiterite-tantalite supply chains at COMIKAGI, the system of mineral production, and related gender, environmental, and occupational issues therein.

### **A5.2.1. Role of COMIKAGI**

COMIKAGI is a cooperative of 39 members, each of whom owns a single share in the entity. COMIKAGI, the entity to which the mining title has been granted, has multiple roles and responsibilities, in addition to reporting requirements, and fees and compliance obligations as needed to maintain its concessions. Among these, the cooperative reviews and approves allocation of areas requested by potential sub-contractors, purchases pre-concentrate from sub-contractors and maintains logbooks of sub-contractors and their production, maintains logbooks of registered workers and headcounts of casual labourers, pays workers accident insurance (covering both registered and casual workers), sells consolidated production to (typically) FECOMIRWA and others, and remits payments to sub-contractors once it has been received from customers.

In some cases, COMIKAGI also provides advanced payments to sub-contractors, particularly in the event of undue delays in payment from FECOMIRWA, a process that typically takes 15–30 days, providing significant challenges for many sub-contractors who must meet daily wage bills and other operating costs. COMIKAGI also finances some common infrastructure essential to production, such as the water pumps and reservoirs that serve the multiple production sites across the area. COMIKAGI also provides salaried security over the area and some supervision of activities, mainly for the purposes of ensuring production stays within the certified trading chain.

### **A5.2.2. Main Supply Chain Actors**

Principal actors in the COMIKAGI supply chain are the cooperative and its members, sub-contractors who finance and organise mineral production activities, mineworkers who carry out extraction and

processing activities, and FECOMIRWA, which consolidates, further processes and sells, tantalite production (Figure 18).

There are 70 active **sub-contractors** working under COMIKAGI, 10 of whom are women. Only a portion of sub-contractors are cooperative members, and all either own the land on which they work or have an agreement (e.g., monthly rent) with landowners, providing specific challenges for women to take on this role (in section 0). It is unclear whether sub-contractors have formal, written agreements with COMIKAGI, but their relationships with their workers are based on a purely verbal agreement, providing uncertainty concerning working obligations and increasing risks of disputes.

Sub-contractors hire workers either in teams or as individuals, typically depending on their roles and functions in production, with labour needs and financial capacity per sub-contractor ranging 5–20 workers. Sub-contractors collect production from their workers, submit numbers of workers to COMIKAGI on a monthly basis, and pay for workers' health insurance, which is deducted from their payments.

**Mineworkers** either work as individuals or in small teams, mainly depending on their respective roles and functions. They are responsible for carrying out all steps involved in mineral production including extraction, transport, and processing activities. Mine workers typically cover their own costs for food during working hours although it is unclear whether they also pay for their own tools and PPE needed to fulfil their functions<sup>96</sup>. Mining methods used and gender division of labour at the sites are described further below.

**Processors and exporters** acts as a trader, processor, and exporter of 3Ts for registered ASM cooperatives and from small-scale companies. Although FECOMIRWA<sup>97</sup> is a processor and marketer of part of COMIKAGI material, it does not exclusively work with them. Most of FECOMIRWA's exports are derived from cooperatives, among which COMIKAGI is their largest supplier. In conjunction with this, FECOMIRWA additionally develops international market relations needed to identify external buyers and handles related export requirements (documentation, taxation, shipping), alongside its various advocacy and support roles.

**Figure 17: Magnetic separation at processor**



**Interaction of supply chain actors:** FECOMIRWA receives pre-concentrate from COMIKAGI and other suppliers at their facility in Kigali and, in the case of mixed tantalite-cassiterite products, conducts further processing via magnetic separation, in some cases preceded by crushing or mixing of concentrate as needed to meet the market specifications. An x-ray fluorescence laboratory provides

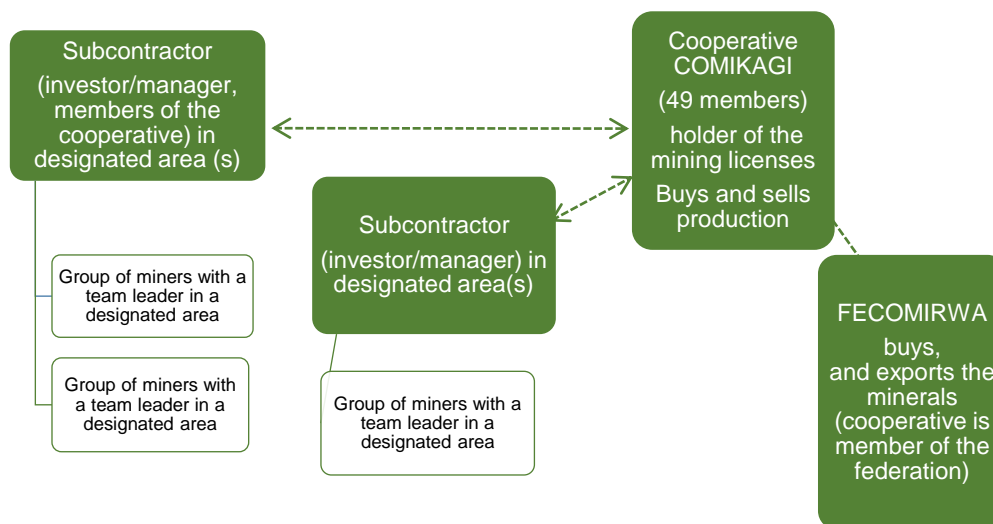
<sup>96</sup> In other Rwandan sites, costs of PPE (e.g., hardhat, gumboots) and basic tools (e.g., pickaxes, spades) are provided to workers by sub-contractors but deducted from their earnings (Hinton 2016b).

<sup>97</sup> See Annex 3 for detailed description of FECOMIRWA.

analytical results on grades of incoming pre-concentrated and processed concentrate, providing the basis for payment to suppliers. Currently, COMIKAGI cassiterite concentrate is exported to Malaysia and Thailand while tantalite concentrate is sold to FECOMIRWA and exported to an Asia buyer on a free-on-truck basis in Kigali.

COMIKAGI's main role is to act as a trade platform for sub-contractors who largely detached from each other as independent small enterprises. Given that the licence is held by COMIKAGI, the cooperative holds a position of relative power over sub-contractors.

**Figure 18: Hierarchy of relations between key actors in the COMIKAGI supply chain**



**However, this relationship is not necessarily subordinate.** Sub-contractors are reliant on COMIKAGI to fulfil legal compliance requirements (inclusive of those required for mineral traceability) and trade functions. Because most members lack sufficient capital to operate, COMIKAGI relies on sub-contractors to invest in and oversee production and essentially take on a preponderant proportion of financial risk. Given that COMIKAGI earns a commission of 5–13.5% of production value, it is in COMIKAGI's interests to see increased production in their licence areas, thus undue termination of a sub-contractor's access to their sites is unlikely to occur.

By contrast, the relationship between the sub-contractors and the miners is a subordinate one. The sub-contractor has an employee/employer relationship based on a verbal agreement that may be with individuals or leaders of small teams. The sub-contractor has all the power to initiate and terminate the relationship with the miners and teams and can have considerable leverage in determining payment terms. Associated risks are undoubtedly compounded by competition for paid work, particularly given that Gakenke has a poverty rate of 56.6% and is ranked seventh among the 10 poorest districts in Rwanda<sup>98</sup>.

An additional layer to the hierarchy involves the presence of teams, led by a team leader who channels payments from sub-contractors to team members, often has influence on team composition, and earns a slightly higher percentage than team members. The cooperative does not have any specific relationship with individual miners or team leaders, nor are the miners members of the cooperative, affording them little say over decisions of the cooperative that may affect them.

### A5.2.3. Mineral Production Methods and the Gender Division of Labour

Mineral production at COMIKAGI is financed by sub-contractors who oversee work of approximately 5–20 workers who operate as individuals and multiple, small teams to perform specific or shared functions in extraction; transportation of ore, waste rock, and water; and mineral processing via gravity concentration.

<sup>98</sup> Rwanda 2013b

The process begins with manual excavation of shafts to depths of approximately 6–10 m until ore-bearing veins are encountered. This **development phase typically requires 20–25 days of investment** by the sub-contractor in the form of tools, timbers (approximately RWF 150,000 or USD 187.5), labour (around RWF 215,000 or USD 268.8) working in small teams, and, in few cases, provisions for lunch. Once ore is encountered, it is extracted by teams of five to eight men via digging of horizontal or semi-horizontal tunnels that follow hard or weathered veins and can extend to 500 m or more (Figure 21). The host rock (pegmatite) is mainly comprised of relatively soft kaolin that can be readily broken using hand tools (e.g., pickaxes, spades) and is hauled to the surface using sacks. The waste rock, or low-grade material piled perilously close to shaft edges and ore, is manually carried by individual paid labourers or team members to processing areas. Ore grades in such deposits are highly variable, owing to a ‘nugget effect’ of mineralisation, but processing data suggests an ore grade on the order of 0.5% cassiterite and 0.04% tantalite, in line with similar economic deposits in the region.

**Figure 19: COMIKAGI vein hard**



**Figure 20: COMIKAGI vein soft**



**Figure 21: Mine shaft**



The processing areas consist of a series of trenches dug into the hillside where one of eight designated teams of five to eight men carry out the next step of ground sluicing. The process involves directing water into the trenches from one of the many pipes that criss-cross the area and agitating the ore-water slurry using a spade to promote the downstream flow of lighter, smaller particles and settling of coarser, heavier material. Once the material has been pre-washed via this process, heavy minerals at the bottom of the trench are collected and then panned to recover the cassiterite-tantalite pre-concentrate (Figure 22).



**Figure 22: Ground sluice**

The method is commonly considered **extremely inefficient and likely to result in significance losses** of fine cassiterite-tantalite, although two or three sub-teams of washers also conduct ground sluicing in downstream trenches, resulting in both greater employment and some increase in volumes recovered. Each sluicing team can process approximately 6 tonnes of ore per day, yielding approximately 60–70 kg of material that is panned down to 30–37 kg of pre-concentrate, grading approximately 62% cassiterite and 28% tantalite pre-concentrate. The pre-concentrate is subsequently transported in sacks to the COMIKAGI office in nearby Mududu Village, weighed, and logged as the sub-contractors' production.

The **organisation of labour may be one factor contributing to women's low participation** in the production process. Although casual jobs in hauling ore or panning are performed by some women, these tend to be the lowest paid positions in operations<sup>99</sup>. Other roles are necessarily (or more effectively) performed in teams of mainly male workers who perform specific (e.g., extraction) or shared (e.g., hauling, sluicing and panning) functions, often under oversight of a team leader designated by the sub-contractor or team members. In other Rwandan 3T sites, women have faced challenges in joining teams of men due to multiple factors, which range from failing to obtain the requisite approval from team members due to their beliefs that women are incapable of carrying out the work, to limited access to capital needed to buy a spot on a team, to perceptions of family and community members equating work in the mines with sex work, among many others<sup>100</sup>.

Further to this, each (or multiple) extraction site is 'owned' by a sub-contractor, who undoubtedly has influence over the composition of workers that they contract<sup>101</sup>. In addition to access to (lucrative) work, **women may face additional barriers taking on more profitable positions in the management of the operations, for example, as sub-contractors**. Only 10 of 70 sub-contractors are women in COMIKAGI, likely due to a range of factors<sup>102</sup>.

<sup>99</sup> Daily wages by position have been reported by COMIKAGI members as ranging from 1,500 RWF (approximately USD 1.9 per day) for transporters, approximately 1,700 RWF (approximately USD 2.1 per day) for diggers (depending on the rock hardness), and 2,000 RWF (approximately USD 2.5 per day) for sluice operators (although some sluice operators report payment by production). In other Rwandan sites, payment is occasionally on the basis of a day rate (e.g., for casual labourers), but most payment is typically on the basis of production, enabling investors (sub-contractors), to share much of the financial risks with workers (Hinton 2016b).

<sup>100</sup> Hinton 2016b

<sup>101</sup> In other Rwandan localities, job seekers must pay a joining fee to sub-contractors and/or team members (Hinton 2016b).

<sup>102</sup> Challenges identified in other sites range from technical and business know-how to gender biases of licence holders controlling allocation of working areas to lack of financial resources (Hinton 2016b).

One of the most significant related to capital and operating cost investment requirements including basic tools (e.g., pickaxes, hardhats), more costly requirements (e.g., timber supports, water pumps), and daily payment to workers, a challenge compounded by often 15–30 days of delays in payment for production. Women often face greater difficulties than men in access to capital (e.g., income, loans) and, where they may have access, less control at the household level over decisions concerning their use. In Gakenke District, approximately 37% of women have decision-making power over use of their own incomes, although 62% of women report that such decisions are made largely in conjunction with their spouses, who may not support their participation in the sector<sup>103</sup>. **At multiple 3T sites in Rwanda, it has been observed that women miners are frequently stigmatised for working in the mines** by spouses, family, and community members due to prevailing beliefs associating women's work in the mines with the sex trade. Consequently, many women stop working in the mines upon marriage (particularly to a non-miner)<sup>104</sup>.

In addition, women are often less likely to own land and may have less experience in business management or confidence to obtain necessary approvals from local leaders<sup>105</sup>. This places many women at further disadvantage, particularly given that a sub-contractor must have an agreement with landowners or own land in their selected area.

#### A5.2.4. Employment and Production

COMIKAGI maintains a relatively accurate record of employment according to monthly reports from each sub-contractor on their workers (listed by name for registered workers and as head counts for casual labourers). Production by sub-contractor is similarly recorded by COMIKAGI, including in accordance with regional certification mechanism requirements.

**Employment and production vary depending on level of activity** in the area, which can be affected by any number of factors such as closure of shafts due to safety reasons (e.g., collapse, flooding), or lack of financial capacity of different sub-contractors, which likely varies according to the previous month's production, metal prices and delayed payments.

Between January and August 2016, the average number of mine workers active across the area was 477, 95 of which were women (20%). In August, 627 miners, 111 of whom are women (18%), and 70 sub-contractors, 10 of whom are women, were employed, totalling 697 (17% women).

In 2015, monthly production averaged 9.4 tpm, but declined between January and August 2016, down to 5.5 tpm, likely due to collapse and closure of one of the most productive sites in the area. In 2014 and 2015, COMIKAGI produced a total of 76.2 tonnes and 108 tonnes, respectively, of cassiterite-tantalite pre-concentrate mixed at a ratio of 72% to 28%.

#### A5.2.5. Environmental and Occupational Issues

##### Management of Mining Waste

One of the main environmental concerns at the COMIKAGI sites relates to inadequate management of tailings (waste from processing), most of which drains quite haphazardly from the multiple trenches spanning the hillsides of processing areas into sometimes marshy valley bottoms, potentially creating siltation issues in downstream streams and rivers (Figure 23, next page). Based on 2015 production values, an estimated 110,000 tonnes of tailings was discharged into the environment in that year alone<sup>106</sup>.

The geochemistry of the ore and waste at COMIKAGI has not been determined, although similar deposits in the region can contain elevated concentrations of radioactive elements (and occasionally other deleterious elements, e.g., arsenic). Particularly given the number of mines in the immediate area, **the cumulative impacts of tailings** (chemical and physical, e.g., siltation) on the districts watercourses warrant investigation. COMIKAGI is exploring means to contain the waste (e.g., sedimentation ponds or basic containment systems), including in conjunction with requirements (e.g.,

<sup>103</sup> NISR 2016

<sup>104</sup> Hinton 2016b

<sup>105</sup> Ibid

<sup>106</sup> Mineral processors report that 1.0–1.1 kg of concentrate is generated per tonne of ore washed.

Environmental Impact Assessment [EIA] processes) to convert their single concession into four separate SSM licences.

**Figure 23: Water and tailings discharge to valley**



## Water and Land Degradation

**Impacts on water quantity are likely a less significant concern.** A major investment for COMIKAGI has involved the extensive network of water extraction from two main sites, storage reservoirs, and diversion via a series of channels and pipes that are directed towards and cutting across processing areas. Water extraction rates have not been determined, but source rivers are reportedly year-round and process water (together with tailings) returns back to the same watercourses.

An important environmental concern relates to land degradation associated with operating and abandoned extraction sites and the multiple trenches and small water impoundments found across area hillsides. This can impact residents by reducing land available for farming, while the visibly numerous open and un-fenced shafts and pits scattered across the area can pose hazards for livestock and humans. However, smallholder farmers also yield benefits via employment in ASM as sub-contractors or workers and/or through payment of monthly ground rents, the gender dimension of which is examined in section 0.

## OHS Issues

OHS hazards and risks are associated with specific jobs, tasks, and functions at the mine. Main OHS issues observed relate to **risks of collapse of underground tunnels and shafts**. In many 3T deposits in the region, highest grades of cassiterite-tantalite mineralisation are found in highly kaolinised pegmatites, the composition of which is somewhat comparable to soft, compressed flour. As such, a considerable proportion of sub-contractors' operating expenses go to purchasing and installing timbers as needed to keep underground workings open, safe, and accessible. Indeed, one of most productive sites had been closed due to collapse of workings and COMIKAGI is now (reportedly with some technical assistance from the GOR) exploring how to safely re-open workings and resume operations.

Other potential risks relate to repeated stress on musculo-skeletal systems associated with carrying of heavy loads (e.g., 50–70 kg bags of ore) and repeated motion in awkward positions (e.g., during sluicing). Chronic exposure to and inhalation of kaolin dust, which can clog lungs and result in serious respiratory illness (kaolinosis), may also pose a risk for underground workers. Additional OHS issues

relate to **inadequate use of PPE**, such as rubber boots, dust masks, gloves, and hardhats (although the latter is notably worn by many ‘diggers’).

All COMIKAGI workers registered by name in the workers’ book are required to get health insurance, often paid by sub-contractors on their behalf, then deducted from wages<sup>107</sup>. Casual workers, which are believed to be much of the workforce, are only reported in number and are covered under COMIKAGI’s workers’ compensation (accident) insurance plan. COMIKAGI also employs a few supervisors who inspect sites, including with respect to OHS compliance; however, the rigorousness of this seems to be a bit limited. The cooperative also employs salaried security guards to guard against theft or incursions of illegal miners (e.g., at night) and other unauthorised persons, although (and given the vast extent of the area) this is believed to primarily focus on protection of pre-concentrate stocks held at COMIKAGI offices (see Figure 24).

**Figure 24: COMIKAGI concentrate room**



## Child Labour

In ASM countries around the world, children engaged in ASM experience the same occupational risks as adults, but are far more susceptible to its negative impacts due in large part to their rapid rate of emotional and physical development and relative inefficiency in detoxification<sup>108</sup>. Psycho-social, physical, and educational impacts can significantly impact the healthy development of boys and girls, with affects extending into adulthood. Fortunately, at COMIKAGI, the presence of **child labour is not visibly present**<sup>109</sup>. However, some male workers encountered seem to have started working in the mines as teenagers.

The secondary school enrolment rate in Gakenke District is only 26.5%<sup>110</sup>. In recent years Rwanda has put in place strict and widely known policies concerning education of boys and girls, with their absence from school often resulting in harsh penalties for parents. COMIKAGI supervisors and

<sup>107</sup> In COMIKAGI, as found in other localities, additional sub-contractors costs for health insurance, personal protective equipment and tools are often transferred to and deducted from payments to workers (Hinton 2016b).

<sup>108</sup> Hinton 2006, WHO, 2005; ILO 1999

<sup>109</sup> No child labour was observed or reported during the author’s field missions in September 2016. The authors’ prior experiences at *other* Rwandan sites suggests that child labour is typically not an issue at organised, more advanced sites but *is* more commonly encountered at less organised, informal operations not assessed for this research. Furthermore, although boys and girls were not observed working in COMIKAGI mining areas during field research, it does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors who may rely on family members to carry out work.

<sup>110</sup> Gakenke District Local Government (2013) reports this rate, albeit low, is the highest of any district in the Northern Province and above the national average of 21%.

security guards (whose roles include keeping unauthorised persons away from worksites) may play a role in this respect.

Although OHS risks encountered at COMIKAGI may not present a serious concern for children, risks nevertheless exist in relation to land disturbances and potential impacts on water quality and quantity (discussed in section 0).

### A5.3. Distribution of Economic Costs and Benefits Across the Supply Chain

This section outlines the revenues, costs and distribution of economic benefits between economic actors in the COMIKAGI supply chain. It further provides insights into the social and gender dimensions of economic costs and benefits derived from activities.

#### A5.3.1. Production Value and Sales

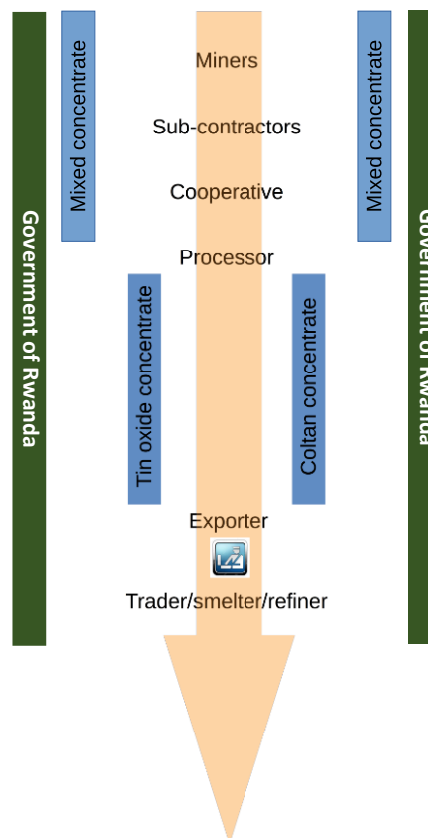
The value of production and sales principally depends on two variables: 1) quality of material and 2) market and sale prices.

##### Quality of Material<sup>111</sup>

Pre-concentrate is composed of a mixture of cassiterite (SnO) and tantalite (tantalite- and columbite-series minerals) at varying ratios, depending upon the nature of the ore at a given locality. In 2015, the average COMIKAGI mix ratio was 72% of cassiterite to 28% of tantalite pre-concentrate. Once sold to FECOMIRWA, pre-concentrate is upgraded by magnetic separation that results in removal of iron-mineral impurities and generates two products: cassiterite and tantalite concentrate, sold to different markets.

The resulting two concentrates still contain impurities and are analysed and valued based on their respective contents (percentages) of tin (Sn) and tantalum oxide (Ta<sub>2</sub>O<sub>5</sub>) in the concentrate product. Although resulting concentrations of tin and tantalum oxide vary, they must meet minimum specifications of a given sales contract, typically on the order of 60% tin in cassiterite concentrate and 30% Ta<sub>2</sub>O<sub>5</sub> in tantalite concentrate, which was used for the purpose of calculations.

Figure 25: Main economic actors in the supply chain



<sup>111</sup> Cassiterite is a tin oxide (SnO). Cassiterite concentrate contains a certain percentage of tin oxide, thus a certain content of tin metal. The price of the concentrate is based on its tin content. Tantalite refers to columbo-tantalite, which is comprised of tantalite (tantalum oxide minerals) and colombite (niobium oxide minerals). Niobium has negligible value compared to tantalum and thus pricing is based on tantalum oxide content.

Figure 26: COMIKAGI mix concentrate thin



Figure 27: COMIKAGI mix concentrate thick



Figure 28: Cassiterite concentrate



Figure 29: Tantalite concentrate



## Market and Sale Prices

Tin value calculations were based on the LME price for tin (USD 19.20 per kg on 12 September 2016 cash settlement price). Tantalum is priced via a series of metal exchanges and is ultimately determined by a contract price. For the purposes of estimation, the Asian Metals Exchange (AME) price was used for tantalum oxide (USD 130 per kg for concentrate containing 30% Ta<sub>2</sub>O<sub>5</sub>).

Although linked to international market prices, actual sale prices depend on the contract between the seller and buyer. Average national export values (as determined by MINIRENA) were used to calculate the domestic price of concentrate and thus value of sales<sup>112</sup>. As shown in Table 6, monthly domestic production value was in the order of USD 102,000.

Based on the average monthly production and number of workers in 2016, an average mine worker contributes approximately 11.5 kg of concentrate per month, equivalent to USD 211.90. Of note, production has decreased significantly compared to 2015, when monthly production was on the order of 9.4 tpm and individual worker production amounted to around 12.2 kg per month.

Table 6: COMIKAGI value of production and sales (January to August 2016)

Product	Average Preconcentrate volume per month (tpm)	Average monthly international value of production <sup>a</sup> (USD)	Average monthly value of sales <sup>a</sup> (USD)	Domestic sales value per kg	Average kg per month per worker	Production value contributed (worker per month)
Cassiterite concentrate	3.96	45,619	43,560	11.0	8.3	91.3
Tantalite concentrate	1.54	200,200	58,058	37.7	3.2	120.6

<sup>112</sup> According to the MINIRENA database, in the first half of 2016, this averaged USD 11 per kg and USD 37.7 per kg for cassiterite and tantalite concentrate, respectively. Throughout 2015, this averaged USD 9.7 per kg and USD 43.4 per kg for cassiterite and tantalite concentrate.

Total	5.5	514,578	101,618	18.1	11.5	211.9
<sup>a</sup> Based on international market prices.						
<sup>b</sup> Based on domestic export prices (averaged for 2016)						

### A5.3.2. Expenditures

Expenditures incurred by different economic actors in the supply chain are outlined below. In the subsequent section on the economic distribution of revenues, costs incurred by one party are accrued by another (e.g., taxes paid by COMIKAGI represent government revenues).

For the purposes of revenue distribution analysis, only main operating costs are detailed. A more comprehensive review of the distribution of economic benefits would consider capital cost investments, including those incurred by COMIKAGI (e.g., licence acquisition and annual maintenance costs, infrastructure investments) and sub-contractors (e.g., water pumps, land acquisition) related payback periods, rates of return, etc. would also be incorporated into the analysis.<sup>113</sup> Given that high costs of entry is a common barrier for investment in the sector at all levels, such analysis would be useful to the discourse.

#### Salaries and Wages

According to different interviews of sub-contractors, miners' costs constitute approximately 70% of their operating costs. COMIKAGI reports that mine workers are paid according to a daily fixed salary ranging RWF 1,500–2,000 per day or USD 1.75–2.50 per day, depending on the task and function performed<sup>114</sup>. For instance, transporters and casual labourers are reportedly paid RWF 1,500 or USD 1.75 per day, while diggers and sluice operators earn RWF 1,700 or USD 2.13 per day and RWF 2,000 or USD 2.5 per day, respectively.

This set-up differs somewhat from many other 3T sites in Rwanda, where workers are more commonly (but not always) paid based on production with some casual day wage labour to support the process, more commonly at a rate of RWF 1,000 or USD 1.25 per day<sup>115</sup>. In other localities, the payment-by-production set-up is favoured by some investors as it puts much of the financial risk on the shoulders of workers while many workers also prefer it as it enables a bigger (albeit less predictable) haul when good ore is encountered<sup>116</sup>. Notably, some COMIKAGI mineral washers (sluice operators) reported payment based on production and this commonly used system may be more prevalent than reported or local operators may be (as found in other Rwandan mines) transitioning to a day wage system.

#### Social, Health, and Other Insurance

All mineworkers are subject to deductions of 8% social security (4% by worker, 4% by employer), which are deducted and paid on behalf of the worker by the sub-contractor.

All Rwandans are legally required to hold health insurance, paid annually every July, with annual costs a function of economic status, ranked from zero paid government on behalf of the poorest individuals, RWF 3,000 or USD 3.75 per year for low income earners, followed by RWF 5,000 to 7,000 or USD 6.25 to 8.75 per year for higher income earners. COMIKAGI reports that it requires all persons registered within their production system to hold health insurance or pays the RWF 3,000 or USD 3.75 per year on their behalf and deducts from payments. However, this seems to apply only to 'regular' workers registered by name. Casual labourers are covered by COMIKAGI's workers' compensation insurance plan in the event of serious accidents causing injury.

<sup>113</sup> For example, COMIKAGI reported that the cost for acquisition of a mining licence(s) is around USD 20,000, which includes the EIAs, consultants and experts needed to complete the EIAs, mine development plans, and other SSM licencing requirements.

<sup>114</sup> According to interviews with some of the investors during the field visit.

<sup>115</sup> The exception to this is typically during the 'development phase'. I.e., when shafts and tunnels are being excavated until ore is encountered, development costs (including daily wages) are often the sole responsibility of the investor (in this case, the sub-contractor). Where casual labourers were paid a day wage, remuneration was more commonly on the order of RWF 1,000 or USD 1.25 per day (as found in Gifurwe) (Hinton 2016b).

<sup>116</sup> In a number of 3T sites in the GLR, Hinton (2016b) found that many (but not all) women miners prefer more consistent, predictable day wages, even if lower than the highly varied but potentially greater incomes obtained from payment by production. Some of this was attributed to how and by who 'shares' in earnings are distributed and risks of being cheated, e.g., by team leaders.

## Due Diligence Levies

The 3T mining sector in Rwanda bears the cost related to meeting the due diligence requirements imposed on the supply chain via the Dodd-Frank Act<sup>117</sup>. Apart from internal costs related to internal traceability, each tonne of cassiterite concentrate generates a levy for the GOR through GMD, paid nationally (relating to the RCM), and a fee paid to ITRI per tonne of metal contained in the concentrate at the point of export to finance the iTSCi traceability scheme, guaranteeing compliance with DDG. GMD provides tagging managers at mine and processing sites. Additional to the levies<sup>118</sup>, a yearly fixed full membership is paid to ITRI by upstream companies, defined as being upstream or at the point of levy collection<sup>119</sup>.

For a mix concentrate of COMIGAKI (72% cassiterite-28% tantalite), these combined costs (of iTSCi and RCM) represent a total amount of approximately 3% as direct cost of DDG. This cost is supposed to be borne by the supply chain, but ultimately becomes the expense of the mine workers. Most of the interviewed stakeholders outlined the high due diligence costs, which represent almost the same level as the royalty or the processor/exporters' net margins.

## Taxes and Royalties

Main taxes and royalties accrued and paid by various actors:

- Royalties: 4% of export value
- Personal income tax: 4.1% of workers' salaries/wages
- Sub-total: 8.1%
- Workers: 15% PAYE income tax on income above RWF 30,000 or USD 465

In addition to this total (3% due diligence levies and 8.1% taxes and royalties), other indirect contributions must be considered. These include:

- In 2015, COMIKAGI paid a total amount of taxes and contributions for RWF 6.6 million or USD 825,000, plus RWF 1.1 million or USD 2,475 of corporate income tax. This total amount of RWF 7.7 million or USD 9,625 represented 8.5% of the 2015 generated commissions and thus 0.6% of the export value of the concentrates.
- Sub-contractors' profits are also normally taxed. If taxed at the real regime (calculating tax based on real profits), we can consider a taxation rate of 20–25%. Considering that part of the profit can evade paying taxes, an average 15% effective rate can be applicable with a certain degree of confidence. As sub-contractors' profit is estimated at 14.1% of the export value of the concentrate, their personal income tax then represents 2.1% of this value.
- Processors/exporters corporate income tax is also a direct contribution. Based on interviews, the research team estimated the net margin at 4% that, at a 30% Corporate Income Tax rate, represents a direct profit tax contribution of 1.2% (without considering other taxes such as businesses pay).

The addition of direct tax and budget contributions comes to 15.9%, which represents a minimum contribution because the other players in the supply chain, like the processors or exporters, also employ people and therefore also contribute direct and indirect taxes that are not accounted in our calculations.

## Commissions

Cooperative gross margin is 10% of the local sales of the concentrates<sup>120</sup>. Sub-contractors generate 20% margin after deducing their costs. Processors exporters generate a 20% gross margin.

## Other Operating Costs

The revenue distribution analysis excludes other operating costs of economic actors. For example, a portion of FECOMIRWA's operating costs would be attributed to in-house salaries, utilities, and processing inputs, among others. COMIKAGI incurs several other costs, including but not limited to

<sup>117</sup> United States 2010

<sup>118</sup> Publicly disclosed in Cook & Mitchell (2014, p. 31)

<sup>119</sup> [https://www.itri.co.uk/index.php?option=com\\_mtree&task=att\\_download&link\\_id=52320&cf\\_id=24](https://www.itri.co.uk/index.php?option=com_mtree&task=att_download&link_id=52320&cf_id=24)

<sup>120</sup> Commissions on sales retained by COMIKAGI vary depending on agreements with individual sub-contractor. This reportedly ranges 5–13.5% and averages 10%.



salaried staff (security guards, supervisors), operation and maintenance of water pumps and the piping system, utility bills for their offices, and costs of pre-concentrate transport to Kigali (approximately RWF 14,000 or USD 175 per tonne). Sub-contractors incur monthly average costs for timbering on the order of RWF 150,000 or USD 338 per month and additional costs for land rent (where rented). Workers additionally receive deductions for tools, PPE, and other inputs.

### A5.3.3. Distribution of Revenues

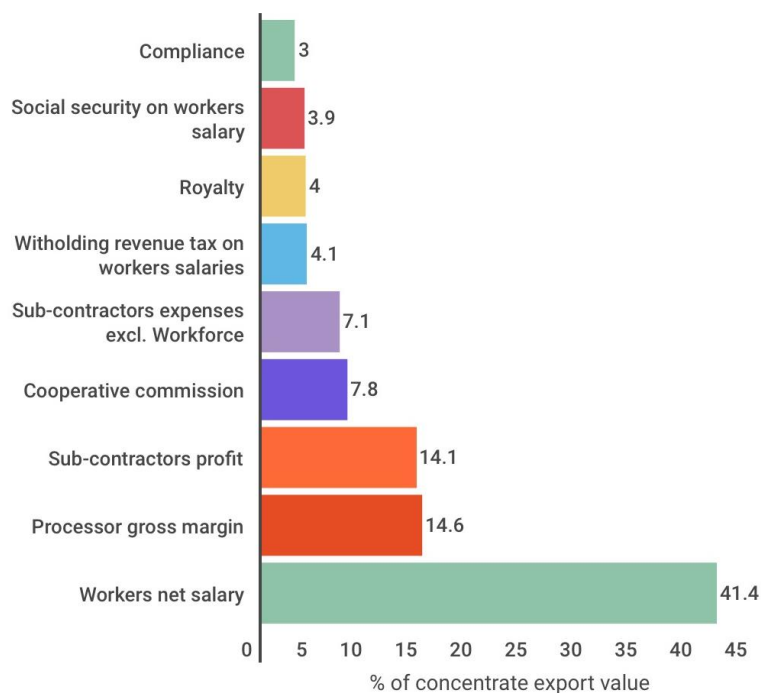
The following are calculations of the revenue distribution among the economic actors of the COMIKAGI supply chain. The calculated revenue distribution offers an approximate reality of the cooperative supply chain. The following information shows the price per ton of 'mix' concentrate produced by the COMIKAGI cooperative and its value distribution along the supply chain.

As detailed in Table 7 and Figure 30, based on the concentrate export value, revenues are distributed as follows.

- **Workers** (477) retain 41.4% of production value as their wages. The average worker net monthly salary (after deductions) is USD 86.
- **Sub-contractors** (70) retain 21.2% as gross profit and 14.1% after major operating expenses are deducted.
- **COMIKAGI** (39 members) retains 7.8% as gross profit.
- **Processors/exporters**, including but not limited to FECOMIRWA, retain 14.6% as gross profit.
- **Traceability services**, including iTSCi and RCM, together constitute about 3% as levies.
- **GOR** retains 12% as taxes, i.e., 4% royalties, 3.9% social insurance, and 4.1% personal income tax on workers

**Table 7: Value of 1 kg of COMIKAGI concentrate along the supply chain**

<b>Price per Kilogram</b>	LME Tin Price	\$19,20	Tantalite oxide ore price	\$130,00
	Cassiterite concentrate price (60% Tin content)	\$11,52	Coltan concentrate price (30% tantalite oxide content)	\$39,00
	Export price	\$10,38	Export price	\$38,00
	Mix concentrate Export price 28%Coltan/72% cassiterite	\$18,11		
	Royalty 4%	\$0,72		
	Compliance	\$0,55		
	Processor trade gross margin	\$2,65		
	Cooperative selling price	\$14,19		
	Cooperative fee 10%	\$1,42		
	Net price for cooperative subcontractors	\$12,77		
	Subcontractors costs (excl. Workforce)	\$1,28		
	Subcontractor profit	\$2,55		
	Workforce cost	\$8,94		
	Social security 8%	0,72		
Withholding revenue tax 15% above 37,5USD/m	0,74			
	Net for workers	\$7,48		
<b>Comikagi revenues per month and distribution</b>	Average 2016 monthly output	5 489 Kgs		
	Export value	\$99 406		<b>100%</b>
	Royalty 4%	\$3 952		4%
	Compliance	\$3 019		3%
	Processor trade gross margin	\$14 546		15%
	Cooperative fee 10%	\$7 794		8%
	Subcontractors costs (excl. Workforce)	\$7 026		7%
	Subcontractor profit	\$13 997		14%
	Workforce share	\$49 072		
	Social security 8%	3 925,73		4%
	Withholding revenue tax 15% above 37,5USD/m	4 088,76		4%
Net workforce payment	\$41 057		41%	
Average 2016 number of workers	477	23% women		
Average worker net payment	\$86			

**Figure 30: Distribution of revenues across the COMIKAGI supply chain (2016)**

### A5.3.4. Social and Gender Dimensions of the Distribution of Costs and Benefits

#### Issues Related to Gender

Rwanda has impressive commitments towards gender equality, including via its National Policy on Positive Discrimination towards Women, entrenched sensitisation processes from local to national levels and ambitious targets of 30% women's employment in all sectors by 2020, among many others<sup>121</sup>. Despite this, and although women comprise 52.8% of the district population<sup>122</sup>, women are only marginally engaged in mineral production at COMIKAGI, with only 14% of sub-contractors and 20% of mineworkers being women.

Such gender imbalances seem to extend beyond the quantity of jobs to the quality of work and its resulting economic benefits. While mineworkers are aggregated in the above analysis, it is important to recognise differences in earnings by position. Work in hauling/transport, one of the most common jobs carried out by women in mines, yields RWF 1,500 or USD 1.9 per day, whereas work in extraction and sluicing earns RWF 1,700 and 2,000 or USD 2.1 and 2.5 per day, respectively<sup>123</sup>. COMIKAGI management indicated that casual workers typically earn RWF 1,500 or USD 1.9 per day, considerably higher than the commonly encountered 'standard' rate of RWF 1,000 or USD 1.25 per day found at other operations<sup>124</sup>. In this context, **women comprise 19% of the overall workforce as sub-contractors and workers, yet receive only 14.2% of the revenue share accrued to the local economy** (i.e., to COMIKAGI, sub-contractors, workers)<sup>125</sup>.

<sup>121</sup> Hinton 2006

<sup>122</sup> Rwanda 2013b

<sup>123</sup> Women at COMIKAGI also reportedly work in panning on a casual basis. Although this was not clarified at this site, in other localities, 'head' sluice operators are typically the highest paid on the team (with other sluice team members earning less), followed by or equalled to those in extraction (Hinton 2016b). At COMIKAGI, some sluice operators confirmed payment according to production and it was observed that most experience operators (13+ years) were positioned in lucrative 'upstream' positions in trenches while junior operators (under 2 years) worked in undoubtedly less productive 'downstream' trenching areas.

<sup>124</sup> Rwanda 2013b

<sup>125</sup> Calculations based on local wage rate provided and gender division of labour at COMIKAGI. This excludes pay distributions within teams (i.e., typically male team leaders earning more than members, which can further disadvantage women), it assumes earnings of male and female sub-contractors is the same and it assumes one 'typical' production system is comprised of approximately 7 male washers (sluicing and panning), 5 male

Gender disparity of direct economic benefits at COMIKAGI may also extend to the economic costs of mining. In Gakenke District, 61% household landholdings span less than 0.5 ha and 82.5% of the population is reliant on agriculture, which is the main source of employment for men (69%) and to a much higher degree for women (92%)<sup>126</sup>. While significant gains have been made in Rwanda in recent years, disparity still exist in terms of household decision-making, including those concerning sale or rental of land and how proceeds should be used<sup>127</sup>.

Thus, although land rents, which comprise 5% of household income in Gakenke, or sales may provide a supplement to household income<sup>128</sup>, women may not benefit to the same extent as men from this trade-off. Furthermore, in other localities, such decisions have been shown to impact women's ability to meet household food security needs, potentially generating additional economic costs to the family associated with malnutrition and resulting development impacts<sup>129</sup>.

Other economic costs may be derived from impacts on water quality or quantity<sup>130</sup>. Women and men in Gakenke District reportedly spend 26 and 9 hours per week on domestic duties, respectively, including in food preparation, childcare, and household cleaning, but excluding time spent fetching water<sup>131</sup>. Additional time spent hauling water (i.e., if nearest water sources are impacted) or tending to ill or injured family members (e.g., due to accidents in the mines or impacts on water quality) has been shown in other ASM areas to significantly affect women's work burdens, reduce time available for participation in income generating activities (including ASM) and result in other effects on their physical and psychosocial wellbeing<sup>132</sup>.

Clearly, understanding the gender dimensions of both economic costs and benefits provides direction for improving the economic development outcomes from ASM. This extends from those directly engaged in and impacted by ASM to the local economy. For women and girls, men and boys, the benefits of multiplier effects derived from injection of mining-related incomes into the local economy and resulting job opportunities cannot be overlooked. Based on 2015 production statistics and the local share of production value (77%), approximately USD 1.6 million was injected into the local economy that year<sup>133</sup>.

## Socio-Economic Benefits of ASM

This investment can be seen in Mududu Village, where COMIKAGI headquarters is located, has a somewhat diversified economy of small shops, canteens, and restaurants, with a significant number (given the population) of relatively new *boda boda* taxis (motorcycles). Furthermore, individual sub-contractors report that **mining has enabled them to significantly improve their socio-economic status**, with contributions ranging from buying land and building a house for themselves or their parents to paying children's school fees (including up to university level) to investing in other income-generating activities (e.g., purchasing lorries for hire, carpentry businesses), thereby further extending employment contributions to the wider economy.

The cumulative effect of multiple 3T mines in Gakenke District is significant. The town is a hub of bustling shops and restaurants and boasts a number of impressive, modern houses, as well as a new

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extraction team workers ('diggers'), and 3 women in transport and other casual jobs. Of total local revenue share distributed to women (14.2%), 11.6% is allocated to an estimation of 95 women workers and 2.6% to 10 women sub-contractors.

<sup>126</sup> Rwanda 2013b; GOR, 2014

<sup>127</sup> For example, in Gakenke District, 21% of married women report having no say in decisions concerning major household purchases (NISR 2016). See also Santos et al. 2014

<sup>128</sup> GOR, 2014.

<sup>129</sup> Hinton 2016b

<sup>130</sup> Water quality and quantity issues, discussed in section A5.2.3, have not been assessed at COMIKAGI. Inadequate waste and water management practices were, however, identified, and this is a commonly encountered issue in ASM.

<sup>131</sup> This excludes work considered by the International Labour Organisation (ILO) to be an 'economic activity' albeit often unpaid including fetching water, fodder for animals and firewood, much of which is traditionally carried out by women and thus represents a substantive increase in work burdens. (GOR, 2014).

<sup>132</sup> Hinton 2016b

<sup>133</sup> Statistic assumes that all 39 cooperative members are residents and spend their ASM incomes locally. This is believed to be the case for sub-contractors and mine workers.

health centre and several schools. Applying revenue distributions found in COMIKAGI to the Gakenke District, **approximately USD 3.2 million was injected in the local economy in 2015.**

Given that Gakenke District has one of the highest poverty rates in the country (56.6%), sources of direct and indirect employment and income are undoubtedly welcome. Although Gakenke has an employment rate of 89.1%, of those employed, the majority of these (82%) cite work in farming as their 'main job' and only 18% (31% men, 7% women) report that wage or independent non-farm employment is their primary source of employment, suggesting that both direct and indirect employment opportunities availed from ASM are more likely to benefit men<sup>134</sup>. Despite this, those primarily reliant on farming are more likely to be working in multiple jobs and 22% of household income is attributed to wages. Thus, mine work can provide an important and often much-needed opportunity for farming families to escape poverty<sup>135</sup>.

## A5.4. Key Conclusions

Main conclusions from the COMIKAGI case study are summarised as follows.

**Most revenues are retained in the local economy.** Based on a 77% revenue share, COMIKAGI operations injected approximately USD 1.6 million into the local economy in 2015, spurring local business development, inducing employment generation and supporting health, education and development of direct and indirect beneficiaries.

**State revenues derived from this single cooperative are significant** and have been estimated at approximately USD 280,000 in 2015. This estimate is attributed to royalties (USD 82,667), corporate income tax from COMIKAGI (USD 1,367) and FECOMIRWA (USD 24,800), personal income tax of mineworkers (USD 128,031), and VAT contributions of *only* workers (USD 43,172)<sup>136</sup>.

**Mineworkers as a group are the most significant beneficiaries** of production revenues (41.3%). Given their large numbers, individual incomes from mining average at only about USD 86 per month, which nevertheless is still above the GDP per capita (USD 718 per year or USD 60 per month). Agriculture and mining visibly coexist around COMIKAGI, but their inter-reliance likely extends well beyond geography. Specifically, much of the food consumption component of poverty line determination (USD 103 per month) is likely to be met through subsistence agriculture, much of which is provided through the labour of female household members and potentially providing some (although not all) explanation for women's low participation in the sector. Despite their levels of poverty, **mine workers cumulatively make the most significant tax contribution of all economic actors**, amounting to 61% of all taxes in 2015, basically double the royalty contribution.

**Sub-contractors, who bear much of the investment risks, are the second most significant beneficiary group**, (14.1%) and individually earn, on average, approximately USD 200 per month. Sub-contractors, who also bear the brunt of investment risks<sup>137</sup>, have reported significant improvement in terms of economic status, including through land purchases, paying school fees, small business development, and others.

**COMIKAGI and processors/exporters hold a revenue share of 7.2% and 13.4%** (after corporate income tax), respectively. This importantly excludes main capital and operating cost. Before expenses, COMIKAGI earns gross revenue of approximately USD 7,100 per month (with cooperative members' shares amounting to only USD 186 per member per month), while the processors/exporters (including FECOMIRWA) gross revenues amounts to USD 13,320 per month in the form of commissions.

<sup>134</sup> NISR 2012

<sup>135</sup> Ibid

<sup>136</sup> Calculation based on 2015 production (108 tonnes at 72% cassiterite, 28% tantalite) and 2015 export prices (MINIRENA). VAT contribution of miners based on 28% of total expenditures attributed to VAT (housing and utilities, alcohol, tobacco, bottled beverages, communications and miscellaneous). (Rwandan expenditures derived from: ADB, 2012, *A Comparison of Real Household Consumption Expenditures and Price Levels in Africa*, African Development Bank publ., 92p.)

<sup>137</sup> Assumes that workers' wages, which comprised 70–75% of sub-contractors' expenditures, are paid daily as reported rather than based on production, which often yields higher (albeit more irregular) incomes for workers but distributes much of the risks to this group.

**Obligations to sell to a single entity pose risks of reducing local incomes further.** COMIKAGI is currently selling to both FECOMIRWA and other processors and exports<sup>138</sup>. Currently, there is only one mining federation in Rwanda (FECOMIRWA)<sup>139</sup>. If cooperatives are obligated to sell all production to the federation, risks of monopolistic pricing and excessive commissions can have significant implications for the incomes of miners, local economic development contributions, and state revenues. Furthermore, there is a potential conflict of interest between the role of the federation to represent and defend the interests of the cooperatives and the role of the federation as a trade platform.

**Distribution of benefits clearly favours downstream actors, while the main financial risks are concentrated upstream.** The organisational structure exists as a practical response to functional operating needs, including in marketing and trade (processors/exporters), acquisition and maintenance of titles (COMIKAGI), investment and supervision (sub-contractors as small enterprises), and labour (individuals and teams as micro-enterprises). Nevertheless, some improvements in labour relations and reduction of legal restrictions can promote a better and fairer distribution of benefits. For example, **upstream (community-level), formalisation of organisational arrangements** (for instance via contracts between sub-contractors and COMIKAGI and between sub-contracts and teams or workers, institution of related internal by-laws and codes of conduct, and inclusion of practices to increase the voice of workers in COMIKAGI) would result in a more equitable distribution of risks (financial, occupational, environmental) and benefits (incomes, employment), particularly if coupled with measures to rectify gender inequalities in the system.

Although COMIKAGI is operating under a small-scale licence, **the operation provides useful insights for operations classed as artisanal.** The current legal restriction on mineral processing by cooperatives (or companies) with artisanal licences potentially promotes a concentration of the supply chain in the hands of few processing plants. A broad range of appropriate, intermediate, low-cost mineral processing technologies could be easily introduced, resulting in increased recoveries and incomes of mine workers, thereby further augmenting economic development contributions. In relation to this, extraction (rather than processing) typically represents an even greater bottleneck to increased production; thus, an equal emphasis on basic geology and safe, efficient mining methods is warranted if future efforts are to spur even greater production and economic development contributions.

**Women yield fewer benefits but bear greater costs.** Until measures are put in place to increase individual women and men miners' incomes, the co-reliance of miners on agriculture appears to be crucial to meeting basic nutritional needs. Women's responsibility for household food security, including by subsistence farming, is only one factor that may contribute to their low participation in and disparate economic benefits from ASM<sup>140</sup>. Furthermore, even for those not directly working in ASM, many negative costs commonly derived from ASM can disproportionately affect women – ranging from increased time spent hauling water to reduced land for growing for household and commercial purposes – yet women are less likely to influence how benefits (e.g., land rent, spouse's incomes) are used.

Importantly, in other Rwandan 3T sites, married men miners often rely on their wives to carry out farming roles while women engaged in ASM were more likely to hire wage labourers to take on their agricultural roles, thereby making a greater contribution to local employment<sup>141</sup>. Women miners additionally reported achievement of multiple gains from their employment, including in terms of increased household bargaining power, improved educational and health status of children and overall socio-economic status of the family<sup>142</sup>.

**An investment in improving the local production system would yield the greatest returns.** The analysis of the COMIKAGI supply chain suggests that introducing low-cost, safer, more

<sup>138</sup> During the interviews and in the literature, there appears to be a belief that the cooperatives have the obligation to sell to the federation. This assumption was not confirmed in the analysis of the legal framework nor was it observed to be a reality on the ground. Under the law, an artisanal licensee has the right to sell their production and there is no requirement that the production of the cooperatives must be sold to the federation.

<sup>139</sup> There appears to be an interpretation that the cooperative law allows only one federation for each economic sector. In fact, the cooperative law is not very clear about the number of the federations per economic sector and the cooperatives are not typified by economic sector (more details in Annex 7).

<sup>140</sup> Barriers to entry into the sector and lucrative work therein are detailed across the GLR, including with emphasis in Rwanda, are highlighted throughout and detailed in Hinton 2016b.

<sup>141</sup> Hinton 2016b

<sup>142</sup> Ibid

environmentally responsible and efficient processing and mining methods would increase local incomes as well as sectoral contributions to the local economy and state revenues. An emphasis on skilling women and instituting policies to increase their access to lucrative work would amplify development yields further<sup>143</sup>. Working arrangements should be formalised (e.g., contracts between sub-contractors and workers that include rights and benefits) with a view to more equitably addressing distribution of economic benefits and environmental, occupational and financial risks.

**One of the main environmental concerns at the COMIKAGI sites relates to inadequate management of tailings (waste from processing), potentially creating siltation issues in downstream streams and rivers.** During the processing most of the ore drains quite haphazardly from the multiple trenches spanning the hillsides of processing areas into sometimes marshy valley bottoms.

**Another important environmental concern relates to land degradation associated with operating and abandoned extraction sites and the multiple trenches and small water impoundments found across area hillsides.** This can impact residents by reducing land available for farming while the visibly numerous open and un-fenced shafts and pits scattered across the area can pose hazards for livestock and humans.

The primary OHS issues observed relate to risks of collapse of underground tunnels and shafts, repeated stress on musculoskeletal systems associated with carrying of heavy loads and repeated motion in awkward positions, respiratory illness, and inadequate use of personal protective equipment.

**No child labour was observed or reported during the author's field missions in September 2016.** This does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors, who may rely on family members to carry out work.

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<sup>143</sup> Multiple examples exist of increased mechanisation and improved technologies in ASM often render women's jobs in ASM redundant. Such efforts should be informed by gender impact analysis and ensure technology improvements also benefit women.

## Annex 6: Detailed Case Study on Gifurwe Tungsten Mines

### A6.1. Area Overview

Located in Rwengabale Sector of Burera District in the Northwestern Province of Rwanda, the Gifurwe Mine commenced operations in 1937. Following sporadic operations by a series of companies, the mine was nationalised when the Régie d'Exploitation et de Développement des Mines (REDEMI) took over in 1989. In 2007, REDEMI's 20 concessions were privatised and Gifurwe was taken on by WMP via a tender process<sup>144</sup>. Soon thereafter, employment surged to 1,000–1,300 male workers who increasingly became more formal as the company established requisite systems and structures, including those required under RCM compliance. The company currently holds a licence area of 812 ha<sup>145</sup>, which includes 15 active and 15 inactive extraction sites.

Figure 31: Google Earth view of Gifurwe area



### A6.2. Supply Chain Actors, Activities, and Employment

#### A6.2.1. Main Supply Chain Actors

Principal actors at Gifurwe are the company (WMP) and its employees, sub-contractors who oversee mineral production by teams, mineworkers who carry out extraction and processing activities, and the buyer, which is Austrian company WBH, one of the subsidiaries of the Swedish group SANDVIK. The concentrate is exported to Europe and refined by WBH, who produces tungsten products as tungsten carbide, metal, and oxide<sup>146</sup>.

<sup>144</sup> WMP 2015

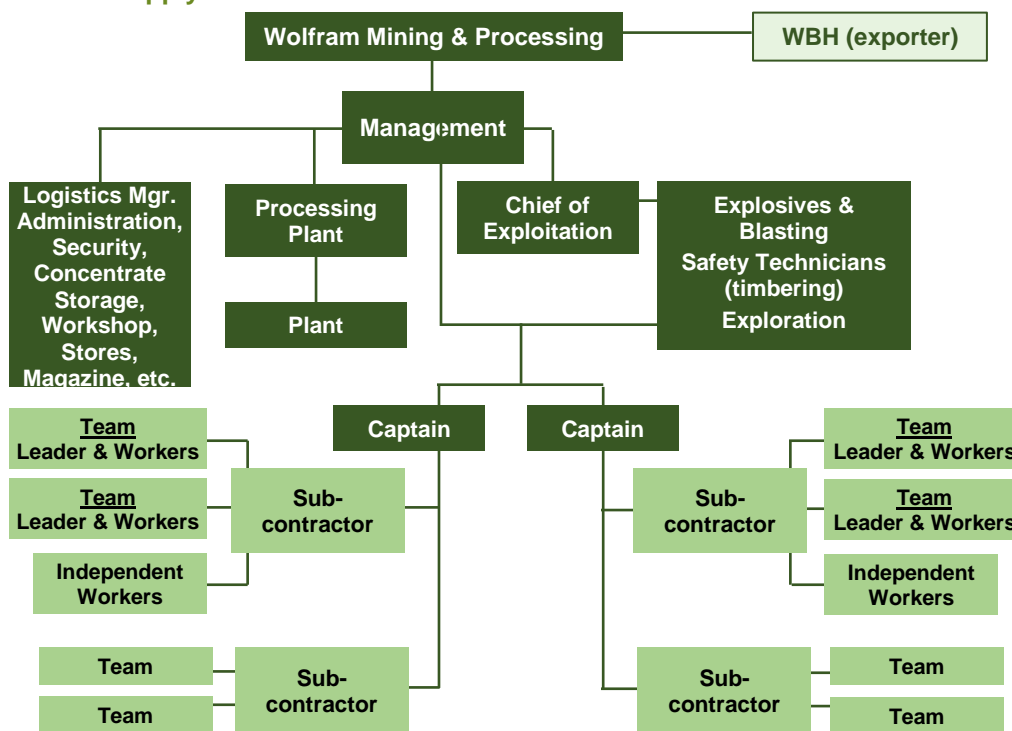
<sup>145</sup> It is not clear what category of licence(s), except that it is an exploitation licence and from the ICGLR database from 2016, the licence duration is 25 years (2014–2039) and that the ICGLR classification of the mines is SM. (ICGLR 2016)

<sup>146</sup> See <http://www.wolfram.at/>.

**WMP is a Rwandese company** headquartered in Kigali, where its finance and administration activities are centred. Via the mine operations manager, the company is responsible for management, administrative, and technical operations including licence maintenance requirements, compliance with RCM, and recording of individual workers and their production, and processing their payments into bank accounts after deductions. The company employs 40 people, including Kigali head office staff, the heads of the processing plant and exploitation (extraction), explosives and blasting teams and other technicians, and captains.

Each of the seven **captains** (including one woman) works on contract with the company and oversees the activities of the sub-contractors working under them. In terms of this oversight, the company defines the areas where sub-contractors are to conduct extraction activities, provides heavy machinery (excavator, bulldozer), and avails PPE and certain tools as needed for their activities. The company also purchases all production, and inspects sub-contractors' work to ensure occupational and environmental standards are adhered to, workers are paid fairly and workers' deductions for taxes, social security, and health insurance payments are properly applied.

**Figure 32: Main supply chain actors at Gifurwe wolfram mine**



There are 15 extraction sites in the mine run by 15 **sub-contractors** (also called managers), four of whom are women. Sub-contractors employ production teams and manage (via team leaders) workers carrying out extraction, hauling, and pre-concentrate production. Sub-contractors record daily production of teams and submit production and workers lists to the company, with most teams dividing daily production equally between members regardless of job and function.

Sub-contractors are under one-year contracts with the company, with commitments including to disclose financial capacity before contract signing; to engage workers and obtain as much production as possible; to commit to sell all production to the company; to employ workers that wear PPE; to provide fuel for heavy machinery (provided by the company); to purchase tools required by mineworkers (which is oftentimes deducted from their payments); to comply with legal and regulatory requirements; to assure security and prevent theft of minerals and other assets (and pay compensation in the event such incidents occur); and to record workers (in a registry) and report their individual production (with payments processed electronically by the company). Sub-contractors are paid a fixed amount per kg of concentrate produced.



Both parties can terminate the contract with 30 days' notice (or 15 days in case of an emergency). Every act by the sub-contractor or their workers that is contrary to the interests of the company is a subject of direct termination of the contract. Disputes from the contract implementation are to be sorted amicably; if not, the complaining party will address the issue to the competent agency. However, the agency is not defined in the contract. As mentioned above, this is a private contract between the company and the sub-contractors, where the government does not have any role or acknowledgement. As important as it is to respect private contracts, in general, these kinds of contracts are regulated by the mining authority in other jurisdictions. In some cases, the regulation defines minimum content and/or needs to be approved by the competent mining authority. It is not clear what the legal status is of each sub-contractor (singular person or collective [legal] person).

**Figure 33 WMP sub-contractor**



The relationships between the sub-contractor, the team leaders, and the miners are usually based on a verbal agreement and are hierarchical based on employee and employer relations. A total of 660 miners work under sub-contractors in teams of 5–30 workers. Although sub-contractors are involved in recruitment of team leaders and (sometimes) workers, team leaders and members typically determine who can work on their teams and criteria for joining (e.g., approval by and payment to other members).

### A6.2.2. Mineral Production Methods and Environment

Historically, most ore extraction was conducted at surface level, although the shift to underground production has escalated over the past decade as near-surface reserves depleted. Workings mainly consist of a series of tunnels and shafts branching from six main adits<sup>147</sup>, constructed by a combination of company employees or direct contractors, who conduct planning, explosives and blasting, inspection, and timbering activities and who sub-contracted workers.

**Figure 34: Tunnel G15 in Gifurwe**



Once ore-bearing veins are discovered, production is carried out by mainly integrated teams (i.e., extraction, hauling and processing work carried out within a single team) and, to a lesser extent, by individuals. Workers break larger rocks manually with sledgehammers and pickaxes and haul ore to the surface (in sacks or in large carts of rails). Where influxes of water are high, water pumps are used to support continued activities. Given high underground production costs, veins are wide (80–100 cm) and grades are exceptionally high (approximately 4.5–8% WO<sub>3</sub>). However, lower grade material is

<sup>147</sup> An 'adit' is an entrance to an underground mine which is horizontal or nearly horizontal.

subsequently recovered, hauled, and processed by women, many of whom work independent of teams, or by mine workers feeding the company processing plant.

**Figure 35: WMP tungsten vein**



**Figure 36: WMP driller**



**Figure 37: Semi-mechanised mineral haulage**



Ore is hauled to nearby areas, where it is crushed with hammers and manually sorted (i.e., visible wolframite is hand-picked for sale), with the remaining material subjected to coarse grinding in advance of washing using ground sluices. Heavy minerals at the bottom of sluicing trenches are collected and panned to recover the wolframite pre-concentrate, which is bagged, weighed, and logged upon transfer to the company. Individuals who pan tailings further supplement production. Processing areas are served by two water sources located 19–21 km away from the production area and directed to the site via an extensive network of channels that route water to ground sluicing trenches near to extraction sites.

**Figure 38: WMP mineral washer**



**Figure 39: WMP river sluicing**



**Figure 40: Sluiced wolframite concentrate**



Production by teams varies widely, but was reported to range 5–6 kg per day, while individual workers (more commonly women) report production on the order of 4–5 kg per day.

**Figure 41: Tailings sluicing****Figure 42: Tailing retreatment**

Much of the concentrate produced by sub-contractors meets market specifications, while low-grade ore and tailings are processed in the company plant. This process begins using a 3–4 tonnes per hour trommel, with oversize subjected to grinding, and fines separated on one of five shaking tables. Concentrate from tables is further upgraded using blanket tables. Tailings from the tables undergo additional fine wolframite concentrate recovery on slimes tables prior to discharge of tailings to a large catchment. The plant typically handles 5–8 tonnes of material and produces 30–40 kg of  $WO_3$  concentrate per day<sup>148</sup>. The final concentrate ranges 62–67%  $WO_3$ , which is subjected to magnetic separation in Kigali in the event that iron sulphides (e.g., arsenopyrite) are visible in the product.

Although WMP collects the tailings from the plant in basic impoundment, and has made efforts to stockpile waste rock in specific areas of the mine, overall mine waste management could be improved. In areas where sub-contractors conduct processing, tailings appear to flow somewhat uncontrolled downslope from sluicing areas. Site hydrology and water quality were not comprehensively assessed but such practices pose siltation risks to downstream watercourses and may affect water quality through release of deleterious elements (e.g., arsenic). In order to offset the footprint of area impacted by the mine and provide a source of timber used to stabilise underground workings, WMP has conducted extensive tree-planting activities, with 135,000 trees planted as of September 2016, and has allocated 90 ha for forestry.

### A6.2.3. Employment and Gender Division of Labour

WMP maintains a registry of all workers derived from records provided by sub-contractors. In September 2016, mineworkers totalled 660 (approximately 20 of whom are women), well below employment levels (1,000–1,300) during periods of high prices. Since 2010, WMP has made notable efforts to address gender inequalities in workforce composition. With support from the company, one women miner (a former school headmistress) conducted community sensitisations with local leaders and formed an all-woman team of 40. The number of women miners subsequently grew to 120, representing 10–12% of the workforce in 2010/11, as women began to join mixed teams and the company began to institute other highly progressive measures<sup>149</sup>. Unfortunately, severe drops in tungsten prices<sup>150</sup> prompted an outmigration of workers discouraged by lower revenues and, by early 2016, the workforce had declined to approximately 800, only around 3% of which were women<sup>151</sup>.

Girfurwe's efforts to employ women have impressively challenged prevailing beliefs in Rwanda that women can't work underground<sup>152</sup>. In addition to one woman employee is charged with supervising (and is trained in) drilling and blasting, while another woman supervises timbering teams. Although

<sup>148</sup> Given the favourable economics of the plant, particularly with respect to tailings re-processing, it is notably not in the company's interests to improve processing methods and thereby increase recoveries of sub-contractors. However, this also provides a business case for the company to improve containment of tailings to ease its collection and transport for processing in the plant.

<sup>149</sup> Other measures included women's grievance boxes, financial support and encouragement to a savings and loan association comprised of women mine workers and technical training of some women in non-traditional areas (e.g., drilling, blasting) (Hinton 2016a).

<sup>150</sup> The wolfram concentrate purchase prices dropped from RWF 2,100 or USD 2.6 per kg to RWF 1,400 or USD 1.8 per kg between 2012 and early 2016. The price as of September 2016 was RWF 1,524 or USD 1.9 per kg.

<sup>151</sup> Hinton 2016a

<sup>152</sup> Ibid

jobs and functions are mainly divided along gender lines (with women predominantly in hauling, crushing, grinding, and panning), a number work in integrated teams, including underground, where production is divided equally amongst members. When queried about women performing drilling jobs, the Chief of Exploitation responded that some women can use jackhammers with jacklegs (which bears the weight of 20–30 kg hammers) as it is ‘guided by technique, not strength’<sup>153</sup>. However, this progressive view is not shared by all at the site. One sub-contractor stated that men were stronger and, therefore, better workers; not surprisingly, he had no women working in his teams. During recent research at Gifurwe, some women expressed that because men perceived them to be weaker contributors to the team, they were required to pay higher fees than men to join (e.g., a goat, crate of beer equivalent to approximately RWF 5,000 to 10,000 or USD 6.3 to 12.5)<sup>154</sup>.

In efforts to challenge gender discrimination, WMP has recently supported a team of seven women and three men to develop an 800 m shaft that seeks to intersect un-exploited vein sets as it extends toward active working areas (Figure 43). In the two months since commencing activities, much work has focused on development, but the team has already produced about 2.5 tonnes of concentrate.

**Figure 43: Women miners group**



While such efforts are promising and WMP’s efforts provide an excellent example for other companies, much work is needed to achieve the GOR target of 30% women’s employment by 2020. Of permanent, salaried positions available (e.g., in management and administration, plant or mine managers, security), only one of 18 company positions are held by a woman (the secretary)<sup>155</sup> and, of contractors, one of seven captains is a woman. Although pay is often lower, some women expressed interest in jobs that provide a ‘day wage’ (e.g., cleaners), while a position in the semi-mechanised processing plant, which are typically much less labour intensive and lower risk than other jobs, was expressed as a ‘no-go’ zone for women, in large part due to the gender bias of the plant manager<sup>156</sup>.

A number of senior workers have reported that conditions have improved substantially since WMP took over Gifurwe. The most commonly cited improvement relates to changes in OHS, including widespread use of PPE, frequent and on-going inspection, supervision and timbering activities, availability of first aid treatment, and a vehicle to transport injured workers, among others. Notably, the Chief of Exploitation has recognised the importance of creating safe work conditions as a means to encourage women to join the workforce, particularly because it can ‘take away the fear’ as operations have shifted from surface to underground<sup>157</sup>. Other improvements relate to the consistency and

<sup>153</sup> Ibid, p. 20.

<sup>154</sup> Ibid

<sup>155</sup> Ibid.

<sup>156</sup> Ibid.

<sup>157</sup> WMP also reports providing induction training for new women and men workers, who work on a trial basis (and are paid as casual labourers) for three months prior to permanent work in teams (where payment is largely based on shared production). Those engaged in underground drilling and blasting receive more intensive training and refresher training on a periodic basis and several women have received such training in the past but many have since left as tungsten prices dropped or as they married. The company also has an OSH committee in place

predictability of payment and the existence of mechanisms to report and address any grievances or issues that arise.

Most workers and employees work from 7 am to 3 pm daily, although two shifts may operate in a day when preparation/development work (e.g., blasting, inspection, timbering) is underway. The processing plant typically runs for two shifts daily.

### A6.3. Distribution of Economic Costs and Benefits across the Supply Chain

Between 2013 to middle of 2016, production declined from 8–12 metric tonnes to 3.5–6 metric tonnes of wolframite concentrate. In July and August 2016, mine production averaged 5.85 metric tpm.

#### A6.3.1. Production Value and Sales

The value of production and sales principally depends on two variables:

- **Quality of material:** Concentrate is valued based on metric tonne units of APT, wherein 1 metric tonne equalling 10 kg contains approximately 7.93 kg of tungsten. In mid-2016, Gifurwe concentrate contained 65% WO<sub>3</sub>.
- **Market and sales prices:** For the purposes of estimation, for tungsten, the APT base price (July 2016) was used (USD 188.50 per metric tonnes unit, European CIF). Export prices observed during the field mission were USD 8.40 per kg of concentrate (corresponding to 68.5% of July European APT price). Although linked to international market prices, actual sale prices depend on the contract between the seller and buyer.

#### A6.3.2. Expenditures

For the purposes of revenue distribution analysis, main operating costs are considered, such as the following<sup>158</sup>.

##### Salaries and Wages

Workers carrying out mine development are paid daily while those in production (extraction, processing) are paid by production, the exception being workers in the processing plant. It is assumed that two-thirds of the workers are work in mine preparation and one-third on extraction (e.g., 440 workers paid daily and 200 paid by production).

- Average daily wages paid to preparation team members were estimated at RWF 1,150, or USD 1.44, which amounts to RWF 30,000 or USD 37 per month (based on six-day work weeks). The team leader earns RWF 1,500 or USD 1.75 per day, his/her assistant RWF 1,200 or USD 1.50, blasters RWF 1,500 or USD 1.75, and supporting miners RWF 800 or USD 1. Plant workers earn RWF 1,000–3,000 or USD 1.30–3.80 per day.
- Production team members are paid RWF 1,660 or USD 2.10 per kg of concentrate produced (as individuals or equally divided between team's members). Food is also deducted from payments at RWF 400 per meal. Sub-contractors are paid also on a production basis at a rate of RWF 554 or USD 0.70 per kg, minus other deductions that may be incurred (e.g., 30–50% of fuel for heavy machinery used for preparation, including of washing areas, in their designated sites).

##### Social, Health, and Other Insurance

All mineworkers, employees, contractors, and sub-contractors, are subject to deductions of 8% social security (4% by worker, 4% by employer), which is deducted by WMP as electronic payments are processed.

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(including representatives of workers) and teams of trained first aid workers but many functional roles are now incomplete due to departure of trained workers.

<sup>158</sup> Capital costs excluded. WMP supplies much of the inputs required for production (e.g., explosives, water pumps, haul cars and tracks, timbers, PPE, water supply, technical expertise). However, some costs are also shared with sub-contractors (e.g., fuel for excavators, tools, some labour for surface development).

## Due Diligence Levies

### Traceability Costs

The 3T mining sector in Rwanda bears the cost related to meeting the due diligence requirements imposed on the supply chain via the Dodd-Frank Act<sup>159</sup>. Apart from internal costs related to internal traceability, each tonne of wolframite concentrate generates a levy for the government through DGM, paid nationally (relating to RCM), and a fee paid to ITRI per tonne of metal contained in the concentrate at the point of export to finance the CFSP. For Gifurwe, these combined costs represent approximately 5.4% of the value of the concentrate produced. Additionally, a fixed full membership of USD 1,800 must be paid yearly to ITRI for upstream companies classified as being before or at the point of levy collection<sup>160</sup>.

### Taxes and Royalties

Taxes, royalties, and levies paid by various actors are summarised below.

- Workers are required pay a 15% PAYE income tax, including for casual workers, on the monthly portion above RWF 30,000 or USD 37.50.
- Each sub-contractor is taxed according to the legal micro-enterprises scheme. Under this, an annual flat amount of RWF 60,000 or USD 75 is paid.
- Corporate income tax amounting to 30%.

### A6.3.3. Distribution of Revenues

Table 8 shows the price distribution along the supply chain for 1 kg of tungsten concentrate produced by WMP and the corresponding monthly amounts.

**Table 8: Value of 1 kg of WMP concentrate and monthly revenues and distribution**

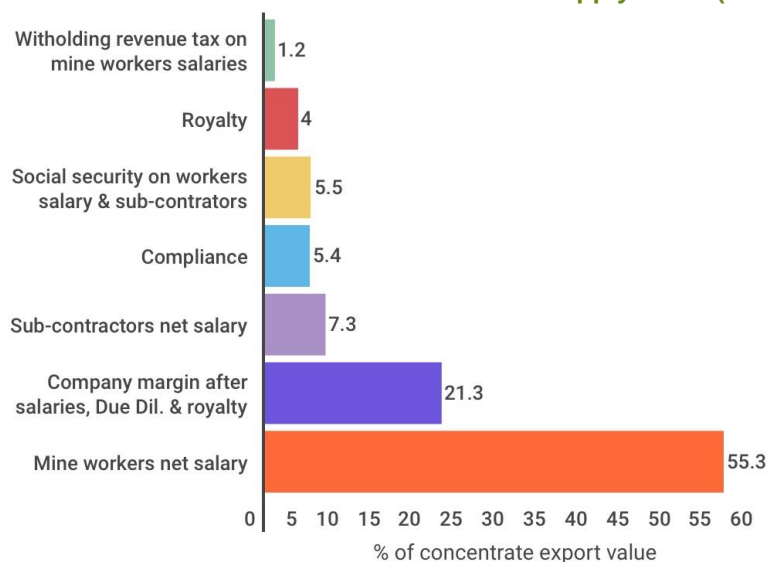
	<u>Price</u> <u>per Kg</u>	<u>Monthly</u> <u>amounts</u>	<u># of</u> <u>workers</u>	<u>Monthly</u> <u>salary/m</u>
Production in Kg:			5 850	
Export price W 65% APT :	\$8,40	<b>100,0%</b>		\$49 140
Royalty 4%	\$0,34	4,0%		-\$1 989
Compliance	\$0,46	5,5%		-\$2 691
Net plant price :	\$7,60	<b>90,5%</b>		\$44 460
Sub-contractors net salary	\$0,61	7,3%		-\$3 569
Sub-contractors Social security	\$0,08	1,0%		-\$468
Mine workers net salary:	\$1,83	21,8%	220	-\$49
Mine workers Social Security:	\$0,14	1,7%		-\$812
Mine workers PIT :	\$0,10	1,2%		-\$610
Non extractive workers net salary:	\$2,81	33,5%	440	-\$37
Net price workers cost deducted:	\$2,02	<b>24,1%</b>		-\$16 445

Based on the above parameters, concentrate export revenues are distributed as follows (Table 8 and Figure 44).

- **Workers** (660) retain 55.3% of the total export value. While 'mine workers' are aggregated in the analysis, it is important to recognise differences in earnings by position and nature of work. For instance, workers involved in mineral production earn approximately 32% more than those in preparation and development.
- **Sub-contractors** (15) obtain 7.3% of the total export value before deductions (social insurance, personal income tax).
- **WMP** obtains 21.3% of the concentrate export value as margin after payment of royalties, due diligences fees, and mine workers' costs, but before corporate incomes tax (and excluding capital and operating expenditures).
- **Processors/exporters**: not applicable (WMP is supposed to export directly to WBH)
- **Traceability costs**, including iTSCi and RCM, together constitute 5.4%.
- **The GOR** obtains 10.7% of the concentrate export value as royalties (4%), social insurance (5.5%), and personal income tax (1.2%) on workers.

<sup>159</sup> United States 2010

<sup>160</sup> [https://www.itri.co.uk/index.php?option=com\\_mtree&task=att\\_download&link\\_id=52320&cf\\_id=24](https://www.itri.co.uk/index.php?option=com_mtree&task=att_download&link_id=52320&cf_id=24)

**Figure 44: Distribution of revenues across the Gifurwe Mine supply chain (2016)**

### A6.3.4. Economic Impact

The significance of the economic impact is best expressed by mine workers and sub-contractors themselves within this agriculture-reliant community. Women miners conveyed how their work in the mines enabled them to buy livestock, provide financial support to their parents, and other benefits that they saw as an improvement from their previous work in farming. One sub-contractor, a miner at Gifurwe since 1974, now owns 16 plots of land that he employs others to work on, built a house, and owns a motorcycle and livestock, while putting three children through school.

Gifurwe workers and sub-contractors, who reside in and mainly originate from nearby communities, yield 62.7%, after deductions. Approximately USD 370,000 could be injected into the local economy annually<sup>161</sup>. Based on these ratios and Burera District's wolframite statistics, **approximately USD 1.8 million was injected into the local economy from miners' and sub-contractors' incomes in 2015 alone**. Multiplier effects were not quantitatively determined from Burera District, but based on factors employed in other ASM countries (and similar production systems in adjacent mines), direct and induced employment may amount to 2,487 and 6,216 jobs, respectively, with the economic contributions totalling USD 6.3 million per year<sup>162</sup>.

### A6.4. Key Conclusions

Main conclusions from the Gifurwe case study are summarised as follows.

**Local economic contributions can provide the foundation for broader employment and development benefits.** Based on a 62.7% revenue share accrued to miners and sub-contractors' incomes, Gifurwe workers contributed around USD 1.8 million to the local economy in 2015, spurring local business development, inducing employment generation, and supporting health, education, and development of direct and indirect beneficiaries. Based on multiplier effects, as many as 8,700 Burera District residents may benefit from direct and induced employment from wolframite mining alone.

**State revenues derived from this operation are significant.** This estimate is attributed to royalties and personal income tax of mineworkers and sub-contractors, but excludes corporate income tax, which is expected to be significant. If VAT on applicable goods purchased by mine workers alone are

<sup>161</sup> Based on July and August 2016 production averages and prices extrapolated for 2016.

<sup>162</sup> Estimated based on per worker production (including sub-contractors) and average monthly production in July and August and using multipliers of 2.5 as used in Uganda, Central African Republic, Liberia (Hinton 2009, Hinton 2011, Hinton & Levin 2010).

considered, an additional 1.75% of total concentrate export value is contributed to state coffers (almost half that recovered from royalties).<sup>163, 164</sup>

**Traceability costs are significant.** In the case of Gifurwe, compliance costs amount to 5.4% of the export value (which is higher than royalties). This highlights the efforts producers must make to comply with Dodd-Frank Act requirements and to access international markets. As traceability costs are fixed, they became a substantial part of the production costs when the 3T mineral prices dropped in the last few years.

**Gifurwe provides positive examples of ways to support women's economic empowerment,** including through efforts to counter harmful beliefs concerning women's capacity to work in 'non-traditional' roles (e.g., underground), targeted efforts to recruit and train women, prior (although currently less active) support for women's savings and loans associations, and recognition of the relevance of safe working conditions. Prevailing local norms and beliefs (e.g., women must leave mines upon marriage) and protective legal prescriptions (e.g., relegating all jobs in mines off limits during pregnancy with little clarity concerning return to work) put such efforts at risk and are likely to impede achievement of Rwanda's 2020 target of 30% women's employment in all sectors for Gifurwe and other operations.

**An investment in improving the local production system would yield the greatest returns.** Introducing low-cost, safer, more environmentally responsible and efficient processing and mining methods would increase miners and sub-contractors' incomes, thereby augmenting development contributions further. However, company capital and operating costs (not fully accounted for in the analysis) are believed to be high and profit margins narrow, with main means to supplement revenues derived from processing tailings (i.e., relying on inefficiency of artisanal production). A more comprehensive cost-benefit analysis is needed to ensure that such operations that seek to employ better standards (e.g., OHS, gender) are not impeded through such measures.

Although WMP collects tailings from the plant in basic impoundments and has made efforts to stockpile waste rock in specific areas of the mine, **the overall mine waste management system leaves room for improvement.**

**Siltation risks to downstream watercourses and impacts on water quality through release of deleterious elements (e.g., arsenic) are potential problem.**

**WMP conducts reforestation activities to offset the footprint of area impacted by the mine** and provide a source of timber used to stabilise underground workings.

**No child labour was observed or reported during the author's field missions in September 2016.** This does not wholly preclude its existence, particularly given local unemployment and poverty rates and financial challenges expressed by some sub-contractors, who may rely on family members to carry out work.

<sup>163</sup> Miners' VAT contribution based on 28% of total expenditures attributed to VAT (housing and utilities, alcohol, tobacco, bottled beverages, communications, miscellaneous). Rwandan expenditures derived from ADB 2012.

<sup>164</sup> In the case of WMP, 55% of the net share goes to mine workers. However, the average net salary represents USD 49 per month for miners in the extracting team and USD 37 for the preparation team miners. Cook & Mitchell (2014) indicate that a mine worker spends typically 59% of his revenue on food and other expenditures, approximately 28% of which is estimated to go towards VAT-taxed expenditures (Rwanda VAT rate is set at 18%). Thus, this direct contribution through VAT can be estimated at 1.75% of the concentrate export value, which represents 43% of the royalties paid on the mine production.



## Annex 7: ASM Cooperatives in Rwanda

The cooperative law defines four levels of cooperatives in which three are umbrella cooperative organisations:

- **Cooperative:** Constituted by a minimum of persons who shall not belong to the same nuclear family. It is a primary cooperative organisation. The law defines three types of cooperatives: production and marketing, commercial and consumer services, and multipurpose cooperative organisations.
- **Union:** Three or more cooperatives join to form a union. It is a secondary cooperative organisation. Primary cooperative organisations can only be a member of one union.
- **Federation:** Three or more unions join to form a cooperative federation at the national level. It is tertiary cooperative organisation. A primary cooperative can become an affiliate to a federation in the case that the cooperative was not able to affiliate into a union.
- **Confederation:** Three or more cooperatives federations join to form a confederation at the national level. It is the APEX cooperative organisation at national level.

In Rwanda, the National Cooperatives Confederation of Rwanda (NCCR) was founded in 2010 and is composed of nine federations, with the following roles:

- Representation of cooperatives at national, regional, and international levels
- Advocacy and lobby of cooperatives
- Lobbying of federations, unions, and cooperatives
- Capacity building of cooperatives
- Supervision and audit of cooperatives

It is important to mention that currently Rwanda has 14 federations from different activities (Table 9) some are from the same sector) and not all are founders of the NCCR.

**Table 9: National federations of Rwanda**

Synod	Code	Name	Certificate	Reg. Date	Province	District	Sector
1.	NYAF0002	Rwanda Federation of Horticulture Cooperatives (RFHC)	RCA/0406/2015	2015-06-10	Mvk	Nyarugenge	Nyakabanda
2.	NYAF0001	RFWC (Wheat)	-	2014-12-24	Mvk	Nyarugenge	Nyakabanda
3.	KICF006	FERWACOTHE (Tea)	-	2015-02-11	Mvk	Kicukiro	Gikondo
4.	RSZF001	FEFICOORWA (Fishing)	-	2013-04-23	Mvk	Gasabo	Gisozi
5.	GASF003	FERWACAPI (Beekeeping)	-	2010-10-21	Mvk	Gasabo	Kimihurura
6.	KICF005	RWCCF (Cassava)	-	2009-08-12	Mvk	Kicukiro	Niboye
7.	NYAF002	RFTC (Transport = Minibuses + Coasters)	-	2012-12-01	Mvk	Nyarugenge	Kimisagara
8.	KICF004	RCCF (Coffee)	-	2009-07-12	Mvk	Kicukiro	Gikondo
9.	KICF003	NDFFR (Livestock)	-	2009-04-12	Mvk	Kicukiro	Masaka
10.	KICF002	FUCORIRWA (Rice)	-	2010-10-25	Mvk	Kicukiro	Kicukiro
11.	GASF002	FERWACOTAMO (Transport = Motorcycles)	-	2015-02-11	Mvk	Gasabo	Kacyiru
12.	MUSF0001	FECOPPORWA (Irish Potatoes)	-	2015-03-15	North	Musanze	Muhoza
13.	NYAF001	FECOMIRWA (Mining)	-	2015-02-11	Mvk	Nyarugenge	Nyarugenge
14.	GASF001	FCMR (Maize)	-	2015-02-11	Mvk	Gasabo	Kimihurura