



Traceability in Artisanal Gold Supply Chains in the Democratic Republic of the Congo Lessons Learned from the Kampene Gold Pilot Project

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Lessons Learned from the Kampene Gold Pilot Project

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Executive Summary

The artisanal and small-scale mining (ASM) of gold constitutes one of the most relevant sources of informal employment in the Democratic Republic of the Congo (DRC). The sector has grown over the past decade and has a high potential to contribute to poverty reduction and economic development, especially in remote rural areas. Gold mining activities provide a livelihood base for around 233,000 small-scale miners and their families in the eastern DRC.

Weak control over ASM gold supply chains is one of the key challenges for responsibility in the sector. While the DRC exports significant quantities of gold from large-scale industrial mining, its annual ASM gold exports average only 200-300kg, with the 56 kg officially exported in 2018 marking a dramatic low in recent years. In contrast to these low export figures, the DRC's actual artisanal gold production is estimated at 14-20 t per year (15-22 t doré gold), valued at US\$ 543-812 million. The discrepancy between official export figures and estimated artisanal gold production indicates that a large portion of ASM gold is smuggled out of the country. This latter part of artisanal gold production is predominantly informal and a part of these revenues contributes to the financing of illegal armed groups. These challenges currently limit the sector's positive contributions to development in the DRC.

Gold traceability is a critical question for improving control and transparency of the DRC's artisanal gold supply chains. Robust traceability measures allow improved risk management and supply chain due diligence while also unlocking the potential of the sector to contribute to the formal economy and state revenues. There is an increasing demand for supply chain due diligence, driven by both responsible consumers as well as regulators such as the European Union. Over the past years, different techniques and procedures for artisanal gold traceability have been employed at a pilot scale but their implementation at a broad scale is still lacking.

A range of international partners are supporting responsibility in the artisanal gold sector of the DRC. As part of a German-Congolese technical cooperation project, the Federal Institute for Geosciences and Natural Resources (BGR) and its local partners have completed a pilot project to establish and incentivize responsible gold supply chains at Kampene in the Maniema Province, DRC. Gold supply chain transactions were monitored using an electronic traceability system. The implementation of this system was accompanied by and incentivized through technical support for artisanal mining cooperatives, capacity building as well as mine site inspections, monitoring missions and audits forming part of the Certified Trading Chains certification scheme.

The experience from implementing the pilot initiative underlines the feasibility for tracing artisanal gold and represents an entry point for potential upscaling. Four mining cooperatives representing 2500 miners formed part of the pilot project. During the pilot implementation phases, 5.2 kg of ASM gold were initially traced at mining sites in 135 transactions out of which a fraction of 56% was traced until export. Successful implementation of the electronic traceability scheme over a seven months period demonstrated the technical feasibility of operating the scheme under rough field conditions including technical challenges in network coverage. Along with other systems supported by different partners, the scheme could thus provide impetus for discussions on improving ASM gold traceability in the DRC at a larger scale.

List of Abbreviations

3T	Tin, Tungsten, Tantalum
ASM	Artisanal and small-scale mining
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources)
CEEC	Centre d'Expertise d'Evaluation et de Certification des substances minérales précieuses et semi-précieuses
COSOC	Coalition of Civil Society Organizations in the Great Lakes Region against Illegal Exploitation of Natural Resources
CTC	Certified Trading Chains
CTCPM	Cellule Technique de Coordination et de Planification Minière
DRC	Democratic Republic of Congo
GIZ	Gesellschaft für internationale Zusammenarbeit GmbH
ICGLR	International Conference on the Great Lakes Region
IPIS	International Peace Information Service
ITOA	Initiative de Traçabilité de l'Or d'Exploitation Artisanale
RFID	Radio-frequency identification
SAEMAPE (SAESSCAM)	Service d'Assistance et d'Encadrement du Small Scale Mining
UAE	United Arab Emirates
UNEP	United Nations Environmental Program
UN GoE	United Nations Group of Experts on the DRC
USGS	United States Geological Survey

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1. Introduction

The artisanal and small-scale mining (ASM) of gold constitutes one of the most relevant local sources of informal employment in the Democratic Republic of the Congo (DRC). The sector has grown over the past decade and there has been significant workforce migration from other commodities such as the 3Ts and diamonds into the gold sector (e.g., IPIS, 2014). The sector forms the livelihood base for around 233,000 miners and their families in the eastern provinces of the DRC.

Despite efforts by the state to improve oversight, the sector faces significant supply chain due diligence risks. The majority of artisanal gold mines are informal and part of the production continues to contribute to the financing of non-state armed groups or undisciplined elements of the DRC's armed forces (e.g., UN GoE, 2013, 2018). Child labor is a relevant risk in some ASM gold mines but robust risk estimates for the whole sector are not available. These challenges are in marked contrast to the growing international demand for supply chain due diligence, driven by both responsible consumers and regulators such as the European Union.

The national ASM gold sector is also characterized by a broad range of sustainability challenges: artisanal production is often associated with low productivity, rudimentary mining and processing tools, dangerous and unsafe working conditions and the absence of safety equipment, unfair wage distribution and the lack of environmental standards. While not all artisanal gold mining in the DRC is associated with dangerous chemicals, the use of mercury or cyanide does occur; this practice can create serious health problems to miners and communities and contaminate the local ecosystems which are the basis of the livelihood of local communities.

Control over ASM gold supply chains is weak. According to the official DRC export statistics for 2014-2017, ASM gold exports averaged 200-300 kg p.a.; 2018 marks a dramatic low point with only 56 kg of official ASM gold exports (CTCPM 2018, 2019). In contrast to these low export figures, the DRC's artisanal gold production is estimated at 15–22 t of doré gold per year. The ASM gold supply chain is characterized by informality, insufficient transparency of local gold trade, and the absence of a viable traceability mechanism. The lack of functioning monitoring procedures in ASM gold supply chains is a significant factor preventing the establishment of appropriate conditions for a responsible and accountable mining sector.

A range of international partners are supporting responsibility in the ASM gold sector of the DRC. Since 2009, as part of a German-Congolese technical cooperation project funded by the Federal Ministry for Economic Development and Cooperation, the Federal Institute of Geosciences and Natural Resources (BGR) has supported project partners in the DRC¹ in improving the working conditions, environmental and social standards as well as supply chain due diligence in the national mining sector². As part of its efforts, the technical cooperation project initiated a pilot project to establish and incentivize an electronic gold traceability mechanism for artisanal gold mines in Kampene, Maniema Province, running from 2016-2017. The present report illustrates key features of the artisanal gold sector in DRC and lessons learned with regards to this pilot project.

¹ Originally, the main project partner was the DRC Ministry of Mines and its technical services at the national and provincial level. Since then, the project partner focus has progressively been expanded to include mining cooperatives and civil society as well.

² The project has been implemented as a joint BGR-GIZ program where the GIZ has recently focused on the cobalt sector. BGR support includes the gold and 3T sectors; the modalities for BGR support in the copper-cobalt sector are currently under review. See project website: <https://www.bgr.bund.de/mineral-certification>

2. Artisanal Gold Mining in the DRC

2.1. Gold Production

ASM gold is mainly produced in five provinces in the eastern DRC: (former) Orientale, North Kivu, South Kivu, Maniema and (former) Katanga. Estimates of the national ASM gold production differ significantly and reflect production changes through time as well as changes in methodology and coverage of the respective estimates. In general, published gold production figures often refer to doré gold which typically contains 83-92% gold (20-22 karat). Recent estimates include:

- Based on a field study in the (former) Orientale Province commissioned by the GIZ, the gold production was estimated at 16.5 t (Matthysen et al., 2011). This figure took into account significant dredging activities in the province at that time.
- The USGS cited estimates for the ASM gold production in the provinces of North and South Kivu as well as parts of Orientale for the year of 2012 (Yager, 2016); combined, these figures referred to 11-14 t of ASM gold. For 2014, the USGS cited lower estimates of 8-10 t of ASM gold for the DRC (Yager, 2017).
- IPIS (2016) calculated an ASM gold production of 12 t based on the combined production/productivity estimates from visited gold mine sites up until that point.
- A broad consensus view for the estimated gold production around 2014-2015 referred to a range of 10-15 t. Ten tons is seen as a conservative estimate referred by, for example, UNEP (2015) and Blore (2015).

Analyzing the ASM database of IPIS for the eastern DRC as of January 2019 (IPIS, 2019) and using typical productivity data, the BGR estimates the current level of annual production of artisanal gold in the eastern DRC at 14-20 t of contained gold, corresponding to 15-22 t of gold doré (assuming 90% fineness). Using the four-year average gold price for 2015-2018 (1,250 US\$/oz), this production has a value of US\$ 543-812 million per year.

This estimate builds on the following assumptions: (1) 0.2 g/d doré gold production per artisanal miner for 310 d/y, and (2) a current global figure of 233,000 artisanal gold miners registered in the IPIS mine site database³. The estimate further considers dredging activities that fluctuate significantly from year to year. Therefore, minimum (0.6 t doré gold p.a.) and maximum (8 t doré gold p.a.) estimates for dredging were established and added to the total of “onshore” ASM gold production⁴.

Overall, the BGR estimates higher figures for ASM gold production in the DRC compared to previous estimates due to combining onshore and dredging gold production. This estimate scales well with current trends for gold imports of actual or inferred DRC origin in the United Arab Emirates (UAE) as further discussed below.

Although the gold production of the ASM sector in DRC is of low significance in comparison to the total global gold mine production (estimated at 3,200 t in 2017), the country is within the

³ An average daily productivity of 0.2 g per miner (working 6 days a week) was estimated for Burundi (Matthysen, 2015) and IPIS estimates a similar productivity of 1.17 g average gold production per miner per week for the DRC. Note that these are average figures – at any given time, miners may produce higher amounts (when encountering a high-grade gold vein) or may not produce anything at all (when developing access shafts or removing overburden, which may take several weeks or even months of work). The figure of 233,000 gold miners is based on mines visited by IPIS from 2013-2018; it excludes older data. The presented estimate for “onshore” ASM gold production is considered a balanced estimate: it may overestimate production from some gold mine sites that are no longer active; on the other hand, it may exclude production from non-covered gold mine sites (not covered due to logistical, financial or security factors).

⁴ The IPIS mine site database does not include any significant figures on gold production from dredging. Therefore, these estimates should be added to the previous estimate. The minimum estimate assumes 15 large dredges (at 150 g/d productivity) operating 21 days/month; this number of dredges was noted in the latest report by the UN GoE. The maximum estimate refers to the situation at Shabunda as observed by COSOG (2015) which estimated about 8 t/y production capacity.

ten largest ASM gold producers among development cooperation countries worldwide. ASM gold production represents approximately 10-15% of the total global gold production (Figure 1). At the same time, ASM activities account for circa 90% of employment in global gold mining and thus has a high impact on local economic development (e.g., Levin, 2014).

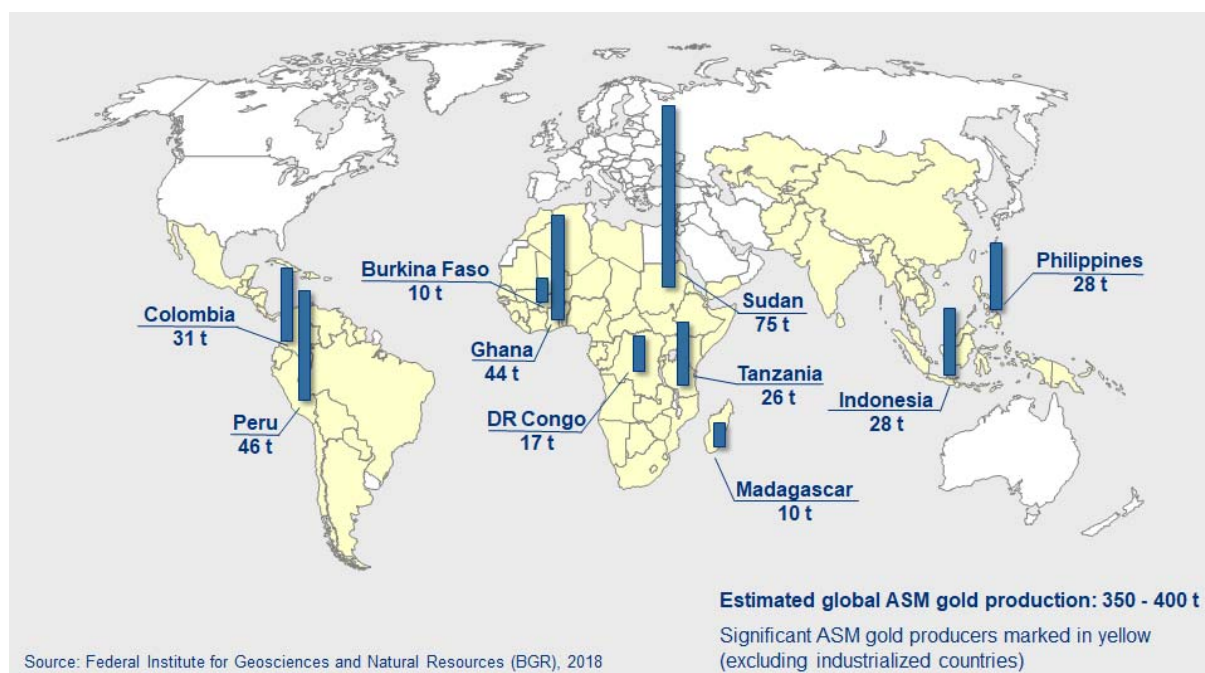


Figure 1: Estimated global ASM gold production in 2016 or 2017. Figures for ten large ASM gold producing developing countries based on literature review and internal BGR estimates (2018).

2.2. Geological Background

In 2016, the BGR commissioned a feasibility study on the possible usage of geochemical data of gold compositions in order to constrain gold origin (Hruschka et al. 2016). In order to evaluate this question, the study investigated (1) different geochemical methods, (2) the geological baseline situation of gold mining in the DRC as well as (3) the artisanal gold supply chain structures. The study is available on the BGR project website⁵ and the following chapter summarizes the geological evaluation as presented in this study.

There are four main geological gold regions in DRC (Figure 2). These “gold provinces” have different geological histories, including the time and type of formation of the ore:

(1) “Northern Gold Province”, located in Ituri and Haut-Uélé Provinces (ex-Province Orientale) is associated with Archean Greenstone Belts (ca. 2.6-2.7 Ga). According to Lavreau (1979, 1984), ca. 350 t of gold have been mined in the province from the early 20th century. 90% of this gold has been mined around the mining area of Kilo-Moto. Half of this gold has been mined from placer deposits. Today, this gold province comprises an industrial gold mine: the Kibali Mine, operated by Barrick Gold Corporation (formerly Randgold). The Kibali Mine produced 25 tons of gold in 2018 (Agence Ecofin 2019). According to IPIS’ mine site database⁶, around 70,000 artisanal miners are working at 557 artisanal mine sites in the “Northern Gold Province”. This is the second largest ASM gold production region in the DRC.

(2) “Lubero Gold Province”, located in North Kivu, to the west from Lake Edwards, this gold province extends eastward into western Uganda. Gold is associated with Archean and

⁵ <https://www.bgr.bund.de/mineral-certification>

⁶ All figures quoted from the database reflect the current status as of January 2019; see IPIS (2019) for general information

Paleoproterozoic rocks of the Ubendian system and the Ruwenzori fold belt (ca. 2.1-1.8 Ga). Some alluvial gold occurrences in this region are associated with platinum-group minerals. The area between Kivu and Kilo has never been mapped in detail. Information on rocks and minerals is scarce. However, gold has been mined in this region. The Canadian exploration company Loncor Resources Inc. holds a large concession (the “North Kivu Project”; Loncor Resources Inc. 2018). According to IPIS’ mine site database, circa 25,000 artisanal miners are working at 76 artisanal mine sites in the “Lubero Gold Province”.

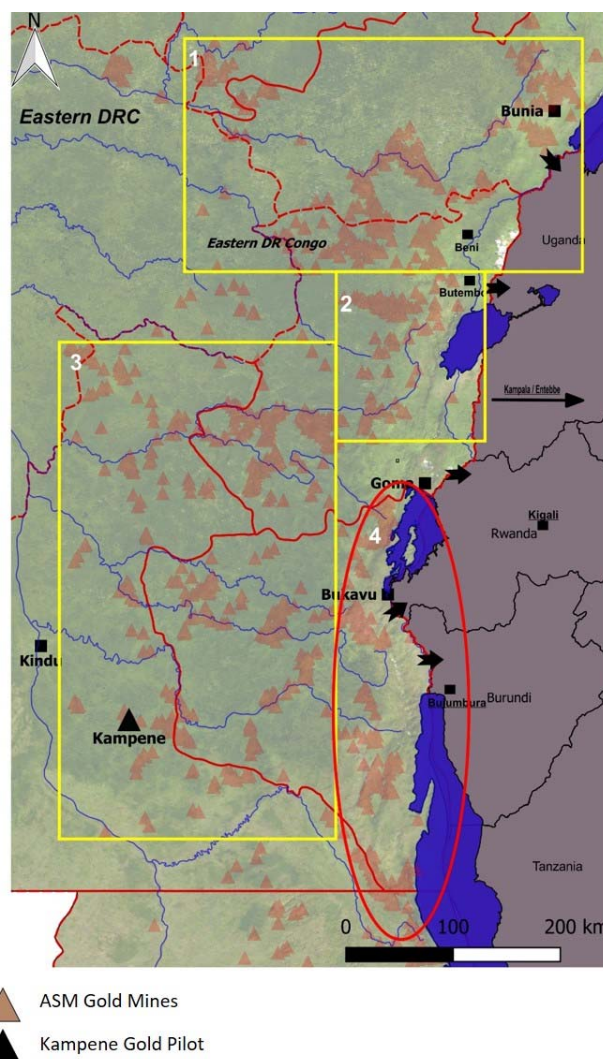


Figure 2: Geological gold provinces in the DRC (adapted from Hruschka et al. 2016) and location of ASM gold mines (brown triangles) as recorded in the IPIS database. Kampene is marked by a black triangle. Black arrows indicate regional directions of gold smuggling.

(3) “Kibaran Gold Province” is spread over North Kivu, South Kivu and the eastern range of Maniema Province, comprising the territories of Walikale, Punia, Shabunda and Pangi. This gold province is related to the Karagwe-Ankole Belt. Gold occurrences are mostly related to late Mesoproterozoic (ca. 900-1,000 Ma) hydrothermal quartz veins external to the “G4” granites intruding pre-Kibaran and Kibaran-age rocks. The G4 granites are regionally known to be related with the abundant “3T” mineralization of tin (cassiterite), tantalum (coltan), and tungsten (wolframite). Therefore, primary gold-bearing quartz-veins can be associated with wolframite and cassiterite, and common placer deposits may be variably associated with cassiterite, coltan or wolframite. Main gold occurrences of the Kibaran Gold Province are mined and/or developed by international companies: Banro’s Namoya Mine and its exploration

programs at Kamituga and Lugushwa (Banro Corporation 2019) and the Maniema Gold Project at Kabotshome by Vector Resources Ltd (2017). According to IPIS' mine site database, circa 93,000 artisanal miners are working at 646 artisanal mine sites in the "Kibaran Gold Province" and additional gold dredging occurs along local rivers (e.g., COSOG, 2015). As such, this is the most important ASM gold production region in the DRC at the moment.

(4) "Panafrican Gold Province" is a narrow corridor located along the eastern border of the DRC, from the southern extremity of South-Kivu, Fizi, until its northern extremity, Kalehe. Gold occurrences form a north-south trend along the lake Tanganyika and Kivu and are believed to be related to Panafrican shear-zones (ca 0.5 Ga). Gold mineralization is associated with hydrothermal quartz veins, hosted in stockworks related to folding structures (Walemba, 2001). Banro's Twangiza mine is the most important mining site of this gold province (Banro Corporation, 2019). According to IPIS' mine site database, circa 45,000 artisanal miners are working at 235 artisanal mine sites in the Panafrican Gold Province.

2.3. Production Techniques

ASM gold production is mainly focused on the eastern DRC but there are also gold mine sites in Kasai and in Congo Central in the western DRC. The ASM gold production is done manually with few mechanized processes. The main types of mineralization are extracted as detailed below:

Hard rock-hosted gold mining

These are extracted with picks, hammers and iron bars from gold-bearing quartz veins. Miners dig shafts and tunnels, following the strike of the quartz veins. The ore is crushed with mortar and pestle and then grounded to powder with autogenous mills. The gold is concentrated in sluice boxes and gold pans. Mercury for gold recovery through amalgamation is occasionally used, albeit not systematically. In the Misisi region in Fizi, semi-mechanized and small-scale mining methods have been introduced in the last years including crushers, ball mills, excavators and few cyanide leaching plants.

Placer gold mining

Placers are hosted by alluvial terraces and colluvial deposits. Gold occurs particularly among the pebble layers of river sediments. Miners dig pits using picks, shovels and iron bars. Ground water is removed with water pumps. Miners sometimes use gold detectors for surface exploration to survey and select the gold-bearing layers. Alluvial terraces and colluviums are mainly represented by loose material; its mining and processing does not require grinding nor milling. Only the few gold-bearing pebbles require a comminution process using hammers, mortar and pestle. The gold is concentrated in sluice boxes and gold pans. Because of the coarser size of gold particles, mercury is rarely used for these operations as it does not improve gold recovery in that case.

Wet placer gold mining (river dredging)

River dredging activities were common in the former Orientale province around 2010 (Matthysen et al., 2011) and have since become increasingly widespread, including Ituri, North Kivu and Maniema; the Ulindi river in Shabunda is of particular relevance (COSOC 2015; Global Witness 2016). Some of these operations had been temporarily suspended due to concerns about smuggling and human rights abuses. In general, the evolution of gold production through dredging in individual regions shifts at the subnational level due to depletion of resources, regulatory factors and technological impacts.

2.4. Gold Trade and Smuggling Risks

The artisanal gold supply chain network in the DRC commonly includes miners, cooperatives⁷, traders (A and B categories) and exporters (Figure 3). In legal ASM gold supply chains, the technical services of the Ministry of Mines should be involved along the entire supply chain at each trading point. State agents from SAEMAPE (formerly SAESSCAM) and the Mining Division are supposed to be present at the mine sites. Intermediary sales and cross provincial border sales are to be witnessed by CEEC and the Mining Division. Lastly, CEEC and the Mining Division are supposed to be present at the exporting phase. Note that, while informality is widespread, local ASM gold trade may also be partially formalized where only some stages of the supply chain are controlled as defined by regulations.

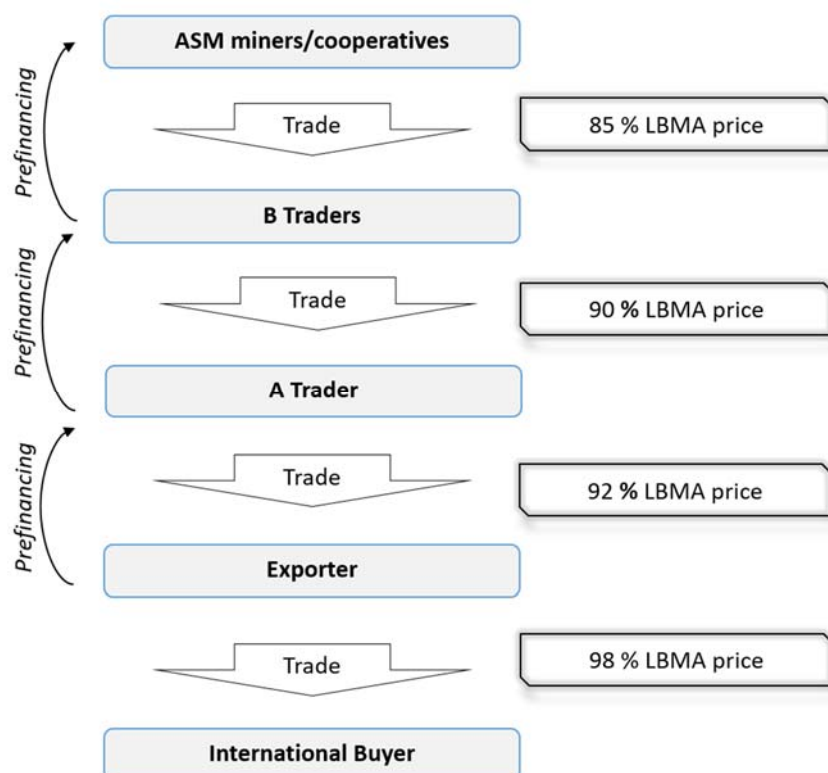


Figure 3: Schematic ASM gold supply chain as applicable for the Kampene pilot site in Maniema Province. Note that buying price variations may exist for other supply chains.

As shown at the beginning of this chapter, current estimates put the annual artisanal doré gold production in the DRC at around 15-22 t. In 2017, only 230 kg thereof were officially exported and 2018 exports were at a dramatic low of 56 kg (CTCPM, 2018, 2019). More than 95% - recently even 99% - of the ASM gold leaves the country unreported and thus formally untaxed, even though ASM gold mining and trade generate indirect taxation benefits in the local economy. Current tax rates in the DRC at the local, provincial and national level do not incentivize the declaration of gold exports. It is economically more attractive to smuggle gold across the border to Uganda, Burundi and, increasingly, Rwanda, possibly using fraudulent certificates (UN GoE 2018). From there, gold lots – lately in refined form – are transported as hand carry on commercial flights, especially to the United Arab Emirates (Table 1).

⁷ Note: while cooperatives are widespread, by far not all ASM miners in the DRC are organized in cooperatives; there are various types of cooperatives that might not comply with international cooperative standards (OHADA).

Table 1: Gold imports reported by the United Arab Emirates from the DRC, Uganda, Rwanda, Burundi (HS 7108: Gold (including gold plated with platinum) unwrought or in semi-manufactured forms or in powder form; source: DESA/UNSD, 2019)

Year	Origin	Weight in kg	Trade Value in USD
2014	DRC	806	31,903,917
	Uganda	949	33,381,452
	Rwanda	205	8,037,373
	Burundi	5,214	209,451,586
2015	DRC	1,160	39,815,568
	Uganda	2,867	94,236,422
	Rwanda	2,003	71,726,668
	Burundi	4,559	164,254,778
2016	DRC	620	20,436,118
	Uganda	9,994	366,330,330
	Rwanda	4,882	179,657,002
	Burundi	2,841	107,112,018
2017 ⁸	DRC	865	27,445,976
	Uganda	10,800	400,692,939
	Rwanda	8,743	310,206,517
	Burundi	1,930	74,391,055

Just as the artisanal gold production at the subnational level changes between different production centers inside the DRC, the gold trade networks at the regional level, *en route* mainly to the United Arab Emirates, may change through time. Two important trends have been observed since 2015. Until then, much of the DRC's artisanal gold production was allegedly smuggled via criminal networks to Uganda and Burundi. However, over the past three years, Rwanda has emerged as an increasingly important transit hub for DRC gold⁹, next to Uganda (Table 1, Figure 4).

While Rwanda's export statistics are transparent as far as the 3T minerals (tin, tantalum and tungsten ore concentrates) are concerned, there is very little transparency on gold exports, and gold's classification in the national export statistics is subject to change. Some of Rwanda's gold exports as declared in the UN Comtrade database for 2017 listed other destinations than the United Arab Emirates (Switzerland, China, Kazakhstan, Canada; DESA/UNSD, 2019) but these exports do not match gold imports from Rwanda reported by these countries.

⁸ The value of gold imports reported by the UAE to the Comtrade database for October 2017 provides per-unit values unrealistic for gold (circa 132,000-144,000 USD/kg). It is likely that the transmitted data for this month were erroneously reported as USD but in fact represent Dirham (AED). Using the October 2017 exchange rate of 3.673 AED = 1 USD the value of reported gold imports in USD can be adjusted which creates typical per-unit values for gold (circa 36,000-39,000 USD/kg for that month). The total values reported for 2017 in Table 1 reflect the manually corrected value for October 2017.

⁹ Rwanda's national gold production is very low. The large majority of its gold exports must be assumed to reflect transit gold. It is possible that the origin of this gold is not only the DRC but also other countries in the region (or even beyond, e.g., West Africa). However, as documented by the UN Group of Experts on the DRC, Rwanda is very likely to act as a transit country for DRC gold which may be introduced into the country, for example, using falsified documents (e.g., ICGLR certificates).

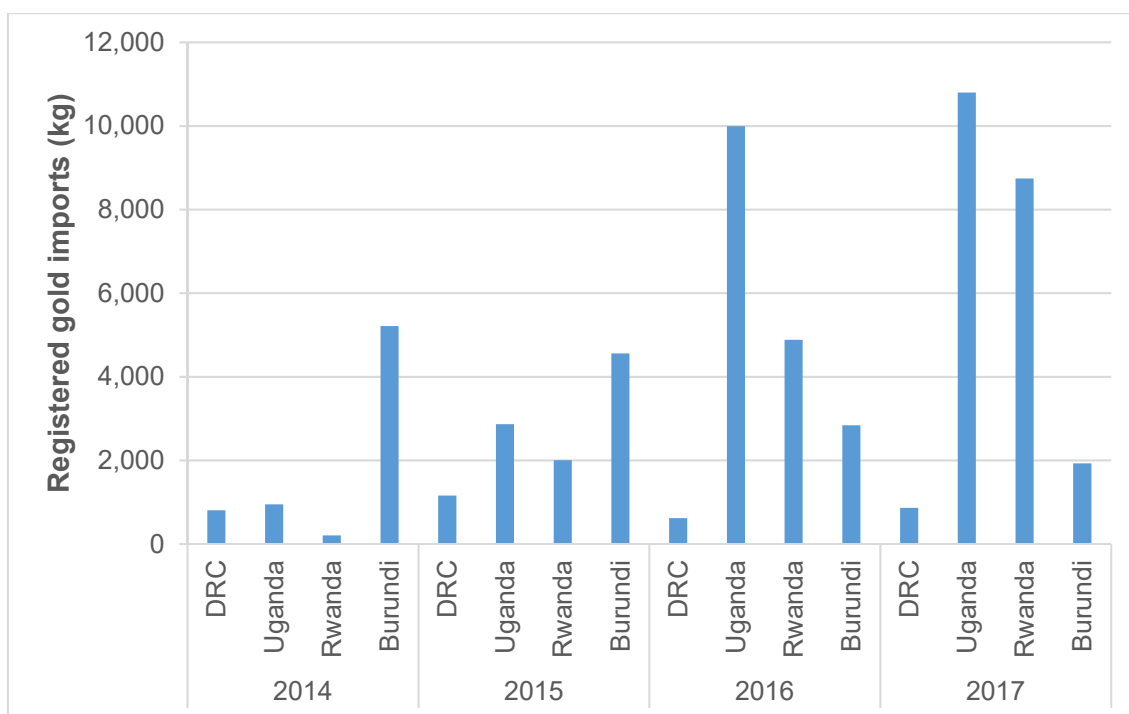


Figure 4: Gold imports reported by the United Arab Emirates from the DRC, Uganda, Rwanda, and Burundi (data for HS 7108: Gold (including gold plated with platinum) unwrought or in semi-manufactured forms or in powder form; source: DESA/UNSD, 2019).

The second important change in the regional gold trade network refers to the role of the African Gold Refinery which became operational in Entebbe, Uganda in 2015. As repeatedly documented through the reporting by the UN Group of Experts on the DRC, Uganda used to be the main transit conduit for smuggled gold from the DRC for the last decade. However, through the operation of the African Gold Refinery and associated tax incentives (0% export royalties on gold), part of this gold was suddenly declared in official statistics (e.g., The Sentry 2018; Figure 4).

Uganda does not operate any large-scale industrial gold mines and estimates for the domestic artisanal gold production vary from 1-3 t (UNEP 2012, Global Witness 2017). A major share of Uganda's exported gold is therefore considered to originate from the DRC, although the African Gold Refinery claimed to also buy and process gold from South Sudan, Tanzania and Kenya. Establishing gold refineries in Uganda and other countries of the region further implies that the unit price of gold transported to the UAE should slightly increase due to the improved purity and added value from gold processing and refining.

2.5. Conflict Risks and the Involvement of Armed Groups

The DRC conflict has given rise to a dramatic human rights crisis and strong refugee movements; currently, more than 800,000 people have fled to other African countries and 4.5 million people classify as internally displaced (UNHCR, 2018). The root causes of the conflict in the DR Congo are manifold and complex. They include the absence of the rule of law, as well as conflicts over land, perceived historic injustices and related ethnic tensions. As conflicts unfold and armed groups develop, motives interact and shift. For instance, in their bid to gain strength, armed groups try to gain control over natural resources and in doing so, economic gain quickly becomes an end in itself.

With respect to mineral resources, the production and trade of 3T minerals (tin, tantalum, tungsten) and especially gold has traditionally been a key source of revenues for both armed groups and elements of the Congolese armed forces as documented through reports by the

UN Group of Experts on the DRC. Interference through rent-seeking activities on mining sites and the associated trading chains ranges from illegal taxation to forced labor and is often associated with other human rights violations. In addition, over the two decades of prevailing conflict, some armed groups have developed deeply entrenched business networks such that indirect conflict risks, e.g., from beneficial business ownership, apply as well.

While the local mining and trade in 3T minerals played a significant role in the past, conflict risks in the 3T sector have by now been significantly reduced due to combined due diligence efforts by industry initiatives and governments on the background of international regulations as well as due to changes in local production dynamics. In contrast, very little improvement can be observed with regards to conflict risks in the ASM gold sector. Gold has become the most important mineral produced in the conflict-affected eastern DRC, with around 80% of all local artisanal miners (outside of the cobalt sector) involved in its production (Matthysen, 2015). Field research conducted by IPIS from 2012 to 2015 indicates that almost two out of every three artisanal gold miners are working on a mining site with direct or indirect presence of armed groups or, in most cases, the Congolese army¹⁰. As such, artisanal gold production and trade are subject to high risks to contribute to conflict financing in DRC.

3. The Kampene Gold Traceability Pilot Project

A range of international partners have recognized the importance of ASM gold supply chains and traceability in the DRC and started implementing pilot initiatives in this regard. Recently, there have been three pilot projects on responsible ASM gold from the DRC: The CBRMT (USAID/Tetratrec) and CEEC (ITOA) pilot projects in South Kivu Province (closed end of 2018), the IMPACT Just Gold Project in Ituri Province, and the Kampene gold traceability pilot project in Maniema Province supported by the BGR. The following chapter provides an overview on the Kampene gold traceability pilot project.

3.1. Location and Setting

The town of Kampene is located in the Maniema province, Pangi Territory, approximately 110 km southeast of the provincial capital Kindu. The region represents a forested area that has been known for a long time for its cassiterite, diamond and gold resources; it has been mined since colonial times. Along roads that penetrate into the forest in a relatively mountainous area, miners either work on the primary gold mineralization in quartz veins or in the alluvial and eluvial gold placer deposits. Nine artisanal mining cooperatives and 10,500 miners are active at over 32 mine sites in a radius of 35 km around Kampene; the main part of the production is mined at three sites: Nyamboko, Mbinguni and Kasogo. Nyamboko is by far the most important mine in the area with 4,500-6,000 miners working at an official daily output of 250 g of doré gold.

The majority of the Kampene ASM gold mining sites are located within mining permits conceded to companies. The permits are either for exploration or for extraction, however the latter are put on hold, justified by the volatile security situation (Force majeure declared). Even though these companies might develop (small-scale) industrial projects in the future, they are committed to continuous collaboration with local ASM cooperatives; the latter have started building relationships with these companies in order to sign agreements to legalize their mining activities. All cooperatives that were part of the Kampene pilot project had signed agreements with the formal mining title holders.

¹⁰ Army presence in 31% of cases with observed interference, in 11% of cases present in violation of Congolese legislation, but without observed interference; armed groups present and observed to interfere in 22% of cases

3.2. Gold Production in the Kampene Area

The primary gold deposits are mined underground using galleries and shafts that follow the gold-bearing quartz veins in the uppermost altered layer. In addition to this, open pit alluvial gold ore extraction takes place in river sediments along the valley (Figure 5). The mining process starts with clearing out an area with spades and pickaxes in order to access the gold bearing conglomerate at the base level; clearing and removing overburden may take up to six months.

Once the gold mineralization is exposed and mined, the ore is carried down to the bottom of the valley where it is processed by contractors. The first processing phase consists of pestle and mortar crushing and manual milling. Subsequently, gold is recovered in sluices fit with banana leaves or carpets. In some cases, gold concentrates from sluicing are mixed with mercury to obtain a mercury-gold amalgam that is later heated and burned in order to obtain relatively pure nuggets of gold doré.



Figure 5: Examples from ASM gold mining at Kampene. Clockwise from upper left: open pit mines in alluvial gold mineralization, detection of gold nuggets using metal detectors, safe gold transport bags (photo credit: ibes AG), registration equipment to facilitate monitoring of gold trade around Kampene, local gold panning.

The mines at Kampene run all year around but activities may be strongly reduced due to water inflow into the mine pits during the rainy season. Below a certain depth (6-8 m), constant water pumping (from groundwater infiltration) is generally required to facilitate mining. ASM miners may work in teams of 6 to 20 miners, depending on mining methods. The average gold production in the area is estimated between 1-2 g per miner per week, highly depending on seasonal impacts.

3.3. Structure of Gold Supply Chains from Kampene

At the mine sites around Kampene, the miners sell the gold to intermediate traders or middlemen, which are often buying quantities below 5 “local gram” of gold (see following chapter) due to limited purchasing power. These traders are commonly called “commissionaires” or “manager” and most of them do not hold an official trading license. At individual mine sites daily trading volumes are estimated to range from 20-250 “local gram”. The managers use funds from an officially licensed B-trader (“Négociant”) in Kampene or Bukavu or they purchase the gold with their own capital. The B-traders mainly buy the gold in the city center of Kampene from the managers, but also travel to the mine sites and buy the gold directly from the artisanal miners. Eleven B-traders are officially registered in Kampene.

From the Kampene mine sites there are currently two gold trade routes. The major route is the export via Bukavu (South Kivu), thus crossing province borders in the DRC. The gold transport is handled by B-Traders using small cargo planes departing one to two times per week from the nearby airfield of Kama. Trade between different B-Traders to aggregate production also occurs since every registered exit from the province needs a transport permit by the authorities. Currently the CEEC is handling 5 to 7 gold transport permits of usually around 100 g per month. Compared to the estimated production in the area, a significant amount is transported without official permits.

Once in Bukavu, the B-traders sell the gold to a local trading house (“Comptoir”) that subsequently exports (formally or informally) the gold. From Bukavu, the gold reaches international airports at Kigali (Rwanda) or Bujumbura (Burundi), where direct flights connect to Dubai. Recently two refineries in Uganda and Rwanda have been established, thus it is possible that gold from the DRC is smuggled or transported (using fraudulent documents) to these refineries and from there exported out of the region (export taxes are significantly lower in these countries).

The second trade route for gold from Kampene is via Kindu, where two exporting trading houses had been operational in 2017, but ceased exporting in 2018. This route was used very infrequently indicating the relative stability of local gold trading networks with established structures for trade and pre-financing. There is a tight relationship between traders and cooperatives as well as miners. Miners sell their gold to a relatively constant group of traders. These trust-based relationships are further enhanced by another level of pre-financing of mineral production by B-Traders or A-Traders from Bukavu.

Pre-financing of gold deals might take different forms, from the supply of groceries to the provisions of equipment or the advance-purchase of gold. Cooperatives and miners therefore sell at a discounted price to this trusted group of traders; the discount is hard to quantify due to various price impacts. In any case, these ASM trading networks render the entrance of new prospective traders or international buyers more difficult.

3.4. Local Price Dynamics for Artisanal Gold

Local ASM gold transactions at Kampene use traditional balance tools with coins or matches as counterweights. Most commonly, an old “Congo Belge” Franc coin is used which has a

weight of about 1.4 g. However, this coin weight is locally referred to as “1 gram”. For the purpose of this report, this unit is referred to as “local gram” which needs to be multiplied by 1.4 in order to obtain the weight in metric gram. Towards the end of the pilot project, digital scales were installed facilitating direct measurement in metric gram. Weight conversion factors need to be considered when evaluating the prices and value proportions of local gold transactions.

Taking into account these factors, approximately 85% of the value of the international gold price is paid out to miners when selling at local mine sites. However, a number of direct or indirect deductions apply to this price proportion as follows. The majority of taxes and levies are due at the level of the extraction and, combined, are estimated at around 30% of the gold value – miners may have to use part of their income from selling their gold in order to pay certain formal or informal taxes. As mentioned above, pre-financing costs apply as well, for instance in the form of interest rates on loans factored into the transaction price. In addition, fraud attempts occur, e.g. by manipulating the weight of traditional balance counterweights. Taking all these taxes, levies and costs into account, it is estimated that miners at Kampene remain with about 50% of the value of the international gold price in the end.

Figure 6 shows the gold prices paid at the mine sites in Kampene as registered during implementation of the Kampene pilot project (see Chapter 3.6) in comparison to international gold prices. Based on an average gold purity of 90% and recalculating “local gram” into metric gram, the recorded local buying prices represent approximately 82-85% of international gold prices. Category B and A traders are commonly selling at between 90-92% of the international gold price, thus trading houses holding an export license are able to buy gold at an approximate discount of 8-10%. A 2% tax is officially due at the exporter’s levels, however, in practice, this may amount up to 6-13% taking unofficial fees and payments into account.

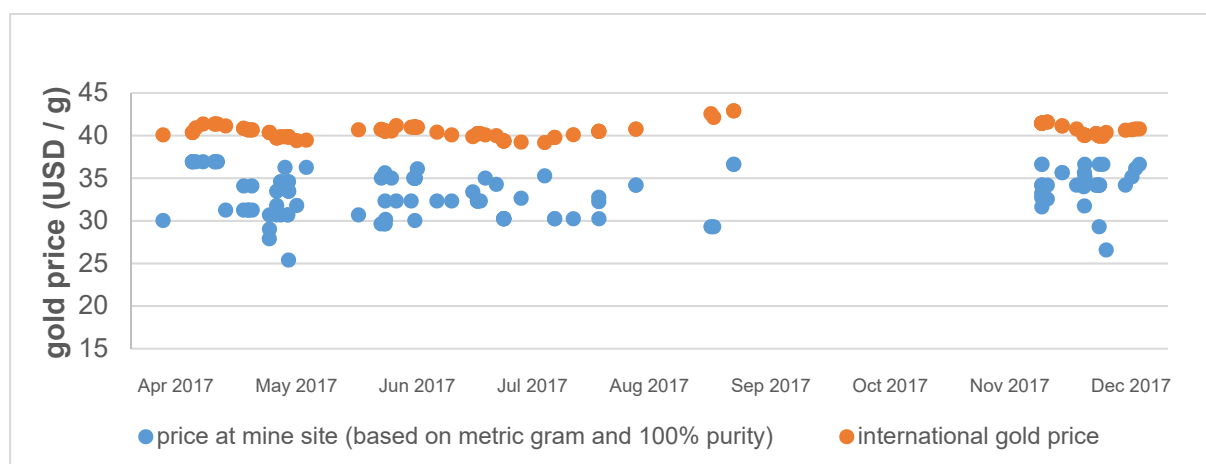


Figure 6: International gold prices and local prices paid out to ASM miners selling doré gold at the Kampene mine site, based on transactions recorded during the pilot initiative using electronic traceability (not recorded for September-November 2017, see Chapter 3.6). Local prices were recalculated from “local gram” (1.4 g) to metric gram and at 100% purity (from doré 90%).

3.5. Concept of the Kampene Gold Traceability Pilot Project

Considering the importance of the artisanal gold sector in DRC, the Kampene gold traceability pilot project aimed at installing a transparent, traceable and responsible supply chain from the local gold producers in eastern DRC that may link up with interested international buyers¹¹. As a responsible gold supply chain goes beyond mere traceability, the Kampene mine was included in the national Certified Trading Chains (CTC) scheme certifying responsible ASM mining practice.

A CTC baseline audit was performed between July 28 and August 1, 2014 to assess the gold supply chain around Kampene and reported an important artisanal mining activity around the locality (Alvarez 2014). Main results were the absence of illegal armed groups for several years, and the strong integration of the miners and mining organizations into the local communities. A second CTC audit was held from October 09 until October 17, 2016 (Alvarez 2016). However, mainly due to the lack of a traceability system for ASM gold, the respective cooperatives did not yet qualify for CTC compliance in the end. Compliance with international due diligence standards was confirmed, though, based on national inspection missions evaluating compliance with the standards of the ICGLR regional certification mechanism, that is, mine sites are free from conflict financing and no child labor or human rights abuses were reported.

Based on this background in combination with the strong political support by the provincial government of the Maniema Province, Kampene was chosen as a pilot area for a responsible and traceable gold supply chain. The provincial government saw an opportunity for establishing a better-governed artisanal gold supply chain, offering the possibility to increase the tax incomes on a provincial level. Furthermore, the national Mining Ministry was highly interested in the outcome of the pilot, since a possible upscaling would enable enhancing control on the artisanal gold sector. Evaluations of the project showed that mining cooperatives are incentivized to participate in such initiatives as they expect better access to exports and higher prices as well as external investment. Moreover, ASM cooperatives acknowledge the benefits of capacity building activities.

The objectives of the Kampene gold traceability pilot project were:

- Formalizing all stakeholders in the upstream supply chain while excluding illicit stakeholders according to the current mining regulation;
- Providing an effective outlet for the gold production of the mine sites located in a certain perimeter around the local trading center as the unique buying point in the area;
- Transporting and commercializing the gold through an official and transparent supply chain from the pit to the national export (and, eventually, international buyers);
- Assuring regular and secure gold trade between miners, mining cooperatives, local traders, counters and international buyers.

Thereby, the initiative aimed to facilitate the following outcomes:

- Artisanal miners increase their revenue and improve their working conditions;
- Mining cooperatives gain control of the gold production of their members and can, with the members contributions, plan and invest in the development of the mining activity;
- The negative environmental impact of mining activities is reduced and the livelihood of the communities improved;
- Government stakeholders gain control of the gold trade in the pilot area and improve the inflow in the public treasury through taxation;

¹¹ For example, through FairCongo, see <https://www.hooverandstrong.com/harmony-fair-congo>

- The input in the public treasury is invested in the communities around to mine sites to provide infrastructure (roads and electricity), medical health care and education.

The pilot has achieved the following milestone:

- CTC Baseline and Certification Audits have taken place in 2014 and 2016. Due mainly to the lack of a traceability system for artisanal gold the cooperatives in Kampene have not been CTC certified, but were validated by national inspection missions aligned with the Regional Certification Mechanism standards of the ICGLR;
- Subsequently, following up on CTC audit recommendations, an electronic traceability system for artisanal gold was successfully tested in the Kampene region in 2017. Results have been shared in two national workshops in May and October 2018;
- Cooperatives have undergone trainings with regard to developing business plans, cooperative laws and gold exploration techniques;
- The pilot has attracted the interest of international buyers and first international sales / exports have been made.

3.6. Implementing an Electronic Traceability System for ASM Gold

In order to improve traceability along the ASM gold supply chain, an electronic traceability system was tested in Kampene¹². The system comprised four elements to monitor gold trade from the mine sites to the points of export (Figure 7): 1) registration hardware (smartphones and tablets), 2) electronically readable and sealed gold transport bags, 3) electronic ID cards for all authorized users of the system, and 4) an online database where all registration data are automatically uploaded, accessible to authorized users. In case of inadequate network coverage for mobile data transmission, registration data are stored and automatically uploaded once the registration device gets sufficient network strength (e.g., when traveling to a larger town). The registration hardware operated continuously and reliably throughout the pilot phase from April-December 2017 and no replacements were required.

Operation of the scheme relied on hardware commonly available from different manufacturers. In this case, it included 50 Blackview BV6000 4G Smartphones and 5 ToughGear Titan Tablet computers (7.9 inch) as registration devices, 55 solar chargers (PowerPort 21W) and 55 external batteries. The equipment was distributed to participants according to their role in the scheme (Figure 7) and operated reliably without major failures. The registration of authorized users and gold transactions required personalized ID cards and special “Safebag” gold transport bags. In total, 2000 gold transport bags were ordered (not all of them actually used) and about 400 laminated ID cards were manufactured which included photographs and RFID chips. The costs for the used hardware and equipment, including shipping to the DRC, were about 32,000 EUR. Additional costs applied for developing and adjusting the database structure, related service implementation, training activities etc.

Registration devices were equipped with a customized App. Data captured through registration devices and uploaded to the database followed OECD documentation recommendations and comprised the identities of gold buyers and sellers, date and time stamps, transport lot weight and price, and certain checkboxes on standard compliance. Transport lot registration requirements and user authorizations could be updated as required in order to give the system flexibility for capturing different transactional structures of legal gold supply chains. In following this approach, data registration by the system could be adapted to the dynamic local context, rather than operating in a pre-defined static supply chain structure, such as a “closed pipe”.

¹² To this end, the BGR commissioned Ibes AG (<https://www.ibes.ag/>) for the technical implementation in 2016-2017.

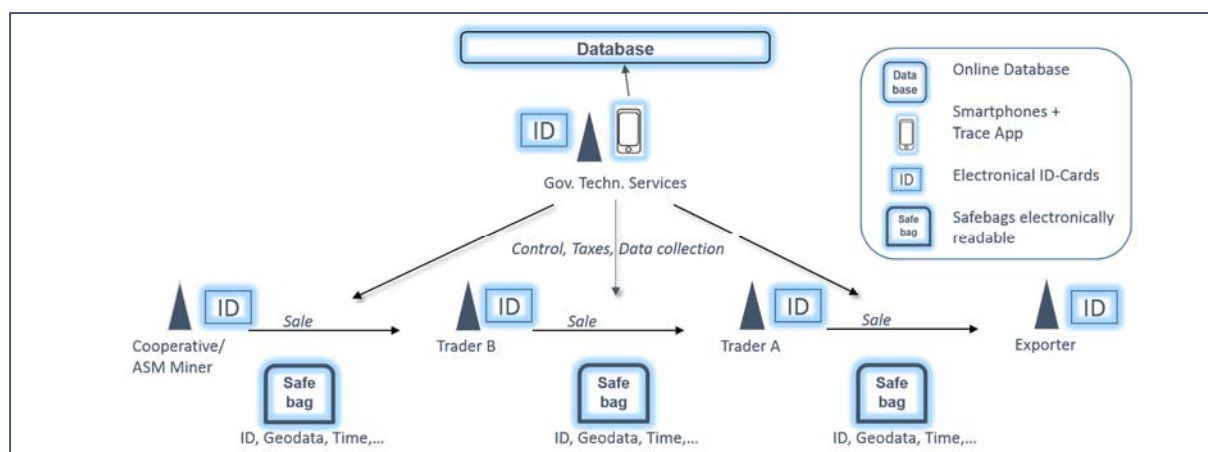


Figure 7: Architecture for transactional data registration used for the Kampene gold pilot project

The electronic traceability system operated from April to December 2017. One or two project support staff to guide application of the system after initial trainings was present during two periods of two months each. The system was continuously used by stakeholders on the ground (235 activated identities of authorized users) even during the absence of support staff, but application levels were strongly reduced during these periods of absence and data were not included in the database. This indicates that electronic traceability schemes require extended periods of on-the-ground support if they are to be applied successfully in the long run.

Using this approach, a total of 135 lots of doré gold (average weight 39 g, median weight 12 g) were registered in the database at mine site sales points (Figure 8). Out of a total of 5.2 kg of gold initially captured at the mine site level, 56% (2.9 kg) were traced until export in Kindu, representing 29 (22%) of total gold trade lots. Out of these, nine lots were traded directly from mine sites to the local exporter in Kindu without intermediate traders. Twenty registered gold lots from Kampene arrived at *comptoirs* in Bukavu which had not been registered within the system beforehand. This was mainly due to the gold transport being handled by traders that had not been registered in the system in the Kampene area, emphasizing the need for flexible adjustment of the traceability scheme once local gold trading networks become more transparent.

The pre-pilot official gold transport permits issued by CEEC for Kampene averaged 0.7 kg of gold per month. Over the four-month period when the electronic traceability system operated with support staff on the ground (ignoring small amounts of registered gold trade outside of this time period), the average amount of registered gold increased to approximately 1.2 kg per month. This indicates that the scheme's operation almost doubled the amount of legal and transparent local gold trade. At the same time, gold production at all Kampene sites is estimated at 20 kg per month in the dry season¹³ – as such, only about 6% of all local gold were captured (rather than 3.5% in the pre-pilot period) indicating the need for longer-term engagement to increase this rate.

¹³ It should be noted that local gold production significantly decreases during the rainy season. Therefore, the local production was likely lower than 20 kg towards the last four months of operation. Consequently, the relative proportion of locally produced gold captured by the system was higher than 6% towards the later phase of operation.

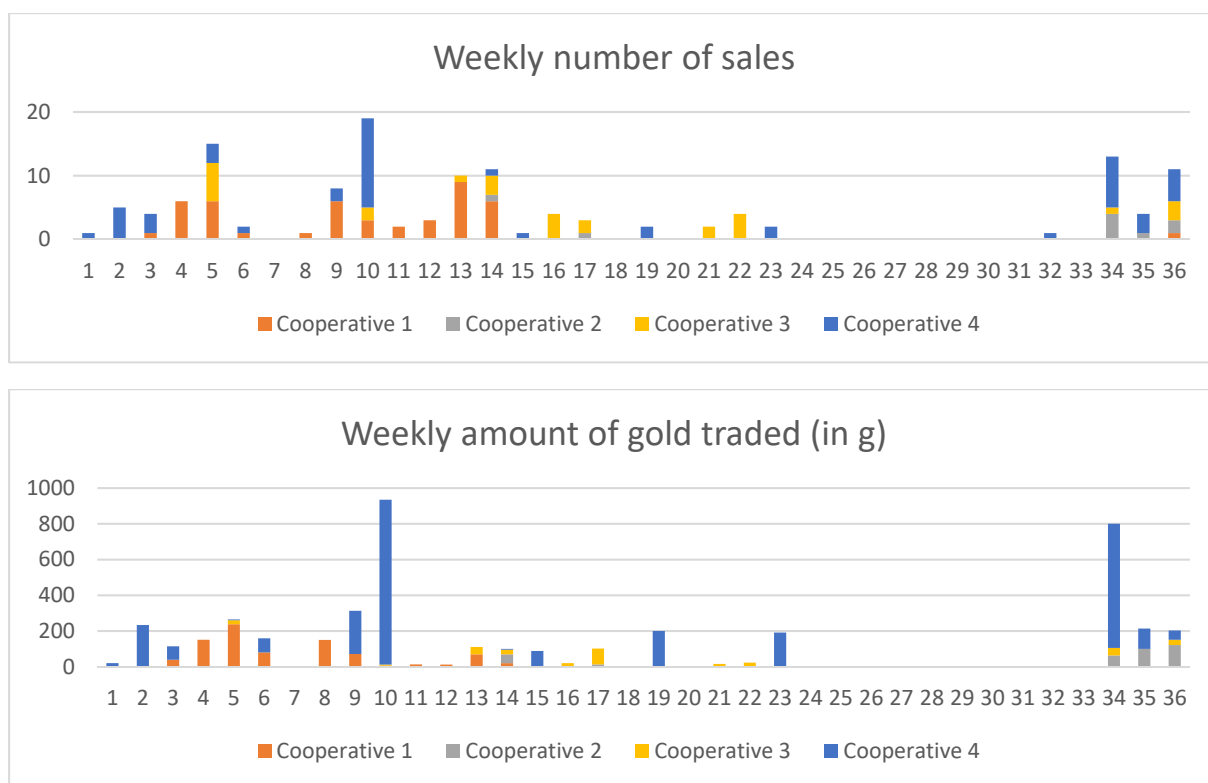


Figure 8: Registered weekly number of sales and amounts of ASM gold traded during the pilot phases in Kampene from April-December 2017

3.7. Challenges and Lessons Learned

Implementation of the scheme had to consider political, technical and financial aspects. During the first month of operating the electronic traceability scheme for ASM gold it became apparent that traders were opposed to using the system. Dealing with this problem of acceptance was facilitated through combined support at a political level as well as by the involved mining cooperatives themselves. Due to this support, the scheme's operational capacities significantly increased by the end of the 2nd month. Generally, acceptance of the scheme was supported by the fact that the scheme did not deliberately exclude potential participants such as traders; rather than creating an artificial closed pipe, the scheme allowed to integrate and formalize these stakeholders in the gold supply chain.

The supply chains from the project area to the points of export were more complex than initially anticipated. Observations showed that supply chains might include numerous B-traders trading between each other or acting as transporters of the gold. These traders, who are legally allowed to participate in the gold trade, were therefore included in the traceability system and registered accordingly. It should be added, that, until today, a national centralized register for all stakeholders within the gold supply chain (that is, miners, traders, cooperatives, exporters) is still lacking in the DRC. The lack of a comprehensive registration system makes it difficult for state authorities to evaluate the legal compliance of individual gold supply chain stakeholders. Creating such a registration database could hence represent a possible leverage point to improve good governance in and control of ASM gold trade.

Implementation of the pilot gold traceability initiative further indicated that taxation and levies on a provincial and municipal level occur that do not comply with the national DRC mining legislation. However, these payments form part of the provincial legal tax provisions and, therefore, should not be considered illegal taxation. In some cases, this additional local tax and levy collection can amount up to 6-13% of the traded gold value. The more stakeholders are

willing to engage in an official and transparent supply chain, the more they become subject to these taxations, thus strongly de-incentivizing formalization. Future developments of ASM formalization strategies in the DRC should therefore consider balanced taxation practices at the provincial, national and regional level. It would also be important to estimate and consider the indirect taxation benefits from artisanal gold mining and trade given that these activities generate substantial flow of money circulating in the informal and, eventually, formal national economy.

4. Conclusions

The artisanal and small-scale gold mining sector in the DRC belongs to the global top-ten ASM gold producers. At the national level, it plays an important economic role, providing informal employment for at least 233,000 miners and creating indirect taxation benefits for the state and the DRC provinces. It is estimated that the value of annual ASM gold production in the DRC is around US\$ 540-810 million; the miners remain with approximately half of this amount with the other half largely distributed between official or unofficial tax payments, traders and exporters.

The sector is associated with substantial risks with regards to smuggling, the involvement and financing of illegal armed groups, and sustainability challenges of informal ASM activities. Managing these challenges requires a bottom up approach building on both incentives and control procedures to improve mining conditions and sector formalization. Addressing these questions is of increasing international concern since consumer demand and public awareness on responsible ASM gold supply chains are growing (e.g., Gronwald, 2019) and a new due diligence regulation with a global scope was established by the European Union in 2017.

In order to improve control and transparency of the DRC's artisanal gold supply chains, gold traceability is a critical question. A range of international development partners, including Germany through the BGR, are supporting stakeholders in the DRC to develop strategies and test different approaches. To this end, the BGR and local partners piloted an electronic traceability system as a feasibility test for ASM gold supply chains originating at mining cooperatives around Kampene, employing about 2500 artisanal miners.

The continuous operation of the scheme over a seven months periods demonstrated that the employed system can operate under rough field conditions and with typical local challenges such as a lack of network coverage for data transmission. The database-supported tracing of ASM gold from the DRC is feasible and improves transparency and control for the legal ASM gold trade. Setting incentives and building support – at the political level as well as by supply chain stakeholders (miners, but also gold traders) – are key ingredients for facilitating implementation. At the same time, there are practical challenges such as the need for longer-term on-the-ground support for facilitating the scheme's operation and the necessity for flexibility, e.g. the adjustment of database structures and data registration procedures. Any discussions on upscaling ASM gold traceability would need to consider these practical challenges and their financial implications.

As a part of the Kampene gold pilot project, the BGR in cooperation with local partners organized national gold workshops in Kinshasa and Bukavu. During these workshops, national stakeholders expressed their interest and willingness towards the development of a national strategy for responsible ASM gold in the DRC. Developing this strategy would require the consideration of political, administrative and practical questions of the ASM gold sector. However, in the long term, an inclusive national approach for responsible ASM gold could not only help decreasing the financing of illegal armed groups and smuggling risks but would support unlocking the sector's potential to contribute to national economic and sustainable development.

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