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EVIDENCE FROM ARTISANAL AND SMALL SCALE GOLD MINING IN DR CONGO

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Abstract

Artisanal and small-scale gold mining (ASGM) comes in many forms – from alluvial panning and dredging to underground pit mining – and employs a wide variety of workers. While the importance of ASGM as a rural non-farm activity has been acknowledged for some time now, relatively little attention has been paid to the heterogeneity in the workforce and the variation in working conditions. Empirical evidence from Watsa and Shabunda in the Eastern Democratic Republic of Congo (DRC) clearly shows that inclusion through employment in ASGM is not always beneficial for *all workers,* and is at least as strongly associated with the perpetuation of indecent and poorly paid work. Given this bleak picture depicting the 'adverse incorporation' of workers, we argue that it is 'time to dig differently' in adopting a pro-social security labour process to effectively ensure that decent work becomes a reality for the thousands of miners in Wasta, Shabunda, and beyond.

Keywords: Adverse incorporation, ASGM, decent work, heterogeneity, labour.

INTRODUCTION

Over the past three decades, the growing demand for gold has led to a massive expansion of small-scale, labour-intensive, and predominantly informal gold mining activities (Verbrugge, 2015, Basri et al., 2017). In the Eastern provinces of the DRC, where most of the country's gold is mined, small-scale gold mining contributes directly and indirectly to the livelihoods of approximately 200,000 mineworkers (IPIS, 2022). Just like in other countries, most of these workers operate in informal conditions (Van Bockstael, 2014; Hilson and Maconachie, 2020). This means, first of all, that ASGM operations are often not covered by legal permits or that they operate in a grey zone between formality and informality, even though in most countries the mining code has specific provisions for Artisanal and Small-scale Mining (ASM) zones (Hilson and Maconachie, 2020). Second, it means that the workers are not registered and not protected by labour and health and safety regulations, even though such regulations are theoretically in place. In the earlier debates around informal ASGM, the focus was very much on property rights and mining titles, following a legalist approach to (in)formality (Clausen and Barreto, 2011; Verbrugge, 2015). More recently, scholars have started to pay attention to informality at the level of the workforce (Robles et al, 2022; Verbrugge, 2014, Verbrugge and Besmanos, 2016). This implies looking at the relations between the holders of capital and the labourers (Verbrugge, 2014) and the heterogeneity within the workforce (Ferring et al., 2016; Libassi, 2020). For the DRC, Geenen et al (2021) have calculated how much miners in different categories earn. Yet so far, these insights into the heterogeneity in the workforce have not yet translated into policies. Except for the specific and growing attention to the position of women in ASM formalization (Hilson et al., 2018; Muheki and Geenen 2018; Kamundala, 2020) policy documents and guidelines generally do not go into the specific conditions for different categories of workers. For example, the pit manager and all the other workers in the mine are very often seen as workers to whom the same reform policies can be applied, and yet the labour hierarchy in mining already points to an interest in looking differently at those who 'own and control' an activity from those who 'effectively work'. Policies affecting those in the ASGM who are most exposed to vulnerable working conditions and practices that jeopardise their social upgrading should therefore be designed differently.

This article contributes to the emerging body of literature on labour in ASGM. We draw on Global Value Chains (GVC) and Global Production Networks (GPN) frameworks to explain the functional integration of ASGM into the global gold production system (Verbrugge and Geenen, 2020). Informality, then, is integral to how global production is organized and allows lead firms to exploit a massive casual workforce while eschewing labour regulation. We critically review the Decent Work Agenda (DWA), which promotes the integration of international labour standards in national policy instruments (Bell and Newitt, 2010; Deranty and Macmillan, 2012; World Bank, 2020). Thus, our contribution is to be situated at the level of a detailed analysis of working conditions for different categories of workers in informal ASGM, using a combination of qualitative data and quantitative survey data. First of all, this contributes to the existing literature on labour in GPN/GVC, which has paid relatively little attention to the role and the conditions of informal production (but see Harriss-White, 2010; Meagher et al, 2016; Mezzadri, 2010, Phillips, 2011, Phillips and Sakamoto, 2011). Second, GPN and GVC frameworks did not, for a long time, pay particular attention to working conditions in the extractive industries, which provide the primary inputs for all GPNs/GVCs (but see Geenen and Verbrugge, 2020a; Lamb et al., 2019; McQuilken and Hilson, 2018; Radley, 2019).

On this note, our fundamental aim is to understand the labour relations in ASGM in Wasta and Shabunda, by examining workers' connections with patterns of indecent work. To fully comprehend how workers' positions are affected by the accumulation process, structural power (in terms of position in the production/trade process) and associational power (in terms of the formation of a collective organization) are critically discussed. Our findings show that workers are almost fully tied into relations of dependence, exposing them to labour market risks such as lack of social security, overworking hours with limited wages, insecure employment, unsafe working environment, and generally powerlessness to protect themselves against various forms of exploitation. In owning and organizing the production process, powerful actors known as 'sponsors' keep a 'circular dynamic' of adverse incorporation in motion namely by monopolizing financial capital and controlling the price of gold at the local market. We dedicate the next section to explaining, at the outset, the structural dimensions in power relations that, as a result, endanger the possibilities of decent work.

INFORMAL LABOUR AND DECENT WORK IN ASGM

Informal labour in capitalist markets: adverse incorporation

Empirical evidence has demonstrated that inclusion through employment in GVC/GPN has had quite disparate effects on different categories of workers. For permanent and skilled workers, inclusion has led to social upgrading, signifying improvements in working conditions and enabling rights (Barrientos et al., 2011a). For a much larger group of low-skilled and more vulnerable workers, inclusion is rather associated with social downgrading, exploitation, and persistent poverty (Barrientos et al., 2011b; Meagher et al., 2016). This group includes migrant workers, women, and other vulnerable populations (Nadvi, 2004; Phillips, 2011; Phillips and Sakamoto, 2011). The notion of "adverse incorporation" was developed to analyze poverty as shaped by the conditions under which some social groups participate in global economic activity (Wood, 2005; Hickey and du Toit, 2007). Fundamentally, it refers to situations in which those social groups lack (or have minor) prospects of accumulation as they are 'stuck' in precarious, unprotected, and exploitative forms of employment. Consequently, they remain poor and vulnerable (Phillips and Sakamoto, 2011). According to many scholars, the roots of those dynamics of structural poverty, lie in capitalism's power relations and accumulation dynamics generating wealth for a few and perpetuating poverty for many (Hickey and du Toit, 2007; Harris-White, 2006).

Similar to other sectors of the economy, ASGM operates within a capitalised system that entails a complex labour organization often operating at the margins between formal and informal (Verbrugge et al. 2014). Power is in the hands of the landowners, who may be local landlords or traditional authorities, and capital owners who finance ASGM operations (Cuvelier et al, 2022; Fisher, 2007; Verbrugge, 2014). Quite some attention has also been paid to the issue of debt as a 'poverty trap' for ASGM workers who become dependent on their financiers (Cuvelier; 2017; Luning; 2018; Perks, 2011; Wilson et al, 2015). Recent studies have shown that intensified production, through technological innovation and mechanization, is altering capital/labour relations (Libassi, 2020; Verbrugge et al, 2021). ASGM is increasingly moving from a manual and labour-intensive activity to a mechanized and more capital-intensive activity (Bikubanya and Radley, 2022). As this requires more and more

investment, for instance in dredges, mechanized ball mills, and cyanidation plants, power is increasingly transferred to the capital holders, and production-sharing arrangements are being replaced by wage relations. This results in a growing exploitation of a workforce that is low-skilled and desperate for job opportunities. For some skilled workers though, wages and working conditions may improve (Dunia Kabunga and Geenen, 2022).

More and more, legal titles are granted to miners' cooperatives. In countries such as the DRC, miners are required to adhere to a cooperative, which acquires a legal permit to exploit an 'artisanal mining zone'. In practice, however, many workers are not affiliated with a cooperative, and some cooperatives also operate in a grey zone in between formality and informality. Besides, studies in the DRC and elsewhere have revealed the undemocratic nature and the elite capture tendencies that are present in many of these cooperatives (De Haan and Geenen; 2016; Huggins et al, 2017). In brief, many ASGM workers are constrained to selling their labour power to the ASGM financiers, but they do not get permanent contracts, nor do they receive property titles. A vast and low-skilled workforce is thus adversely incorporated into global gold production.

Decent work as 'labour-led' social upgrading?

Understanding the nature of capitalist exploitation and indecent labour is particularly important to identify the flaws in the working relationship between employment actors and employees. This is why, for just over two decades, the international development community has increasingly called for "not just the creation of jobs, but jobs of acceptable quality" (ILO, 1999), while paying excessive attention to the achievement of decent work for all under the Sustainable Development Goals (SDG8). This is indeed a clear commitment to the promotion of decent work by achieving fundamental principles and rights at work, extending social protection, and promoting social dialogue.

This commitment, framed in the Decent Work Agenda (DWA), is of strategic significance for the world of work and its future as it is the first international labour standard to focus on the informal economy in its entirety and diversity. By integrating with the Millennium Development Goals (MDGs) in 2006, the agenda sought to assert its ability to tackle labour market degradation, including through the programs that the ILO has implemented to foster audit partnerships between buyers, governments, and trade unions, particularly to reduce child labour, forced labour and health and safety issues. However, while the DWA addresses the problem of social inequalities created by globalisation, it prioritizes institutional arrangements over workers and thereby risks downplaying the real actors for whom social improvement is intended. According to critical authors such as Selwyn (2013) the DWA is well suited to, if not reinforcing, neoliberal hegemony as it derives, in essence, from a 'top-down' approach aimed, paradoxically, at solving workers' problems through capital. Based on this weakness, Selwyn (2013) thus enshrines the inability of the DWA to identify systemic problems of exploitation in capitalist social relations. Instead, it is argued that the DWA must open up opportunities that focus on the struggles, causes, and mechanisms of socioeconomic inequalities of the labouring-class (Miyamura, 2012).

Nevertheless, to the extent that the DWA explicitly addresses the problems of informal and precarious work, it is of relevance to improving the quality of work in the ASM. Indeed, in the sector, decent

working conditions are associated with the proliferation of non-standard labour contracts through a persistently large informal economy, which limits the ability of artisanal workers to fully benefit from their integration into the world economy. Unfortunately, the design of the SDGs, like the MDGs before them, literally ignored the ASM, particularly in contexts like Sub-Saharan Africa, where such oversight poses critical development challenges (Hilson and Maconachie, 2020). Yet, as Hilson (2021) argues, given the flexible nature of the SDGs, strategies that aim to bring ASGM to the fore could gain some traction as long as they are framed in development terms. However, although the DWA aims to enforce labour market regulations, it is clear that it carries the seeds of its lack of operability in all contexts. Indeed, by institutionalising it through the application of international labour standards, which are then implemented by national governments, the DWA can be extremely difficult to achieve in the context of mainly informal and/or illegal ASM (Hilson and Maconachie, 2020). In this paper, we embrace this fact and postulate that international regulations may have little resonance at the local level, as they do not take into account the structural, cultural, and political factors that are enacted and perpetuated by local stakeholders. Therefore, in the remainder of the paper, we describe the unique characteristics of mining in the study regions before developing a regulatory framework for decent work.

METHODOLOGY

The DRC is in the top ten of gold producers in the world (World Bank, 2020). Most of the DRC's ASGM production occurs in the Haut-Uélé, North and South Kivu, Maniema, Ituri, and Tanganyika provinces (Neuman et al., 2019; World Bank, 2008). The mining sites selected for this research are located in the two main gold-producing regions: Watsa territory in Haut-Uélé province, and Shabunda territory in South-Kivu province. We collected both quantitative and qualitative empirical data in Watsa in June 2019, and in Shabunda in March 2020. Three main mine sites were selected in each region, based on importance (in terms of production volumes) and diversification (in terms of types of gold exploitation): Moku-Babarau, Vika Vile-Mbilo and Vika Vile-Were in Watsa, Kasthungu, Matili-Mungembe and Shabunda-Ndeya in Shabunda. In each mine site, we selected a variety of operations to illustrate as much as possible the diversity in ASGM. The following table gives an overview of the types of operations considered.

Table 1. Types of operation

Types of operation	Technical characteristics of the activity	Characteristics of the workforce and general working conditions
Alluvial mining (by panning)	Operation centred on an alluvial deposit located at the edge of the watercourse, consisting of blocking the latter with tree trunks, stones, and earth. Alluvial sediments are extracted only with a shovel.	On average about ten people whose activity is threatened by the constant risk of being injured by rocks or tree trunks.
Crushing	The exploitation of residues (waste) from other types of exploitation, consisting of crushing in a mortar (iron) and pestle (often hardwood) or in a mechanical crusher (ball mills).	Involvement of about 10 people, usually exposed to dust and the risk of injury from tools (in manual operations).
Debordage	The operators install appropriate facilities through which the water is channeled to a specific point. The slurry is led through wooden channels to an open reception basin. The diggers then filter the slurry and the gold dust appears on the surface after several filtering procedures.	Operation involving about ten people, the risk of illness related to wastewater is high because of the unhealthy environment in which the workers are immersed.
Dredge	Machine mining with 30-metre long pipes used to 'suck', extracts the gravel which passes through a sluice covered with mats holding the fine gold. After a two-hour rotation, the belt is removed from the sluice and transported to the river bank where it is cleaned and the fine particles are amalgamated by the washing team.	About 30 people, some on the dredge, some under the dredge (in the water), and some on the shore. The diver is the main operator. There is a high risk of asphyxiation and stones or mud falling into the water.
Loutra	As with crushing, this operation uses the tailings, but these are then soaked in a hole initially installed and used as the contents of the hole are depleted; by sieving and washing with a paddle or in small iron pans locally called *kayari*	Generally, less than 10 people are working in this operation, the product of which is very often washed with mercury, with obvious health consequences.
Open-pit mining	Meticulous open-cut mining extending about 5 metres into the subsoil and requiring the removal of overlapping layers of sand (rarely soil) and ore.	Dangerous operation with teams of up to 50 people. Meticulous weaving or *Tissage* is the remedy for recurrent rockfalls.
Underground pits	A closed operation of about 50 metres (locally known as a 'descendries') consisting of shafts and tunnels excavated (often with dynamite) through quartz rock and supported by wooden poles. The digging that takes place there gradually leads to what the operators call 'drum' or mineralised rock.	Operation involving an average of 50 people with an extremely high risk of asphyxiation and collapse due to the use of air compressors and the construction of unsustainable 'stairs' or 'landings' in the basement.

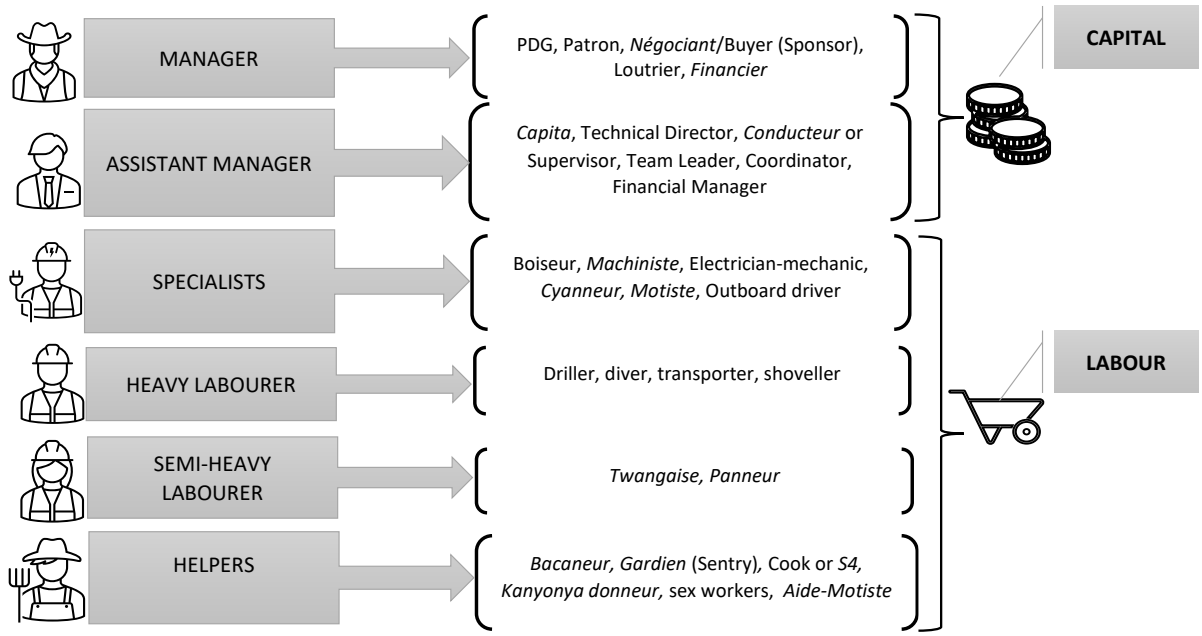
At the level of each ASGM operation, we have then purposively selected individual workers in different worker categories with some variation in working experience (short and long), gender, age, and origin (locals and migrants). As such, the sample is illustrative of a variety of socio-demographic profiles, work categories, and gold mining operations. We do not claim representativity, as a random sample is extremely difficult because of the informality of the activities, the high mobility of the workers, as well as the insecurity in the region (which did not allow the team to stay for multiple days in one site). In total, 194 artisanal miners were selected in Watsa and 420 in Shabunda. The entire dataset was first read and reviewed multiple times to become very familiar with its content. Then, data were thoroughly cleaned (by running frequencies of key variables to identify missing values and outliers). For the qualitative variables, the information as reported by the respondents was cross-checked and thematically coded.

FINDINGS AND DISCUSSION

Workers and skills

Mining for gold is not just about digging a hole in the ground. It involves a wide range of activities in preparation, extraction, processing, and transporting. Tasks are gendered, with men commonly involved in shoveling, drilling, and mechanical crushing, and women in panning, washing, and manual grinding. Figure 1 gives an impression of the incredible variety of tasks, which depend on local geologies and ecologies, but also histories and cultures.

Figure 1. Hierarchical diversity of worker positions



Source: Author's own

For analytical purposes, we have categorized these into six worker categories[1]: managers, assistant managers, specialists, heavy labourers, semi-heavy labourers, and helpers**.**

Table 2. Workers and skills

	Watsa		Shabunda	
	N	**%**	**N**	**%**
Categories of workers				
Manager	20	4,8	34	8,1
Assistant Manager	17	4	56	13,3
Specialists	12	2,9	57	13,6
Heavy labourer	113	26,9	231	55
Semi-heavy labourer	13	3,1	31	7,4
Helpers	19	4,5	11	2,6
Learning to handle tools and machines				
Friend	49	25,3	158	37,62
Family member	34	17,5	54	12,85
Fellow miners	8	4,1	5	1,19
On-site training	3	1,5	7	1,67
Self-taught	87	44,8	49	11,67
n/a	13	6,7	147	35

In both areas of study, new techniques and technologies such as jackhammers, mechanized ball mills, and dredges have been introduced in the past decade (Dunia Kabunga and Geenen, 2022). ASGM activities are rapidly evolving from purely manual to (semi–) mechanized activities, which also prompts a need for new skills. For instance, dredge mining requires not only diving skills but also underwater breathing through breathing tubes. In open pit or underground mining, the use of technology such as compressors, injectors, or circuit breakers requires electrical training, particularly to regulate/control the electrical pressure of the equipment. The need for new skills also applies to the use of ball mills by *machinistes,* the maintenance and operation of which requires specific technical skills in general mechanics. The vast majority said they learned the skills themselves (45% in Watsa) or from friends (25% in Watsa, 38% in Shabunda). The more specialized and better-remunerated tasks require a new set of skills, which are not taught by formal training, but rather on the job. This is important to keep in mind when assessing channels and outcomes of formalization in ASGM.

Table 2 reveals that only very few workers learned their skills through formal training. These people would have received training either from private actors (Congolese, Chinese), from cooperatives in other territories, from the Ministry of Mines, in the region, or nearby. These pieces of training can be on mechanics, electricity, maintenance, and technical handling of machines (crushers, dredgers,

[1] Our categorization is inspired by earlier ones made by Stoop et al. (2016) and Geenen et al. (2021) for South-Kivu.

testers) or safety in the mines. Table 3 shows that in Wasta and Shabunda the largest number of workers with formal training related to their work are in the heavy category, with 69% and 39% respectively. In practice, these workers carry out most of the production activities: daily digging, crushing (manual or mechanical), pit logging, diving, and dredge platform activities (using the engine), etc. An important piece of information, moreover, from this table is that more than half of the respondents have not undergone any formal training for mining activities. Once again, heavy labourers constitute the largest majority in both sub-study settings, followed by managers (in Watsa) and specialists (in Shabunda). From an analytical perspective, this indicates a major concern at the operational level, reflected in the lack of management capacity (for untrained managers), the lack of specialist knowledge (for specialists), and, most importantly, the lack of technical training on occupational safety (for heavy labourers).

Table 3. Category of workers and training

		Manager	Assistant Manager	Specialists	Heavy labourer	Semi-heavy labourer	Helpers	Total
Watsa								
No	N	18	16	12	100	12	16	174
	%	10,3	9,20	6,90	57,50	6,90	9,20	100,00
Yes	N	2	1	0	11	1	1	16
	%	12,50	6,30	0,00	68,80	6,30	6,30	100,00
n/a	N	0	0	0	2	0	2	4
	%	0,00	0,00	0,00	50,00	0,00	50,00	100,00
Shabunda								
No	N	18	39	44	144	14	9	268
	%	6,70	14,60	16,40	53,70	5,20	3,40	100,00
Yes	N	3	5	9	11	0	0	28
	%	10,70	17,90	32,10	39,30	0,00	0,00	100,00
n/a	N	13	12	4	76	17	2	124
	%	10,50	9,70	3,20	61,30	13,70	1,60	100,00

Labour relations

The pathway through which workers access a mine is primarily associated with whether they were referred by an acquaintance (e.g., a friend) of theirs, a family member, or they simply showed up spontaneously at the site and were hired. More than 80% of our respondents have been hired based on oral contracts with their employers. These contracts provide them little security, and pit managers can hire and fire workers at any time. Pit managers may justify this based on the unpredictability of gold mining activities; during some unproductive periods much less labour is needed. But ultimately this results in unprotected workers being subject to unstable employment that limits their opportunities for accumulation and long-term security (Phillips and Sakamoto, 2011).

Table 4. Labour relations

	Watsa		Shabunda			Watsa		Shabunda	
	N	%	N	%		N	%	N	%
Recruitment process					***Member of a cooperative***				
I had seen a call for tender	-	-	4	1	No	8	4,1	310	73,8
I am the owner	2	1	6	1,4	Yes	1	0,5	109	26
I introduced myself spontaneously	68	35,1	95	22,6	n/a	185	95,4	1	0,2
Someone I know/friend asked me	73	37,6	164	39	***Status within the cooperative***				
A family member asked me	24	12,4	115	27,4	Founder	-	-	10	2,4
n/a	27	13,4	36	8,6	Member	1	0,5	75	17,9
Type of contract					Manager	-	-	22	5,24
No agreement	-	-	28	6,7	***Level of satisfaction***				
Written agreement	8	4,1	21	5,0	Very satisfied	-	-	4	1
Oral agreement	160	82,5	337	80,2	Somewhat satisfied	-	-	20	4,8
n/a	26	13,4	34	8,1	Neutral	-	-	15	3,6
Member of a trade union					Not satisfied	1	0,5	13	3,1
n/a	9	4,64	12	2,86	Not satisfied at all	-	-	53	12,6
No	175	90,21	301	71,67	***Working with a sponsor***				
Yes	10	5,15	107	25,48	No	74	38,10	231	55,00
Level of satisfaction					Yes	113	58,20	180	42,86
Somewhat satisfied	1	0,50	2	0,48	n/a	7	3,60	9	2,14
Neutral	-	-	4	0,95	***Existence of conflicts with the sponsor***				
Not satisfied	9	4,60	25	5,95	Quite rarely	46	23,71	41	9,76
Not satisfied at all	-	-	73	17,38	Quite often	19	9,79	13	3,10
					Occasionally	8	4,12	8	1,90
					Never	36	18,56	114	27,14
					Very often	4	2,06	4	0,95

Another factor that adds to the workers' precarity, is the dependence on financiers or sponsors. The latter prefinance mine workers in exchange for a share in the production or the right to sell the gold produced (Geenen, 2015). The financiers might be pit managers or local gold traders, commonly called *négociants.* In Watsa 58% of respondents work with sponsors, against 43% in Shabunda. This can be explained by the fact that in Shabunda we surveyed smaller operations which are less capital-intensive, hence the need for sponsors is less present. As a general rule, the more capital and technology-intensive the operation is, the more present and powerful sponsors are. It appears from table 3 that conflicts between sponsors and miners rarely occur. This may seem surprising in the context of informal debt. However, when one considers that miners have no choice but to rely on these financiers, otherwise they will not be able to produce (Matthysen et al., 2019) such a finding seems justified. This is why amicable reconciliation is the preferred way out of conflicts, as stated by 29% of our respondents in Wasta and 13% in Shabunda.

In terms of associational power, we have looked at the role of miners' cooperatives, and miners' associations. The associations are often structured by occupation. For instance, the dredger's association: *Association des Plongeurs du Congo* (ASSOPLOCO) in Shabunda has been created to defend the interests of dredge workers. This informal-like association, initiated by divers, provides support to its members (in case of conflict with other actors such as the Traders), and trains and equips divers within the limits of its resources. Statistics show, however, that 90% of the miners surveyed in Watsa and 71.6% of miners in Shabunda are not members of any local association or union. Either these associations simply do not exist, or those that do exist do not sufficiently meet the expectations of the miners. According to the Congolese mining code, all mine workers are required to be members of a cooperative (since 2010)[2]. A cooperative is a legal entity that can also apply for exploitation permits in designated artisanal mining zones. In reality, though, many cooperatives do not have such a permit or conflict with competing cooperatives. Previous studies have also shown that many cooperatives in the DRC are subject to elite capture, serving the interests of their most prominent members (de Haan and Geenen, 2016; Geenen and Radley, 2014; Matthysen et al., 2019).

In our sample, 73,8% of respondents in Shabunda are not members of a cooperative, and in Watsa only one respondent was a cooperative member. In Watsa there are no miners' cooperatives; ASGM is organized by the *Administrateur du Foyer Minier* (AFM) and his committee. This AFM-led structure holds a license to operate the sites and is therefore recognized by local state and customary authorities as having *de facto* mining rights. It also obtains approval from local communities to operate as a gold producer and therefore organises all mining activity at the sites under its aegis. The high non-response rate (95%) reinforces what miners told us during interviews: they do not even know what a cooperative is because it is a system that does not exist and has never existed on their mine sites. Where it exists, the cooperative is often even seen as a tool to guarantee access to mining sites because it belongs to the owners of the forest where the mining sites are located. Many respondents are not satisfied with the cooperative for several reasons. For some, cooperatives' actions are not very visible in the field; they exist in name only and do not provide real assistance to miners:

> "The initiative is good, but the actions of the cooperatives do not yet provide much support to the members, especially to modernise their operations" (Shabunda, BB/BB3).

> "From the point of view of importance, we are satisfied with its presence. However, from the point of view of interest, I am not so satisfied because we do not see it". (Shabunda, LWP/BDL11).

According to others, the cooperative has already made many promises to the miners, which have yet to be fulfilled. Moreover, the leaders of the cooperative work more for their own benefit than for those of the members. For others still, becoming a member would merely add a burden because they would have to pay additional contributions. Cooperative management is considered untransparent and undemocratic. To illustrate these concerns, some miners stated:

[2] Arrêté ministériel n° 0706/CAB.MIN/MINES/01/2010 du 20 septembre 2010 portant mesures urgentes d'encadrement de la décision de suspension des activités minières dans les provinces du Maniema, Nord-Kivu et Sud-Kivu.

> "The cooperative does not support us as we would have hoped: no training and no advocacy with the state. It is a means of enrichment for a few individuals" (Shabunda, MA/LKC7).
>
> "Sometimes the president and his committee embezzle funds from the cooperative and sometimes they declare the real amount" (Shabunda, DK/BDL32).
>
> "These are institutions muzzled by the powerful who create them and choose the leaders themselves" (Shabunda, SB/BB5).

Many cooperatives are still in their infancy and experience many conflicts due, among other things, to the inexperience of the founders and leaders, who are sometimes corruptible. Some miners do not join these associations simply because they are not indigenous, not natives, and they find that there are many requirements. They often feel discriminated against by the natives. And others are not interested because they are not members of the pit manager's family. Other miners still do not join these associations because they do not have the financial means to contribute regularly and pay or renew membership fees. Although hailed by policymakers as critical for better organizing ASGM, the perception of cooperatives' benefits for miners in our survey is rather negative, with two third of respondents in Shabunda who are members being 'not satisfied' or 'not satisfied at all'.

Payment systems

Regarding the payment systems in the surveyed mines, we can distinguish four types[3]: sharing of production in bulk, sharing of production in cash, sharing in terms of amount per bag or meter, and finally, remuneration through a fixed wage. When the workers receive part of the production in bulk that means after removing bags of stones or sand from the pit or river, for example, these bags are shared between the workers and the PDG. Often the PDG takes either 50% or 66%. He will use part to cover his expenses in the pit. The workers stay with the other part. Everyone can have their stones crushed and washed and go and sell them. In a variant of this system, workers also receive part of the production, but this time in cash. In the third system, workers receive a fixed amount per job or per bag they have produced. This system used to be mainly applied to specialists such as timber workers or *boiseurs* (Geenen et al. 2020).

According to the different types of mining, the table below shows that in Watsa the bulk production sharing system dominates, mainly in the underground pit mines which are widespread in the region. Indeed, 84% of workers receive payment in this way and 70% of open pit miners adhere to this system, whereas dredge mining, which is more mechanised, uses mainly cash payment of production (53%). In Shabunda, an area dominated by open-pit mining, 45% of open-pit workers are paid in wages and 84% of dredging machine operators are salaried. These results reflect a palpable reality: the increasing specialisation of operations in Shabunda, notably with the use of testing machines in Matili-Mungembe, or pumps and motorised dredgers in Shabunda-Ndeya. These technological tools, therefore, require a more expert workforce to which a fixed salary is applied.

[3] See also Geenen et al (2020) for the different payment systems in ASM.

Table 5. Payment systems and types of operations

Watsa						
		Amount (bag or meter)	**Cash**	**Bulk**	**Fixed wage**	**Total**
Open-pit mining	N	4	2	21	3	30
	%	13,3	6,7	70,0	10,0	100,0
Crushing	N	0	2	0	0	2
	%	0,0	100,0	0,0	0,0	100,0
Débordage	N	0	0	2	0	2
	%	0,0	0,0	100,0	0,0	100,0
Loutra	N	0	0	1	0	1
	%	0,0	0,0	100,0	0,0	100,0
Dredge	N	1	9	7	0	17
	%	5,9	52,9	41,2	0,0	100,0
Underground pits	N	13	6	119	4	142
	%	9,2	4,2	83,8	2,8	100,0
Shabunda						
		Amount (bag or meter)	**n/a**	**Cash**	**Bulk**	**Fixed wage**	**Total**
Open-pit mining	N	12	2	59	38	89	200
	%	6,0	1,0	29,5	19,0	44,5	100,0
Alluvial mining	N	4	0	25	28	38	95
	%	4,2	0,0	26,3	29,5	40,0	100,0
Crushing	N	0	0	2	0	4	6
	%	0,0	0,0	33,3	0,0	66,7	100,0
Debordage	N	0	2	8	2	24	36
	%	0,0	5,6	22,2	5,6	66,7	100,0
Loutra	N	0	0	6	1	1	8
	%	0,0	0,0	75,0	12,5	12,5	100,0
Dredge	N	0	0	9	0	46	55
	%	0,0	0,0	16,4	0,0	83,6	100,0
Underground pits	N	6	0	3	6	5	20
	%	30,0	0,0	15,0	30,0	25,0	100,0

In both Watsa and Shabunda, the respondents mentioned that they prefer the payment systems practiced at their mining sites. Indeed, because these systems are usually practiced in the sites for many years now, many miners prefer them rather than adopting new systems with which they are less familiar. A system based on production sharing in bulk is generally considered to be fairer than a cash-sharing system because it allows the worker to keep control over his own production. In the former case, the worker takes the raw ore to the processing units himself, and keeps an eye on the crushing, grinding, and washing (see also Dunia Kabunga and Geenen, 2022; Robles et al, 2022 for the case of the Philippines).

What matters, in fact, is the fairness of the systems in use (terms of the agreement). And indeed, some miners have reported that all systems are good if they are respected, which is not always the case.

Thus, some workers criticize their payment system because, according to them, it benefits only the capital holders. As Matthysen et al., (2019) argue, the consequence is that an ill-negotiated payment system can negatively affect production. Indeed, many miners may choose to abandon their work at a given mine site, as PDGs constantly and unilaterally change payment systems. Such a scenario could occur in Watsa or Shabunda as the terms of the wage arrangements continually favour the PDGs and the financiers with whom they work.

Gold sales

After minerals have been processed, workers sell the gold either to itinerant traders present at the site or bring it to a trading hub. According to our survey almost 85% of respondents sell their gold themselves.

Table 6. Sale of gold

	Watsa		Shabunda	
	N	%	N	%
Miners sell their gold alone				
No	26	13,40	69	16,43
Yes	164	84,50	349	83,1
n/a	4	2,10	2	0,5
Type of seller				
Gold buying house	40	20,60	102	24,29
Small dealer	74	38,10	232	55,24
Sponsor	50	25,80	15	3,57
Existence of an agreement with the seller				
No	93	47,9	315	75.0
Yes	69	35,6	19	4.5
n/a	2	1	86	20.5
Existence of a price agreement				
No	82	42,3	233	55.5
Yes	76	39,2	115	27.4
n/a	6	3,1	72	17.1
Level of satisfaction with the price of gold				
Very satisfied	-	-	52	12.38
Somewhat satisfied	16	8,2	191	45.48
Neutral	41	21,1	19	4.52
Not satisfied	99	51	66	15.71
Not at all satisfied	8	4,1	21	5.00

Miners generally make credit arrangements with financiers. The latter offer credit - in Congolese francs - and expect a supply of gold in return. The agreement is most of the time oral and based on trust, loyalty, and respect (Geenen, 2015). At the time of the sale, there is still room for negotiation about prices, measures, and impurities. But if the miner is indebted to the financier, this significantly reduces the room for negotiation. And often, in the case of debts, the miner receives a debt at a price lower than the regular price, but he must repay this debt by selling at the regular local market price. The borrower is always privileged because he always buys at the agreed price even if the price has risen. In case of breach of trust or when the convention is not honoured, conflicts may arise. Many are settled through informal negotiation, but some result in court charges where indebted miners are required to settle their debts vis-à-vis their sponsor. Table 5 shows that 45% of the miners are somewhat satisfied with the price, while 21% are not (at all) satisfied with the price. These results reflect what respondents often told us: the price of gold is a given in mining sites and there is little room for negotiation, especially when pre-financing arrangements had been made. In the actual sale of gold, the exchange rate often applied at mining sites is lower than the official rate. Here is an illustration from the case of Shabunda:

In February 2020, traders were buying a gram of gold for around 100,000 FC (US$50)[4] at Shabunda Centre. According to some experts (Global Witness, 2016), the "gram" (locally known as *reng*) offered by the trader with a hand scale and old coins as counterweights is actually between 1,3 and 1,45 grams[5]. The actual purchase price is, therefore, between US$34,4 and US$38,4/g, which corresponds to 74,2 – 82,9% of the London Bullion Market Association (LBMA) international fixing of about US$46.3/g (US$1,904.50/ounce) in February 2020[6]. These price variations certainly have to do with the lack of real-time information for artisanal miners in this virtually cut-off area. In the meantime, efforts to formalize the sector seem to be putting miners in a hardship trap: miners are constantly harassed for the lack of a miners' permit when they want to sell gold, and the latter is quite costly for the average miner.

These findings show that power tends to be concentrated in the hands of a few prominent sponsors/traders who control financial and physical capital at the expense of workers who receive below-market rates for their labour power. While it is not forced labour in the strict sense of the term and that of the ILO, it is a variant of it, also known as *bonded labour*, in which based on certain financial agreements, the debtor, unable to pay his debt, is at the service of his creditor according to agreements that may or may not be specific.

Although some well-positioned workers benefit from better remuneration (in kind or in cash), the remuneration of the workforce is not based on a minimum payment that can secure workers in case

[4] The exchange rate of the Congolese franc indexed to the U.S. dollar was valued at about 2,000 Congolese francs on the market.

[5] (COSOC-GL, July 2015): traders use a 20 Makuta coin declared as a 9 g counterweight. In reality, the weight of the coin is 13.1 g. This may be reinforced by the miners' valuation of a gold tola at 10 grams while the latter would be valued at 14.4 g instead (Geenen, 2014).

[6] One troy ounce represents 31.1 grams. Note that February is the survey period. In February 2020, the ounce was valued at US$1425 on February 3, US$1430 on February 14 and US$1460 on February 28, respectively. The average price during the month would be US$1440.

of gold price fluctuations. The Wasta operation is quite illustrative in this sense: 84% of the workers are paid in kind, and 51% of them are not at all satisfied with the price at which gold is bought from them on the local market. These results suggest that while artisanal miners may be economically included, the terms for inclusion seem adverse, with poor working conditions, derisory remuneration levels, and systems resulting in impoverishment and exploitation.

Labour conditions

Work schedules

Most miners work very irregular schedules. As such, the hours and days of work may vary depending on the type of operation and the production level at the mine. Furthermore, some respondents revealed that they didn't really have time limits but worked until targets were met (production). In terms of working hours, table 7 shows that the average hours worked per day are close to 8 in many types of operations in Shabunda, except for the underground pit operations where the average is close to 9 hours. The RSD results are highest in the dredge and waste operations, suggesting that the values around this average would be much higher. In Watsa, results show that waste mining, underground pit, and open pit gold mining take an average of more than 9 hours per day for miners to complete.

Two points are worth noting in the face of these observations. First, these work hours are for an individual miner and not for the entire work team. Indeed, working hours are not based on specific contracts but depend on the ambitions of the teams of workers. For example, reaching the mineralized rock and exploiting it requires a lot of physical work from heavy and semi-heavy labourers. Here, the notion of "hours worked" and "hours at work" has to be taken into account in the sense that managers may spend long days supervising or not supervising activities, while people digging and other activities in the mine (e.g. logging) spend long hours (day and night) actively ensuring the production process. Second, the standard deviations associated with these averages show that these values deserve to be overestimated. The differences between the maximum and minimum values of working hours are considerable (except for the waste mining in Watsa). Indeed, taking the example of the dredge operation, a diver works a certain number of rotations (6 rotations on average) while the guard works 24 hours a day. Thus, the number of working hours would exceed the 8 hours of work per day that constitutes the scale set by the ILO.

Table 7. Time spent working

	N	Min	Max	Mean	Sd.	RSD
Watsa						
Open-pit mining	20	8	14	9,6	1,759	0,18323
Waste mining[7]	4	10	12	11,5	1	0,08696
Dredge mining	16	2	12	7,06	3,043	0,43102
Underground shaft mining	103	5	15	9,77	2,016	0,20635
Shabunda						
Open pit mining	187	4	20	7,8	2,205	0,28269
Alluvial mining	92	2	12	7,26	1,54	0,21212
Waste mining	43	1	21	6,91	2,942	0,42576
Dredge mining	55	2	24	7,69	4,936	0,64187
Underground shaft mining	17	3	24	8,76	4,918	0,56142

Notes: Sd.: Standard deviation; RSD: Relative standard deviation (= Standard deviation/Average) and provides information on the dispersion of the data. If RSD < 0.15: the dispersion is low; if 0.15 < RSD < 0.30: the dispersion is medium; if RSD > 0.30: the dispersion is high.

Occupational health and safety

Working in mining operations is associated with dangerous physical work. In our survey we asked the respondents what symptoms and pathologies they were suffering from; multiple answers were possible. The combination of back, rib, and hip problems and generalized muscle pain due to fatigue, was most often mentioned, with 78% of respondents in Watsa and 89% of respondents in Shabunda claiming to experience this. In Shabunda, many respondents also suffer from urinary problems (61%), breathing problems (47%), and skin problems (45%). In Watsa, respondents reported breathing problems (41%) and stress (22%) as problems number two and three.

The factors explaining these pathologies are both related to the general conditions in and around the mining sites, and the nature of the work itself. Hygienic conditions in the sites are alarming, and sanitation is defective, with a lack of showers and clean latrines. Most sites have no health facilities either, and miners often revert to self-medication (Geenen et al., 2021). Moreover, the mining communities have no access to clean drinking water, and the mining activities themselves - including the use of mercury and cyanide - are further polluting the water. The work itself is physically demanding. Many workers experience muscular pains all over the body leading to the exhaustion of physical strength. For instance, underground drillers working in shifts may spend several hours underground, in tiny spaces where they have to fold their bodies in unnatural positions while exercising physical force to extract the hard rocks. At the same time, there is little supply of oxygen, and the pumps that are installed to evacuate the groundwater may leak, causing toxic fumes (Geenen et al., 2021). Transporters, on the other hand, transport bags of 50 to 70 kilograms on their back, going back and forth between the places of extraction and the processing units, which may involve climbing steep

[7] To simplify the calculations and to allow some comparability between operation types, Crushing, Loutra and Débordage operations have been grouped together in the waste operation type, as they use products from other operation types and are more or less homogeneously labour intensive than other operations.

hills and passing through muddy, slippery roads. Female grinders (*twangaises*) report being exhausted by the repetitive movement of banging the pestle into the mortar, to the extent that they endlessly repeat this movement and hear the clanging sound in their dreams.

Table 8. Occupational health and safety

	Watsa		Shabunda	
	N	%	N	%
Symptoms and pathologies				
Skin problems	15	7,73	190	45,24
Problems with the eyes	14	7,21	135	32,14
Stress/ trauma and anxiety	42	21,64	155	36,9
Lungs/ breathing problems	79	40,72	196	46,67
Urinary problems	16	8,24	257	61,19
Back, rib, and hip problems/Generalized muscle pain due to fatigue	152	78,34	375	89,29
Problems with the ears	21	10,82	101	24,05
Other	24	12,366	130	30,95
None	6	1,43	-	-
Type of accidents				
Asphyxiation	12	6.18	5	1.22
Accidents with work tools	-	-	45	10.98
Accidents with machinery	46	23.71	18	4.39
Accidents underwater	7	3.61	17	4.15
Rockfall	19	9.79	26	6.3
Fall	16	8.25	15	3.66
Landslide	8	4.12	6	1.46
Flooding	-	-	4	0.98
Other (accidents related to fights, gold smoke inhalation during gold processing)	-	-	2	0.49

Regarding the various diseases, some miners think that there is little chance of living long by doing this work every day and ASGM in Shabunda and Watsa is not without consequences for the health of the miners' families and the surrounding communities. Occupational health is a major concern in Shabunda, where 42% of alluvial miners and 30% of dredge miners are continually concerned about it. The level of concern is lower in Watsa but still quite significant, with 27% of open-pit operators and 17% of dredge operators concerned about occupational health. About the impact of health in the community, in Shabunda more operators are concerned than in Watsa, given that mining in Shabunda is done in sites close to villages and by actors from the community or its surroundings, whose families are almost all located in Shabunda. In Wasta, where the origins of the workers are quite diverse, the surrounding communities and families are little affected by the activities in the mines.

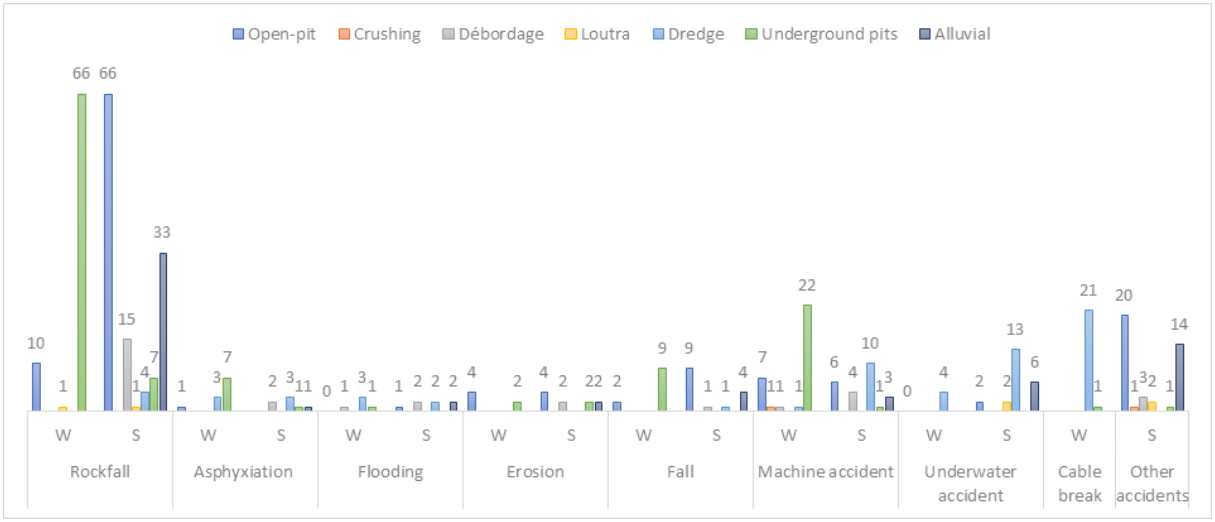
Accidents with tools and machinery are dominant, particularly in Watsa, followed by rockfalls and landslides in the mining sites. Because of these accidents, miners are increasingly concerned about the safety conditions of their work since the dangers or risks of accidents are always present if safety is not rigorous on the sites. Some respondents expressed their concerns in the following terms:

> "With the drilling we do, and the hammering we do, there can be an arch in the ceiling of the pit and as we cannot see it outside, the ground can collapse on us" (Watsa, R_68ICKSKONwCdSLb)

> "The risk of cave-ins due to the lack of tools to support the ceiling and walls because the ground becomes lighter and lighter as we go up and down the shafts" (Watsa, R_erCF2rMmtIwLXX3).

Based on the surveys, the following graph shows the most frequent accidents at the mining sites visited:

Graph 1. Common accidents in mines



Notes: W stands for Watsa, while S stands for Shabunda. Other accidents can be injuries with stones, accidents with work tools, drowning, or fights.

In underground mines, rockfalls and machine accidents are the most common. The tunnels are protected by wooden structures, which are built by specialists called *boiseurs* or timber workers. These are highly skilled workers who are indispensable for the safety of the tunnels. However, some pit managers do not sufficiently invest in this, and the wood is also easily affected by humidity, causing it to become more porous. As mentioned above, diesel pumps are often installed underground to evacuate the groundwater. The diesel fumes are expelled through long tubes, but these may leak and produce toxic fumes underground. In dredging operations, underwater accidents and machine accidents have been cited as the most common accidents. The river's depth is a constant concern because the divers work in the water: they take a tube in their mouth to breathe and then spend two hours underwater to search for gold in the river bed.

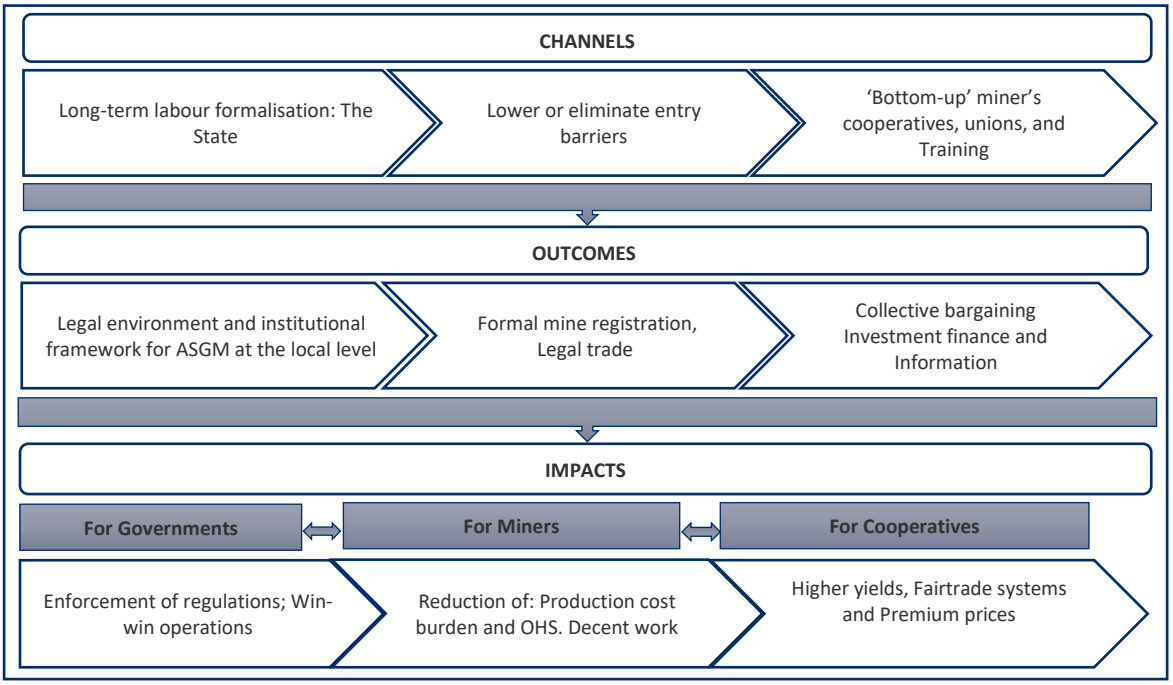
In all the operations studied, the generic problems are, among others, the lack of training in accident prevention, the lack of protective equipment, the lack of control and technical expertise, the poor

organisation of work, and the individual irresponsibility of some workers. In dredging operations, vigilance is more than necessary because of the "blind" relationship between the diver and the *motiste* who controls the state of the engine on the platform when the diver is underwater. As the two actors only communicate through the movement of the oxygen supply hose, the end of which (also called the *bec*) is pushed into the river sediment by the diver, a lack of attention to the condition of the compressor can result in the diver running out of oxygen at any time. In terms of the equipment that divers need, it is worth mentioning the diving mask, the neoprene wetsuit, as well as breathing tubes of durable quality. Lack of equipment remains a common problem in alluvial mining, in open pits or underground, as there is a great need for motorised dugout canoes (for alluvial mining), *Chang Fa* type engines, work equipment (boots, clothing, gloves, etc.); coupled with the problem of lack of training as mentioned above, the risk of accidents becomes increasingly high.

TIME TO DIG DIFFERENTLY

How to promote decent work in ASGM? The difference between the types of workers shows a conflicting relationship between those who hold the financial capital and those who constitute the 'beginning' of the gold production chain (Geenen and Verbrugge, 2020a) in Watsa and Shabunda. These conditions describing a decent work deficit are reflected in both contexts by a lack of social protection for the most vulnerable, rather unstable employment, and the lack of associative power of artisanal miners. From this perspective, the formalisation initiatives often advocated in the academic literature and by practitioners seem difficult to implement, particularly because they do not take into account the 'difference of scale' between workers and also the increasingly mechanised nature of mining (see Bikubanya and Radley, 2022). In this sense, understanding the heterogeneous nature of ASGM allows for the identification of actors who would benefit more from formalisation and mechanisation processes, while others would not. For example, focusing on regulations for granting mining rights would only strengthen the position of those who can afford to acquire them, while many workers, with their meagre, irregular, and unpredictable payments, are unable to acquire digger cards to formalize. The dynamics of adverse incorporation in the relationship between capital and labour, analysed in this paper not only in terms of connectivity between actors but also in terms of inequalities of power, thus provides an incentive to 'dig differently'. Figure 2 describes the Decent Work Framework (DWF) we develop in this paper, and includes main headings: From the *channels* of formalization to the *outcomes* and finally, the *impacts* in terms of decent work in the ASGM. The arrow boxes show (1) the interrelated nature of the factors of formalisation and (2) the continuous direction that this process takes.

Figure 2. Decent Work Framework



Source: Author's own

This figure shows the behaviours and strategies needed to transform the structures and processes leading to decent work: labour formalisation beyond simple mineral (exclusivity) rights, low (or removal of) barriers to entry into the formal processes, and the focus on organisations such as associations and cooperatives for technical performance. These organisations are badly needed in Watsa and Shabunda. A starting point for reducing the power between capital and labour is to enable the need for workers to be collectively organised in trade unions and associations that are freer and have more room for manoeuvre than the almost non-existent cooperatives. First of all*, to increase their associational power***,** acting as a form of small business, these unions/associations would be the first line of defence for "low-level" workers who would then demand greater social protection from their *PDGs*. Concretely, the creation of bottom-up cooperatives (de Haan and Geenen, 2016) and unions will induce the power of collective organisation as a means to increase miners' agency and ability to act and strategize within the labour regimes available to them (De Neve, 2014). Practically, labour unions and cooperatives should defend miner's concerns and respond to immediate issues opposing marginalized miners and influential actors of the chain (e.g., sponsors, PDGs). The power of the hill owners ("*de colline*" or "*ayant droit*" in Shabunda) and that of the AFM (in Watsa) would then be counterbalanced by the freedom of association and collective bargaining. The latter is very critical to ensure a progressive shift to high-value-added of gold mining activities, as suggested by the 2030 Agenda and the human rights-based approach to Decent work[8].

Second of all, *to increase their structural power,* through organizations such as cooperatives, miners may receive support such as financial investments (e.g., availability of flexible financing and

[8] Human rights based approaches | Australian Human Rights Commission Accessed 19/07/2021

microloans), up-to-date information on the gold market, and training to meet international gold mining standards (Fairtrade International, 2011)[9]. In this sense, NGOs and policymakers working in the mining sector would be of capital assistance in facilitating the daily communication of gold prices to artisanal miners who, in the Shabunda context are entirely cut off from the rest of the world.[10] However, the impacts of these dynamics would only be more widely felt if the Congolese government fully backs the sector. Geenen and Radley (2013) argued that the formalization, as a process (de Haan, Dales, and McQuilken, 2020), is a permanent role of the state. Indeed, the process within its own administration (e.g., SAEMAPE[11], Division des Mines) should be as simple and expeditious as possible to achieve a "win-win" situation between the mining operators and the state. However, this is only possible, to the extent that miners realize that the costs associated with formalization are lower than the monetary burdens they incur as informal. In this perspective, the legal environment and institutional framework for ASM should be established (Barry, 1996), not only as national regulations but considering the local realities as it was demonstrated how miners in both contexts were heterogeneous with diverse social and cultural features. Knowledge of and compliance with these laws at the local level are valuable tools in implementing formalization (Matthysen et al., 2019). To sum up, evidence in Watsa and Shabunda showed how structural challenges of economic marginalisation (power relations in artisanal gold commodity) undermine the working conditions in DRC's ASGM. Therefore, these non-exhaustive recommendations that we propose, not as a quick fix for the formalisation challenge, are geared toward a policy of inclusiveness that provides supportive mechanisms for informal gold miners to enjoy sustainable economic growth and decent work.

CONCLUSION

Working conditions in ASGM are precarious and dangerous, which, among other things, increases the vulnerability of informal artisanal workers' employment in various ways. This paper analysed these decent work deficits to propose possibilities for transforming the adverse incorporation dynamics of gold miners in Watsa and Shabunda into decent work. 'Informalization' of labour in these two areas shows two different, though interrelated processes: the participation in the ASGM labour market of different categories of workers and precarious labour relations and insecure working conditions. This paper delves much into the heterogeneity of ASGM, focusing on the labour dynamics of the workers at the *beginning* and the *heart* of production (specialists, heavy, semi-heavy labourers, helpers). The use of concepts of adverse incorporation and decent work provide a better understanding of conditions on which people are employed (gainfully or not) taking into account the interplay of job quality and job quantity. In an ideal world, this will assist the Congolese government and other policy-makers to support the benefits of 'acceptable quality jobs' in terms of associational workers' power (small businesses with collective bargaining) and in terms of structural power (investments for higher yields). The proposed DWF has the potential to meet the expectations of the most vulnerable workers

[9] FAIREVER - Artisanal Gold | FAIREVER - Artisanal Gold Accessed 20/07/2021

[10] Case of the mining operators of the Langa Langa and Matili forestry groups in the Shabunda territory: these operators, who only know the price of gold imposed by the local trader, are not only separated from the center of SHABUNDA by the distance (about 30 km of the road very difficult to access) but also by the cruel absence of technological means of communication.

[11] SAEMAPE: Service d'Assistance et d'Encadrement de l'Exploitation Minière Artisanale et à Petite Echelle

and can become a reference for social protection measures. This could be true if efforts are made in the area of freedom of association and trade unionism of workers, thus contributing to a deeper understanding of the concept of decent work at the local level. To conclude, the long-term reforms that need to be made should focus on transforming power relations within the sector in a bottom-up approach to guarantee that decent work is a reality for the estimated two hundred thousand Congolese engaged in ASGM.

REFERENCES

Barrientos, S., Gereffi, G. & Rossi, A. (2011a). Economic and social upgrading in global production networks: A new paradigm for a changing world. *International Labour Review*, *150*(3-4), 319-340.

Barrientos, S., Gereffi, G., Posthuma, A., Mayer, F. & Pickles, J. (2011b). Decent work in global production networks: Framing the policy debate. *International Labour Review*, *150*(3–4), 298–317.

Barry M. (Ed.) (1996). Regularizing Informal Mining: A Summary of the Proceedings of the International Roundtable on Artisanal Mining Organized by the World Bank, Washington, D. C., May 17–19. 1995. Industry and energy department occasional paper no. 6.

Basri, Sakakibara, M. & Ratnawati (2017). Economic features of the artisanal and small-scale gold mining industry in Bombana, Southeast Sulawesi, Indonesia IOP Conf. Series: Earth and Environmental Science 71 (2017) 012016.

Bell, S. & Newitt, K. (2010). Decent work and poverty eradication: literature review and two-country study A study for the Decent Work and Labour Standards Forum. 8 Coldbath Square, London.

Bikubanya, D.-L. & Radley, B. (2022). Productivity and profitability: Investigating the economic impact of gold mining mechanisation. In Kamituga, DR Congo (ed.), *The Extractives Industries and Society.* https://doi.org/10.1016/j.exis.2022.101162.

Clausen, F. & Barreto, M.L. (2011). Property rights theory and the reform of artisanal and small-scale mining in developing countries. *Journal of Politics and Law* 4(1), 15–26.

Cuvelier, J. (2017). Money, migration, and masculinity among artisanal miners in Katanga (DR Congo). *Review of African Political Economy* 44 (152): 204-219

Cuvelier, J., Geenen, S. & Verbrugge, B. (2022). Governance. In D'Angelo, L. & Pijpers, R (eds.), *The anthropology of resource extraction*. Routledge: 77-93

Deranty, J-P. & MacMillan, C. (2012). The ILO's Decent Work Initiative: Suggestions for an Extension of the Notion of "Decent Work" *Journal of Social Philosophy*, Vol. 43 No. 4, 386–405.

Dunia Kabunga, P. & Geenen, S. (2022). Work regimes and technology-driven transformations in DRCongo's artisanal and small-scale gold mines. The Extractive Industries and Society.

Ferring, D., Hausermann, H. & Effah, E. (2016). Site specific: Heterogeneity of small-scale gold mining in Ghana. *The Extractive Industries and Society* 3(1), 171–184.

Fisher, E. (2007). Occupying the Margins: Labour Integration and Social Exclusion in Artisanal Mining in Tanzania. *Development and Change 38*(4): 735–760 (2007).

Geenen, S. (2014). "Qui cherche, trouve". The political economy of access to gold mining and trade in South Kivu, DRC. Thèse de doctorat en études de développement. *Anvers: Université d'Anvers.*

Geenen, S. (2015). African artisanal mining from the inside out. Access, norms and power in Congo's gold sector. Routledge, Abingdon.

Geenen, S. & Radley, B. (2014). In the face of reform: What future for ASM in the Eastern DRC? *Futures 62* (2014) 58–66.

Geenen, S. & Verbrugge, B. (2020a). Theorizing the Global Gold Production System. In Verbrugge, B. & Geenen, S. (eds.), *Global Gold Production Touching the Ground.* (pp. 17-52). Palgrave Macmillan: Cham.

Geenen, S. & Verbrugge, B. (2020b). Informalization. In Verbrugge, B. & Geenen, S. (eds.), *Global Gold Production Touching the Ground.* (pp. 69-96). Palgrave Macmillan: Cham.

Geenen, S., Stoop, N. & Verpoorten, M. (2020). How much do artisanal miners earn? An inquiry among Congolese gold miners. *Resources Policy*, 70: 101894.

Geenen, S., Bikubanya, D.-L., Dunia Kabunga, Ph., Igugu, O., Kabilambali, G., Katoto, P., Marijsse, S., Mayeri, D., Muhanzi Aganze, G., Mukotanyi Mugisho, Mussa Bashizi, Fiz, Nkuba, B., Vanlerberghe, E. & Zahinda Mugisho, F. (2021). La fièvre de l'or. Santé et environnement dans les mines d'or de Kamituga, RDC. IOB Working Paper 2021.10. University of Antwerp, Institute of Development Policy.

IPIS (2022). IPIS Due Diligence series. Responsible mining scorecard in eastern DRC. D/2022/4320/06, 28p.

de Haan, J. & Geenen, S. (2016). Mining cooperatives in Eastern DRC: The interplay between historical power relations and formal institutions. *The Extractive Industries and Society*, *3*(3), 823- 831.

de Haan, J., Dales, K. & McQuilken, J. (2020). Mapping Artisanal and Small-Scale Mining to the Sustainable Development Goals. Newark DE: University of Delaware (Minerals, Materials and Society program in partnership with Pact).

Harriss-White, B. (2006). Poverty and capitalism. *Economic and Political Weekly,* 1241-1246.

Harriss-White, B. (2010). Work and wellbeing in informal economies: the regulative roles of institutions of identity and the state. *World Development 38* (2), 170-183.

Hickey, S. & du Toit, A. (2007). Adverse incorporation, social exclusion and chronic poverty, *Chronic Poverty Research Centre*. Working Paper 81, ISBN 1-904049-80-X.

Hilson, G., Hilson, A., Siwale, A. & Maconachie, R. (2018). Female Faces in Informal 'Spaces': Women and Artisanal and Small-scale Mining in sub-Saharan Africa. *Africa Journal of Management* 4 (3), 306-346.

Hilson, G. (2021). Decent Work and Economic Growth. In Parra, C., Lewis, B. & Ali, S. (eds). *Mining, Materials, and the Sustainable Development Goals (SDGs).* Boca Raton: CRC Press.

Hilson, G. & Maconachie, R. (2020). For the environment: an assessment of recent military intervention in informal gold mining communities in Ghana. *Land Use Policy* 96, 104706.

Huggins, C., Buss, D. & Rutherford, B. (2017). A 'cartography of concern': place-making practices and gender in the artisanal mining sector in Africa**.** *Geoforum,* 83 (2017), pp. 142-152.

ILO (1999). 'Social and Labour Issues in Small-Scale Mines: Report for Discussion at the Tripartite Meeting on Social and Labour Issues in Small-scale Mines'. Geneva: International Labour Organization.

Kamundala, G. B. (2020). Formalization of artisanal and small-scale mining in eastern Democratic Republic of the Congo: An opportunity for women in the new tin, tantalum, tungsten, and gold (3TG) supply chain? *The Extractive Industries and Society 7*(2), 420-427.

Lamb, V.; Marschke, M., Rigg, J. (2019). Trading Sand, Undermining Lives: Omitted Livelihoods in the Global Trade in Sand. *Annals of the American Association of Geographers* 109 (5): 1511-1528.

Libassi, M. (2020). Mining Heterogeneity: Diverse Labor Arrangements in an Indonesian Informal Gold Economy. *The Extractive Industries and Society*, 7(3), 1036-45.

Luning, S. (2018). Mining temporalities: Future perspectives. *The Extractive Industries and Society* 5 (2), 281-286.

Matthysen, K., Spittaels, S. & Schouten, P. (2019). Mapping artisanal mining areas and mineral supply chains in Eastern DR Congo: Impact of armed interference & responsible sourcing. *IPIS and DIIS, Anvers*.

McQuilken, J. and Hilson, G. (2018). 'Mapping' Small-Scale Mineral Production Networks: The Case of Alluvial Diamonds in Ghana. *Development and Change* 49 (4): 978-1009.

Meagher, K., Mann, L., & Bolt, M. (2016). Introduction: Global Economic Inclusion and African Workers. *The Journal of Development Studies,* 471-482.

Mezzadri, A. (2010). Globalisation, informalisation and the state in the Indian garment industry. *International Review of Sociology, 20*(3), 491–511.

Miyamura, S. (2012). Emerging Consensus on Labour Market Institutions and Implications for Developing Countries: From the Debates in India. *Forum for Social Economics* 41(1): 97–123.

Muheki, S. & Geenen, S. (2018). Women in (and out of) artisanal mining: opposing policy and women's lived experiences in Lujinji B and Wakayiba mines, Mubende, Uganda. IOB Discussion Paper. Institute of Development Policy, University of Antwerp.

Nadvi, K. (2004). Globalisation and poverty: How can global value Chain Research Inform the Policy Debate? *Institute of Development Studies Bulletin 35* (1), 20–30.

Neumann, M., Barume, B., Ducellier, B., Ombeni, A., Näher, U., Schütte, P., von Baggehufwudt, U., Ruppen, D. & Weyns, Y. (2019). Traceability in Artisanal Gold Supply Chains in the Democratic Republic of the Congo Lessons Learned from the Kampene Gold Pilot Project. Hannover. BGR.

De Neve, G. (2014). Fordism, flexible specialization and CSR: How Indian garment workers critique neoliberal labour regimes. *Ethnography* 15(2) 184–207.

Perks, R. (2011). 'Can I go?' Exiting the artisanal mining sector in the Democratic Republic of Congo. *Journal of International Development* 23 (8): 1115-1127.

Phillips, N. (2011). Informality, Global Production Networks and the Dynamics of 'Adverse Incorporation. *Global Networks 11*(3):380-97.

Phillips, N. & Sakamoto, L. (2011). The dynamics of adverse incorporation in global production networks: Poverty, vulnerability and 'slave labour' in Brazil. Politics/Political Economy Institute, University of Manchester. ISBN: 978-1-906433-77-2.

Radley, B. (2019). Mining industrialisation in the African periphery: Disruption and dependency in South Kivu. DRC PhD dissertation International Institute of Social Studies, The Hague.

Robles, M.E.; Verbrugge, B. & Geenen, S. (2022). Does formalization make a difference in artisanal and small-scale gold mining (ASGM)? Insights from the Philippines. The Extractive Industries and Society, https://doi.org/10.1016/j.exis.2022.101078.

Selwyn, B. (2013). Social upgrading and labour in Global Production Networks: A critique and an Alternative conception. *Competition and Change.* 17 (1): 75-90. DOI 10.1179/1024529412Z.00000000026.

Stoop, N., Buraye, K., J. & Verpoorten, M. (2016). Relocation, reorientation, or confrontation? Insights from a representative survey among artisanal miners in Kamituga, South-Kivu. Working paper / 2016.09. Institute of Development Policy and Management. ISSN 2294-8643

Van Bockstael, S. (2014). The persistence of informality: perspectives on the future of artisanal mining in Liberia. *Futures 62,* 10–20.

Verbrugge, B., Buxton, A. & Besmanos, B. (2014). Artisanal and small-scale mining: protecting those 'doing the dirty work', Briefing, *International Institute for Environment and Development (IIED),* available at http://pubs.iied.org/17262IIED (Accessed 16 May 2021).

Verbrugge, B. (2014). Capital interests: a historical analysis of the transformation of small-scale gold mining in Compostela Valley province, Southern Philippines. *The Extractive Industries and Society 1* (1): 86–95.

Verbrugge, B. (2015). The Economic Logic of Persistent Informality: Artisanal and Small-Scale Mining in the Southern Philippines, *Development and Change 46*(5): 1023 1046.

Verbrugge, B. & Besmanos, B., (2016). Formalizing artisanal and small-scale mining: Whither the workforce? *Resources Policy* 47, 134–141.

Verbrugge, B. & Geenen, S. (2020). Global Gold Production Touching the Ground. Palgrave Macmillan: Cham.

Verbrugge, B., Lanzano, C. & Libassi, M. (2021). The cyanide revolution: efficiency gains and exclusion in artisanal and small-scale gold mining. *Geoforum*, 126, 267-276.

Wilson, M.K., Renne, E., Roncoli, C., Agyei-Baffour, P. & Tenkorang, E.Y. (2015). Integrated Assessment of Artisanal and Small-Scale Gold Mining in Ghana. *International Journal of Environmental Research and Public Health. 12*(7): 8133-8156.

Wood, G. (2005). Poverty, capabilities and perverse social capital: the antidote to Sen and Putnam. In Kahn, I. & Seeley J. (eds.). *Making a Living: The Lives of the Rural Poor in Bangladesh.* Dhaka University Press, Dhaka. pp. 1–18.

World Bank (2008). Democratic Republic of Congo Growth with Governance in the Mining Sector. Mining and Chemicals Department Oil/Gas, AFCC2, Africa Region.

World Bank (2020). State of the Artisanal and Small-Scale Mining Sector. Washington, D.C.: World Bank.