CHAPTER 1

Introduction: Snapshots of Global Gold Mining

Boris Verbrugge and Sara Geenen

1.1 A Dual Gold Mining Economy?

The history of mining is often presented as a linear evolution from premodern and traditional forms of mining, towards capital-intensive industrial mining undertaken by large (multinational) mining companies (see, e.g., Lynch 2004). At first glance, trends in the gold mining industry seem to corroborate this view. A process of consolidation that started in the early 2000s concentrated power in the hands of a small number of "major miners" (Humphreys 2015). By 2017, only five companies (Barrick Gold, Newmont Mining, AngloGold Ashanti, Kinross Gold, and Goldcorp) were responsible for nearly one-fifth of newly mined gold

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(Thomson Reuters 2018). Since the gold mining boom of the 1980s, the gold mining industry has also expanded from its historical core (constituted by South Africa, the USA, Australia, Canada, and Russia) into "new gold mining destinations" such as China, Peru, Ghana, and Indonesia. As illustrated by the following description of the first fully automated underground gold mine in Mali, the industry is also witnessing profound technological change and is on the verge of entering the digital age:

> The Syama mine, located 300km southeast of Mali's capital Bamako, has total reserves of 2.9 million ounces of gold. Work on the deep drilling program at the mine began in late 2015, ensuring the new, low levels of the mine are designed with automation in mind. (…) Throughout the mine there will be a fibre-optic network, ensuring that the autonomous haulage trucks and other elements are in constant contact with the control centres above ground. (…) The advantages of automating a mine are clear, as the technology increases efficiency and improves safety. (Mining Technology 2018)

Yet in many new gold mining destinations, the expansion of industrial gold mining is accompanied by an equally dramatic increase of what is widely referred to as artisanal and small-scale gold mining (ASGM). Across the globe, up to thirty million people may now be involved in small-scale, low-tech, labor-intensive gold mining, producing up to one-fifth of the global gold supply (IGF 2017). This expansion of ASGM is having a deeply transformative impact on mineral-rich regions across the globe, providing opportunities to people from different walks of life:

> The gold rush is only four months old in Nathenje, Malawi, but already there are thousands of prospectors digging, shoveling and sifting soil in the age-old search for a nugget that will transform their lives. Using rudimentary picks and shovels, villagers from the nearby settlements of Lumwira and Dzondi have been joined by other Malawians from across the country, more experienced in gold panning. An informal system of bosses and employees has also sprung up, alongside a makeshift collection of plastic shelters offering basic accommodation. (AFP 2018)

Despite its central importance for local livelihoods as well as the global supply of gold, and despite its far-reaching social and environmental impacts (not least in terms of mercury pollution), the lion's share of ASGM-activities persists without any form of government recognition,

let alone regulation. In a bid to re-assert control over mineral wealth, some governments are now taking drastic measures to quell the expansion of what is often referred to as "illegal" mining:

> In an operation that lasted a couple of days and that involved four airplanes, police officials, forest rangers and the National Guard, Brazilian authorities dismantled a number of open-pit gold and cassiterite mines operating illegally in the heart of the Amazon. (…) A $200,000-shotgun, eight hydraulic excavators, four motor pumps and other equipment were seized and destroyed. (…) According to official information, illegal mining in the remote area generates profits of at least $120,000 per month. (Leotaud 2018)

The opportunities and challenges associated with the global expansion of (gold) mining have been widely debated in development studies (e.g., Bebbington et al. 2008; Kemp 2009; Gamu et al. 2015). This literature is underpinned by dualist views of the gold mining economy, which is seen as bifurcated between two distinct sectors. On one side, we find a gold mining industry that is seen as a vehicle for neoliberal globalization and that has entered into an unholy alliance with "landlord" states in an attempt to monopolize access to mineral-bearing land (Emel et al. 2011). On the other side, we find a rudimentary ASGM-sector that operates "in the margins" (Fisher 2007) of the global economy and that functions as an "informal safety net" (Aizawa 2016) for the rural poor (Hilson and Garforth 2012). This image of a dual gold mining economy is reinforced by empirical accounts of conflicts between mining companies and ASGM-operators, who often have no choice but to operate "illegally" inside company concessions (see, e.g., Carstens and Hilson 2009; Okoh 2014; Patel et al. 2016) (Table 1.1).

1.2 Diversity and Connectivity

While intuitively appealing, this image of a dual gold mining economy fails to do justice to empirical realities on the ground. As demonstrated by the "snapshots" from Malawi and Brazil, rather than constituting homogeneous and mutually exclusive categories, ASGM and industrial gold mining now harbor a wide range of gold mining practices with varying degrees of capital and labor intensity and various levels of (technology).

Table 1.1 A dual gold mining economy?

	Artisanal and small-scale gold mining	*Industrial gold mining*
Main actors	Poor (rural) communities	Mining companies
Driving force	Poverty/subsistence	Profit/accumulation
Type of operations	Rudimentary gold panning and tunneling activities	Large open-pit and underground mining operations
Technology use	Minimal use of technology	Extensive use of modern technology
Factor intensity	Labor-intensive	Capital-intensive
Regulatory situation	Informal—criminalized by state	Formal—protected by state

Source Own elaboration

While many ASGM-activities remain entirely informal, a growing number of ASGM-activities now operate with at least some degree of government recognition—even if only a tacit recognition from local government officials (Verbrugge 2015). Within the gold mining industry, in addition to major mining companies that operate massive, capital-intensive mining projects, we find a considerable number of "mid-tier" and "junior" firms that focus on smaller exploration and mining activities (Dougherty 2013). Moreover, the practice of subcontracting tasks in the supply chain makes major mining companies increasingly reliant upon specialized service providers and labor hire companies, which in some occasions operate at the brink of informality.

Dualist views of gold mining also fail to make sense of the complex interactions and linkages that may exist between ASGM and industrial mining. While there may indeed be conflict and antagonism, in many other cases there may be a degree of mutual tolerance, which is sometimes facilitated by personal relationships between people involved in ASGM and/or industrial gold mining. More fundamentally, knowledge and (technology) transfers between industrial gold mining and ASGM may contribute to their mutual strengthening. In a growing number of cases, we are even witnessing the emergence of full-blown production and marketing agreements:

> Gran Colombia's chief executive officer, Lombardo Paredes, said the company would now incorporate additional small mining collectives into its

> contract mining model. (…) Currently, over 2,500 informal miners operate within the company's title. Over the next few months, the company will negotiate specific operating contracts with each of the mining collectives that have interests in Gran Colombia's property. (Jamasmie 2017)

And even where there exist no such direct linkages between ASGM and industrial mining, a substantial share of the gold produced by informal ASGM still finds its way into official gold trading circuits. Connecting ASGM to global gold markets are a wide range of intermediaries, who often operate in the twilight zone between the formal and the informal economy:

> Traditionally –even in a formalized supply chain – small local traders buy from artisanal miners and sell on to big national exporters, so-called collectors. These in turn sell to regional and global buyers and refineries. Alongside official intermediaries, informal and illegal channels exist. (…) Formal and informal channels usually meet at the level of the global buyers. (Pieth 2019: 91)

As a result of this diversity and connectivity, one may now encounter gold mining activities with different degrees of capital and labor intensity, and with different degrees of government recognition, that interact with each other in a variety of ways. In a growing number of cases, the distinction between what is formal or informal, legal or illegal, and small scale or large scale is becoming increasingly difficult to uphold. Consider the following description of "small-scale" gold mining in Palawan, the westernmost island of the Philippines:

> Yet, the two feuding firms share one important thing in common. Though both are fairly big companies, they have come to typify the new, corporate look of "small-scale mining" that used to evoke images of lowland gold panners or Cordillera natives working with picks and shovels to dig for gold nuggets. For the government, the growing number of big companies using small-scale mining permits issued by provincial governors (…) represents an unacceptable abuse of a regulatory loophole. From only 70 in 2004, the number of small-scale mining permits issued by provincial governors more than doubled to 173 three years later, in 2007, according to the Mines and Geosciences Bureau (MGB). Small-scale mining was conceived by the laws as an activity that largely relies on manual labor, but the companies engaging in small-scale mining are using heavy equipment such as excavators, backhoes, and dozers, among others. (Fonbuena 2008)

1.3 Organization of the Book

The central objective of this book is to develop an explanatory framework that can help us make sense of this diversity and connectivity in global gold mining. Inevitably, such a framework moves beyond rigid dualistic views of gold mining that divide it into an informal and subsistence-oriented ASGM-sector, and a modern and capitalistic mining industry. In Chapter 2, Sara Geenen and Boris Verbrugge lay the theoretical foundations for this framework, which they refer to as "The Global Gold Production System." It builds on critical insights from the literature on the global organization of production (notably that on global production networks) and on the informal economy, and draws attention to how structural trends in global gold production "touch ground," producing particular "gold mining crystallizations." These crystallizations are defined as dynamic and interconnected sets of gold mining practices, in which the factors of production (land, labor, capital, and technology) and associated social relations of production crystallize in particular ways, and which are embedded in a particular ecological and institutional environment. Ultimately, the framework draws attention to how *all* types of gold mining, from artisanal gold mines to large-scale digital mines, are functionally integrated into one overarching global gold production system.

At the same time, Chapter 2 will also detail how our analytical focus on gold production contributes to closing two important gaps in the literature on the global organization of production. The first one is a preoccupation with the role of (lead) firms in the official, formal part of the economy, and an associated failure to accommodate the role of informal production. The second one is an empirical focus on the *transformation* of raw commodities into (semi)finished products—and a concomitant neglect of the "beginnings" of global supply chains, the point at which the vital inputs to our global economy are extracted from their ecological environment.

The remainder of the book is divided into two parts. The Part I consists of three chapters that deal with structural trends in global gold production. More precisely, in response to rising demand and the looming threat of scarcity, gold production has globalized (Chapter 3), informalized (Chapter 4), and become more technologically advanced (Chapter 5). Part II consists of twelve case studies that detail how the global gold production system "touches ground" in new gold mining destinations, where they produce context-specific gold mining crystallizations.

1.3.1 *Part 1: Trends in Global Gold Production*

Chapter 3 zooms in the shifting geographies of gold mining. Boris Verbrugge and Sara Geenen demonstrate how, in response to rising global demand, gold mining has expanded from its historical core (constituted by South Africa, and to a lesser extent also the United States, Canada, Russia, and Australia) into a wide range of new gold mining destinations. The chapter proceeds by discussing the different factors that have facilitated the globalization of gold mining, which include (but are not limited to) liberalization and technological innovation. Yet global gold mining is now facing a number of systemic challenges, in the form of increased resistance, rising costs, and the looming threat of resource scarcity.

In Chapter 4, Geenen and Verbrugge turn to the question of informality in gold mining, which is evident not only in the widespread trend toward outsourcing in industrial mining, but also in the global expansion of informal ASGM. They question existing causal explanations that treat informality as a product of management strategies (in the case of industrial gold mining) or as a product of legal exclusion (in the case of ASGM), and instead analyze "informalization" as a systemic response of the global gold production system to the challenges identified in Chapter 3. Most importantly, an increased reliance on cheap and flexible informal labor allows the global gold production system to deal with rising cost pressures.

In the closing chapter of Part I, Verbrugge traces technological innovations throughout the gold production cycle, from exploration, over mining and refining, to recycling. Chapter 5 ends with a snapshot of the gold production cycle, which clearly demonstrates that the formal and informal parts of the global gold production system are tied together by a web of more or less distinct linkages and intermediaries, to the point where distinguishing between them becomes extremely difficult.

1.3.2 *Part 2: The Global Gold Production System Touching Ground*

To varying extents, the country case studies in Part II of the book engage with and refine the theoretical-analytical framework developed in the Part I of the book. Notably, the different case studies demonstrate how structural trends in global gold production (global expansion, informalization,

and technological innovation) intersect with the institutional and ecological context in particular regions and countries, producing particular gold mining crystallizations.

In Chapter 6, Marjo de Theije starts off with the observation that gold mining in the Brazilian Amazon has always been informal. Efforts on the part of the national government to stimulate industrial gold mining have always been half-hearted, mostly due to resistance on the part of local communities and elements of regional elites. ASGM, meanwhile, has the flexibility to operate in the challenging geographical environment of the Amazon forest. The figure of the *garimpeiro* is also deeply rooted in the country's historical imagery and is positively seen as a type of petty developer of the riches of Brazil. It is only when the Amazon Gold Rush shifted gear in the 1980s that the Brazilian government started undertaking efforts to formalize and regulate informal *garimpagem*, albeit with limited success.

Moving into neighboring Peru, Dolores Cortes-Macpherson zooms in on the trade in ASGM-gold which, despite widespread media attention, has attracted surprisingly little scholarly interest. For a long time, ASGM-gold was long smuggled out of the country on commercial flights. When the Peruvian government imposed tougher airport controls in 2012, this led to the emergence of clandestine cross-border smuggling networks in the Andean region, which provided new opportunities for criminal actors. In this way, government efforts to put an end to clandestine gold smuggling paradoxically pushed the gold trade even further into the criminal sphere. More broadly, Chapter 7 illustrates how the global gold production system flexibly responds to external pressures.

In Chapter 8, Maria Eugenia Robles Mengoa and Alexandra Urán take us to Colombia, which is witnessing an unprecedented boom in informal ASGM. This informal gold mining boom stands in stark contrast with the government's regulatory interventions, which are primarily aimed at attracting foreign investment in its—currently negligible—gold mining industry. At the same time, the Colombian legal system harbors a series of "legal loopholes" that allow powerful intermediaries to benefit from the burgeoning trade in ASGM-gold to the detriment of ordinary workers, who bear the full brunt of a hostile political economy.

Moving across the Atlantic into Ghana, in Chapter 9 Robert Pijpers rightly observes that the global expansion of gold mining is by no means a new phenomenon. Instead, mining in the "Gold Coast" has seen successive phases of expansion and contraction, and the gold mining crystallizations that now dot the country bear the traces of this century-long history.

However, the ASGM-boom that started in the early 2010s emerges as qualitatively different, in terms of its sheer scale, its environmental impact, and the amount of resistance it generates.

In the second chapter on Ghana (Chapter 10), Gordon Crawford and Gabriel Botchwey zoom in more closely on the factors that fueled this recent gold rush, which took place in spite of a national ban on ASGM. First, they draw attention to increased Chinese involvement in Ghanaian ASGM, which not only injected fresh capital, but also led to the dispersal of new technologies. Second, they draw attention to how state officials at different government levels collude with purportedly "illegal miners," thereby actively facilitating the further expansion of ASGM.

In Chapter 11, Sabine Luning describes how global mining capital touches down in Burkina. She draws attention to how gold mining crystallizations evolve throughout the mining cycle. During the exploration stage, there is room for mutual accommodation between junior mining companies and ASGM, and even for the multidirectional transfer of knowledge and technology. During the exploration stage, relations tend to become more strained, as the (seemingly) haphazard expansion of mining upsets local land and livelihoods systems, leading to increased resentment on the part of local communities. Luning also draws attention to how these evolving gold mining crystallizations are embedded in the broader political context of Burkina Faso and indeed play an important role in the violence that currently (late 2019) engulfs the country.

In a similar vein, in Chapter 12, Eleanor Fisher and colleagues zoom in on how the gold mining boom intertwines with post-independence politics in Uganda. Spurred on by increased international interest in Uganda's largely untapped gold reserves, national elites are now cultivating an image of gold as a "national treasure" that holds significant development potential. Yet they are simultaneously undermining this development potential through their rent-seeking behavior. Ordinary ASGM-operators, meanwhile, see their livelihoods threatened by the government's efforts to attract foreign mining investment. And although the Ugandan government is undertaking half-hearted efforts to formalize ASGM, these efforts seem to benefit only the lucky few.

In Chapter 13, Cristiano Lanzano focuses on the relationship between technological innovation and socioeconomic change in ASGM-areas in western Burkina and eastern Guinea Conakry. In Burkina, the diffusion of cyanide processing transformed residual "waste" into a highly profitable

product and caused a shift toward more hierarchical forms of labor organization and more unequal systems of revenue-sharing. In Guinea, the introduction of new extraction (e.g., explosives, wooden support structures) and processing techniques (e.g., sluice boxes, mercury amalgamation) by Burkinabe migrants did not merely contribute to a reconfiguration of systems of labor organization and revenue-sharing, but also led to a transformation of customary governance systems.

In Chapter 14, Sara Geenen and Simon Marijsse take us to the eastern DRC. They vividly describe the history of gold mining in the region, drawing attention to how ASGM has persisted throughout the colonial and post-colonial period. Yet the real gold mining boom started in the 1970s and 1980s, when a crisis in industrial mining and successive civil wars created fertile conditions for the expansion of informal ASGM. As the authors note, this process of informalization went hand in hand with a shift from more hierarchical systems of labor control (in industrial mining), toward a more fragmented value chain that revolves around the adverse incorporation of ASGM-labor. They illustrate this point by describing four "gold mining crystallizations," each of which involves intricate systems of labor organization and exploitation.

In Chapter 15, we move into neighboring Zimbabwe. While poverty is undoubtedly one of the key factors fueling the dramatic expansion of ASGM, Grasian Mkodzongi also notes that unlike in neighboring South Africa, industrial mining never really gained a foothold in the country due to unfavorable geological conditions. The Zimbabwean state, meanwhile, has directly and indirectly facilitated the expansion of ASGM, by providing financial and political support to selected ASGM-operators, and through its controversial land reform program, which "liberated" gold-bearing land. In addition, the expansion of ASGM as a "popular activity" par excellence also fits in nicely with the discourse of decolonization and indigenization propagated by ZANU-PF. Upon closer inspection, however, the ASGM-boom benefits only a small group of elite players, while ordinary laborers remain trapped in "exploitative labour relations sponsored by global (*now predominantly Chinese*) capital."

In Chapter 16, Brian Klein takes us to the island nation of Madagascar, another country where both the extraction and trade of gold have been mostly informal, despite repeated attempts on the part of the pre-colonial, colonial, and post-colonial state to assert control. This predominance of informal modes of gold production can be attributed to a combination

of geology (dispersed and distant deposits), the inability of both corporate and state-led mining to muster a stable workforce, and resistance to these "exclusionary" forms of mining on the part of local communities. In recent years, Madagascar (much like Ghana and Zimbabwe) has witnessed the entry of dozens of small- to medium-sized Chinese companies, although their status remains uncertain amidst localized resistance and political uncertainty.

The final two chapters take us to Southeast Asia. In Chapter 17, Matthew Libassi presents a case study of Pongkor, one of the most (in)famous gold mining areas of Indonesia. He identifies the "transformative moments" that have shaped the history of mining in Pongkor, and that help us make sense of the gold mining crystallizations that now exist in the area. A first transformative moment was the erstwhile emergence of informal ASGM, which was facilitated at least in part to the expansion of corporate mining. A second moment was the increased attempts on the part of the Indonesian government to gain control over Pongkor. Yet rather than leading to the disappearance of ASGM, government interventions contributed to its transformation into a "more subtle and disciplined" activity. Third—and reminiscent of the situation in Burkina—the diffusion of cyanidation processing is fundamentally upsetting systems of labor organization in ASGM, engendering new dynamics of differentiation whereby wealthy mining bosses increase their profits as a result of efficiency gains, while workers are stuck with older and less efficient mercury amalgamation methods.

Finally, in Chapter 18, Boris Verbrugge describes the recent history of gold mining in the Philippines, which could arguably be described as having witnessed an ideal-type informalization trajectory—although it exhibits important similarities with other cases in the book, notably the DRC. More precisely, a structural crisis in industrial mining that started in the 1980s (and persists until today) has cleared the way for a massive expansion of ASGM, which ultimately relies on the exploitation of informal labor. This informalization trajectory was facilitated by a decentralization of state structures, which enabled local government officials to strengthen their control over ASGM.

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