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Performing traceability: Unpacking the artisanal and small-scale gold mining (ASGM) trade circuit in Peru

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ABSTRACT

To what extent can traceability requirements improve the transparency in artisanal and small-scale gold mining (ASGM)? This article addresses the crucial but rarely explored problem of gold traceability, and what happens when gold moves from mine to market. Building on transparency discussions that scrutinize the power dynamics behind information demands, we argue that the push for origin information of minerals can create an ideal scenario for performative governance (Ding, 2020) in which actors feign traceability to continue participating in the gold value chain. To present evidence of these dynamics, we outline how gold circulates in two ASGM constellations in Peru: Arequipa (in the Andes) and Madre de Dios (in the Amazon). We find that Northern market concerns regarding the legal origin of gold has created contradictions in Peru's formalization regulatory framework. To bypass these barriers, actors along the value chain will benefit from the assistance of "logistical entrepreneurs" (Schouten et al., 2019) to secure gold production and trade. We conclude that, rather than promoting meaningful change towards a more responsible and transparent gold value chain, traceability requirements can promote more opaque practices and introduce more complexity into an already highly informal sector such as ASGM.

1. Introduction

Traceability refers to the systematic recording, tracing, and reporting of a product's origins, distribution, and details throughout its life cycle (Norton et al., 2014; Olsen and Borit, 2013). Due to its potential to "make visible" social and environmental risks (Gupta et al., 2020), traceability has become a central requirement to improving transparency and accountability in mineral supply chains. Securing traceability, unfortunately, is more easily said than done, especially in gold mining. Gold is a malleable and fungible commodity that allows the melting and mixing of material from different sources without affecting its value. Hence, illegally extracted gold can be easily smuggled and blended into the legal economy, making it an attractive vehicle for money laundering (Cortes-McPherson, 2020; OECD, 2021). Artisanal and small-scale gold mining (ASGM) is part of this trend, with responsible sourcing programs demanding a trail of evidence of its production (Fairtrade International, 2013; Responsible Jewellery Council, 2019). Yet, despite the efforts of end markets and governance instruments to

trace the sector's activities, illegal trade and gold laundering are a growing concern (Pieth, 2019; Zabyelina and Uhm, 2020).

Since the rise of traceability, various authors have highlighted the unequal power relations and exclusionary practices this information mechanism can generate, particularly towards smaller producers in notoriously informal supply chains (Gardner et al., 2019; Postma and Geenen, 2020; Smith, 2022; Toonen and Bush, 2020; D. Vogel, 2010). Although we do not deny these dynamics, this literature addresses traceability as a largely inflexible process that can discourage bottom-up accommodation. This article takes a different approach by assessing the capacity of national governments and local ASGM actors to adapt to traceability demands. With few exceptions (Cortes-McPherson, 2020; Fold et al., 2014; Geenen, 2013; Robles Mengoa and Urán, 2020; Smith, 2022), the artisanal and small-scale mining (ASM) literature has been heavily focused on producers and political challenges related to formally accessing and exploiting minerals. We draw on the former concern, to shed light on mid-stream actors and their role in ensuring that gold moves from mine to market. We also investigate whether traceability

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mechanisms can improve the governance of informal global value chains and their role in transforming trade-based livelihoods. To achieve this, we analyze the impact of traceability requirements in ASGM in Peru.

Peru is South America's top gold producer (Ministerio de Energía y Minas, 2023). According to official figures, in 2022, the gap between Peru's gold exports and production exceeded 62 tonnes (Ibid.), a discrepancy frequently attributed to ASGM's participation in illegal gold production and trade (Pieth, 2019). Since 2012, the central government has advocated the implementation of policy devices to keep track of miners and traders' activities. Still, allegations of illegal Peruvian ASM-gold reaching prominent European and US refineries continue (Paz-Campuzano, 2020). While some explanations tend to emphasize the opportunism of local gold producers who have chosen illegal trade as a means of tax evasion (e.g., Valdés et al., 2019), these accounts are based on secondary information and offer a superficial appraisal of miners' incentives and trading operation.

Our study adapts the concepts of information fetishism (Fluck and McCarthy, 2019) and performativity (Ding, 2020) to examine the role of information production in the governance of global mineral value chains. We highlight how traceability demands can help feign transparency and sustainability without altering practices on the ground. To explain this paradoxical finding, we follow the daily activities of logistical entrepreneurs (Schouten et al., 2019). We recognize this group as middle-persons who move between the shadow economy of mineral production and globalized traceability standards, offering solutions for a stable mineral supply. In the case of Peru, we argue that the push of Northern gold markets for origin evidence has encouraged the rise of these entrepreneurs who provide information and circulation services. With their assistance, producers along the supply chain can bypass rigid standards and access global gold markets while offering traceability documentation for end-clients. Our findings suggest that, instead of promoting more transparent and formal extraction and trade practices, traceability may encourage opaque practices to achieve compliance.

Our research informs two bodies of literature, the first of which is transparency in Global Value Chains/Global Production Networks (GVC/GPN). Transparency (i.e., information disclosure) has been mainstreamed under the assumption that improving the public's knowledge of global value chains can boost more sustainable practices (Gupta et al., 2020; Mol, 2015). We join researchers who explore the information systems they rely on (Gardner et al., 2019); however, instead of inviting greater scrutiny on procedural and bureaucratic dimensions, which amount to a checklist of legal requirements, we stress the disparities between top-down regulatory reforms and local production and trading practices. We also explore mining-related livelihoods. While miners can alternate this activity with other ways of living, including agrarian-based economies, we also bring attention to commodities trading as a prevalent dynamic. By following logistical entrepreneurs, we can begin to map transitions from a natural-asset-dependent economy to one that is trading-based, especially in contexts where environmental deterioration means resource extraction is no longer viable.

Next, we describe our data collection methodology, followed by a conceptual section. We discuss how concerns about transparency have turned voluntary traceability mechanisms into mandatory conditions for formal participation in mineral supply chains. Then, we present the concept of logistical entrepreneurs and their potential to facilitate production flows, even in the face of information barriers. To illustrate these dynamics, we delve into the Peruvian case and examine the motivations behind the Peruvian government's decision to "buy in" to traceability and how local actors involved in gold extraction and trade organize around these new demands. We conclude that in the Peruvian case, top-down traceability requirements have led to a situation where miners are unable to profit from their production, and traders cannot formally buy it. In this scenario, logistical entrepreneurs play a vital role in overcoming these barriers. This leads to the question of what type of information traceability mandates help to capture and the extent to

which they improve the governance of ASGM.

2. Data collection

This paper is based on extensive qualitative data collection throughout our fieldwork on responsible sourcing in ASGM (Villanueva Ubillús) and formalization pathways in Peru (Vila Benites), conducted between 2019 and 2022. In exploring what happens when gold leaves the mine and how it is traced until it is exported, we found it helpful to "follow the thing" (Cook, 2004; Tsing, 2009). This allowed us to map the actors involved in gold production and trade and the devices they rely on, revealing the unexpected and ambiguous connections between people and settings on different geographical scales. To achieve this, we conducted multi-sited fieldwork well-suited for research topics that explore the trans-local nature of phenomena (Marcus, 1995).

Our fieldwork took place in six Peruvian regions: Arequipa, Ayacucho, Cusco, Lima, Madre de Dios, and Puno. Our analysis focuses on two main ASGM hubs, Arequipa and Madre de Dios (see Fig. 2), with distinctive mining practices (tunnel and alluvial, respectively). This selection allowed us to provide two different illustrations of how gold circuits assemble according to different mineral distribution and technologies appropriate for specific extraction practices. Information from other regions was included to demonstrate what happens at mid-points, when gold moves closer to export exit points.

Our data collection strategy included over 170 semi-structured interviews with ASGM workers and operation owners, workers in processing plants, gold traders, government authorities, public servants, and managers of certification schemes and responsible sourcing programs. In addition, we conducted non-participant observations in five mining sites on the borders of Arequipa and Ayacucho, and two areas in Madre de Dios. We complement this information with a documentary review of laws, policies, and international standards regarding traceability and ASGM governance over the last two decades.

In Peru, illegal ASM is a criminal activity (Legislative Decree N°1102), making gold trade a sensitive topic. This paper focuses on understanding how and why ASGM actors engage in illegal and informal practices and the consequences for traceability, rather than those who engage in such practices. Therefore, to protect our participants' identities, we have anonymized the names of companies, mining sites, and interviewees. We make direct reference only to the departments and geographical areas in which they operate.

3. Mid-stream actors in the gold GVC/GPN: unpacking circulation

The GVC/GPN framework was developed to make sense of the fragmentation and spatial dispersion of global production (McGrath, 2018). It understands production as a multi-scalar phenomenon composed of networks of non-linear processes dispersed but embedded in complex social, political, and geographical contexts (Henderson et al., 2002). Mining also follows this network logic. Far from being ready-for-export commodities, minerals are products of "resource-making" systems (Valdivia et al., 2021) in which their value is shaped by power dynamics between actors, institutions, and economies that participate in the production process. ASGM, in particular, challenges the classic notion of bounded, enclave-like extraction models, producing crystallizations between extraction nodes, labor, and technology among which ore circulates to transform into gold (Geenen and Verbrugge, 2020).

This section focuses on how traceability mandates for more transparent mineral value chains constitute a power device to determine who participates in global production. Nonetheless, we highlight that traceability can generate contradictions and marginalization dynamics, triggering processes to perform compliance. Against this backdrop, we examine the role of mid-stream actors to participate in information creation and circulation, and reworking the sector's rules from the

“bottom up”.

3.1. Information and performance in mineral governance

ASM is a controversial industry. Despite being a critical source of income and livelihood to communities in the developing world (Hilson and Maconachie, 2020; Huntington and Marple-Cantrell, 2022), concerns about the industry’s broad impacts where extraction occurs have pushed for transparency regarding the overall conditions of mineral production. This process includes disclosing information on the origins of minerals to ensure that they are “responsibly sourced” from operations unrelated to allegations of environmental harm, civil conflicts, and human and labor rights infringements (OECD, 2016; Young, 2018). Transparency demands are usually associated with citizens and consumers who, located far from the locations where products are out-sourced and assembled, perform a politics of “caring at a distance” (Bryant and Goodman, 2004). In the case of gold, the end market is not reduced to Western retailers but includes central banks and non-Western purchasers (Hilson, 2009). Consequently, national governments involved in gold purchases are also fueling the surge of end-to-end monitoring technologies (e.g., blockchain) and traceability policies to confirm gold origins (Mining.com, 2021).

Traceability is a new form of value chain governance that aims to lend credibility to production through information generation mechanisms of a product’s origin (Eden, 2010; Mol and Oosterveer, 2015). Generating this type of data, however, is neither a straightforward nor apolitical process. Traceability requires that information about a product is: a) available throughout the value chain (Gardner et al., 2019); and b) reliable (i.e., truthful) (Schleifer et al., 2019). This implies a minimum investment capacity and access to institutions capable of providing verifiable data (Gardner et al., 2019; Mol and Oosterveer, 2015). As expected, not all actors (particularly small upstream ones) operate under such conditions, increasing their risk of exclusion from formal production and trade dynamics as stakeholders are homogenized and reduced to data input (Toonen and Bush, 2020). Moreover, while improving access to information can generate better insights into production processes, it does not guarantee significant transformations nor identification of the drivers behind “unsustainable” practices (Mol, 2015; Toonen and Bush, 2020). Additionally, there is the issue of surveillance. Questioning the links between power and knowledge, Foucault (1980) recalls Bentham’s concept of “the gaze”— this is, the existence of structures and systems to monitor and control social groups. Traceability mechanisms can play the same role, micromanaging the physical and spatial movement of products and their producers, and creating clear distinctions between those who exercise surveillance and those who are surveilled (J. H. Smith, 2022; Toonen and Bush, 2020).

The implications of traceability and information in reproducing power imbalances are particularly relevant for mineral supply chains. For instance, Vogel, Musamba, and Radley’s 2018 work on the ITRI’s Tin Supply Chain Initiative reveals that implementing traceability requirements for ASM did not successfully mitigate human rights infringements in certified mines. Rather, it created new para-fiscal and fraudulent practices around them (C. Vogel et al., 2018). Smith (2022) confirms these findings, highlighting how the ITRI traceability system has become a new form of “colonialism” in which those who do not follow its tag-and-trace scheme are automatically considered illegal suppliers. Likewise, Calvão and Archer, 2021 study on cobalt traceability found that blockchain is geared to enable large-scale mining (LSM) companies and digital experts to enforce their own data extraction systems. Moreover, private blockchain systems work without third-party assessments (Calvão and Archer, 2021), which gives companies control over the data they report and its veracity. Therefore, blockchain traceability is used to satisfy downstream consumers’ transparency demands in preference of empowering smaller producers and local monitoring devices (ibid.).

The decoupling of the information produced and the practices in

place is a tendency identified by Fluck and McCarthy (2019) as “information fetishism”. These authors use this term to reflect on national governments’ reliance on information to claim transparency, turning information accumulation and disclosure – regardless of its content – into a means of facilitating reproduction of the power distribution of the contemporary world order (Fluck and McCarthy, 2019). High dependence on information and the alleged transparency it provides can create pernicious incentives that erode actual performance. In her analysis of the environmental auditing of the Chinese state, Ding (2020) concludes that opting for the theatrical can be as resourceful as objective outcomes when pressure to fulfill requirements is high, but capacity for compliance is low. State bureaucrats may be pressured to perform compliance and take accountability instead of being allowed unlimited time and resources to adapt to new processes. To the extent that traceability is increasingly becoming a pre-condition to participating in global value chains (Aiello et al., 2015; Chen and Slotnick, 2015), tracing mineral origins has become a matter of enforcement instead of voluntary implementation. The United States Dodd-Frank Act (2009) and its consequences for the Democratic Republic of Congo (DRC) set a precedent. Section 1502 targeted the DRC’s mineral imports due to the links between mineral production and armed groups (Ellebrecht, 2019). Consequently, the country became a field of policy experimentation, from mineral export bans to responsible sourcing programs (Geenen, 2012; J. H. Smith, 2022). The association of ASGM with illicit activities in Latin America has also invoked other forms of legal intervention (GIATOC, 2016; Kempers, 2020).

The emergence of government-enforced traceability transforms the space of mineral standards by combining information with another source of credibility: the law. The implication here is that the state should develop the means to provide evidence of gold circulation by employing law enforcement. While this could incentivize the development of capacities to ensure lawful mining practices, an approximation via performative governance raises the relevance of differentiating traceability information from effective compliance. In a sector such as ASGM, in which mid-stream actors play a critical role in facilitating gold movement, the enforcement of traceability becomes a challenge.

3.2. Logistical entrepreneurs in ASGM

Traceability guidelines for mining are predicated on an ideal scenario based on LSM companies, whereby extraction and mineral processing practices are kept in-house, allowing direct management and technological mediation of tracking production (Grappi and Neilson, 2019). However, in ASGM, this is rarely the case. The geological details of ASGM sites are rarely determined, with some researchers referring to them as residual deposits of LSM (Kemp and Owen, 2019). Accordingly, ASGM miners often operate below profit margins and must move operations rapidly when ore production is low (Peluso, 2018). Once extracted, the ore undergoes a beneficiation process to recover gold and prepare it for commercialization. Unfortunately, high-capacity beneficiation plants are rarely found within ASGM sites as they demand high input volumes, high technical know-how, and investment (Ferring et al., 2016; Seccatore et al., 2014; Seccatore and de Theije, 2017; N. M. Smith, 2019). In need of speedy solutions to secure their permanence and competitiveness in the value chain, miners will seek help to navigate the production process. It is in such a scenario that the relevance of logistical entrepreneurs is revealed.

Logistical entrepreneurs are mid-stream actors who operate between highly regulated links of the supply chain and the places where lead firms lack control over mineral production (Schouten et al., 2019; c. f. Tsing, 2009). They are the bikers, drivers, small-scale gold buyers, brokers, and local trading houses central to maintaining ASGM crystallizations (Geenen and Verbrugge, 2020). Certification schemes often portray these actors as “exploitative middlemen” who hamper miners’ access to end-clients (Hilson et al., 2018). Instead, they champion investing in technological improvements and the implementation of a

chain-of-custody (CoC) to document how gold moves along the supply chain (Martinez et al., 2022; Responsible Jewellery Council, 2019). Despite their transformative narrative, several authors have criticized these schemes' preference for working with more established and licensed producers capable to comply with transparency and production concerns (Fisher, 2018; Hilson et al., 2016, 2018).

As our study will show, intermediaries are important for less established producers in investment desert areas. Taking advantage of their cultural identities and knowledge of particular geographies and local institutions (Tsing, 2009), these actors circumvent infrastructure and administrative barriers to cater to the space-specific organization of ASGM in three ways.

First, they offer a commercial gateway for ASGM production. Due to their limited production capacity and atomization, it is difficult for miners to attract large buyers. Authors such as Pieth (2019) have highlighted how the sector's so-called scatter production significantly contributes to the global gold market. However, these calculations lose sight of the quotidian labor of logistical entrepreneurs who buy, process, transport, and trade small quantities of gold until they amass enough to insert production into a market that formerly forbade it. Second, logistical entrepreneurs can absorb the risk of moving gold from the mine to other links in the value chain. ASGM miners are frequently victims of threats and violence from state forces seeking to eradicate the illegal expansion of this activity and from criminal organizations aiming to capture and control production (Betancur-Corredor et al., 2018; Vila Benites and Villanueva Ubillús, 2022). Drawing on their social capital and knowledge of the shifting nature of mining sites and routes, logistical entrepreneurs offer off-road solutions in contexts of uncertainty, violence, and punitive regulation (Aoyama et al., 2006; Shell, 2019). Finally, these actors can introduce miners to technological solutions and financial flows to carry out production. For instance, given the reputational concerns linked to the ASM sector, yellow-line machinery companies often refuse to provide the sector with these technologies. As a result, miners are forced to source local technicians to help them configure these devices according to their needs and financial capacity (Delgado et al., 2020; Lanzano and Arnaldi di Balme, 2021). In the absence of producers' technological, financial, and legal capacities, logistical entrepreneurs can bring actors together by offering access to loans, supplies, technicians, and beneficiation services, ensuring that gold – in its different forms (ore, amalgam, speckles, activates charcoal, and bars) – has access to value-enabling processes and markets.

These examples showcase the critical role played by logistical entrepreneurs in facilitating successful gold production and movement wherever there is a significant barrier to be overcome. In the following sections, we demonstrate how critical they are in contexts of high demand for information accumulation, opening new markets for documentation, and transport services to accommodate the informational needs of various actors along the value chain.

4. Peru's ASGM sector

Peru is divided into 25 political regions and 4 ecological areas: the Pacific Ocean, the coast (where Lima, the capital, is located), the Andean highlands, and the Amazonian rainforest. The country's mining industry has been relevant throughout the 20th century, leading numerous boom-and-bust economic cycles (J. C. Orihuela and Gamarra Echenique, 2019). Nonetheless, in the early 1990s, mining became the main economic activity due to a neoliberal reform to expand private investment for the development of large-scale open-pit projects (Bury, 2005). Today, mining represents nearly 60% of national exports, with gold as the second-largest export (15,4%), behind copper (Ministerio de Energía y Minas, 2023).

ASM is a highly heterogeneous sector, and mining has traditionally been perceived as a low-tech, labor-intensive endeavor (Hilson and Maconachie, 2020). However, over the past four decades, the introduction of engines, heavy machinery, and more effective mineral

processing techniques prompted the development of more extensive and industrialized operations (Cortés-McPherson, 2019). According to the Law for the Formalization and Promotion of Small-Scale Mining and Artisanal Mining (Law N°27651), artisanal and small-scale metal miners' daily production must not exceed 25 metric tons (MT) and 350 MT, respectively. This production threshold allows the inclusion of a wide variety of miners, from seasonal to "small entrepreneurs" (Verbrugge, 2014). In the case of gold, Peru's geography accommodates subterranean and placer gold deposits. This condition enables the development of both alluvial and tunnel ASGM operations. As section 5 will show, the nature of gold deposits is crucial for gold traceability as it can determine the introduction of further production and commercial processes.

4.1. The expansion of ASGM

ASGM has a long history in Peru. While gold extraction and panning have been practiced since pre-colonial times (Mosquera et al., 2009), policy interest in the sector is only recent. To increase employment in and migration to less developed areas, in the late 1970s, the state declared national interest in the development of ASGM, granting tax benefits, loans, and tools through the state's Mining Bank (Pachas, 2012; Pinedo, 2016). During the following decade, as the country entered a period of economic recession and the unraveling of an internal armed conflict, ASGM continued to attract newcomers who turned to this activity as a livelihood strategy (UNEP, 2012). By 1992, the sector's impact on the mining industry was significant, contributing to 64% of Peru's gold production (Ministerio de Energía y Minas, 2002). ASGM's prevalence would stagnate when President Alberto Fujimori introduced a series of legal instruments, such as the General Mining Law (Legislative Decree N°109) and the Law for the Promotion of Investments in the Mining Sector (L. D. N°708), with a view to transforming Peru into a competitive mining destination. Consequently, since 1994, large- and medium-scale mining (LMSM) gold production has dramatically increased (see Fig. 1).¹

The state's "bias" towards LMSM (Hilson, 2019) did not inhibit the growth of ASM – rising international minerals prices prompted its uncontrolled expansion (Swenson et al., 2011). The activity is present in the entire country, with gold production concentrated in Madre de Dios, Puno, Arequipa, and Piura (Fig. 2). This figure, however, does not reflect the sector's real contribution to gold production, as ASM is notoriously informal and "off the radar" (i.e., operating without complete legal permits), with entities such as the United Nations (UN) estimating more than 250,000 miners operating in Peru (PlanetGOLD, 2020).

ASM's expansion has become a topic of policy and academic debate owing to its social, political, and environmental costs (Baraybar Hidalgo and Dargent, 2020; Damonte, 2016; Valencia Arroyo, 2014). The Amazonian region of Madre de Dios, is a notorious case study for the links between ASGM and deforestation, human trafficking, and mercury contamination, among other contentious issues (Álvarez et al., 2011; Novak and Namihás, 2009). Moreover, the steady rise of this commodity kindled the involvement of criminal networks in illegal ASGM (GIATOC, 2017).

The rapid growth of ASM has exceeded the state's capacity to formalize miners. As in other mining destinations, formalization in Peru has been reduced to the legal recognition of artisanal and small-scale miners' tenure situations and the provision of licenses for their extraction practices (Atienza et al., 2023; Hilson and Maconachie, 2017). Since 2002, formalization policies have undergone constant revision, with a shift from the recognition of the need for miners to legally access mining

¹ The graph was elaborated based on production summaries for LMSM and ASM published in the Ministry of Energy and Mines' Mining Yearbooks. We include these figures only as an indicative of the weight that ASGM production has had throughout the years in comparison to LMSM.

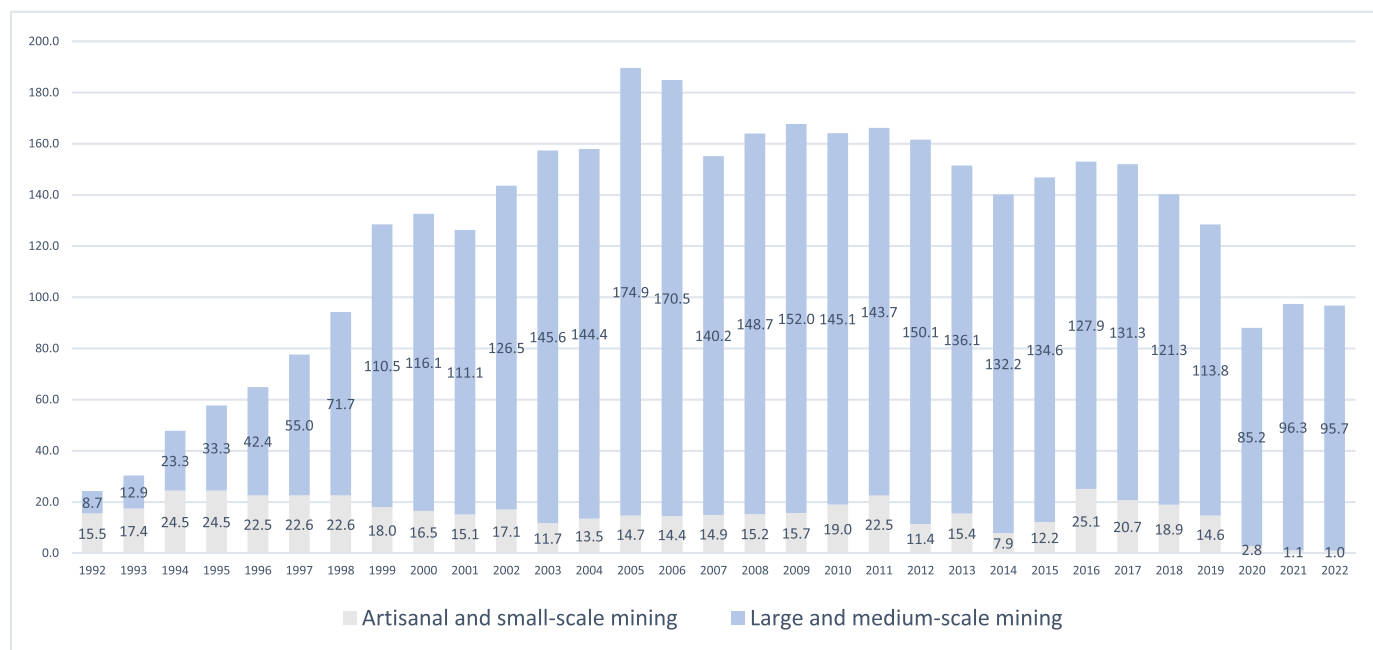


Fig. 1. Peru's gold production, 1992–2022 (t).

Source: Ministry of Energy and Mines. Mining Yearbooks (2007–2022). Elaboration: authors.

concessions to criminalization of gold mining in sensitive areas in Madre de Dios, and the simplification of formalization permits to expedite the process (Vila Benites and Villanueva Ubillús, 2022). Nonetheless, an important accomplishment for the sector is their legal distinction to access mining rights under a promotional regime. Miners can apply to the “small-scale” or “artisanal” categories to obtain affordable mining concessions compared to LMSM. Since 2012, Peruvian legislation distinguishes between formal producers and those who are informal and illegal.² To facilitate their shift from an illegal to an informal status, in 2016, the Ministry of Energy and Mines (MINEM) launched the Integral Registry of Mining Formalization (REINFO), an online registry for miners seeking formalization (L.D. N°1293).

These changes did not prompt rapid formalization. Official records confirm that at the beginning of 2023, more than 87700 miners were registered with REINFO, with 12.7% reaching formal status (Ministerio de Energía y Minas, 2023). Moreover, the designation of (in)formal status failed to delimit the opportunities and responsibilities for miners opting for formalization (Martinez et al., 2021). Conversely, it created gray areas on the “range of action” miners have in fulfilling their operation requirements, including commercialization activities.

4.2. Gold trade and the pressure for “responsible sourcing”

Traditionally, Peru's gold market has been dominated by three countries: Switzerland, Canada, and the United States (US) (see Fig. 3). As we will detail next, these markets have pressed on different reforms in ASGM so as to guarantee responsible sourcing. Today, however, these destinations have faced strong competition from “emerging gold markets”, particularly, India, which currently stands among the leading gold buyers (World Gold Council, 2018). These pull factors, ranging from responsible sourcing to “sheer sourcing” will outline the complex scenario in which producers, traders, and logistical entrepreneurs operate.

² According to L.D. N°1105, informal mining refers to miners who have started the formalization process or who operate with inadequate technologies for ASM, without complying with all social, technical, and environmental conditions. On the contrary, illegal mining refers to miners operating in prohibited areas or who have not started the formalization process.

In 2008, as part of the Peru – US Trade Promotion Agreement (TPA), which pushed for stricter environmental institutions, the Ministry of the Environment (MINAM) was created (Peinhardt et al., 2019). The agreement included a Forest Annex -which aimed to protect the US timber industry- that conditioned Peru's access to the US market to the development of stronger state capacity to control illegal logging and curtail timber trade (ibid). This encompassed the criminalization of logging and mining, major deforestation drivers, under environmental crimes (Vila Benites, 2023). Where previous attempts to modernize the sector failed, including the issuing of documentation to prove timber origins (Bedoya Garland et al., 2007; J. Smith et al., 2006), the new reforms set a higher entry bar. These new conditions introduced additional costs that several smaller producers were unable to meet, pushing them to operate through informal networks dedicated to document forging (Moore, 2018; Sears and Pinedo-Vasquez, 2011). Under the same TPA premise, gold commercialization and mining supplies were reregulated, while ASGM miners were offered a new but ill implemented formalization process (Vila Benites and Villanueva Ubillús, 2022).

The OECD's “Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas” (2016), which applies to companies from all OECD member countries, also stressed the importance of controlling gold trade and supplies introducing traceability as the main solution. In 2012, the Peruvian government expressed its formal interest in becoming an OECD member (Gestión, 2012). In the coming years, Peru will be one of the first to engage with the OECD's Country Program, geared towards strengthening public policies and adhering to due diligence guidelines in crucial industries, including mineral supply chains (OECD, 2020).

Pressured by these international commitments to control deforestation linked to ASGM in the Amazon, in 2012, the Peruvian government adopted stricter regulations for the formalization of ASM and, after 20 years, decided to legislate on gold trade again. Through nine decrees, the new legislative package differentiated informal from illegal mining (L.D. N° 1105). It also criminalized mining by inscribing illegal mining in the criminal code (L.D. N° 1102), including the commercialization of illegally extracted gold.

Until 1991, the Mining Bank (a public financial entity) centralized the gold trade. After its dissolution, the government allowed the free

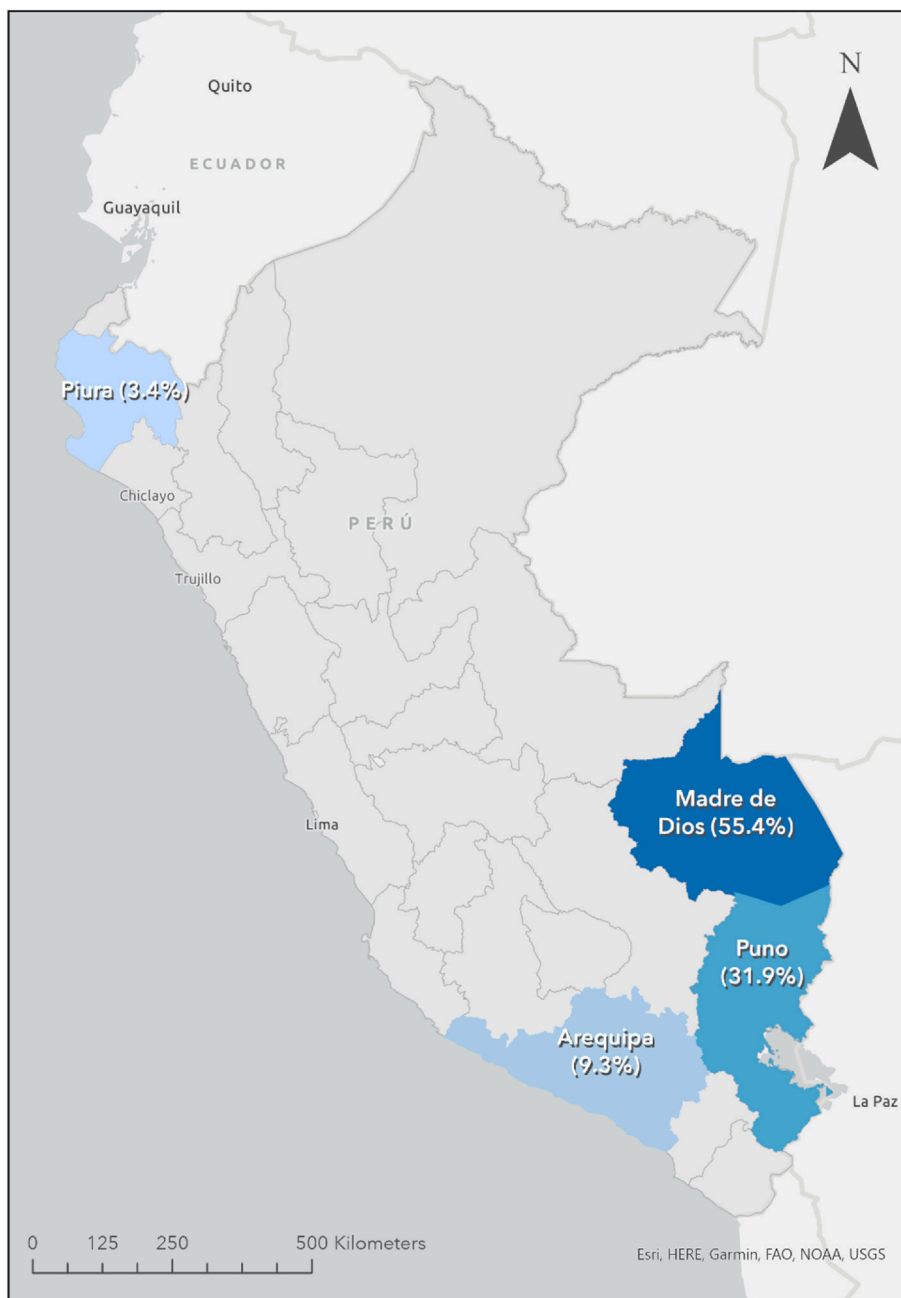


Fig. 2. ASGM top producers, 2016–2021 (%).
 Source: Ministry of Energy and Mines. Mining Yearbooks (2016–2021). Elaboration: Arman Bajracharya.

commercialization of gold (Supreme Decree N°005-91-EM-VMM) and granted tax benefits for this activity. Although gold buyers were obliged to verify the product’s origin (S.D. N°014-92-EM), the law did not establish what this process entailed. The 2012 legislative package directly addressed this gap, conferring the National Superintendence of Customs and Tax Administration (SUNAT) the power to apply special controls to the gold trade and specifying the type of receipts and data for origin verification (L.D. N°1107). Failing to provide this information would become an asset laundering offense (L.D. N°1106). SUNAT joined forces with the Public Ministry and Peru’s Financial Intelligence Unit (UIF) to increase customs control in key airports as notorious cases of illegal gold reaching the US increased (Cortes-McPherson, 2020). To complement these measures, the government bestowed Activos Mineros SAC –a state-owned company specializing in environmental remediation– the responsibility to grant permits to selected trade houses

to buy gold from formalized ASGM miners (D.S. N°012-2012-EM). A Special Registry of Gold Traders and Processors (RECPO) was also created.

Despite the various steps towards tracking the origins of gold production and constraining illegal trade, and bureaucrats colloquially talking about these changes under the terms of traceability, the Peruvian legal framework would not directly mention it until 2017 (L.D. N°1336). It also failed to provide a clear definition for this concept. Still, producers and traders had to adjust their practices to navigate the new decrees. The following section delves into these practices.

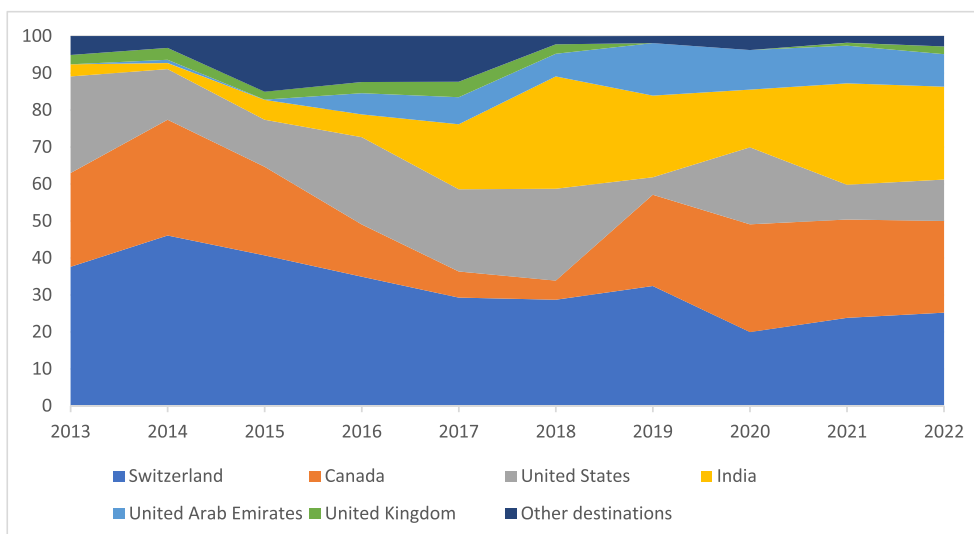


Fig. 3. Main gold export destinations, 2013–2022 (%).

Source: Ministry of Energy and Mines. Mining Yearbooks (2013–2022). Elaboration: authors.

5. Dissecting ASM-gold circulation in Peru

5.1. Arequipa

Benefiting from the presence of the coastal desert and part of the Andean mountain range, the Southern region of Arequipa holds Peru's second- and fourth-largest reserves of copper and gold, respectively (Ministerio de Energía y Minas, 2021). The region borders Nazca, the country's central hub for mineral laboratory analysis, and is close to key mineral exit points such as Lima, Tacna (border with Chile), and Puno (border with Bolivia). These conditions have helped mining to become Arequipa's leading economic activity (INEI, 2021).

In the public imaginary, Arequipa is closely linked with LMSM. The region is Peru's third largest destination for LMSM investment (Ministerio de Energía y Minas, 2023). Nonetheless, ASM also plays a prominent role. Since the REINFO's creation, Arequipa has led the number of registered miners (over 16800), although almost 13% have completed it (ibid.).

The coexistence of ASM and LMSM in Arequipa is tense and ambivalent (Cano and Kunz, 2022; Malone et al., 2023). Some LMSM companies reach exploitation agreements for ASM miners to work in their concessions in exchange for access to their production, fixed fees, or a percentage of their profit. Unfortunately, these are difficult to sustain due to ASM miners' perceptions of "abusive" conditions, unmatched expectations, and lack of consensus among them (Interview with plant workers at formal mine, August 15, 2021; Interview with biller, May 15, 2022; Interview with formal miner, May 13, 2022). In June 2022, a dispute for concessions in which 14 miners were violently killed was a somber reminder of the everyday conflicts between both sectors (R. Orihuela, 2022) and of the active presence of ASM.

5.1.1. Production chokepoints

Underground (i.e., tunnel) mining is the preferred type of mineral extraction in Arequipa's ASM sector. According to miners who have worked since the 1980s, that decade saw a migratory wave to abandoned LMSM concessions of Canadian and US companies. In the best case scenarios, miners organized into associations, as tunnel mining can require hundreds of workers. Those unwilling or unable to join chose to work for others in exchange for a fee or a small percentage of the daily production or join friends and family members to carry out their own artisanal operations. The diversity in labor organization has important implications for miners' access to key technology for processing

minerals.

Tunnel mining heavily depends on chemical beneficiation to recover gold, as gravel and ore need to be crushed and processed to obtain the mineral. The higher the capacity of miners to access processing technology, the better the chances for a high percentage of gold recovery. Hence, beneficiation is one of the most valuable processes in the gold value chain. In the case of artisanal miners working with relatives or for third-party operations, the preferred way to process minerals is through ball mills and *quimbaletes*. *Quimbaletes* are used to mix ore, water, and mercury mechanically. This mixture creates an amalgam containing gold and mercury, which is later burnt to evaporate the mercury and reveal the mineral. The use of *quimbaletes* entails two challenges for gold traceability and production. First, it benefits the spreading of micro exchanges (also known as "ant-trade"³), as miners can rapidly process small quantities to sell to retailers. Second, while affordable, this technology is perceived as inefficient when dealing with large amounts of mineral or high ore grades (Veiga and Fadina, 2020). Consequently, miners with more extensive operations and investment capacity will opt for cyanide beneficiation plants or engine-powered mercury mills.

Having direct access to their own plants and laboratories is ideal for small producers as they can oversee the mineral analysis and beneficiation process. It is also suitable for traceability as it allows a closed-pipe production model to guarantee the gold's origin. Thus, investing in a cyanide plant is prioritized by ASM cooperatives participating in fair trade and certification schemes as it helps them minimize the number of intermediaries between the mine and the market. Those unable to invest rely on third-party plants.

A plant's business model focuses on collecting, processing, and melting gold to sell to international buyers as *doré* bars or activated charcoal to national refineries. The city of Chala, in Arequipa, is where most formal and medium-scale plants concentrate. Favored for its easy access to the Pan-American Highway, Chala is known as the "neurological center of ASM" of the coast (Interview with a representative of an international cooperation agency, February 17, 2021). The profitability of this business has attracted national and foreign investors, with informants noticing the proliferation of illegal plants as well as the presence of Canadian capitalists in neighboring areas. Although plants have

³ Investigative reports in Peru use the term "ant-trade" to refer to the movement and trade of gold in small quantities (Pinedo, 2016; Romo, 2019). This strategy helps smuggling gold and other supplies without drawing the attention of authorities.

the potential to serve as choke points to trace and track gold origins, selling ASM ore to plants is a challenging endeavor. According to diverse sources (Interview with a biller, May 15, 2022; Interview with an illegal trader, October 27, 2021; Interview with an informal miner, October 27, 2021), informal miners were unable to sell their gold legally. When verifying gold's origins, SUNAT demanded documentation beyond the REINFO code, including transportation and environmental permits, concession titles, exploitation agreements (in the case of miners working in a third-party's concession), and even penal records. As described before, the formalization framework recognizes those miners who are operating but have started the formalization process. Nonetheless, they are only fully licensed to do so after achieving a start/restart authorization. This ambiguous situation has led to different degrees of response by law-enforcing entities, ranging from full demand of documentation to forbearance until achieving formalization.

Being prosecuted by SUNAT is a significant problem. A miner shared (Interview, October 27, 2021), "I was fined and all my accounts were blocked. I cannot do anything on my name, not even formalize". The new traceability requirements are perceived as a turning point in the trade business. According to a former gold collector (Interview, June 16, 2022), "In 2015–2017, the (gold trade) business became dangerous (...). People do not take chances. They do not come down to buy gold. Everyone in Chala is under investigation for asset laundering". The new restrictions have had three implications for ASM. First, they have dissuaded miners from completing the formalization process as they prefer to remain "invisible" from the state's surveillance. Second, they blocked informal producers from selling gold even though they were allowed to practice mineral extraction. Lastly, they impeded plants and mid-level traders from legally buying informal ASM production. The incongruity of the Peruvian legal framework between ASM production and trade has created the ideal scenario for the emergence of logistical entrepreneurs.

5.1.2. Logistical entrepreneurs to bypass legal barriers

When selling their production, ASGM miners must perform a balancing act between securing the best price and avoiding prosecution by SUNAT. Regardless of their legal status, miners without the financial capacity for efficient beneficiation or direct links with international clients will resort to logistical entrepreneurs. We present them in three groups, detailing their interconnections and services (see Fig. 4).

The first of these are gold collectors and local trade houses. Under the guise of currency exchange houses, retail traders buy gold as amalgam and pay immediately in cash. They haul illegal gold to key Peruvian cities, risking potential heists and decommissions along the highway. Depending on the route, some collectors charge a security fee for the transport service (around 6% of the purchase). The most popular destinations are Juliaca (a city closer to the international border with Bolivia) and Lima (where the major ports and international airport are) (see Fig. 6). Once there, these traders can opt for "off-the-books" transactions to supply the local market or resell the collected gold using false documentation for future exports. In the latter case, collectors are careful not to draw the attention of SUNAT, choosing to send small amounts of gold (up to 5 kg) per international purchase. This strategy is occasionally followed up by authorities seeking to shut down the operations of notable gold smugglers (Cortes-McPherson, 2020). To evade SUNAT's detection, gold exporters close down their businesses and reopen them later by filling another fiscal identity in RECPO.

The second group of logistical entrepreneurs is the *facturadores* (billers), who provide false documentation to forge the origins of illegal and informal gold. Similar to ASM miners, *facturadores* have undergone the formalization process, petitioning concessions to extract minerals without carrying out any mining operation. Instead, *facturadores* expedite their formalization process (through investing in private consultants, bribes, etc.) and sell the information of their formal concessions to informal and illegal miners, traders, and plants in order to claim that

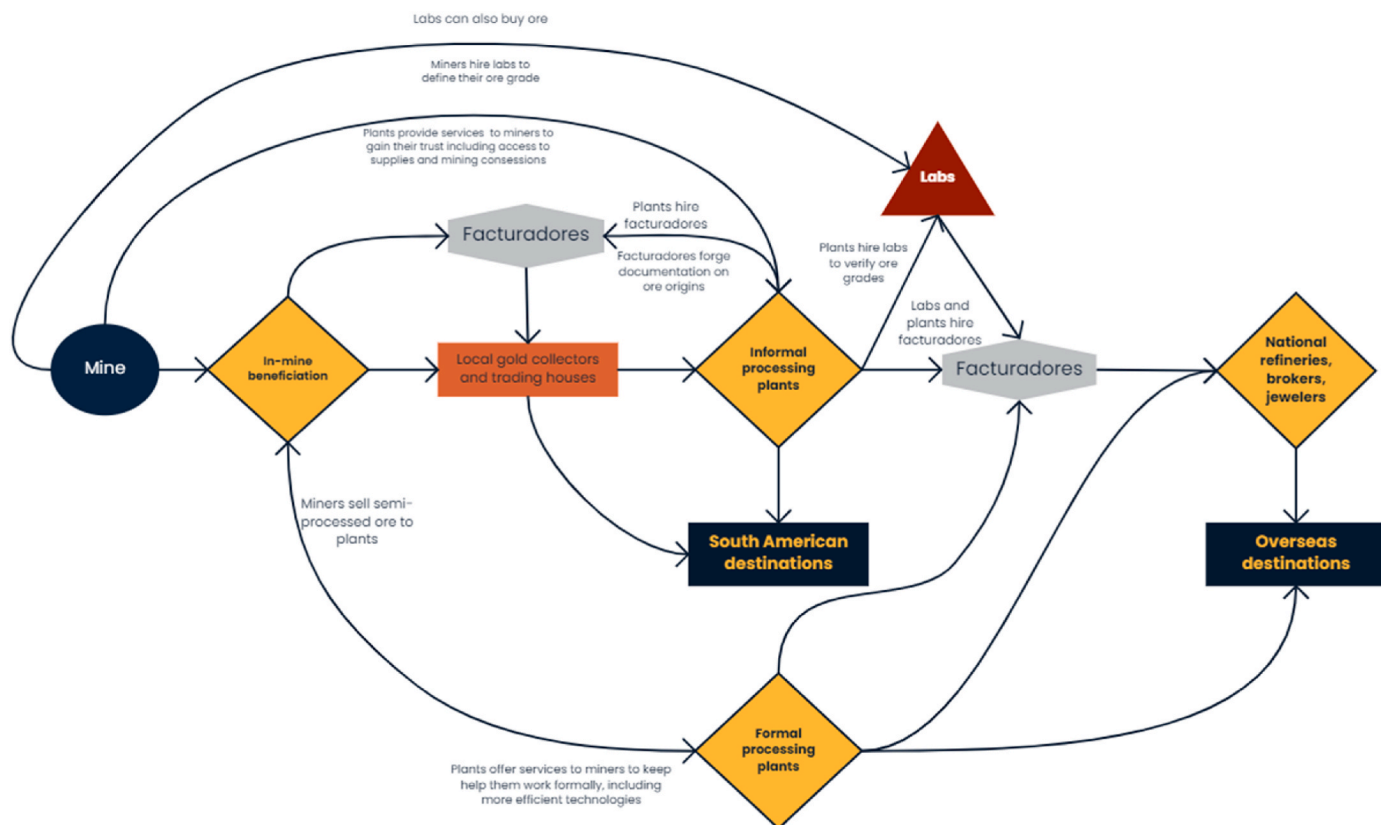


Fig. 4. Logistical entrepreneurs in Arequipa's trading circuit
Elaboration: authors.

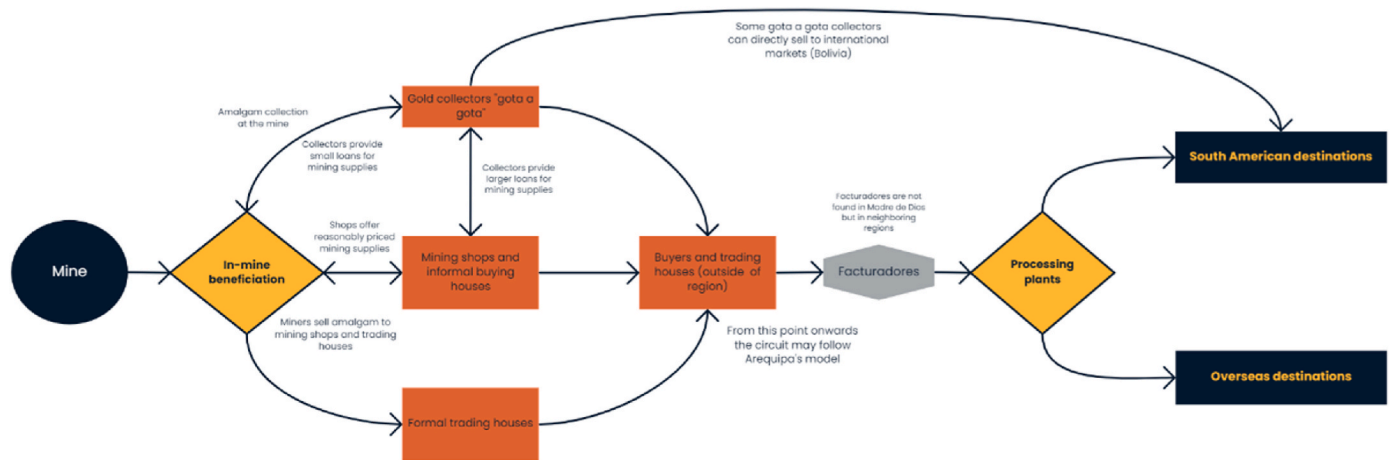


Fig. 5. Logistical entrepreneurs in Madre de Dios' trading circuit
Elaboration: authors.

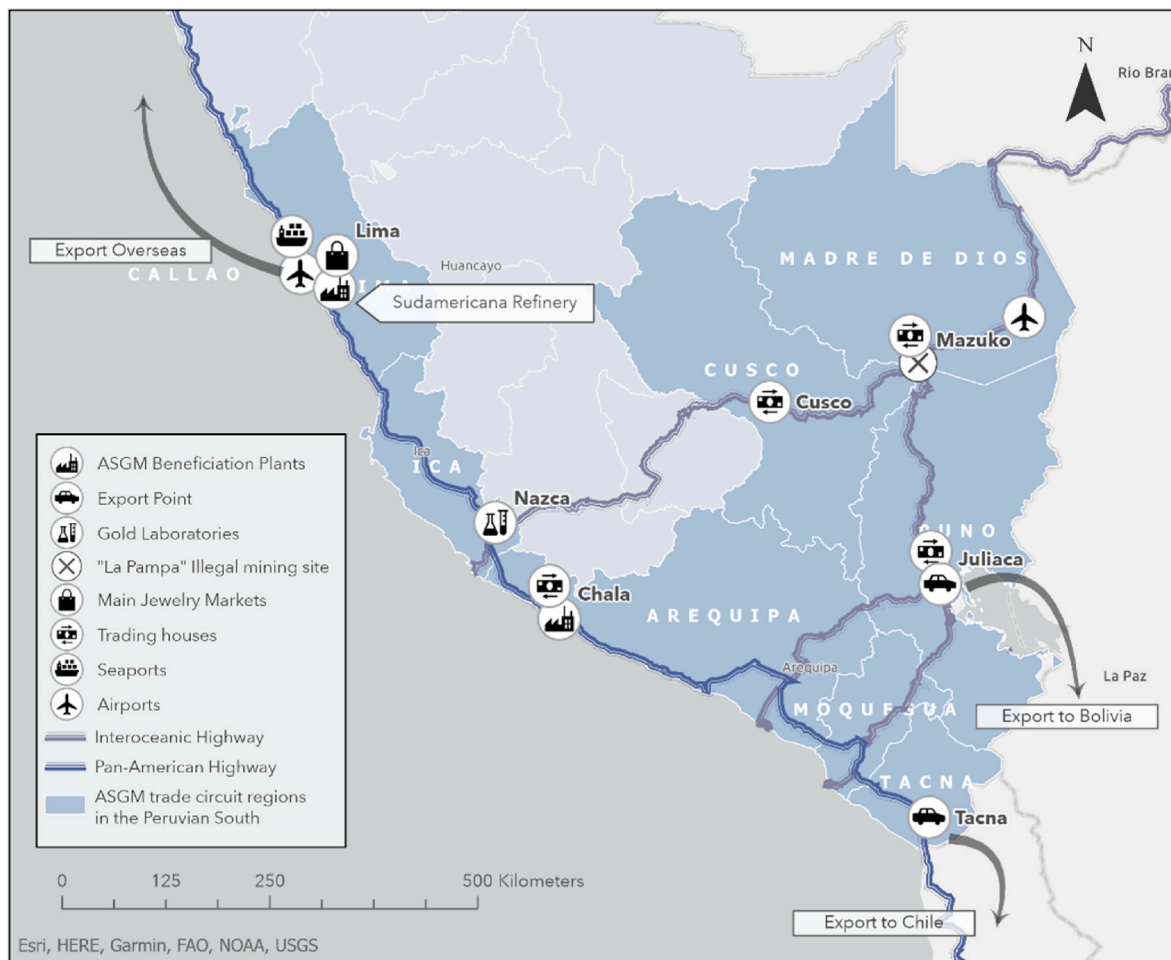


Fig. 6. Asgm circuits in the peruvian South
Elaboration: Arman Bajracharya.

their gold derives from a formal concession. In exchange, they ask for 1%–2% of the final sale. Known as “miners without mines”, *facturadores* have informal agreements with nearby miners to mislead supervising entities in exchange for discounts for origin documentation (Interview with a biller, May 15, 2022) (c.f., *Bedoya Garland et al., 2007; Sears and Pinedo-Vasquez, 2011*). However, they may also engage in abusive

relationships, editing receipts to overcharge them (*ibid.*).

Finally, cyanide processing plants are also crucial intermediaries. Although plants may have their own concessions, they frequently engage with ASGM because a) their ore has a low concentration of gold, b) they have a high processing capacity, or c) to maintain good relations with local miners. Even when many of them are located in the small

town of Chala (see Fig. 6), plants deploy a web of gold collectors to secure their suppliers nationwide. Some formal plants that are under MINEM's strict supervision avoid using *facturadores*. They even take additional steps to ensure the formal origins of their supply: hiring consultant teams to georeference mines, offering direct transport from suppliers to plants, providing access to machinery, and technical and legal assistance for formalization, among others. Assuming these responsibilities often means only purchasing gold from formal miners with high-grade production, offering strict negotiation margins.

Informal and illegal miners who seek better deals will turn to informal plants or, in some cases, laboratories. Known for their "unfair competition" strategies (Interview with a plant representative, May 13, 2022), informal plants hire *facturadores* to provide false documentation and build trust bonds by offering multiple services such as access to supplies (e.g., explosives and water), concessions, loans, transport, and even entertainment (e.g., concerts and alcohol) (c.f., Putzel et al., 2008, on trader's investments in timber operations). After all, these plants are aware of the state's lack of auditing processes to confirm the legality of the information they provide. As one gold trader in Juliaca (Interview, June 03, 2022) put it: "All documents are forged. They guarantee nothing".

In Arequipa, gold traceability is an exception, as the web of local traders creates a complex system of gold laundering. Buyers end up fully engaging with these dynamics while trying to avoid prosecution. "There are Indian, Turkish, Swiss, Italian, American companies, all trying to buy gold. Some will take higher risks and pay in advance (...) You do not know who SUNAT will shut down" (Interview with gold broker, February 03, 2021). In a context of high demand, logistical entrepreneurs profit from the risks imposed by traceability demands.

5.2. Madre de dios

With 93% of its surface covered by Amazonian forest (Reano, 2021), the southern region of Madre de Dios is Peru's biodiversity capital (Law N°26311) and its main ASGM center. Since the late 1970s, the state promoted gold mining as part of its development strategy for the Peruvian Amazon (Pachas, 2012; Valencia Arroyo, 2014). Over the past decade, this strategy has significantly shifted. Skyrocketing gold prices attracted the migration of miners – mainly from neighboring Andean regions (INEI, 2017)– and stimulated deforestation to unprecedented rates (IIAP/MINAM, 2011). It has also attracted illegal actors, including criminal networks that use gold mining to launder money from drug trafficking (GIATOC, 2016; Rettberg and Ortiz-Riomalo, 2016). Miners deal with daily experiences of violence as crimes against property, including extortion, have increased 30 times between 2009 and 2016 (INEI, 2017). To curb these effects, in 2010 the state introduced an urgency decree that defined an area of mining (known as the "Mining Corridor") and another of mining exclusion, only applicable to Madre de Dios (Urgency Decree N°012-2010). Since then, the region has been the focus of state interventions ("interdictions") with the deployment of extensive military campaigns.

In Madre de Dios, alluvial mining is the preferred method of gold extraction. This type of mining uses suction and dredging devices to recover gold speckles in bodies of water that have been naturally dragged from the Andes over the course of centuries. According to a recent study extraction may yield between 30 and 50 g of gold per day (Loaiza et al., 2021), with highest concentrations often found in new mining sites. These findings confirm a common truth between miners and gold buyers: ore concentrations, even in the oldest mining sites of Madre de Dios, are higher than most found in underground mining. This condition allows miners to forego beneficiation plants as they can recover gold directly through mercury amalgamation. Despite this advantage, miners still depend on intermediaries to circumvent the dangers brought about by state regulation and criminal activity when moving gold to trading centers.

5.2.1. Legal bottlenecks for gold trade and circulation

As in Arequipa, during our fieldwork interviews, informal miners in Madre de Dios confirmed that they could not legally sell their production. SUNAT demanded documentation demonstrating their status, such as their REINFO code as well as proof of their mining rights. But unlike Arequipa, Madre de Dios miners are also demanded environmental permits, called IGAFOM. While over 350 miners have successfully completed the formalization process (Ministerio de Energía y Minas, 2023), many find it difficult to finish it. First, because they fail to meet IGAFOM requirements due to high costs of environmental assessments and fear of losing their small-scale category when applying for IGAFOM (interview with a miner in the process of formalization, October 24, 2019; interview with local mining authority, November 1, 2019).

Second, because they cannot reach any type of agreement with the mining rights holders. Currently, 52% of mining rights within the "Mining Corridor" fall under the category of "extinguished" (INGEMMET, 2021). These were mining titles that a concession holder lost due to failure to fulfill their obligations. According to our interviewees, the decree package of 2012, which banned the use of ad-hoc machinery and mining in rivers, left a significant group incapable of meeting production goals set by the government to cover the mining rights fees, forcing them to lose their titles.

Miners in the process of formalization, including some of those who lost their titles following the decree package, could recommence the process by indicating that their operations take place in an extinguished concession. This option has created space for stagnation as these miners are obliged to reach an exploitation agreement with the mining title holder. Since these concessions do not have official title holders, they will never formalize.

The responsibility of disentangling this messy situation falls on the Geological, Mining and Metallurgical Institute (INGEMMET), but, until now, it has not provided any alternative. If these miners want to continue exploiting minerals, they must invest in fulfilling other requirements of the formalization process. This places them in a contradictory situation as they have to sell gold to maintain the small-scale mining category and invest in the upgrading of their practices but are unable to do so because they are not formal. However, a REINFO code allows them to continue extracting gold. In a 2023 update, a representative of the miners' federation noted that the disparity between extraction and commercialization permits for informal miners has been raised with the Peruvian Congress. However, if approached, it is not clear how SUNAT will react if traceability mandates remain in place.

The paradox that informal miners face directly affects formal gold traders. Initially, Activos Mineros SAC granted permission to three companies to buy gold from formal miners in the region (Castilla, 2018). With only 3,8% of miners having finished the formalization process (Ministerio de Energía y Minas, 2023), it is nearly impossible for these companies to remain profitable while buying gold exclusively from this group (Interview with worker of formal trade house, July 13, 2021; Interview with former gold trader, October 12, 2021). Likewise, for formal miners, selling their gold to these companies is not a straightforward endeavor. These houses are located in the region's main cities (Mazuko, Puerto Maldonado, and Huepetuhe) (see Fig. 6), far from mining sites. They often lack sufficient funds to purchase miners' production and hardly offer competitive prices compared to illegal buyers.

The routes in which gold can formally move in the region were also severely affected in the last years. Until 2014, 80% of Peruvian gold was shipped through the Jorge Chavez International Airport in Lima (El Comercio, 2014). For gold buyers in Madre de Dios, shipping gold through air routes was the obvious option to move production closer to trading hubs due to the remoteness of mining sites and cities. As the price of gold increased, the airport in Puerto Maldonado (Madre de Dios' capital) became a common target for thieves and the preferred exit point of criminal networks that exported illegal gold. The High Commissioner for Mining Formalization and Interdiction announced the introduction of special teams in airports to detect the transport of gold (ibid.), instead

of identifying the criminal networks heisting airports in the first place. Airport controls included in-situ detection, with random inspection and X-ray machines, as well as prosecution of major gold brokers (Cortes-McPherson, 2020), which conveyed the message that gold air transport from Puerto Maldonado to Lima was forbidden, even when no law prohibits moving gold through the local airport.

Besides airways, the state also increased control along Madre de Dios' main connection with Brazil and the Peruvian South: The Inter-Oceanic Highway. Through Legislative Decree 1103, the state established taxing routes to supervise the circulation of gold, chemicals and key mining supplies. These routes included eleven check points where the Police and SUNAT can verify the legality of cargos. As the next section shows, the various measures to surveil gold movement and supplies created an opportune environment for the proliferation of logistical entrepreneurs to aid miners and traders looking for safe ways to reach different markets.

5.2.2. Logistical entrepreneurs and the diversification of gold routes

In Madre de Dios, logistical entrepreneurs are present in both the informal and formal gold trade (see Fig. 5). In the case of formal companies, the legislative package not only limited the universe of miners they could purchase gold from, but it also increased the risk and investment of trading gold. With the blockage of air routes, companies rely on logistical entrepreneurs to transport gold through roadways to mid-cities where mineral is processed. These intermediaries can be local adult women or men with in-depth local knowledge of on-road and off-road transport routes in the Amazon. Their social connections to local groups, such as family and clans help them counter the risk costs of gold transport (e.g., heists) with their social capital. They carefully hide small quantities of gold, adapting their clothes (from shoes to underwear) to avoid raising any suspicion. They move in buses, motorcycles, and private vehicles, evading state control and heists along the way.

Moving gold from mine to market is a risky business. For traders, the risks of being victims of heists parallels the risks posited by drug trafficking. In the word of a worker of a formal trade house: "They [the criminals] will take you to the mountains and dismantle your car (...). Even trading houses employees cannot take a break carrying their backpacks [because criminals will suspect they carry gold] and they can be attacked" (Interview, July 13, 2021). Formal buyers send the gold to cities such as Cusco, Juliaca, and Lima where it is blended, melted and turned into *doré* bars ready to export to Switzerland, the US, and India (ibid.).

The direct participation of formal companies in gold laundering has been observed by miners who complain about the blatant collusion between the state, refineries and gold shops in Lima, and international buyers. As stated by a formal miner (June 22, 2021), "The gold is not going to Bolivia or Brazil, it goes to Lima. Activos Mineros never has money to buy our gold and we have to sell it illegally. Who keeps that money? People related to the government – and they never get caught. But if the miner sells it [illegally], the police come and take away your *orito* [small gold]". This quote raises miners' perception of unequal treatment when comparing themselves against traders who amass large amounts of gold but remain under the radar.

Although formal gold houses do buy gold from informal and illegal miners, these producers find other trading options in logistical entrepreneurs. Due to distances, heist risks, and transport costs, miners can opt to sell their gold to supply stores and informal trade houses nearby mining camps. A second option is to sell their gold to collectors. Before interdiction operations, machinery firms and trading houses invested directly in mining operations, acting as "unexpected financiers" (Cortes-McPherson, 2020). Today, collectors act as transport and capital logistics operators, deploying the "gota-a-gota" ("drop-by-drop") loan scheme. *Gota-a-gota* is a scheme better explored in the Colombian context, where small firms or individuals who do not qualify for official loans from the banking system access to informal credit at high interest rates (Barrera Lievano et al., 2022; Perez-Rivera, 2021). Unsurprisingly,

as noted by some of our interviewees, Colombian lenders introduced this scheme in Madre de Dios. We cannot confirm that they are not associated with violence. However, they are described as a social group different from illegal organizations or drug-trafficking networks: charismatic, trustworthy, and adventurous. "Who would like to take the risk of taking my gold? No one, maybe them, only them, they are young, they are swift" (Interview with miner, October 19, 2020).

Informal trade houses and collectors move the gold to Lima, Cusco, Arequipa, and Juliaca. Among these cities, Juliaca is the preferred destination due to its proximity with Bolivia. Although there are accounts of gold smuggling to South American countries such as Brazil, Ecuador, and Chile (CIPER, 2016; García Delgado, 2019), Bolivia's lenient legislation for gold commercialization has turned this country into an attractive destination (OAS - DTOC, 2021). As stated by a gold collector (Interview, October 27, 2021), "The main market is Juliaca; it is the axis. Collectors are always in Juliaca. The problem is that there is a lot of supply, and some collectors no longer want to go down to Juliaca. They take the road to La Paz [Bolivia] where they are given 5% or 7% more [per gram of gold] and it pays off, but it is dangerous. (...)". Peruvian authorities in Puno are aware of these dynamics. For public authorities, the extension of the border between both countries makes it impossible to control it (Interview with public prosecutor, June 06, 2022).

Unlike Arequipa, *facturadores* are not directly present. The forging of legal documents is left to trading houses and collectors when gold starts moving outside Madre de Dios. While acknowledging the illegality of this practice, these actors are aware of their relevance to maintain the government's traceability charade. One clerk at a trading house in Cusco commented: "they want the papers, so we give them the papers. The miner is happy [with his/her sale], the government is happy [with documents]" (Interview, November 20, 2019). A gold collector-miner further explained the role they fulfill in ensuring the production of documents: "they [the government] are not helping us, we are helping them! We! They ask proof, so we prove it. We ask to be formal, but they say nothing. They ask for papers, we give them. I cannot stop working (...) I have a family, I want to be formal, but I do not see how" (Interview, October 24, 2020). In conclusion, in Madre de Dios, the performance of documentation offers a pathway for local producers to legal and illegal markets despite the context of impossible formalization.

6. Discussion and conclusions

The Peruvian experience dealing with gold traceability mandates illustrates how apparent abstract concepts such as information and transparency transform production flows on the ground. In Peru, we found that the pressure of Northern gold buyers to secure information on mineral origins prompted top-down policy shifts to control how gold circulates in the country. For Peru's mining governance, these changes entailed that the state had to maintain its open market attitude towards mineral trade while increasing its surveillance on how this activity occurs. Far from providing guarantees on critical areas surrounding ASGM extraction and trade – e.g., environmental protection, human rights infractions, gender exclusion, insecurity, conflict, etc. – the state focused on one central issue: demanding documentation on the legality of production. Inadvertently, the new policy framework created a legal conundrum in which gold trading can only occur in the delimited margins of formalization, although informal mineral extraction and production are allowed. In this paradoxical context, logistical entrepreneurs have risen to become production enablers, deconstructing these information barriers so that actors across the value chain can adapt.

In Arequipa and Madre de Dios, mid-stream actors constitute a logistics sector in their own right (Coe, 2014). Besides ensuring basic conditions for extraction, after the introduction of traceability mandates, logistical entrepreneurs now also play a critical role in assisting gold's physical movement and its acceptance in the formal trade circuit.

In Arequipa, we found a sophisticated network of intermediaries rooted in technology access and trust bonds. Here, gold circulation highly depends on negotiation agreements between miners, beneficiation plants, and local retailers to access beneficiation services and concessions, high-grade ore, and, ultimately, the national and international markets. By contrast, in Madre de Dios, less complex processing practices render circulation less dependent on beneficiation plants but more sensitive to supply and investment flows.

In both regions, documentary forging is fundamental. Even when gold buyers have the state's permission to make ASGM purchases, legal constrictions push formal actors into gold laundering. Although in Arequipa we found plants willing to go the extra mile to filter legal producers and fulfill the state's auditing role, these practices end up excluding miners with smaller and low-grade production. For those informal and illegal miners who cannot access formal trade channels, selling gold to logistical entrepreneurs is the safest option. In addition to offering competitive prices, logistical entrepreneurs absorb the physical and legal risks of attempting to reach gold markets. The latter is particularly relevant in Madre de Dios, where transporting gold across regions has become a dangerous task due to the growing violence but also for the increased presence of SUNAT throughout highways.

Our study contributes to the analysis of value creation and transparency in mineral value chains in two ways. First, it showcases the agency of mid- and upstream actors in value chains (Gereffi and Lee, 2016; Selwyn, 2013). Far from being mere policy recipients, these actors can dispute governance decisions aimed at limiting their participation in global production through performative practices. In the case of traceability for gold mining, performing compliance is possible insofar as origin documentation is valued for its ability to provide proof for end-clients, not for the veracity of the information it contains. In this context of information fetishism, traceability becomes an empty signifier, as accumulated information brings legitimacy to a product at the expense of promoting a more formal, inclusive, and transparent gold value chain.

But who performs for whom? Our analysis suggests that performative practices transcend upstream players as they benefit actors at different scales: the Peruvian government that has to comply with the OECD's standards, the miners, producers, and traders who need to get their production to the gold market, and international buyers who have to secure enough production while fulfilling clients' traceability expectations. Thus, in the case of mineral traceability, we find that performative governance encompasses more than state actors (Ding, 2020). Non-state actors – either proponents or intended recipients of governance instruments – also engage in the theatrical, offering a form of “cosmetic compliance” (Postma and Geenen, 2020). These performative dynamics coincide with research concerning reforms in nature-based value chains following market-driven demands, especially the forestry sector after the Peru-US TPA (Sears and Pinedo-Vasquez, 2011).

Second, our study reveals the value of movement in mineral value chains. As highlighted by Valdivia et al. (2021), in extractive industries, value creation exceeds resource extraction and processing. In Peru, ASGM production frequently requires the aid of logistical entrepreneurs in order for gold to leave the extraction areas. Ensuring that resources reach value creation chokepoints and that they (appear to) comply with the formal market's expectations is essential to transforming resources into commodities. The value of movement offers new ways of considering how ASM is embedded in local economies (Huntington and Marple-Cantrell, 2022; Smith, 2022); and the relevance and meanings of “movement” for the livelihoods that emerge around resource extraction, *per se*. In informal contexts, such as those described in this article, logistical entrepreneurs can serve as intermediaries between the informal and formal economy and between the rural contexts where extraction occurs and the other scales in which gold circulates.

The analysis of performative practices in gold trade begs the question: To what extent is traceability useful for building more responsible practices on the ground? If information mechanisms are targeted to limit

the participation of producers instead of understanding the challenges they face to fulfill traceability and other transparency expectations, the incentives for bypassing these mechanisms will remain, especially when dealing with high-priced commodities such as gold. What is missing are efforts to work on traceability governance from the bottom-up, with more nuanced and environmentally adequate measures to encourage ASGM, and other extractive value chains, to adhere to responsible sourcing.

Author statement

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Data availability

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