Creation of a Sustainable Mining Program through Formalization of Artisanal and Small Scale Miners

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Introduction

This report is the academic product of a Spring 2019 Capstone Workshop (Capstone) at Columbia University SIPA. The Capstone team, the authors of this report, consisted of seven students from SIPA and two students from Columbia Law School. It reflects research and analysis conducted between January and April 2019 including travel to Nigeria. The Capstone is supervised by SIPA faculty advisors Christine Capilouto and Jenik Radon.

The Government of Nigeria, as detailed in the Economic Recovery and Growth Plan (ERGP), has decided to place a strategic focus on solid minerals in an effort to diversify the economy.[1] As part of this effort, the government instituted the SMDF. The SMDF is a fund that was created in the 2007 Minerals and Mining Act (the 2007 Act) to catalyze growth in the solid minerals sector. The 2007 Act tasks the SMDF with developing the human and physical capacity of the sector; funding geo-scientific data gathering, storage, and retrieval; equipping mining institutions to perform their statutory functions; funding extension services to artisanal and small-scale mining (ASM) operators; and provide mining infrastructure.[2]

The initial scope of work for the Capstone team was to assist the SMDF with its broader mandate, whereby the SMDF specifically indicated its efforts and policy objectives to attract foreign direct investment (FDI) and international mining companies to the Nigerian mining sector. Through a process of internal discussions between the SMDF and the Capstone team, it became clear that a more pressing priority was to address the existence of a large informal mining sector, which has substantial negative effects on the attractiveness of the sector as a whole. We especially focus on gold mining since it is the primary mineral extracted by artisanal miners. Notably, artisanal mining contributes to the risky investment environment which is keeping FDI and large mining companies away from Nigeria. Therefore, formalizing miners is a necessary step for the SMDF, and the government as a whole, to achieve their objectives. We focus on the registration of miners, which is the first step of the formalization process, and more specifically on artisanal miners who, for the purpose of this project and report, are distinguished from small-scale miners (see definitions below).[3]

[1] Ministry of Budget and National Planning Nigeria, *Economic Recovery and Growth Plan 2017-2020*, February 2017, 52-70.
[2] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) §34.
[3] Our distinction is further justified by the proposal to create a separate mineral lease and licensing process for artisanal miners in a new bill that would replace the 2007 Act, and which is currently being considered by the National Assembly (see Section 1.3 below).

The team's research process consisted of the following:

- A comprehensive desk study and a legal and institutional review to understand the context of the Nigerian mining sector;
- Case studies of artisanal mining formalization in Ghana and Mongolia to establish lessons learned;
- In-person and phone interviews in New York, NY, United States with non-profit and multilateral organizations, artisanal mining experts, and academics to establish international best practices; and
- In-person interviews in Abuja, Nigeria with government officials and artisanal mining experts to identify challenges with current formalization efforts and the current registration process.

Our findings and policy recommendations to the SMDF are presented in the below report, organized into seven sections.

Section one puts the Nigerian mining sector in context. It importantly includes a discussion of how artisanal mining is currently practiced in Nigeria and how formalizing the sector may motivate increased investment from abroad by addressing some of the many factors contributing to Nigeria's substantial risk environment. The section also outlines the current institutions and frameworks guiding the sector, as well as some of the initiatives and actions taken by the government to modernize and improve the sector as a whole.

In **section two**, the report addresses the current registration process and how the government is trying to incentivize miners to register. Meanwhile, **section three** draws upon the team's desk review and provides insight from two key case studies, Ghana and Mongolia. The case studies provide many lessons for how other governments have attempted to formalize artisanal miners. Section three also draws on the established literature to describe some of the emerging international best practices.

Section four specifically looks at the SMDF's current plans to register miners using a gold purchase program and identifies some of the barriers which will likely prevent the success of the program. The main barriers to success are the need for holistic incentive structures, increased awareness, government coordination, engagement with artisanal mining actors throughout the supply chain, and buying center management. Drawing on this analysis and the insights from section three, **section five** provides recommendations to the SMDF.

Lastly, **section six** outlines some of the larger institutional, legal and policy roadblocks that will make it difficult to successfully formalize the ASM sector.

Acknowledgements

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Any errors and omissions are solely the responsibility of the Capstone team.

Acronyms

1999 Act	1999 Minerals and Mining Act
2007 Act	2007 Minerals and Mining Act
ADR	Alternative dispute resolution
ALP	Alternative Livelihood Projects
ASGM	Artisanal and small-scale gold mining
ASM	Artisanal and small-scale mining
BoM	Bank of Mongolia
BVN	Bank Verification Number
CBN	Central Bank of Nigeria
SIPA	Columbia University School of International and Public Affairs
CASM	Communities and Small-scale Mining
CDA	Community development agreement
COMEG	Council of Nigerian Mining Engineers and Geoscientists
DCIM	District Committees on Illegal Mining
DVLA	Driver and Vehicle Licensing Agency
ERGP	Economic Recovery and Growth Plan
EIA	Environmental impact assessment
EITI	Extractive Industry Transparency Initiative
FME	Federal Ministry of Environment
FMH	Federal Ministry of Health
FDI	Foreign Direct Investment
GNASSM	Ghana National Association of Small-Scale Miners
GFP	Gola Forest Programme
IMCIM	Inter-Ministerial Committee on Illegal Mining
ICMM	International Council on Mining and Minerals
IIED	International Institute for Environment and Development
MSF	Médicins Sans Frontièrs
MOU	Memorandum of Understanding
MIREMCO	Mineral Resources and Environmental Management Committee
MinDiver	Mineral Support for Economic Diversification Project
MMA	Minerals and Mining Act
MRPAM	Minerals Resources and Petroleum Authority of Mongolia
MAN	Miners Association of Nigeria
MCO	Mining Cadastre Office
MESTI	Ministry of Environment, Science, Technology and Innovation
MLGRD	Ministry of Local Government and Rural Development
MMSD	Ministry of Mines and Steel Development
NAP	National Action Plan
NEXIM	Nigerian Export-Import Bank
NEITI	Nigerian Extractive Industries Transparency Initiative
NGSA	Nigerian Geological Survey Agency
NSIA	Nigerian Sovereign Investment Authority
NGO	Non-governmental organization
PPE	Personal protective equipment
PAGMI	Presidential Artisanal Gold Mining Initiative
SSML	Small Scale Mining Lease
SMDF	Solid Minerals Development Fund
SMSTF	Special Mines Surveillance Task Force
SPV	Special Purpose Vehicle
SAM	Sustainable Artisanal Mining Project
SDC	Swiss Agency for Development and Cooperation
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
USAID	United States Agency for International Development
UMaT	University of Mines and Technology Tarkwa
WHO	World Health Organization

Definitions

Artisanal Mining

There is no universally applicable definition of artisanal mining. Countries vary in their legal and local definitions of artisanal mining.[4] For the purposes of this report, we draw from the vocabulary used by Pact, an international nonprofit development organization that has done extensive work related to formalization of artisanal and small-scale mining. We use four factors to distinguish artisanal from small-scale mining: size, production technique, professionalism, and financing. Artisanal mining is typically performed on small, shallow mineral resources and miners use rudimentary techniques, generally manual, to access the ore. Artisanal miners do not necessarily view mining as a professional business: mining may be an occasional, supplementary, seasonal, or full-time activity. Capital investments in artisanal mining are negligible.[5]

Small-scale mining

As above, there is no single definition of small-scale mining. For the purposes of this report, we define small-scale mining as follows. Small-scale mining is typically performed on mineral resources that require some degree of mechanization to make it cost-efficient to access them. Small-scale miners employ machinery, generally view mining as a business activity to be performed full-time, and are more likely to receive some degree of financing to support their activities.[6]

Illegal mining

Mining activities that violate national law or do not operate according to national regulations. Individual countries define what constitutes "illegal" mining in various ways and, in many cases, there may be a blurred line between illegal and informal mining (for example, when miners operating outside the legal system trespass on valid and active licenses). See section 1.3 for a discussion of Nigeria's view on "illegal" vs. "informal" with regard to artisanal mining.

Informal mining

Informal mining can be both legal or illegal. Informal mining activities are outside of the formal economy and hence "are not organized in or effectively represented by a legal entity; do not receive governmental support; or do not benefit from enforcement of policies that enable them

[4] UNITAR and UN Environment, *Handbook for Developing National ASGM Formalization Strategies within National Action Plans* (Geneva: UNITAR and UN Environment, 2018), 16, https://unitar.org/cwm/sites/unitar.org.cwm/files/uploads/formalization_handbook_e_web_final.pdf.

[5] Christina Villegas (Pact), interview by Columbia Capstone team, New York, February 26, 2019.

[6] Christina Villegas (Pact), interview by Columbia Capstone team, New York, February 26, 2019.

to understand and comply with the requirements set in national regulations" (as described by the UN in the context of artisanal and small-scale gold mining (ASGM)).[7]

Formalization

The term "to formalize" is used in a variety of ways within the context of artisanal mining. For the purposes of this report, we have adopted the UN's definition of the term (in the context of artisanal and small-scale gold mining). Put simply, "Formalization is a process that seeks to integrate [artisanal mining] into the formal economy."[8] There are two important aspects of this definition that must be emphasized. First, operating legally is a necessary but not sufficient condition. The UN states that artisanal mining is legal when "actors are recognized by national law, are in possession of mining licenses and permits, and adhere to any other standards as required by national regulations."[9] For artisanal mining to be formal, actors also need to be "organized in legally recognized entities that represent their needs; comply with regulations, policies, and management practices, including taxation (if applicable); and [be] empowered and enabled to manage their activity including technical, administrative, financial, social, and environmental aspects."[10] Second, formalization does not only include miners but the entire supply chain. The sector will not be formal unless all ASM actors are formal. ASM actors include all "persons or institutions directly involved in the [ASM] supply chain, which add value to (...) production or trade."[11] This may include everyone from diggers, to pit bosses and exporters.

Middlemen

Middlemen buy minerals from artisanal miners and bring it to market by selling the mineral to a buyer. They often engage in other activities as well. It is, for example, common for middlemen to provide small loans to miners. It is important to note that the term middlemen encompass a wide range of actors. While many middlemen around the world are from the same community as miners, others are foreign nationals.[12] Some middlemen, moreover, operate formally within national legal systems while many other operate informally and some engage in criminal activity.

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[7] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 17.

[8] United Nations Environment Programme, *Analysis of Formalization Approaches in the Artisanal and Small-Scale Gold Mining Sector Based on Experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda* (Geneva: United Nations Environment Programme, June 2012), 1, https://wedocs.unep.org/bitstream/handle/20.500.11822/11357/Formalization_Document_Final_June_2012.pdf?sequence=1&isAllowed=y.

[9] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 17.

[10] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 17.

[11] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 7.

[12] Lisa Goldman et al., "Artisanal and Small-Scale Gold Mining in Nigeria: Recommendations to Address Mercury and Lead Exposure" (Environmental Law Institute, November 2014), 50-51.

Executive summary

Although Nigeria is richly endowed with a variety of solid minerals, mining contributes very little to the national economy; the sector accounted for only 0.18% of GDP in 2018. The Government of Nigeria has decided to place a strategic focus on solid minerals in an effort to diversify the economy away from oil and gas. To this end, the government instituted the Solid Minerals Development Fund (SMDF), a fund tasked with catalyzing growth in the solid minerals sector. An important need is to address the existence of a large informal artisanal mining sector. Nigerians have practiced informal artisanal mining for centuries. Today, the activity is largely poverty-driven and supports the livelihoods of at least 500,000 people. Partly due to its informality, artisanal mining is associated with many negative externalities such as environmental degradation, crime and health hazards. One tragic example is the 2010 lead poisoning outbreak in Nigeria's northwestern Zamfara State, which killed approximately 400 children and has affected thousands more.

To address these problems, increase revenues from the sector, and attract foreign investment, the government is moving to formalize artisanal miners. The government has undertaken and is currently pursuing a number of important modernization efforts to reach this goal. It has, for example, moved to strengthen the regulatory framework, designed a strategic agenda for the sector, gained financial support from the World Bank, and made attempts to decentralize the mining license application process and enhance existing geological data. The government, with the leadership of the SMDF, has also created the Presidential Artisanal Gold Mining Development Initiative and the National Gold Purchase Program with the explicit mission to formalize the sector.

The Capstone team's report analyzes how the SMDF can plan for the government's formalization, in a sustainable way, of artisanal miners and the challenges facing both the SMDF and the government as a whole in reaching this long-term goal. The report draws on in-person interviews with key governmental stakeholders and mining experts conducted during the team's travel to Nigeria, best practices established across the world, lessons learned from case studies of Mongolia and Ghana, and interviews with non-profit and multilateral organizations, artisanal mining experts, and academics. The team would like to highlight the following findings from our analysis:

Formalizing the artisanal sector will not automatically increase foreign investment and attract large mining companies

A proof of concept will not be enough to drastically increase investment in Nigeria by international companies, investors or buyers. The underlying risks and costs must change if the Nigerian mining sector wishes to benefit from international investments. Formalizing artisanal miners has the potential to decrease both risks and costs. The government must, however, ensure that formalization contributes to increased security, clarified land tenure, simplified due diligence, supply stability, and ethical certification for international actors to invest in Nigeria.

The current registration process is excessively burdensome and incentive structures not significant enough for many artisanal miners to formalize

Miners make the decision of whether to register and enter the formal economy based on a simple cost-benefit analysis. As it stands, the associated costs outweigh the benefits for many miners. Many miners are unable or unwilling to meet the requirements to obtain and maintain a Small Scale Mining Lease (SSML),[13] and many of the incentives outlined in official publications are currently not offered to miners.

There is an evolving body of best practices for Nigeria to draw upon

A body of lessons learned and best practices is emerging from studies of other countries' attempts to formalize the artisanal mining sector. Practices that have been shown to be especially important include decentralization, grassroots engagement, engaging the entire supply-chain, and providing training and capacity building to address environmental and health hazards.

Nigeria can learn from the challenges faced by other countries, such as Ghana and Mongolia

In-depth case studies of Ghana's and Mongolia's efforts to formalize their artisanal mining sectors show how other governments have decided to tackle challenges currently faced by Nigeria. Strong coordination mechanisms, legal and regulatory reforms, and carefully crafted incentive structures helped these governments. Both countries continue to face challenges related to corruption and continued illegal operations which Nigeria would do well in addressing early in the process.

The SMDF currently face five main barriers to success

1) Current and proposed incentive structures may not stimulate sustained buy-in from artisanal miners and should be expanded to include more non-economic incentives.
2) The formalization effort depends on the awareness of miners of the expanded benefits and reduced costs associated with formalizing as compared to continuing their traditional practices. More should be done to raise awareness and motivate behavioural change.
3) Government agencies could benefit from increased inter-governmental coordination to create effective synergy and prevent duplication.
4) Middlemen play a crucial but, at times, negative role in the current supply chain and can influence others by promoting or opposing the formalization agenda. The SMDF must find a balance between limiting the undesirable behaviour of these actors and engaging with them constructively.
5) Using private-sector actors to run buying centres will introduce a number of potential problems along with the potential benefits. The SMDF should use performance measurement systems and strong contracts to ensure the private operators contribute to the social good.

[13] An SSML is required to conduct artisanal or small-scale mining operations pursuant to Section 49 of the 2007 Nigerian Minerals and Mining Act and Section 48 of the 2011 Nigerian Minerals and Mining Regulations.

The government as a whole face additional roadblocks to successfully formalize the entire sector

While the SMDF is in no position to solve or address many of these additional roadblocks, they are important to keep in mind. We highlight some here in the hopes of spurring additional government action in the sector. Remaining roadblocks include: legal and regulatory challenges which make the registration process costly and challenging for miners; a lack of transparency and a perception of continued corruption; a lack of the necessary infrastructure for both artisanal and larger-scale mining; a potential for conflicts between artisanal and larger-scale mining companies; and limited geological talent, information, and technology.

Recommendations

To help the SMDF address the identified barriers to success, the Capstone team has designed context- and institution-specific recommendations to the SMDF. These recommendations include:

As no single best model for how a country should formalize artisanal mining exists, it is our hope that the report's targeted recommendations and analysis of opportunities and challenges for Nigeria will add value to the SMDF's efforts to grow the mining sector and ultimately contribute to improving the lives of Nigerian miners and their communities.

1. Context

1.1 The Nigerian mining industry

Although Nigeria is richly endowed with a variety of solid minerals,[14] the mining of solid minerals contributes very little to the national economy. In 2018, the mining sector accounted for only 0.18% of national GDP.[15] In contrast, the mining sector contributes much more to the national economy in countries such as Botswana, the Ghana and South Africa (see figure below).

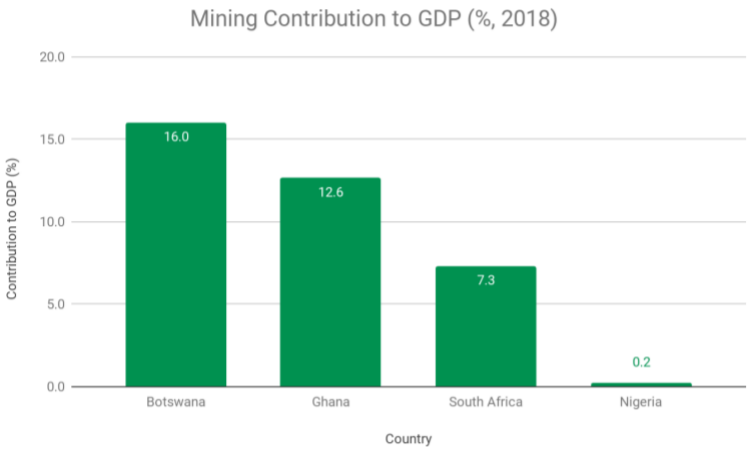

Figure 1: Mining contribution to GDP in 2018 (*source*: National Bureau of Statistics,[16] Statistics Botswana,[17] Ghana Statistical Services[18], Statistics South Africa[19])

[14] Nigeria Extractive Industries Transparency Initiative, "Solid Minerals Industry Audit Report," 10-11.
[15] Nigerian Bureau of Statistics, "Nigerian Gross Domestic Product Report (Q4 and Full Year, 2018)", 142.
[16] National Bureau of Statistics, *Nigerian Gross Domestic Product Report*, 142.
[17] Statistics Botswana, *Gross Domestic Product - First Quarter 2018*, 5.
[18] Ghana Statistical Service, *Rebased 2013-2018 Annual Gross Domestic Product* (Accra, Ghana: Ghana Statistical Service, April 2019), 4.
[19] Ghana Statistical Service, *Rebased 2013-2018 GDP*, 4.

In light of rising challenges associated with Nigeria's petroleum sector, the Government of Nigeria has increased its focus on the solid minerals sector as a potential catalyst for economic development. In fact, some stakeholders in the Nigerian mining industry have indicated that the sharp drop in the oil price has been a blessing in disguise. It provides, they argue, a well-needed incentive to diversify the economy.[20] Official publications similarly establish that the government wishes to develop the solid minerals sector to diversify the economy by increasing its contribution to GDP, exports and foreign reserve.[21]

To achieve its goal, the government initially tried to attract FDI and multinational corporations into the Nigerian mining sector. The National Assembly of the Federal Republic of Nigeria (National Assembly) passed an investor-friendly mining act in 2007 and the government redefined its role from owner-operator to administrator-regulator.[22] Yet, investments did not pour in from abroad. Despite high commodity prices and a concerted effort by the government, not a single major mining company invested in Nigeria and only a few junior companies did.[23] Foreign investors and companies continue to perceive the market as unsafe and challenging, as discussed in more detail in section 1.3.

These challenges led the government to reformulate its strategy. Recently, government agencies are making the strategic choice to look inwards and prioritize domestic sources of capital and investment -- a strategy also promoted by the World Bank.[24] An increased focus on domestic artisanal mining is a central part of this strategic realignment. The government hopes that a formalized and thriving domestic mining sector will be a proof of concept, showing investors the sector's profit potential. Furthermore, the government hopes that integrating artisanal miners into the formal economy will provide additional benefits to the Nigerian economy. Miners will benefit by receiving the credit needed to invest in safer mining practices, their communities will be less exposed to harmful chemicals and mining-related conflict, and the government will gain taxes from mining revenues. The government could, moreover, use revenues to spur greater economic development and growth.[25]

Formalizing artisanal mining will require the government to transform a traditional economic sector. Across the world, artisanal mining is largely a poverty-driven activity typically practiced in the poorest and most remote rural areas of a country by a poorly educated populace with few employment alternatives.[26] In these communities, artisanal mining is a viable livelihood alternative

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[20] Gregory T. Okere, "Diversifying Nigeria's Economy through Solid Minerals," *The Nation Newspaper*, March 13, 2019, https://thenationonlineng.net/diversifying-nigerias-economy-through-solid-minerals/.

[21] Ministry of Mines and Steel Development, *Roadmap for the Growth & Development of the Nigerian Mining Industry*, August 2016; Ministry of Budget and National Planning Nigeria, *Economic Recovery and Growth Plan 2017-2020*.

[22] Ministry of Mines and Steel Development, *Nigeria's Mining and Metal Sector: Investment Promotion Brochure*, August 2016, 18.

[23] World Bank MinDiver Team at MMSD, interview by Columbia Capstone team, Abuja, March 19, 2019.

[24] World Bank MinDiver Team, interview by Columbia Capstone team, New York, March 26, 2019.

[25] Ikenna Theodore Oramah et al., "Artisanal and Small-Scale Mining in Nigeria: Experiences from Niger, Nasarawa and Plateau States," *The Extractive Industries and Society* 2, no. 4 (December 1, 2015): 694–703, https://doi.org/10.1016/j.exis.2015.08.009; Ministry of Mines and Steel Development, *Roadmap,* 39-41.

[26] "Small-Scale Mining," Oil, Gas, and Mining Unit, World Bank, 2016, http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTOGMC/0,,print:Y~isCURL:Y~contentMDK:20246087~menuPK:509392~pagePK:148956~piPK:216618~theSitePK:336930~isCURL:Y,00.html.

since it is generally not capital intensive and does not require many technical skills. Artisanal mining has grown in size across sub-Saharan Africa in recent decades as rural inhabitants with agricultural livelihoods have increasingly diversified their income sources to include non-farm activities. This is also the case with Nigeria. The agricultural sector has consistently been an important contributor to Nigeria's economy, accounting for 25.13% of real GDP in 2018.[27] At the same time, artisanal mining has been practiced in Nigeria for generations with long-established Nigerian communities, such as the Nok, Kano, Benin, Ife, and Oyo, reported to have exploited minerals, including iron, clay, and gold for metal sculpting since about 400 BC. The growth of artisanal mining in Nigeria has been spurred by limited large-scale mining (LSM) after World War II and an accessible top layer, along with the larger movement to diversity from agricultural livelihoods.[28] Artisanal mining activities in Nigeria may change in degree of intensity with the seasons, migration, market prices, and the exhaustion of deposits. A recent study on artisanal and small-scale mining in north-central Nigeria found that farm seasonality and poverty were the two biggest drivers for rural inhabitants to take up artisanal mining.[29]

While the actual number of artisanal miners is uncertain, stakeholders in the Nigerian mining industry such as the Nigerian Extractive Industries Transparency Initiative (NEITI) estimate that roughly 80% of all mining operations in Nigeria are carried out by artisanal miners.[30] Further, the Government of Nigeria estimates that the sector directly employs at least 100,000 to 150,000 people and supports at least 500,000 more.[31] To date, the Mining Cadastre Office (MCO) has issued only 1,522 Small Scale Mining Licenses, the only mineral title available for artisanal miners under the current legal regime (see section 2.1 for more detail), indicating that the sector is largely informal.[32]

Informal artisanal mining is associated with many problems in Nigeria such as health risks, environmental degradation, and crime. One tragic example is the 2010 lead poisoning outbreak in Nigeria's northwestern Zamfara State, which killed approximately 400 children and has affected thousands more. A 2013 study on the outbreak confirmed a direct link between mining and lead poisoning, primarily through the exposure pathways of incidental ingestion of lead-rich soil and dust particles by hand-mouth transition and of inhaled lead particles that are cleared from the respiratory tract and swallowed.[33,34] The government estimated that the cost of treating all lead

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[27] National Bureau of Statistics, *Nigerian GDP Report*, 10.

[28] Oramah et al., "Artisanal and Small-Scale Mining in Nigeria"; Abba Ahmed et al., "Solid Mineral Deposits of Nigeria: Potentials, Challenges and Prospects" (poster, Beijing, Society of Economic Geologists 2017 Conference, September 2017), https://www.segweb.org/SEG/_Events/Conference_Archive/2017/Conference_Proceedings/files/pdf/Poster-Presentations/Abstracts/P237-Ahmed.pdf.

[29] Oramah et al., "Artisanal and Small-Scale Mining in Nigeria."

[30] Chineme Okafor, "Stakeholders Put Size of Nigeria's Artisanal Mining at 80%," *This Day*, September 4, 2018, https://www.thisdaylive.com/index.php/2018/09/04/stakeholders-put-size-of-nigerias-artisanal-mining-at-80/.

[31] Solid Minerals Development Fund, *Presidential Artisanal Gold Mining Development Initiative*, 2019.

[32] "Nigerian Mining Cadastre Office – The Official Website of the Nigerian Mining Cadastre Office," Nigerian Mining Cadastre Office, accessed May 28, 2019, https://www.miningcadastre.gov.ng/.

[33] Geoffrey S Plumlee et al., "Linking Geological and Health Sciences to Assess Childhood Lead Poisoning from Artisanal Gold Mining in Nigeria," *Environmental Health Perspectives* 121, no. 6 (June 2013): 744–50, https://doi.org/10.1289/ehp.1206051, 744.

[34] More recently, another lead poisoning outbreak occurred in Nigeria's central Niger State in 2015. This outbreak and the resulting deaths of children were also linked to mining. Martin Zinggl, "A silent killer: Lead poisoning in

poisoning victims from the outbreak is equivalent to about 61% of Zamfara's total health care budget for 2017 and 2018.[35] In addition to high amounts of lead, researchers also measured concentrations of mercury, manganese, and arsenic in Zamfara that were greatly in exceedance of U.S. Environmental Protection Agency Regional Screening Levels[36] (risk-based concentrations that are protective for humans and are used to identify areas that may require cleanup[37]). A separate 2017 study of trace metal concentrations at gold mining sites in Nigeria's southwestern Ijeshaland, Osun State measured concentrations of metals, including aluminum, iron, nickel, and lead, in surface water (rivers and streams, used for drinking) that exceeded the World Health Organization's standards for drinking water.[38] This indicates that although lead has been the most-studied hazard following the Zamfara case, mining-related contaminants other than lead may pose additional health and environmental threats to artisanal miners and mining communities in Nigeria. Artisanal mining has also been linked to banditry: in April 2019, the government issued a ban on all mining activities in Zamfara state following a statement by the acting Inspector General of the Police supporting intelligence reports that "established a strong and glaring nexus between the activities of armed bandits and illicit miners."[39]

Nigeria," *Al Jazeera*, November 16, 2016, https://www.aljazeera.com/indepth/inpictures/2016/10/silent-killer-lead-poisoning-nigeria-161024163015220.html.

35 Solid Minerals Development Fund, *Presidential Gold Initiative*, 20.

36 Geoffrey S Plumlee et al., "Linking Geological and Health Sciences to Assess Childhood Lead Poisoning from Artisanal Gold Mining in Nigeria," Environmental Health Perspectives 121, No. 6 (June 2013), 744.

37 "Regional Screening Levels Frequent Questions," Data and Tools, United States Environmental Protection Agency, updated May 13 2019, https://www.epa.gov/risk/regional-screening-levels-frequent-questions.

38 Adewale M. Taiwo and Julius A. Awomeso, "Assessment of Trace Metal Concentration and Health Risk of Artisanal Gold Mining Activities in Ijeshaland, Osun State Nigeria— Part 1," *Journal of Geochemical Exploration* 177 (June 2017): 1–10, https://doi.org/10.1016/j.gexplo.2017.01.009.

39 Ismail Mudashir, "Armed Banditry: FG Stops Mining in Zamfara," *Daily Trust*, April 8, 2019, https://www.dailytrust.com.ng/armed-banditry-fg-stops-mining-in-zamfara.html.

1.2 Legal, regulatory and institutional framework

A number of important legal and regulatory documents and institutions currently govern the ASM sector in Nigeria. These provide the framework in which change can and must occur for the sector to be successfully formalized.

1.2.1 Legal and regulatory frameworks

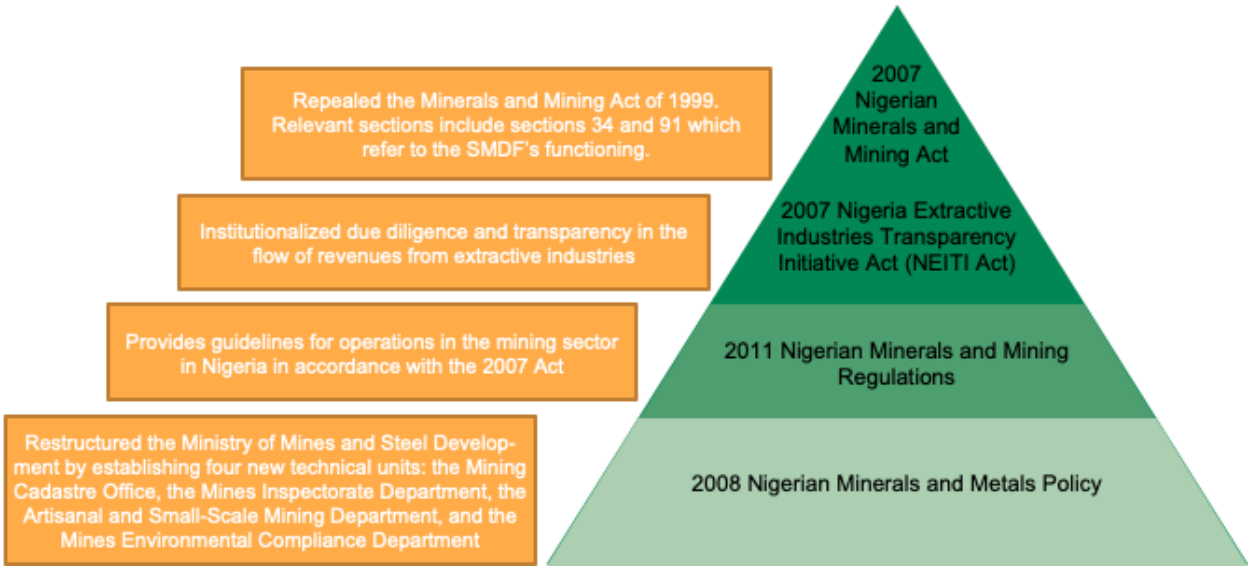

Figure 2: Legal framework for mining in Nigeria (*source*: Capstone team)

1.2.2 Institutional frameworks

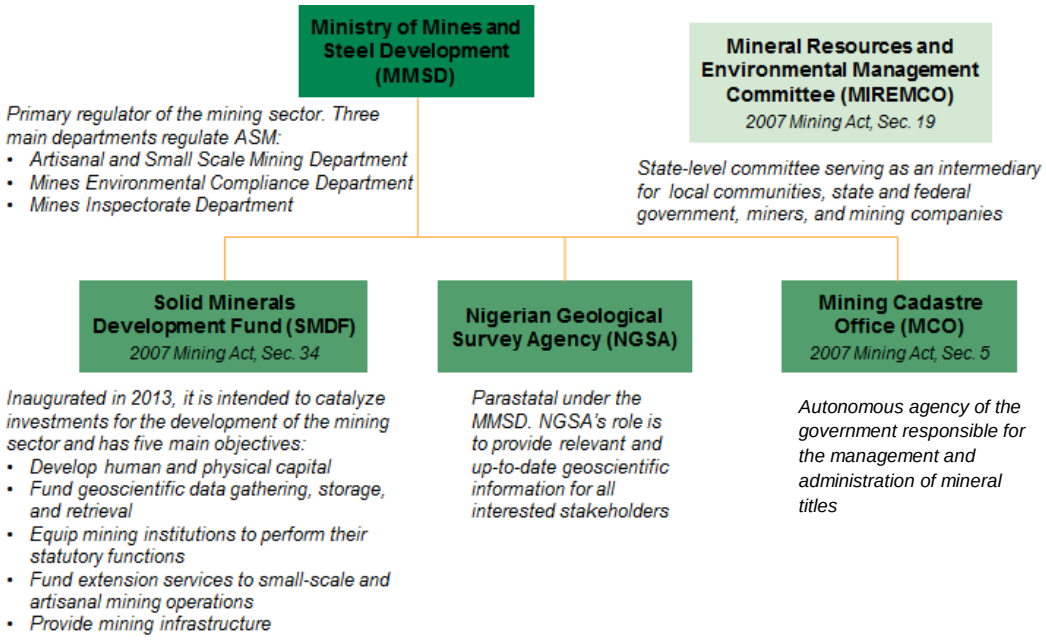

Figure 3: Institutional framework for mining in Nigeria (*source*: Capstone team)

1.3 Modernization effort

While many challenges stand in the way of developing Nigeria's mining sector, the government has taken notable steps to modernize the industry and attract new investments from the private sector. Some of the government's most significant sector-wide modernization efforts are highlighted here. We further discuss these efforts and remaining barriers in section 4 and discuss more targeted efforts in section 2.

Strengthening the regulatory framework

With the passage of the 2007 Act, which repealed and replaced the 1999 Minerals and Mining Act (1999 Act), the government put into place mining laws aimed at making the sector more competitive. The 2007 Act established the federal government's ownership of all mineral resources, the offices in charge of overseeing the mining sector, the procedures for acquiring the rights to search for and produce mineral resources, and the rights and obligations of holders of mineral titles (defined as a Reconnaissance Permit, an Exploration License, a Small Scale Mining Lease, a Mining Lease, a Quarry License, and a Water Use Permit). Provisions such as tax holidays of three to five years and exemption from payment of customs and import duties for mining equipment are included as incentives for investors. Also of note, as mentioned above, is the creation of the SMDF, a fund tasked with catalyzing growth in the mining sector.[40] The corresponding 2011 Regulations further established procedures by stipulating the duties of each government office charged with mining sector oversight, the application procedure for would-be holders of mineral licenses, and the royalties, fees, rents, and compensation payable by holders of mineral titles.[41]

A new bill that would replace the 2007 Act is currently being considered by the National Assembly. The proposed bill underwent two readings in the House in February and November 2018 and has been referred to the Solid Minerals Development Committee for further review.[42] Two of the main changes included in the bill are the creation of a new "super"-regulatory agency for the mining sector, the Nigerian Mining & Minerals Commission, and the creation of a separate mineral lease and licensing process for artisanal miners.[43]

[40] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007).
[41] Nigerian Minerals and Mining Regulations 2011, S. I. 47 (2011).
[42] "HB 1313: Nigerian Minerals and Mining Bill, 2018," Bill Tracking, PLAC, accessed May 28, 2019, http://placbillstrack.org/view.php?getid=3183.
[43] Nigerian Minerals and Mining Bill 2018, H.B. 1313 (2018).

A strategic agenda for the mining sector

In 2016, the Ministry of Mines and Steel Development (MMSD) published the *Roadmap for the Growth and Development of the Nigerian Mining Industry* (Roadmap). The Roadmap is an updated strategy document that replaces the initial 2012 roadmap and outlines specific objectives for time frames ranging from immediate (0-6 months) to long-term (5-10 years) and ongoing (to refresh regularly). It sets ambitious goals, including for the mining sector to contribute 3% to GDP by 2025. Formalizing ASM (short-term) and providing training and extension services to ASM operators to improve productivity (ongoing) are listed as key action items to reach this goal.[44]

Notably, the Roadmap distinguishes between informal and illegal mining when referring to artisanal miners. Artisanal mining activities that are not based on a valid mineral license or are otherwise outside the legal framework are not termed "illegal", but rather "informal." [45,46] This gives the government the leeway to engage with artisanal miners to organize and register them, as opposed to pushing artisanal miners further away from being participants in formal systems by criminalizing their activities. Such an inclusive approach to artisanal mining provides a way for the government to both increase the revenue it receives from the artisanal mining sector and address the concerns of artisanal miners and their host communities.

Financial support from the World Bank

The government has attracted $150 million in credit from the World Bank for a project to enhance the contribution of the mining sector to the Nigerian economy. The project is titled the Mineral Support for Economic Diversification Project (MinDiver) and was approved by the World Bank in 2017. It has three components: 1) strengthening the government in its role to establish a strong foundation for mining sector development, thereby enhancing the government's capacity as a regulator and a facilitator, 2) facilitating downstream sector development and enhancing its competitiveness and attractiveness to investors, and 3) providing implementation support.[47] One of the key objectives of the MinDiver project is getting ASM operators inventoried, formalized, and supported through technical assistance.[48] Related project activities include performing a conflict assessment of potential conflicts between ASM operators and other land users; implementing an ASM remote monitoring system; and incentivizing ASM operators to form cooperatives, primarily through the provision of equipment.[49] The MinDiver project also includes a focus on the SMDF: related objectives and activities include establishing a fiscal accountability and transparency framework for the SMDF and putting in place a mechanism for attracting long-

[44] Ministry of Mines and Steel Development, *Roadmap*.
[45] While in this paper we use the term "informal" to refer to being outside of the formal economy, the Government of Nigeria defines "informal" more specifically as meaning outside of the legal system.
[46] Ministry of Mines and Steel Development, *Roadmap*, 23.
[47] The World Bank, "Nigeria: Mineral Sector Support for Economic Diversification Project (MinDiver)," Projects & Operations, accessed May 28, 2019, http://projects.worldbank.org/P159761/?lang=en&tab=overview.
[48] The World Bank, *Nigeria: Mineral Sector Support for Economic Diversification Project (MinDiver) - Implementation Status and Results Report*, April 25, 2019, 4, http://documents.worldbank.org/curated/en/548801556228132142/pdf/Disclosable-Version-of-the-ISR-Nigeria-Mineral-Sector-Support-for-Economic-Diversification-Project-MinDiver-P159761-Sequence-No-03.pdf.
[49] World Bank MinDiver Team at MMSD, interview by Columbia Capstone team, Abuja, March 19, 2019.

term capital into an SMDF-Special Purpose Vehicle (SPV) (see section 2.3 for further discussion of the SMDF-SPV).

The MinDiver project is designed to look primarily at the existing pool of domestic capital and ways to stimulate local investors to participate in the mining sector, rather than geological data exploration to attract large international companies. The expectation is that domestic transactions will be a proof of concept and attract medium- and large-scale mining operators and international investors. In other words, if Nigeria develops smaller mines domestically and uses them to stress-test proposed larger projects, it will facilitate the creation of an enabling environment for FDI. Keeping the proof of concept transactions small and manageable, with less investor capital at risk, will encourage local investors to participate in the initial projects.[50]

Decentralized and online mineral title applications

The application process for mineral titles, currently in paper format and centralized at the MCO headquarters in Abuja, is being upgraded so that there will be application offices in each of the six geopolitical zones of Nigeria and the application will be in an electronic format.[51] The MMSD has contracted with GAF AG, a geo-information technology consulting company, as part of the World Bank MinDiver project to enable online applications, e-recording, archiving, and the establishment of local offices.[52] The upgrade will include an online map for viewing and searching existing mineral titles, a first draft of which has already been developed.[53]

Enhanced geological data

The limited geological data available on mineral resources in Nigeria is being further developed to make the data more useful and accessible to miners. The Nigerian Geological Survey Agency (NGSA) has been commissioned by the MMSD to compute detailed geochemical maps of the surface of Nigeria.[54] The British Geological Survey (BGS) has been put under contract through the World Bank MinDiver project to provide technical assistance to the NGSA, specifically reviewing and compiling an electronic geodata archive and developing a geodata policy and data protocols to support data transparency and beneficial use. The target end date for the geodata project is 2022.[55] The BGS previously worked with the NGSA on carrying out geochemical mapping of the surface of Nigeria from 2008 to 2010 as part of an earlier World Bank project in Nigeria, the Sustainable Management of Mineral Resources Project (SMMRP).[56] Under the SMMRP, the NGSA completed airborne geophysical surveys of the entire country (divided into

[50] World Bank MinDiver Team, interview by Columbia Capstone team, New York, March 26, 2019.
[51] Nigeria Mining Cadastre Office, interview by Columbia Capstone team, Abuja, March 20, 2019.
[52] "GAF Continues to Assist with the Modernisation of the Nigerian Mining Cadastre Office," GAF AG, August 11, 2018, https://www.gaf.de/content/gaf-continues-assist-modernisation-nigerian-mining-cadastre-office.
[53] "Nigerian Mining Cadastre Map," Nigerian Mining Cadastre Office, accessed May 28, 2019, http://server.miningcadastre.gov.ng/.
[54] Alhaji Uba Saida Malami (Chairman of the Solid Minerals Development Fund), interview by Columbia Capstone team, Abuja, March 23, 2019.
[55] The World Bank, *Nigeria: Mineral Sector Support for Economic Diversification Project (MinDiver)*, Implementation Status and Results Report, April 25, 2019, 3.
[56] "Nigeria Geochemical Mapping Technical Assistance Project," British Geological Survey, accessed May 28, 2019, https://www.bgs.ac.uk/gbase/international/nigeriaMappingProject.html.

44 cells for geochemical mapping) and, of the 44 cells the surface of Nigeria was divided into for geochemical mapping, computed eight in detail.[57] 36 remain to be completed under the current MinDiver geochemical mapping project.

Infrastructure development

The government plans to put substantial effort into addressing Nigeria's "historic under-investment" in infrastructure,[58] which will have spillover effects on improving Nigeria's "sub-par" mining infrastructure.[59] Capital expenditures related to infrastructure projects in the power, roads, rail, and agricultural sectors are a major part of the 2019 budget,[60] which was signed into law in May 2019.[61] Projects listed in the budget include ongoing and new railway projects; rehabilitation of railway tracks; projects related to hydro, solar, and gas power generation and transmission; and the construction and rehabilitation of roads nationwide.[62] Additionally, the Nigerian Infrastructure Fund, managed by the Nigerian Sovereign Investment Authority (NSIA), a sovereign wealth fund established in 2011, focuses on domestic investments in selected infrastructure sectors and has made power one of its five sectors of focus.[63] While not necessarily directly aimed at improving mining infrastructure, infrastructure investments to develop better railways, roads, and power generation will facilitate the transport and handling of minerals.

Combating illegal mining through increased security and community engagement

The MMSD began collaborating with state governors in 2017 to revive the State Mineral Resources and Environmental Management Committees (MIREMCOs) provided for in section 19 of the 2007 Act.[64] MIREMCOs are state-specific committees charged with advising the MMSD, local governments, communities, and mineral title holders on dispute resolution, environmental, and social issues.[65] Our understanding is that MIREMCO is the only extrajudicial dispute resolution mechanism currently available to artisanal miners. Also in 2017, the MMSD operationalized the Special Mines Surveillance Task Force (SMSTF), a police task force established in 2012 to target illegal mining. The MMSD has provided operational vehicles to the SMSTF and MIREMCOs in some states to help with logistics;[66] however, how active the SMSTF and

[57] Nigerian Geological Survey Agency, interview by Columbia Capstone team, Abuja, March 21, 2019.
[58] Kemi Adeosun, "Resetting Nigeria's economy by boosting infrastructure," *Financial Times*, February 19, 2017, https://www.ft.com/content/b644d0f8-f52b-11e6-8758-6876151821a6.
[59] Ministry of Mines and Steel Development, *Roadmap,* 25.
[60] Udoma Udo Udoma, "Breakdown of 2019 FGN Budget Proposal: Public Presentation of the 2019 Budget of Continuity" (PowerPoint Presentation, Abuja, Nigeria, December 20, 2019), https://budgetoffice.gov.ng/index.php/breakdown-of-2019-fgn-budget-proposal?task=document.viewdoc&id=697.
[61] Eromo Egbejule, "Nigeria: the new Buhari budget," *Africa Report*, May 29, 2019, https://www.theafricareport.com/13463/nigeria-the-new-buhari-budget/.
[62] Udoma Udo Udoma, "Breakdown of 2019 FGN Budget Proposal."
[63] Nigeria Sovereign Investment Authority, "Nigeria Infrastructure Fund | Nigeria Sovereign Investment Authority - NSIA," accessed May 29, 2019, http://nsia.com.ng/investments/nigeria-infrastructure-fund.
[64] Kayode Fayemi, "2017 End of Year Ministerial Briefing," December 21, 2017, Abuja, Nigeria, transcript, 7.
[65] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) §19.
[66] "Illegal mining: FG strengthens Mines Surveillance Task Force, others with 50 vehicles," News and Media, Ministry of Mines and Steel Development, March 22, 2018, http://www.minesandsteel.gov.ng/2018/03/22/illegal-mining-fg-strengthens-mines-surveillance-task-force-others-with-50-vehicles/?ekfknglfkfcjmgdb.

MIREMCOS are across different states and the extent of financial and logistical support received by them are unclear.

Reducing exposure to mercury, lead, and other harmful chemical substances

The government has acknowledged the health risks that chemical substances such as mercury and lead pose to ASM operators, in particular artisanal and small-scale gold mining (ASGM) operators. Nigeria has signed and ratified the Minamata Convention on Mercury, a global treaty to protect human health and the environment from the adverse effects of mercury exposure.[67] The Convention requires each signatory to develop a National Action Plan (NAP) for the ASGM sector in their country (if applicable) to reduce emissions and releases of, and exposure to, mercury.[68] Nigeria is working with the United Nations Industrial Development Organization (UNIDO) and the World Health Organization (WHO) to prepare a NAP for managing mercury in the ASGM sector. The NAP project began in March 2016 and has an estimated completion date of December 2019.[69] Several government agencies, including the Federal Ministry of Environment (FME), the Federal Ministry of Health (FMH), and the MMSD, are contributing funding and resources to the project.[70] As part of the project, the MMSD will complete a national comprehensive analysis of the ASGM sector that includes an inventory of mercury use in the sector.[71]

Government agencies such as the FME, FMH, and MMSD are also collaborating with Doctors Without Borders/Médicins Sans Frontières (MSF) and other non-governmental organizations (NGO) on responding to and reducing lead poisoning. For example, the government provided funds for environmental remediation of affected villages in Zamfara state[72] and organized two conferences on lead poisoning associated with ASGM aimed at bringing international and national stakeholders together to find ways to minimize future outbreaks.[73]

[67] "Nigeria brings to 88 the number of Parties to the Minamata Convention," News, United Nations Environment Programme Minamata Convention on Mercury, February 2, 2018, http://www.mercuryconvention.org/DNNAdmin/AllENGLISHNewsEntry/tabid/3444/articleType/ArticleView/articleId/208090/language/en-US/Nigeria-brings-to-88-the-number-of-Parties-to-the-Minamata-Convention.aspx.
[68] United Nations Environment Programme, Minamata Convention on Mercury, Article 7, http://www.mercuryconvention.org/Portals/11/documents/Booklets/COP1%20version/Minamata-Convention-booklet-eng-full.pdf.
[69] "National Action Plan in Nigeria," UNIDO Open Data Platform, accessed May 29, 2019, https://open.unido.org/projects/NG/projects/150170.
[70] UNIDO, *UNIDO GEF-6 National Action Plan Nigeria submission signed*, December 17, 2015, 2, https://open.unido.org/api/documents/3869869/download/UNIDO%20GEF%206%20NAP%20Nigeria_submission%20signed.pdf.
[71] UNIDO, *National Action Plan Nigeria Annex C: Project Results Framework*.
[72] "Nigeria: Funds Released for Lead Cleanup," Human Rights Watch, January 29, 2013, https://www.hrw.org/news/2013/01/29/nigeria-funds-released-lead-cleanup#.
[73] "2nd International Conference on Lead Poisoning Associated with Artisanal Gold Mining in Nigeria, With Special Focus on Prevention," Lead Poisoning Conference, accessed May 29, 2019, https://www.nigerialeadconf.com/.

Presidential support for mining sector development

The President recently approved the Presidential Artisanal Gold Mining Development Initiative (PAGMI) designed to integrate artisanal gold mining activities along the value chain into Nigeria's legal, economic, and institutional framework. As a first step towards integration, the PAGMI will be used to fund a National Gold Purchase Program under which a special purpose vehicle jointly owned by the SMDF and participating states will buy, process, and sell gold mined by artisans in order to improve ASGM operators' market access.[74] The president's approval of the PAGMI signifies the importance that formalization is beginning to hold for the government. Presidential support will be key to ensuring that the PAGMI and the above modernization efforts continue to receive support and funding from the government and, eventually, become substantial enough to overcome existing investor perceptions of Nigeria and an identified trust deficit.

[74] Solid Minerals Development Fund, *Presidential Gold Initiative*, 2.

1.4 Risk environment

The Nigerian mining industry exists within a context of significant real and perceived risk. The perception of an elevated risk environment leads to lower investment in Nigeria. This has had a real effect on the amount of investment and lending to the mining sector. The mining and quarrying sector has consistently received minimal credit.[75] Most recently, the mining and quarrying sector received only N20.69 billion in the fourth quarter of 2018, which is 0.14% of the total credit provided to the private sector.[76] This lack of lending and investment has an impact on artisanal miners' ability to upgrade their equipment, the ability of the government to attract medium- and large-scale industrial miners, and everything in between. The perceptions of corruption, political risk and the ease of doing business are especially important to ameliorate in order to improve the health of the mining sector. While providing recommendations on how to improve each of these is not within the scope of this project, it is important to note how each of these perceptions affects the mining sector and limits the opportunity for systemic change in the industry.

Nigeria has a reputation for widespread corruption. Whether this is fair or not, it has an effect on investment. According to Transparency International, Nigeria ranks 144th out of 180 in the 2018 Corruption Perceptions Index.[77] Transparency International was cautiously optimistic about some of the anti-corruption measures that President Buhari has undertaken, but they have noted that the results of these initiatives have not been seen yet.[78] While ASM practitioners will likely continue to operate in Nigeria despite perceived or actual corruption, all corrupt payments eat into their profits and affect their already meager earnings. Larger mining companies have shied away from Nigeria, in part due to the perception of corruption and the extra cost and risk that corruption adds to an LSM project.

The perceived political and security risks of operating in Nigeria is another area of concern. This is of particular concern for foreign direct investment, but it also affects small-scale miners. According to WillisTowersWatson, a leading international insurance firm, Nigeria is a medium-high risk country, with a very high risk of terrorism, a medium-high risk of political violence and a

Nigeria's elevated risk

144th in Corruptions Perceptions Index

146th in Ease of Doing Business Index

[75] National Bureau of Statistics, *Selected Banking Sector Data: Sectorial Breakdown of Credit, ePayment Channels and Staff Strength (Q4 2018)*, February 2019, 28.
[76] National Bureau of Statistics, *Selected Banking Sector Data*, 2-5.
[77] "Corruption Perceptions Index 2018," Transparency International, accessed May 28, 2019, https://www.transparency.org/cpi2018.
[78] "Sub-Saharan Africa: Undemocratic Regimes Undermine Anti-Corruption Efforts," Transparency International, January 29, 2019, https://www.transparency.org/news/feature/cpi2018-subsaharan-africa-regional-analysis.

medium-high risk of expropriation.[79] For international majors, the risks of political instability and the expropriation of mining sites are worrisome. The additional risk means that profit margins have to be especially attractive in order for the risk of capital to be worth it. The ongoing court case over a lucrative oil field between the international oil company Shell and the Nigerian firm Malabu Oil & Gas, which is controlled by a former Nigerian Minister of Petroleum,[80] shows the political risks of international companies investing in the natural resources sector in Nigeria.

Another headwind facing Nigeria is the perception that it is difficult to engage in business in the country. According to the World Bank's Ease of Doing Business Index, Nigeria ranks 146th in the world in terms of the ease of operating a business.[81] This perception can lead to fewer businesses being started and lower investments in the Nigerian economy as a whole. In the mining sector, this can be expressed in terms of the regulatory framework, including the cost and complexity of setting up a mining business. For artisanal miners, this complexity and cost can be a barrier to entry. In order to encourage the formalization of artisanal miners and to attract larger investments, it is important to improve the ease of doing business.

[79] "Winter 2018 Political Risk Index," Willis Towers Watson, December 5, 2018, https://www.willistowerswatson.com/en/insights/2018/12/the-political-risk-index-analysing-patterns-in-the-worlds-most-vulnerable-countries.
[80] Libby George and Shadia Nasralla, "Don't Neglect to Pay the Middleman: How Shell and Eni Ended up on trial," *Reuters*, May 20, 2018, https://www.reuters.com/article/us-eni-shell-nigeria-corruption-idUSKCN1IL0XH.
[81] "Ease of Doing Business Index," Data, World Bank, accessed March 15, 2019, https://data.worldbank.org/indicator/IC.BUS.EASE.XQ.

1.5 Attracting investment

The real and perceived risk environment in Nigeria has so far prevented any large scale investment in the mining sector. As mentioned in section 1.1, this drove the government to realign its strategic focus to be on artisanal mining. This section outlines how doing so may contribute to increased FDI and other investment in the sector. As explained below, a strategic focus on crucial leverage points such as the informal artisanal mining sector can unlock substantial systemic change.[82] Hence, successfully formalizing artisanal miners could contribute to increased FDI, investments from large-scale mining companies, upstream and downstream investments, and increased FDI directly into the artisanal mining sector. The link, however, is not direct. Simply providing a proof of concept will likely not be enough to overcome the significant contextual barriers preventing large scale investment.

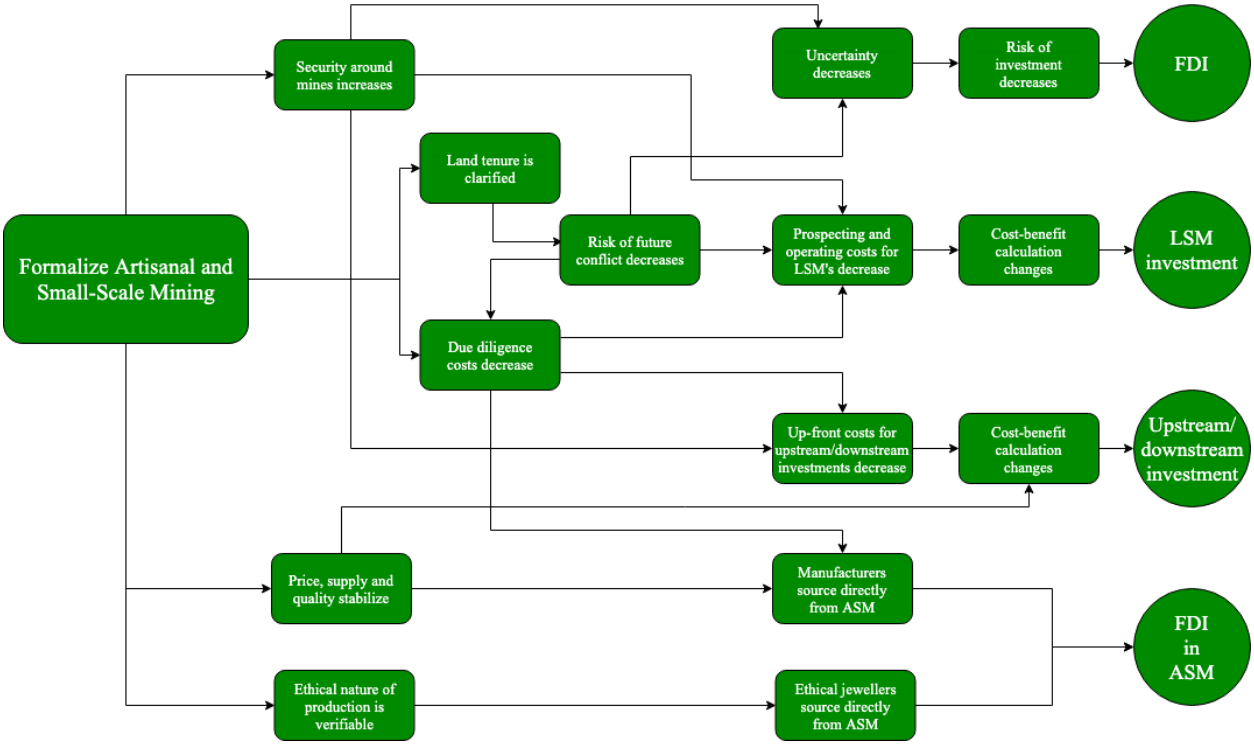

Figure 4: Path from formalizing mining to investment (*source*: Capstone team)

As discussed in section 1.4, a major impediment to foreign direct investment in Nigeria is the associated security and investment risk. Investors' risk perceptions may be influenced by a multitude of different factors, many unrelated to the government's efforts in the mining sector. For example, continued security threats from Boko Haram, inter-communal violence, and

[82] UNITAR & UN Environment, "Handbook for Developing National ASGM Formalization Strategies within National Action Plans" (Geneva: UNITAR & UN Environment, 2018), page 11.

banditry contribute to the high security risk profile.[83] However, formalizing artisanal miners may help reduce the investment uncertainty and reduce some of the security risks. It could, for example, reduce the risk stemming from potential conflicts with artisanal miners by clarifying land tenure. Disputes between local communities and multinational corporations are becoming increasingly common and costly for investors around the world and are most commonly associated with unclear or overlapping tenure.[84] Furthermore, informal miners may be hard to engage with and their actions are often perceived as unpredictable, especially by companies. Formalizing miners into recognized units and providing clear legal rights would help companies deal with conflicts more effectively.[85] Hence, formalization may decrease both the overall risk of conflict and facilitate conflict resolution – reducing the overall risk associated with the investment. Formalization may also decrease the perceived security risk. Informal mines are often connected with criminal activity and banditry. As such, they can be a driver of insecurity within mineral-rich regions. If done correctly, formalization may decrease such instability and contribute to investor confidence.

Formalizing artisanal miners may also help attract majors and juniors to the sector. Currently, LSM is not cost-benefit justified in Nigeria. The costs associated with prospecting and operating the mines are too significant.[86] While formalization will not help reduce the massive costs associated with mineral transports or geological data gathering in Nigeria, it may decrease prospecting and operating costs at the margin. Clarifying land tenure and increasing the security around mines will help decrease LSM's prospecting and operating costs in similar ways to which it would reduce associated investment risks. Mining companies would, additionally, gain from formalization through decreased due diligence costs. According to their own sustainability policies, major mining companies no longer operate without extensive due diligence following internal and external guidelines such as the *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*. Nigeria fits the definition of a high-risk area as defined by the OECD,[87] so responsible companies would have to establish specific management systems to support due diligence and develop strong grievance mechanisms,

[83] Felix Onuah, Alexis Akwagyiram, and Catherine Evans, "Nigeria Suspends Mining in Zamfara State after Banditry Surges," *Reuters*, April 7, 2019, https://www.reuters.com/article/us-nigeria-security/nigeria-suspends-mining-in-zamfara-state-after-banditry-surges-idUSKCN1RJ0IS; Adam Kendall (McKinsey), interview by Columbia Capstone team, Abuja, March 22, 2019; Fola Oyeyinka (Special Adviser on Economic Affairs, Office of the President), interview by Columbia Capstone team, Abuja, March 20, 2019.

[84] Morgane Fritz et al., *Global Trends in Artisanal and Small-Scale Mining (ASM): A Review of Key Numbers and Issues*, (IISD, January 2018), 33.

[85] Remi Pelon and Gotthard Walser, *Mining Together: Large-Scale Mining Meets Artisanal Mining, A Guide for Action*, (CASM and the World Bank, 2009), 22-23.

[86] NEXIM, interview by Columbia Capstone team, Abuja, March 19, 2019; "Attracting Foreign Investment to Build Nigeria's Mining Sector," Mining Review Africa, September 21, 2018, https://www.miningreview.com/event-news/attracting-foreign-investment-into-nigerias-mining-sector/.

[87] OECD, ed., *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*, 3rd ed. (Paris: OECD Publishing, 2016), 13.

The OECD defines conflict-affected and high-risk areas in the following manner: "Conflict-affected and high-risk areas are identified by the presence of armed conflict, widespread violence or other risks of harm to people. Armed conflict may take a variety of forms, such as a conflict of international or non-international character, which may involve two or more states, or may consist of wars of liberation, or insurgencies, civil wars, etc. High-risk areas may include areas of political instability or repression, institutional weakness, insecurity, collapse of civil infrastructure and widespread violence. Such areas are often characterised by widespread human rights abuses and violations of national or international law"

traceability schemes, and physical security practices.[88] The guidance further recommends that a prospective company invest in and help the government formalize artisanal miners. Companies are unlikely to be able to justify these additional expenses when other barriers are so extensive. Formalizing the sector may facilitate and thereby decrease the cost of a company's due diligence operations and may, in the long run, contribute to de-classifying Nigeria as a high-risk area for due diligence purposes.

Potential upstream and downstream investors face similar due diligence requirements, as defined in the OECD Due Diligence Guidance, and investment uncertainties. The government is aware of many of these constraints, as they have concluded that the economics do not justify the establishment of a refinery in Nigeria as part of the proposed Gold Purchase Program (see section 2.3 for further discussion of this program).[89] Increased security and decreased due diligence costs may slightly change the economics and increase the probability of investments being profitable. Moreover, formalizing artisanal miners will stabilize the price, supply, and quality of their product. As a result, upstream and downstream investors will be able to predict future cost and earnings more accurately. Decreased costs and increased predictability will likely help potential investors in upstream and downstream operations justify their investments.

Lastly, formalizing artisanal miners will help international buyers source directly from Nigerian artisanal miners. If potential buyers can verify the ethical nature of gold and gemstones and the sector reaches the standards set by international certification schemes, ethical jewelers are likely to be interested in buying minerals directly from miners. Ethical jewelry is a growth industry and has the potential to become a substantial source of investment and establish ASM as an export industry. Manufacturers may also be interested in directly sourcing materials from ASM. The United States Agency for International Development (USAID) has, for example, found that U.S. manufacturers would be interested in directly sourcing artisanal diamonds from Liberia and the Central African Republic if it was commercially viable to do so.[90] Manufacturers especially highlighted that inconsistency and uncertainty of supply posed severe challenges. Formalizing ASM in Nigeria will likely increase both the consistency and the certainty of the supply – contributing to the commercial viability of direct sourcing.

A proof of concept will not be enough to drastically increase investment in Nigeria by international companies, investors or buyers. The underlying risks associated with such investments and the cost-benefit calculation of companies must change if the Nigerian mining sector wishes to benefit from international investments. Formalizing artisanal miners has the potential to decrease both risks and costs. The government must, however, ensure that formalization contributes to increased security, clarified land tenure, simplified due diligence, supply stability, and ethical certification for international actors to invest in Nigeria. If not, formalizing artisanal miners will not help the government achieve its long-term vision for the solid minerals sector.

[88] OECD, ed., *OECD Due Diligence Guidance*, 17-19.
[89] Solid Minerals Development Fund, *Presidential Gold Initiative*, 26-27.
[90] Steven Van Backstael, Estelle Levin, and Ruby Weinberg, *Property Rights and Artisanal Diamond Development: Feasibility of Direct Marketing of Artisanal Diamonds From Liberia and CAR to the USA*, (USAID, June 2011), viii.

2. Current registration and incentives

Assuming artisanal miners are aware of the possibility of becoming formal operators in the sector, they make the decision of whether or not to register based on the real and perceived costs and benefits associated with formal operations. Burdensome registration processes, taxes and uncertainty contribute to the costs while access to services and higher prices contribute to the benefits. In Nigeria today, the costs outweigh the benefits for most artisanal miners. There is an existing mineral title for mining that can be obtained by ASM operators that would allow artisanal miners to formally operate within the legal system. It is our understanding, that, in practice, fulfilling the necessary requirements is prohibitively difficult for artisanal miners. Additionally, we understand that, in practice, existing incentives for artisanal miners to formalize are very limited. Below, we detail the current registration process artisanal miners must complete in order to acquire the legal right to mine (section 2.1), current formalization incentives (section 2.2), and an important new formalization initiative by the government (section 2.3) to lay the ground for our analysis of gaps in current processes and our recommendations to the SMDF on how to close them.

2.1 Registration process

In Nigeria, mining licenses are regulated through a cadastre system. A mining cadastre is the principal public institution that manages mining titles in a country. As stated by the World Bank, a well-functioning cadastre thereby "forms the cornerstone of good mineral resource management in a country."[91] One key principle of the system is that mineral resources belong to the state.[92] As such, the state needs to create a licensing system in which it can guarantee good use of national resources and receive royalties and taxes.

The 2007 Act establishes Nigeria's cadastre system. According to Section 5(1) of the 2007 Act, the Nigerian MCO is responsible for the management and administration of mineral titles. Within Nigeria's cadastre system, the applicable mineral title for artisanal miners is the Small Scale Mining Lease (SSML).[93] An SSML is the only mineral title that individuals and cooperatives can obtain to get the right to mine commercially.[94] Section 49 establishes that a qualified applicant for an SSML must be a Nigerian citizen, a Nigerian mining co-operative, or a corporate body. The applicant

[91] Enrique Ortega Girones, and Alexandra Pugachevsky, "Mineral Rights Cadastre," Extractive Industries for Development Series, World Bank, June 2009, http://siteresources.worldbank.org/EXTOGMC/Resources/ei_for_development_4.pdf, 1.
[92] Enrique Ortega Girones, and Alexandra Pugachevsky, 2.
[93] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) § 49, 90 and 91.
[94] Only corporate bodies may apply for a Mining Lease, the other mineral title in the 2007 Act that gives holders the right to mine any mineral commercially. Individuals and cooperatives may apply for a Quarry Lease, but this limits the minerals that a lease holder can mine to those that can be quarried (e.g., limestone).

(including, for cooperatives and corporate bodies, all members or directors of the applicant or any stakeholder owning a controlling share) must be legally capable and not have been convicted of a criminal offense.[95] An SSML can cover an area between 5 acres and 3 square kilometers in size.[96]

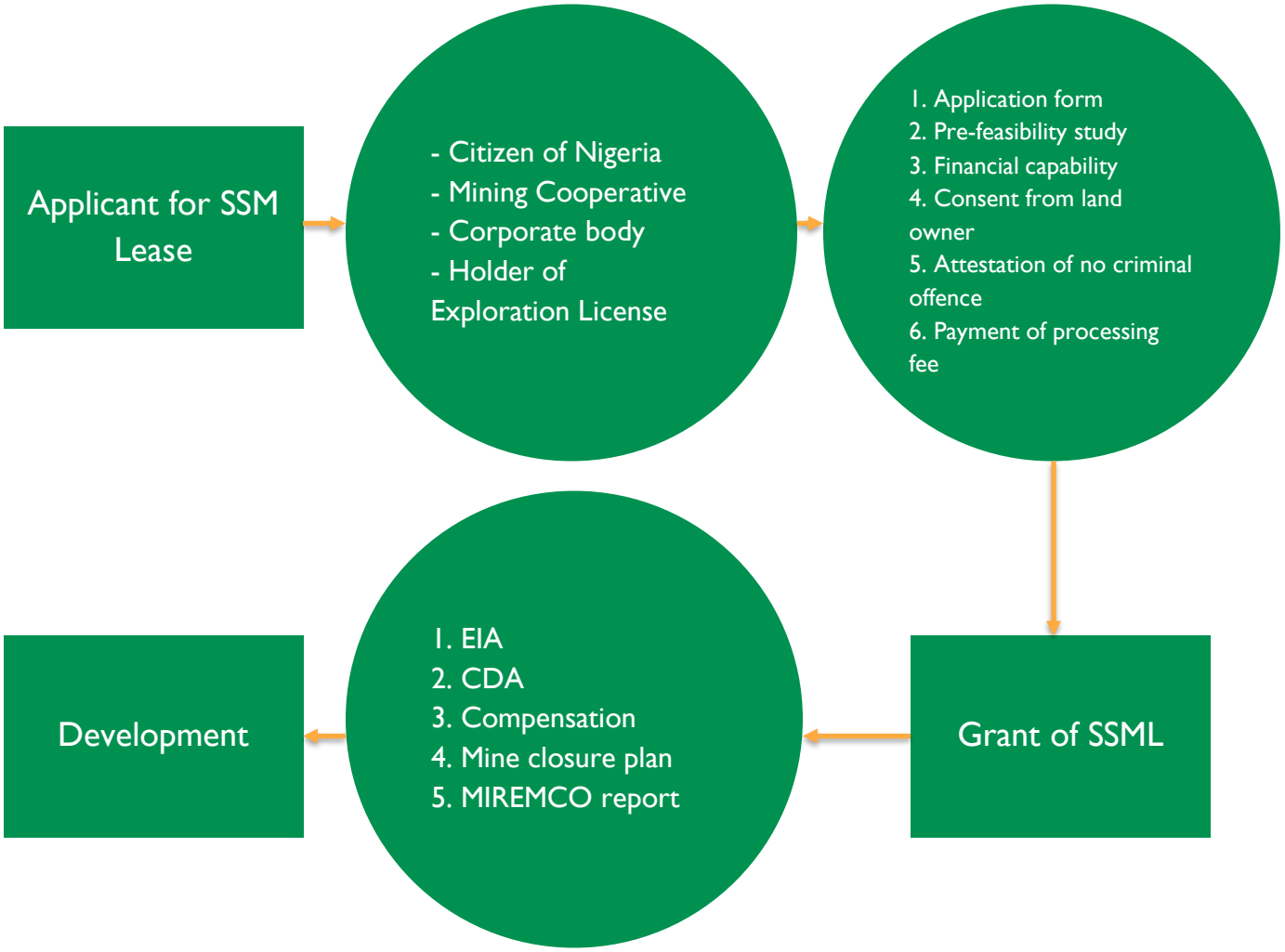

Figure 5: SSML application process and requirements (*source*: Capstone team)

To obtain an SSML, a miner has to fill out several application forms, provide a pre-feasibility report to indicate that the proposed mining activity can be done in a cost-effective and timely manner, provide bank guarantees of financial capabilities, produce an engineering report to prove technical competence, attest to having no criminal record, and obtain consent from landowners. After the mineral title has been granted, the applicant's environmental impact assessment (EIA), community development agreement (CDA), compensation, mine closure plan and reports from state bodies are checked to ensure that the mineral title is being properly used.[97]

[95] Nigerian Minerals and Mining Regulations 2011, S. I. 47 (2011) § 46(a)(i-iii).
[96] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) § 90.
[97] "Guidelines on Mineral Titles Application," Nigeria Mining Cadastre Office, January 2014, 6 and 10-12, http://www.minesandsteel.gov.ng/wp-content/uploads/2016/10/Guidelines-for-Mineral-Title-Applications.pdf.

An applicant has to pay a number of fees throughout the process. A processing fee needs to be paid to the MCO for mineral title registration.[98] The processing fee was set at ₦10,000 (around $30) for an SSML in the 2011 Regulations, but may be adjusted at the discretion of the Minister of State for the MMSD.[99] Review of an EIA assessment by the FME costs ₦50,000 (around $140).[100] The Council of Nigerian Mining Engineers and Geoscientists (COMEG) charges a one-time registration fee of ₦50,000 and an annual practicing fee of ₦20,000 for artisanal and small-scale miners with an SSML.[101] While COMEG registration is not required to acquire or maintain a license, it helps with the process, as a pre-feasibility report sealed and signed by COMEG is required to obtain an SSML. The holder also has to pay an annual surface rent and a rehabilitation fee according to the MMSD schedule. The surface rent was set at ₦10,000 in the 2011 Regulations, but may be adjusted at the discretion of the Minister of State for the MMSD.[102] Additionally, to access the extension services for cooperatives of small-scale and artisanal miners described as being offered in the 2007 Act (see section 2.2), mining cooperatives must pay a registration fee to the Artisanal and Small-Scale Mining Department within the MMSD. The registration fee was set at ₦5,000 (around $15) in the 2011 Regulations, but, as is the case with the processing fee and surface rent, may be adjusted at the discretion of the Minister of State for the MMSD.[103]

The MCO oversees the process of applying for and renewing a license. Acquiring guarantees and obtaining data, however, also involves the COMEG, the NGSA, the Federal Ministry of Environment (responsible for the EIA),[104] the police, and private banks. Additionally, currently applications must be filed in Abuja, although the MCO is in the process of developing an online application system and building additional offices across the six geopolitical zones (see section 1.3 for additional information). We have not been able to confidently conclude how long it takes an individual to secure these guarantees or how much travel is involved in the process. We understand, however, that once an applicant has secured the guarantees, completed the forms and filed the application with the MCO, it takes about 1-3 months for the decision to be finalized.[105]

[98] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) § 10(a).
[99] Nigerian Minerals and Mining Regulations 2011, S. I. 47 (2011), Schedule 1 § 1.
[100] "Application for EIA," Federal Ministry of Environment, accessed May 29, 2019, http://environment.gov.ng/application-for-eia/.
[101] Council of Nigerian Mining Engineers and Geoscientists, *New Approved Rates for Registration and Practicing fees*, February 2013, http://www.comeg.gov.ng/downloads.
[102] Nigerian Minerals and Mining Regulations 2011, S. I. 47 (2011), Schedule 1 § 2.
[103] Nigerian Minerals and Mining Regulations 2011, S. I. 47 (2011), Schedule 1 § 20.
[104] "About Us", National Environmental Standards and Regulations Enforcement Agency, accessed May 29, 2019, http://www.nesrea.gov.ng/about-us/.
[105] Nigerian Mining Cadastre Office, interview by Columbia Capstone team, Abuja, March 20, 2019

From our stakeholder interviews and research, we identified the following challenges in the current registration process:

The requirements to obtain and maintain a small scale mining lease are cumbersome and too extensive

The current process requires individuals to have corporate and legal knowledge and commission expensive studies. Moreover, artisanal miners need to be able to get a bank to guarantee them. In a country with a 51% literacy rate, where 50% of the population lives in rural areas[106] and where only 40% of lower-middle income adults own a bank account,[107] most miners do not have the means or the knowledge required to complete the registration. Private banks, furthermore, do not generally provide loans to artisanal miners because they have no collateral.[108] The process also lacks transparency and involves travel to the MCO headquarters in Abuja. As discussed in section 1.3, the MCO is, however, working to make the process easier by establishing local offices and allowing for online applications and tracking.

Moreover, it is hard for an artisanal miner to maintain the lease once it has been granted. An EIA, a CDA, a compensation plan, a mine closure plan, and reports from states are all required by law. However, in practice, due to a lack of resources to perform the tests, a lack of supervision from the government, and an underestimate of the environmental and social impacts of mining in the mining community, they are rarely implemented.[109]

Employment structures are often informal and lack supervision

Once an individual acquires a mineral title, the license holder may hire artisanal miners to do the exploration or let artisanal miners mine on the licensed land. There is no effective supervision of whether miners receive a fair wage or whether exploration and production is legal, safe and environmental-friendly under such employment. Currently, the MCO only records information about the license holder and does not know the details of who the license holder employs. For supervision, the MCO mainly focuses on revoking licenses where no mining activity is being carried out at all.[110]

There is a lack of a verifiable identification processes for artisanal miners

Artisanal miners may often lack identification documents. In Nigeria, birth registration is estimated to cover only 38–42% of total births.[111] The National Identity Management

[106] "Nigeria: Education and Literacy," UNESCO Institute of Statistics, http://uis.unesco.org/country/NG. 2008 literacy rate; 2017 rural population (%)
[107] Global Findex Database 2017 (accessed April 30, 2019), https://globalfindex.worldbank.org/. Nigeria 2017 lower-middle income age 15+ with an account (%)
[108] Nigerian Export-Import Bank, interview by Columbia Capstone team, Abuja, March 19, 2019.
[109] Nigerian Mining Cadastre Office, interview by Columbia Capstone team, Abuja, March 20, 2019.
[110] Nigerian Mining Cadastre Office, interview by Columbia Capstone team, Abuja, March 20, 2019.
[111] World Bank Group, *Identification for Development Country Diagnostic: Nigeria* (Washington, DC: International Bank for Reconstruction and Development/The World Bank, 2016), 17, http://documents.worldbank.org/curated/en/136541489666581589/pdf/113567-REPL-Nigeria-ID4D-Diagnostics-Web.pdf.

Commission, the lead government agency in Nigeria responsible for identification, is in the process of implementing a national identity system that uses National Identification Numbers (NIN) and biometric identification (ID) cards to register and identify every individual in Nigeria. As of 2015, however, only 4% of the population was covered by the NIN system. More recently in 2014, the Central Bank of Nigeria (CBN) launched its own centralized biometric identification system, the Bank Verification Number (BVN). As of 2015, 52% of adults in Nigeria with bank accounts were covered by the BVN system.[112] Since artisanal miners usually live in rural and remote communities and may not have bank accounts, they are likely excluded from existing ID systems. This suggests the starting point of formalizing artisanal miners should be getting them an individual ID, before entering them into the cadastre system.

The SSML is not the ideal mineral title for artisanal miners

The cumbersome process and the guarantees required to receive and maintain the rights to a SSML make it hard for artisanal miners to operate within the legal system. Experts and practitioners have also concluded that the process excludes miners from applying.[113] Currently, the proposed mining bill adds a new mining license for artisanal mining that covers smaller areas, is for a shorter duration, and may involve fewer requirements (to be determined in the corresponding regulations should the bill be passed). The proposed bill and corresponding regulations provide an opportunity to design a mineral title more suited to the mining practices and capacities of artisanal miners than the SSML.

[112] International Telecommunication Union Telecommunication Standardization Sector, Focus Group Digital Financial Services, *Review of National Identity Programs*, May 2016, 107-113, https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/09_2016/Review%20of%20National%20Identity%20Programs.pdf.
[113] Dr. Emeka Okengwu, interview by Columbia Capstone team, Abuja, March 18, 2019; Nigerian Mining Cadastre Office, interview by Columbia Capstone team, Abuja, March 20, 2019.

2.2 Formalization incentives

On paper, the current institutional framework guiding the mining sector provides incentives for ASM operators to formalize. According to the 2007 Act, the MMSD should provide a number of extension services to registered mining cooperatives. The services include geological information, mineral reserve evaluations, skills training, access to mining equipment, environmental impact assessment reports, and workshops on legal, marketing and business skills.[114] The Act further establishes that the SMDF should provide funding for these services.[115] The 2016 Roadmap aims to expand the formalization incentives.[116] To accomplish this, the roadmap specifies that the government should "facilitate expansion of equipment leasing companies into specialized mining equipment," "provide training programmes to artisanal and small-scale miners with strong emphasis on technical skill development, environmental protection and sustainable business management," "expand financial access to available funds," and "provide counseling and health care services."[117]

It is our understanding that, in practice, very few of the outlined services are provided as incentives for miners to formalize.[118] Interviewed stakeholders provided few details on the topic. The few services that exist face substantial challenges. The NGSA, for example, organizes mineral clinics open to all the last Saturday of every month at state offices nationwide at which miners, regardless of whether they are registered, can receive geological information and advice and test samples. Few artisanal miners, however, have accessed these services. Officials have recognized, however, that due to high illiteracy, artisanal miners may not be able to read the data provided, and that even if they are literate, the geodata currently available is likely too complex for artisanal miners to understand and use it.[119]Additionally, the MMSD tried to provide artisanal miners with equipment as part of an earlier World Bank project that ran from 2012 to 2015,[120] including wet milling machines and Egoli machines,[121] but the miners found the equipment to be too complex to operate and not portable enough and thus stopped using it after a short period of time[122].

We have not been able to determine the exact reason for the under-provision of services and the inability of these services to incentivize miners to formalize. Potential reasons include that

[114] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) § 91.
[115] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007) § 34(d).
[116] Ministry of Mines and Steel Development, *Roadmap*, 48.
[117] Ministry of Mines and Steel Development, *Roadmap*, 61-62.
[118] Nigerian Mining Cadastre Office, interview by Columbia Capstone team, Abuja, March 20, 2019; Nigerian Geological Survey Agency, interview by Columbia Capstone team, Abuja, March 20, 2019; World Bank MinDiver Team at MMSD, interview by Columbia Capstone team, Abuja, March 19, 2019.
[119] Nigerian Geological Survey Agency, interview by Columbia Capstone team, Abuja, March 20, 2019.
[120] "Australia, Canada, & World Bank to Support Nigeria's Mining Sector Reforms for Greater Contribution to the Economy," World Bank Nigeria, Facebook, July 2, 2013, https://www.facebook.com/notes/world-bank-nigeria/australia-canada-world-bank-to-support-nigerias-mining-sector-reforms-for-greate/593545004018810/.
[121] *The Wet Milling Machine sites in Bagega*, Follow the Money, YouTube, July 16, 2014, https://www.youtube.com/watch?v=chiAAfA965E.
[122] World Bank MinDiver, interview by Columbia Capstone team, Abuja, March 19, 2019.

miners do not know about the extent of the services offered or that the services do not outweigh the costs associated with registration. Alternatively, the government may not provide services in a manner that allows miners to take advantage of them. Lastly, the services that the government currently provides and is required by the 2007 Act to provide may not be the most effective to incentivize formalization. We expand on this discussion in section 4.1 and 4.2.

The government has, however, taken some important steps to increase artisanal miners' access to capital. In 2017, The MMSD signed a Memorandum of Understanding (MOU) with the Bank of Industry, a Nigerian development finance institution, to manage a $14 million fund that would support ASM projects. ASM operators unable to get loans from regular banks would be able to access capital from the fund, ₦100,00-10 million (~$275-28,000) for a miner certified as artisanal under the scheme[123], to cover the costs of equipment and payments for drilling, access to geological data, and other mining services.[124] Disbursements from the fund have not yet begun, but may begin in the near future under the pilot of the National Gold Purchase Program (see section 2.3 below). The intention, as stated by the Minister of MMSD, Hon. Abubakar Bawa Bwari, is for the SMDF to help manage disbursements from the fund and, together with private sector companies, start an equipment-leasing and hire-purchase scheme for ASM operators.[125]

In addition to the SMDF-run fund disbursements described above, the Nigerian Export-Import Bank (NEXIM) is interested in expanding the bank's role in the future, as solid minerals are one of the bank's focus areas for intervention. NEXIM currently provides export credit, risk-bearing, trade and market information, and advisory services to the solid minerals sector.[126] NEXIM's prior interventions have primarily been direct funding to miners and supporting the Miners Association of Nigeria (MAN) to move from an out-of-the-way office in Jos to a more centralized one in Abuja, including providing the MAN with free office space at NEXIM's headquarters.[127] NEXIM is now looking to collaborate with MMSD to provide loans and equipment cluster financing to groups of miners to allow them to afford modern-day mining equipment and mining services.[128]

[123] Miners certified as small-scale under the scheme would be able to access ₦10 million-100 million.
[124] "FG, BOI launch N5bn funding support for Artisanal and Small Scale Miners," News & Media, Ministry of Mines and Steel Development, August 29, 2017, http://www.minesandsteel.gov.ng/2017/08/29/fg-boi-launch-n5bn-funding-support-for-artisanal-and-small-scale-miners/.
[125] Hon. Abubakar Bawa Bwari, "Nigeria Beyond Oil - 3yrs Account of Stewardship in the Minerals and Metal Sector," Industry news, Nigeria Mining Week, January 25, 2019, http://www.nigeriaminingweek.com/NIGERIA-BEYOND-OIL-3yrs-Account-of-Stewardship-in-the-Minerals-and-Metal-Sector.
[126] Nigerian Export-Import Bank, interview by Columbia Capstone Team, Abuja, March 19, 2019.
[127] "The NEXIM Bank and The World Bank to Collaborate on Developing Nigeria's Mining Sector," Nigerian Export-Import Bank, November 11, 2015, https://neximbank.africa-newsroom.com/press/the-nexim-bank-and-the-world-bank-to-collaborate-on-developing-nigerias-mining-sector?lang=en.
[128] Nigerian Export-Import Bank, interview by Columbia Capstone team, Abuja, March 19, 2019.

2.3 New initiatives

While only accounting for 0.18% of national GDP,[129] the mining industry in Nigeria has the potential for rapid growth due to the large number of informal artisanal miners whose output is not currently accounted for in that statistic. At present, the oil industry dominates the country, but also leaves it susceptible to economic shocks and price fluctuations relative to global market demand. To reduce such dependency, the government has initiated new programs focused on formalizing artisanal gold miners. According to government figures, these miners account for 100,000 to 150,000 jobs and directly support another 500,000 individuals, but because they are not formalized, they do not contribute to income taxes, and are deprived from access to financing and government labor protections.[130]

In order to help formalize the mining sector, the government developed the Presidential Artisanal Gold Mining Development Initiative (PAGMI). It is estimated that if the program is rolled out as planned (discussed further below), it will help create 100,000 to 150,000 new jobs within a year of implementation. The program also estimates that the daily income for individual miners will increase by approximately a factor of five due to higher productivity, greater recovery rates, more mechanized operations, and access to improved geological data. The government aims to improve the health of local communities and prevent tragedies like the 7,000 incidences of lead poisoning, and resulting 700 deaths in Zamfara and Kebbi states due to poor mining practices. Through the PAGMI, the government hopes to promote safer mining practices and help control the use of mercury and cyanide in mining activities. By formalizing more artisanal miners, the government anticipates that it will receive higher taxes and royalties on mining activities. At present, the government estimates that only 0.008% of gold is being processed through official channels.[131] If the PAGMI achieves its medium-term target of formalizing 30-50% of the sector, the income tax benefit to the government could increase by $30-51 million with royalties accounting for an additional $9-16 million.[132]

To address some of the shortcomings identified in the current formalization regime and to further incentivize miners to formalize, the government has designed *The National Gold Purchase Program*, which derives from the PAGMI. This program contains three parts related to the development, procurement and refining of gold. First, a Federal Gold Reserve pilot program was conducted to establish and verify the feasibility and ease of a gold trading platform and the structure of a gold purchasing system. Second, a National Gold Purchase scheme to formalize artisanal gold mining

[129] National Bureau of Statistics, *Nigerian Gross Domestic Product Report*, 142
[130] Solid Minerals Development Fund, *Presidential Gold Initiative*, 2.
[131] Solid Minerals Development Fund, *Presidential Gold Initiative*, 3.
[132] Solid Minerals Development Fund, *Presidential Gold Initiative*, 3.

activities will be piloted in Kebbi and Osun states.[133] Lastly, the plan discusses how gold from the artisanal mining sector will be refined into gold bars for supply to the National Treasury.[134]

The National Gold Purchase pilot program will be overseen by the SMDF and will include the registration of miners and small-scale companies that want to participate in the program, along with the creation of buying centers where the gold will be bought from the formalized artisanal miners. The SMDF will also provide loans for equipment and logistics to registered participants. Moreover, extension services will, according to the program, be offered to miners to ensure that best practices are being implemented. A special purpose vehicle (SPV), managed by the SMDF, will be incorporated to run the program and be responsible for coordinating the procurement of the gold and establishing the buying centers in Kebbi and Osun states in areas where gold is mined (see section 4.5 for further discussion of the management of the buying centers).[135]

Ultimately, the Federal Government of Nigeria will have the first option to purchase the gold outright should it decide to operate a Federal Gold Reserve program and no markup will be added if purchased for the Central Bank of Nigeria.

[133] At the time of writing, and to the best of our knowledge, the pilot programs have not yet been implemented in Kebbi and Osun states, although they were initially scheduled to start in 2019.
[134] Federal Government of Nigeria, *Details of the National Gold Purchase Program*, 2018.
[135] Federal Government of Nigeria, *Details of the National Gold Purchase Program*, 2-3.

3. Case studies and international best-practices

Formalizing artisanal miners is not an easy task. Developing countries have tried to formalize the sector with varying levels of success since, at least, the late 1980s.[136] More recently, UN agencies, the World Bank, NGOs and academia have started to study effective formalization measures and to advise countries trying to formalize the sector. As a result, a body of lessons learned and best-practice has emerged. This section outlines some of the general best practices most relevant to Nigeria and closely analyzes two case-studies -- Ghana and Mongolia -- to collect lessons learned.

3.1 International best-practice

3.1.1 Gold purchase programs

Nigeria is not the first country to establish a state gold-buying program as a means of formalizing its artisanal mining sector. Countries such as Mongolia, Ghana, Côte d'Ivoire, Bolivia and Peru have all tried it before. While these experiences have provided some international best-practice, there is still considerable debate about some aspects of the programs. There is, for example, continued debate about the proper level of decentralization and the role of middlemen in the programs (discussed further in section 4.4). Despite continued debate, a few general lessons have been learned.

Decentralize

First, it is widely recognized that some level of decentralization is necessary for success. Buying centers should be located in strategic locations determined by distance from mining areas and existing market structures. If centers are not decentralized enough they will reinforce existing social hierarchies and the power of middlemen by potentially giving them monopolistic positions in their ability to transport the gold from the mine to the center.[137] Buying programs in Ghana,

[136] RCS Global, "State Gold-Buying Programmes: Effective Instruments to Reform the Artisanal and Small-Scale Gold Mining Sector?" (London: IIED, 2016), page 12.
[137] UNITAR & UN Environment, "Handbook for Developing National ASGM Formalization Strategies within National Action Plans" (Geneva: UNITAR & UN Environment, 2018), page 42.

Colombia, Bolivia and the Philippines all lost the ability to directly engage miners because centers were not strategically located in mining regions.[138] Conversely, gold buying centers should not try to attempt to completely bypass middlemen (discussed further in section 4.4).[139] One type of gold-buying centers that have found success are those that form a close relationship with local communities by either being located close to them or by establishing close ties. By closely cooperating with the existing community and operating within current social structures, centers become part of the local social fabric rather than disrupting it. The buying program in Côte d'Ivoire, for example, created village-level cooperative that included both miners and licensed buyers and were led by traditional village authorities.[140] Buying centers that establish close cooperation with communities also contribute to gradually building trust between the government and the local community. To further this role, the government may choose to give back some of the revenues from the centers to the local community and create stakeholder forums in which all involved parties are encouraged to participate.[141]

Phase requirements

Second, phasing the requirements placed on miners is usually a good way to lower the barrier of initial participation. It also gives the government the time needed to increase the capacity of miners to successfully go through the registration process. Some governments have even chosen to adopt a no questions asked policy to first establish themselves within communities. While such policies are not to be recommended everywhere, they show the importance of eliminating prohibitive requirements. Other countries, including Ghana, have struggled with not raising requirements enough over time, effectively sanctioning harmful practices.[142] It is important to note that by establishing buying centers, the government takes on the due diligence responsibilities associated with directly sourcing minerals from the artisanal mining sector. As such, the government has a responsibility to establish transparent governance and risk mitigation measures fully in line with the OECD Due Diligence Guidance. For further discussion of government responsibility and buying center management, see section 4.5.

Create sustainable price structures

Third, incentivising participation by offering high and stable prices may be an attractive option, but it can be detrimental to the financial stability of the program. Price incentives may also attract smuggling by offering higher prices than in neighbouring countries.[143] More successful schemes have provided miners market prices and instead incentivised participation through non-financial means. In Côte d'Ivoire, for example, the buying program offered miners 80% of the international

[138] Pact Institute, "A Golden Opportunity: Scoping Study of Artisanal and Small Scale Gold Mining in Zimbabwe" (Pact Institute, July 2015), page 25.
[139] Christina Villegas (Pact), interview by Columbia Capstone Team, New York, February 26, 2019.
[140] RCS Global, "State Gold-Buying Programmes: Effective Instruments to Reform the Artisanal and Small-Scale Gold Mining Sector?" (London: IIED, 2016), page 12.
[141] RCS Global, "State Gold-Buying Programmes: Effective Instruments to Reform the Artisanal and Small-Scale Gold Mining Sector?" (London: IIED, 2016), page 4 and 32.
[142] RCS Global, "State Gold-Buying Programmes: Effective Instruments to Reform the Artisanal and Small-Scale Gold Mining Sector?" (London: IIED, 2016), page 15.
[143] RCS Global, "State Gold-Buying Programmes: Effective Instruments to Reform the Artisanal and Small-Scale Gold Mining Sector?" (London: IIED, 2016), page 3.

price but incentivized participation by sharing an additional 12% of the profits from the centers with the community (8% was paid as a royalty to the state-owned mining company).[144]

3.1.2 Assistance and training

One of the major challenges artisanal miners may experience when attempting to adhere to legal requirements and international standards is a lack of technical capacity to meet the requirements. If artisanal miners receive little assistance with these processes, they may be more inclined to stay or revert back to being informal. Regardless of how attractive the economic incentives offered to formalized artisanal miners are, miners may choose not to formalize for the simple reason that meeting the requirements is too burdensome. To overcome this barrier, governments have provided direct assistance and training to miners.[145]

To take one example, Ethiopia implemented a large-scale project in selected rural mining communities to support artisanal miners, with a particular focus on women, from 2011-2017 with financial assistance from the Japan Social Development Fund (a collaboration between the World Bank and the Government of Japan).[146] A key aim of the project was increasing the formal participation and employment of female artisanal miners in the project communities. As such, training in business management, gender awareness, and legal principles for women in artisanal mining communities was included as a major project component. Of note, those doing the technical training took a "training of trainers" approach. Training occurred on a regional level and every women's group designated a certain number of representatives to travel and participate in the training activities. Women who participated would, in turn, organize training sessions for their communities to share what they learned, spreading the knowledge to a larger group of artisanal miners. Local and national government representatives also participated in the training in order to inform policy on a regional and national level.[147] Additional examples of assistance incentives used by Ghana and Mongolia, including training on sustainable mining practices, are discussed in sections 3.2 and 3.3 below.

[144] RCS Global, "State Gold-Buying Programmes: Effective Instruments to Reform the Artisanal and Small-Scale Gold Mining Sector?" (London: IIED, 2016), page 13.
[145] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 45-48.
[146] "Ethiopia: Support to Artisan Miners (JSDF)," Projects and Operations, World Bank, accessed May 29, 2019, http://projects.worldbank.org/P125487/ethiopia-support-artisan-miners-jsdf?lang=en&tab=overview.
[147] World Bank, *Ethiopia: Support to Artisan Miners (JSDF) (P125487) - Implementation Status and Results Report*, October 6, 2016, 3, http://documents.worldbank.org/curated/en/433561475808312503/pdf/ISR-Disclosable-P125487-10-06-2016-1475808298009.pdf.

3.1.3 Contextual understanding

A clear understanding of local dynamics and drivers is central to formalizing artisanal mining. According to Pact, a "lack of understanding of existing mining and trading dynamics" has doomed most formalization efforts, especially through state gold buying programs.[148] It is especially important that miners' physical, social and economic contexts are considered to understand the drivers behind miners' decisions to formalize or stay informal. Furthermore, local participation in the initial stages of the decision making process can facilitate the management of social issues and create local support, which has been shown to be critical to the success of the mining industry.[149]

One example of an intervention addressing the lack of local participation and understanding in formalization practices is the national ASM dialogue series conducted by the International Institute for Environment and Development (IIED). These dialogues aim to help decision makers identify solutions that promote formalized, rights-based, and productive artisanal mining within a more inclusive and responsible mining sector. By contracting local companies to operate as dialogue conveners and pre-dialogue researchers, the IIED has been able to leverage local change agents to create forums in which all local stakeholders can participate in the dialogues. Furthermore, the process itself is focused on solutions, thereby aligning the dialogues with the goals of policymakers.

The dialogues have provided national policymakers with a wealth of information that has helped identify barriers to the formalization process. For example, in Tanzania it was found that most license holders did not conduct any mining activities on their leases, but rather contracted teams of informal miners to mine on their leased areas and collected royalties from these miners.[150] This system of land tenure undermined the efficacy of artisanal mining operations by incentivizing license holders to obtain as many licenses as possible without actually mining their land and providing negligible benefits to the miners themselves. In addition to providing a forum for stakeholders to identify chokepoints in the artisanal mining formalization process, the dialogues simultaneously allowed these stakeholders to propose solutions that inherently had their buy-in. Among the proposed solutions were targeted trainings in accordance with miners' needs and wishes, such as financial management and minerals trading.[151] During the process of identifying barriers and possible solutions, policymakers were able to effectively engage stakeholders to foster discussions that helped them make informed decisions on artisanal mining issues.

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[148] Pact Institute, *A Golden Opportunity*, 22.
[149] Michell, Grace, and Phil Mcmanus. "Engaging Communities for Success: Social Impact Assessment and Social Licence to Operate at Northparkes Mines, NSW." *Australian Geographer* 44, no. 4 (2013): 435-59, https://doi.org/10.1080/00049182.2013.852502; "Understanding Artisanal Mining through Participatory Diagnostics," LandLinks, USAID, May 24, 2018, https://www.land-links.org/2015/02/understanding-artisanal-mining-through-participatory-diagnostics/.
[150] Willison Mutagwaba, John Bosco Tindyebwa, Veronica Makanta, Delphinus Kaballega, and Graham Maeda, *Artisanal and small-scale mining in Tanzania - Evidence to inform an 'action dialogue'* (London: International Institute for Environment and Development, 2018), 68, https://pubs.iied.org/pdfs/16641IIED.pdf.
[151] Mutagwaba et al., *Artisanal and small-scale mining in Tanzania*, 80.

3.1.4 Environmental issues

Given Nigeria's recent tragic history of human and environmental contamination from artisanal mining activities, notably lead poisoning in Zamfara and Niger, best practices for pollution control and safety measures related to artisanal mining hold special relevance for Nigeria. Additionally, steps to prevent environmental degradation from artisanal mining are key to manage protected land areas and maintain Nigeria's critical agricultural sector while expanding mining activities.

Raise awareness of chemical toxicity and alternatives

Coupling restrictions on hazardous substances with a progressive approach of providing incentives to switch and assistance with switching to alternatives that do not negatively impact profitability has been found to be more successful than a blanket ban or restrictions alone in eliminating the use of hazardous substances among artisanal miners.[152] As one notable example, the Filipino NGO, Ban Toxics, has collaborated with groups of artisanal and small-scale miners in the Philippines to disseminate information on mercury toxicity and alternative methods directly to miners,[153] building an awareness among artisanal miners of the dangers associated with mercury use that encourages miners to use mercury-free methods.[154] Additionally, Ban Toxics has partnered with UNIDO and the Philippines Department of Health and Department of Environmental and Natural Resources under the Philippines National Action Plan to reduce mercury usage in ASGM. Through these partnerships, Ban Toxics is training local health workers on the diagnosis and treatment of mercury poisoning[155] and providing training courses to women in ASGM communities on how to process gold without using mercury.[156]

Guidelines and capacity building for rehabilitation of closed mines

Formalization, as defined in the "Definitions" section above, requires that artisanal mining actors comply with regulations and are empowered to manage the environmental aspects of their activities. A key aspect of this is implementing specific regulatory guidelines for rehabilitation targeted at artisanal miners and community mining areas. Given the newness of rehabilitation as an issue for artisanal mining, many countries do not have such specific guidelines but rather rely

[152] UNEP. "Developing National ASGM Formalization Strategies within National Action Plans." 2018. https://unitar.org/cwm/sites/unitar.org.cwm/files/uploads/formalization_handbook_e_web_final.pdf, pp. 33-34

[153] Cascaro, Lorie Ann. "Group Eyes 5,000 Diwalwal Miners to Use Mercury-free Facility." MindaNews. May 23, 2014. Accessed May 17, 2019. https://www.mindanews.com/environment/2014/05/group-eyes-5000-diwalwal-miners-to-use-mercury-free-facility/.

[154] UNEP. "Faces of Change: Fighting for a Mercury-free Future." UN Environment. December 22, 2017. Accessed May 17, 2019. https://www.unenvironment.org/news-and-stories/story/faces-change-fighting-mercury-free-future.

[155] Pulitzer Center. "Indonesia: Mercury, Gold and "Uncommon Diseases"." Pulitzer Center. February 16, 2017. Accessed May 17, 2019. https://pulitzercenter.org/reporting/indonesia-mercury-gold-and-uncommon-diseases.

[156] UNIDO. "Mercury-free Gold Mining Strengthens Women in the Philippines." UNIDO. Accessed May 17, 2019. https://www.unido.org/news/mercury-free-gold-mining-strengthens-women-philippines.

on abstract guidelines intended for medium- and large-scale mining companies. This leads to a failure in rehabilitation implementation by artisanal miners.[157]

One of the most successful examples of concrete rehabilitation guidelines for artisanal miners is Mongolia's Frugal Rehabilitation Methodology. The Asia Foundation's Engaging Stakeholders in Environmental Conservation project worked in partnership with the Sustainable Artisanal Mining Project (SAM) in Mongolia to develop the Frugal Rehabilitation Methodology for rehabilitation of land degraded by artisanal mining. The SAM project worked with local ASM NGOs in the region to design a rehabilitation method that is affordable, feasible, replicable, effective and specific to artisanal and small-scale miners. The rehabilitation method was tested and demonstrated[158] and the model was widely disseminated to the artisanal and small-scale miners through brochures,[159] information sessions, and local training programs. The rehabilitation is carried out by artisanal miners who are members of local ASM NGOs.[160]

Alternative livelihood options

There are multiple reasons why mining countries may include an alternative livelihood program as part of their formalization efforts, chief among them a) to conserve protected areas, and b) to decrease environmental degradation of areas around mining communities. We discuss each goal and examples of alternative livelihood programs driven by them below.

Many countries, including Ecuador, Gabon, Ghana, Indonesia, Sierra Leone, Tanzania, and Peru, have attempted to conserve protected areas by banning mining in those areas and evicting artisanal miners from them. Governments have encountered problems with such bans, however. Artisanal miners sneak into protected areas to mine despite the ban and thereby become subject to criminal prosecution, pushing the miners further away from participation in the formal legal, economic, and institutional framework. Successful approaches have incorporated community dialogues (as discussed above in section 3.1.3) and alternative livelihood programs. For example, after instituting a ban on mining in the Gola Rainforest National Park in 2007, the government of Sierra Leone established the Gola Forest Programme (GFP) to further combat environmental damage from artisanal mining activity in the park by providing an alternative source of employment and compensation for lost revenue from mining. The GFP signed a community benefits and payment agreement with the government and local communities in 2007 in which local governments, landowners, and communities have the right to be compensated for forgoing their rights to activities such as mining. Under the agreement, locals retain their ownership of the land and management rights are given to the Forestry Division of the Ministry of Agriculture

[157] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 35.
[158] Government of Mongolia Ministry of Mining, Swiss Agency for Development and Cooperation, and the Asia Foundation, *Frugal Rehabilitation Demonstration (FRD) in Mongolia: FRD Case Studies Handbook*, 2016, https://asmhub.mn/uploads/files/cases-studies-encompressed.pdf.
[159] Government of Mongolia Ministry of Mining and Swiss Agency for Development and Cooperation, *Бичил уурхайг зохион Байгуулалтад оруулах, алБажуулах гарын авлага* [Organizing Artisanal Mining: Official Guide], 2017, https://drive.google.com/file/d/1rrtCp-dDvvo17jDOR5eqvzabBgefkDdq/edit.
[160] Jonathan Stacey, "Environmental Rehabilitation: Learnings from Artisanal Miners in Mongolia," PANORAMA, March 28, 2019, https://panorama.solutions/en/solution/environmental-rehabilitation-learnings-artisanal-miners-mongolia; Government of Mongolia Ministry of Mining, Swiss Agency for Development and Cooperation, and the Asia Foundation, 7-8.

Forestry and Food Security.[161] In addition to the compensation, the GFP employs community members in the development and implementation of the program and in the construction of schools, community centers, roads, and health centers.[162]

In addition to the conservation goals outlined above, alternative livelihood programs may be used to encourage miners to transition to other activities in order to reduce the pressure and impact of artisanal mining on the environment of mining communities. To address such issues, the Government of Ghana has, for example, introduced the Alternative Livelihood Projects (ALPs), spearheaded by the Ministry of Local Government and Rural Development (MLGRD). Currently, 18 districts in 5 regions with high incidence of illegal mining activities have been earmarked for implementation of the program. The program is tailored to meet the specific needs and challenges of each selected district. For instance, 23,000 acres of existing oil palm plantations in communities in the Prestea-Huni Valley District and Dunkwa-Ayanfuri were set out for allocation to miners willing to migrate to agriculture.[163]

[161] "Gola Rainforest National Park REDD project," the REDD desk, accessed May 29, 2019, https://theredddesk.org/countries/initiatives/gola-rainforest-national-park-redd-project.
[162] UNITAR and UN Environment, *Handbook for ASGM Formalization*, 74-75.
[163] Kwabena Frimpong-Boateng, "Regularizing the Mining Sector and Enforcement of Mining Laws - Speech by Chairman Inter-Ministerial Committee on Illegal Mining," (December 2018).

3.2 Ghana

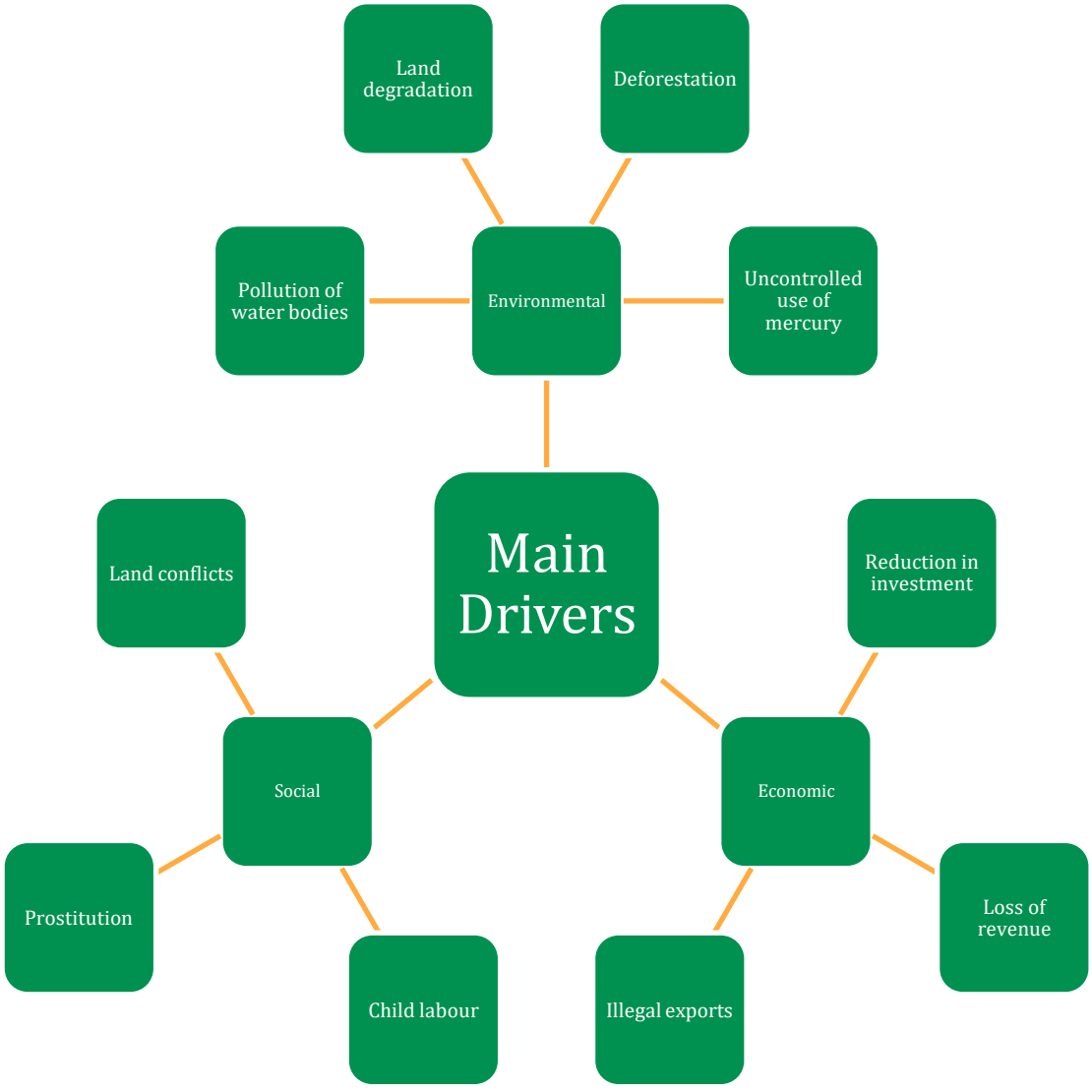
3.2.1 Relevance to Nigeria

Ghana is an emerging economy and regional peer of Nigeria, with similar economic, cultural and social attributes. In 2017 it had the second-fastest growing economy in Africa with 8.1 percent GDP growth, largely driven by extractive industries (oil, gas and mining),[164] as is the case with Nigeria. Given the regional similarities between Ghana and Nigeria, the structure of the artisanal mining sector within Ghana is similar to that in Nigeria, although the artisanal mining sector in Ghana is more developed as a result of recent formalization efforts undertaken by the government. Ghana initially faced similar challenges to those faced by Nigeria, including the use of mercury, predatory middlemen, environmental degradation, and a lack of government coordination. To tackle some of the identified problems, Ghana implemented a gold buying program similar to the one Nigeria plans to implement. Otherwise, Ghana has taken a more forceful approach to formalization than the one we understand Nigeria plans to pursue.

Ghana's reforms are still being implemented and a number of the initiatives are still being rolled out. A holistic evaluation of the success or otherwise of the entire formalization effort is therefore not possible at this time. Initial outcomes, however, suggest that attitudes are changing and the artisanal miners are receptive to the changes, which indicates that at least some of the reforms are on the right track.

[164] "The World Bank in Ghana," The World Bank, accessed May 29, 2019, http://www.worldbank.org/en/country/ghana/overview.

3.2.2 Drivers of reforms



Gold accounted for 96% of Ghana's mineral export revenue in 2017.[165] In the last decade, artisanal mining has become very prevalent in Ghana. From an insignificant 7 percent of gold production in 1995, ASM activities grew to almost 40% of total gold production in 2016 (see graph below), most of which was exported or sold illegally.[166] The increased activity had a negative impact on

[165] The Ghana Chamber of Mines, *Performance of the Mining Industry in 2017*, 2018, 11, https://ghanachamberofmines.org/wp-content/uploads/2016/11/Performance-of-the-Industry-2017.pdf.
[166] Gabriel Botchwey et al., "South-South Irregular Migration: The Impacts of China's Informal Gold Rush in Ghana," *International Migration*, October 11, 2018, https://doi.org/10.1111/imig.12518.

the economy and environment, which attracted the attention of the government. To address various challenges created by artisanal mining, the government introduced and implemented holistic reforms aimed at formalizing artisanal mining and integrating the sector into the mainstream mining industry.

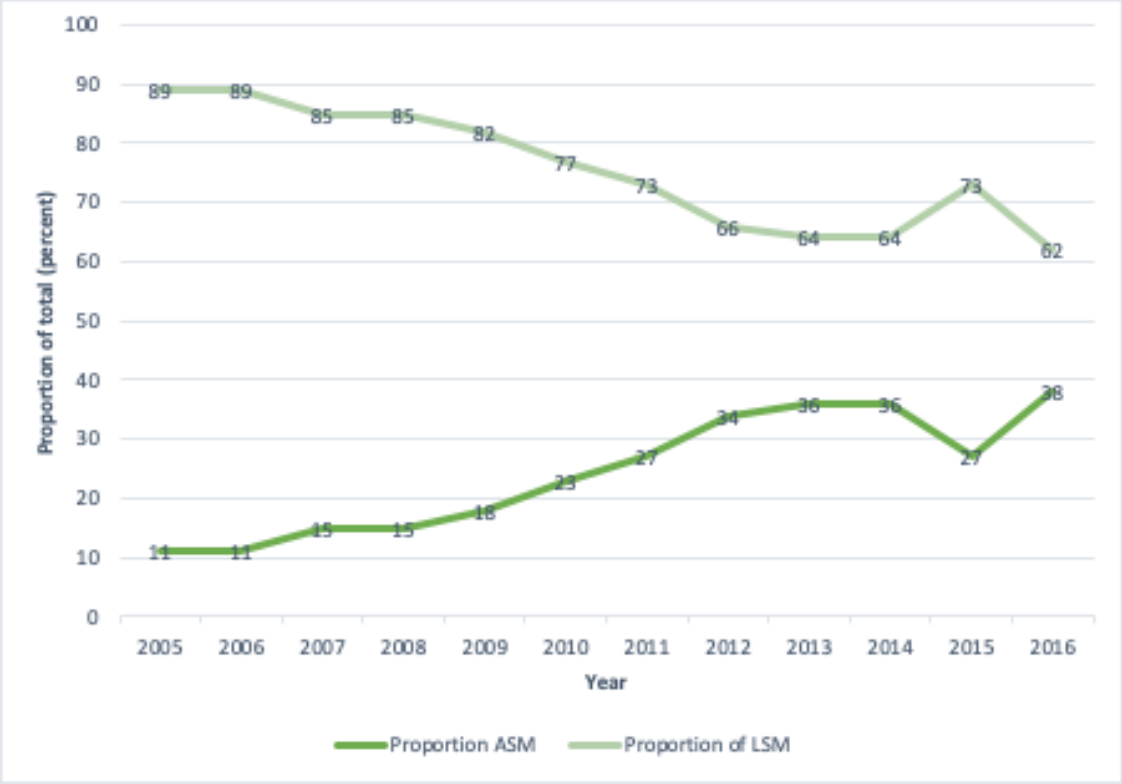


Figure 7: Distribution of small-scale and large scale-mining (*source*: Capstone team, data from Botchwey)

Before the reforms, ASM operations contributed to severe land degradation,[167] pollution of water bodies, armed conflict in mining communities (leading to deaths of miners and mining company executives),[168] and a widespread and unregulated influx of foreigners into the sector. In effect, the government experienced a substantial loss of revenue. Miners also used dangerous chemicals such as mercury and cyanide, which polluted water bodies. As a result, the Ghanaian government decided to ban all ASM activities in 2017 and undertake reforms to address the associated challenges.

[167] Expanding mining activities contributed to the degradation of over 10% of Ghana's surface area (22,853 square kilometers). It is estimated that it would cost US$29 billion to reclaim the degraded land - excerpt from Regularizing the Mining Sector and Enforcement of Mining Laws; Speech by Chairman Inter-Ministerial Committee on Illegal Mining, December, 2018

[168] In 2016, for example, over 175 miners died at the Anglo Gold mining site; Taylor: "Illegal Gold Mining Boom Threatens Cocoa Farmers (And Your Chocolate)", *National Geographic*, March 6 2018, https://news.nationalgeographic.com/2018/03/ghana-gold-mining-cocoa-environment/

3.2.3 Key stakeholders

To carry out holistic reforms of artisanal mining operations and reduce the incidence of illegal mining, the Presidency set up the Inter-Ministerial Committee on Illegal Mining (IMCIM) with a broad mandate to address the issues of illegal mining through a multi-stakeholder bottom-up approach. The IMCIM has full responsibility for proposing and implementing the action steps required to formalize ASM activities. It includes the major agencies overseeing mining and mining related activity: Environment, Science, Technology and Innovation (MESTI), Lands and Natural Resources, Local Government and Rural Development, Chieftaincy & Religious Affairs, Regional Re-Organization and Development, Sanitation and Water Resources, Interior, Defense, and Information. As such, it served an important coordination role and helped the Presidency ensure a whole-of-government approach.

3.2.4 Formalization reforms

According to the Chairman of the IMCIM, the Committee pursued and continues to pursue three main objectives to formalize the sector -- sanitization, regularization and reform, and monitoring and enforcement. Within this approach, the following initiatives were introduced to achieve the government's objectives:[169]

Public education and sensitization

The IMCIM embarked on a nationwide public education and sensitization tour to interact with the major stakeholders. They utilized traditional and new media to disseminate information about the intended reforms and its accompanying benefits to both artisanal miners and the mining communities.

Incentive structures

Financial assistance is given to miners who are willing to formalize through small-scale mining cooperatives. Cooperatives had to be formed by the miners themselves and with the Ghana National Association of Small Scale Miners (GNASSM). The government also provides subsidies to the cooperatives to lease and purchase equipment.

[169] The information analyzed in this section was presented by the Chairman of the IMCIM in a speech held in December 2018.
Regularizing the Mining Sector and Enforcement of Mining Laws; Speech by Chairman Inter-Ministerial Committee on Illegal Mining, December, 2018

In addition, about 123 mining areas were designated for licensing exclusively to small-scale miners with the intention of incentivizing formalization and scaling-up of artisanal to small-scale by providing the miners with access to rich deposits that would not otherwise be accessible to them. Ghana also provided geo-data to artisanal miners for free. Geo-data can be a powerful incentive if it helps miners increase their profits. However, it must be legible to miners and appropriate for their needs.

Easier license application

The Minerals Commission simplified the registration process by creating a website with an online newsletter and fact sheets on minerals and procedures for acquiring licenses. Moreover, the major outcome was a drastic reduction in the time it takes to obtain a small-scale mining license from up to three years to a maximum of ninety days. The government also introduced the GalamSTOP software, which allows users to track and monitor the registration process from start to finish

Capacity building

The IMCIM carried out an in depth study of the capacity needs of ASM. The study identifies the lack of training and education as a major challenge faced by the ASM operators. The IMCIM, therefore, funded training programs in sustainable mining and good mining practices for artisanal and small scale miners at the University of Mines and Technology Tarkwa (UMaT). Over 3,000 miners were trained in an eighteen-month period. The training programs are funded by the IMCIM and eligible miners are identified and vetted by the District Committees on Illegal Mining (DCIM).

In addition to the reforms discussed above, Ghana implemented a number of additional reforms to ensure the sustainability and enforcement of the formalization effort. While these do not directly apply to the registration of miners, they provide key takeaways on how to ensure that early successes are maintained in the long run.

Use of technology

The government deployed drones and drone technology to monitor mining sites and confirm compliance with the ban alongside pilot monitoring of mining sites with the use of satellite imaging. The government further developed and deployed GalamSTOP, a single window electronic reporting system that integrates data from the various stakeholder agencies and monitors the life cycle of mining and related licenses and permits within the ASM sector to ensure the process does not exceed a 90-day timeline. Additionally, the registration and installation of tracking devices on earth-moving equipment was done by the IMCIM in collaboration with the Driver and Vehicle Licensing Agency (DVLA). The DVLA registered and installed electronic tracking devices on earth-moving equipment to ensure that the use of equipment at inappropriate locations is monitored and reported. For rivers, patrol boats were deployed with trained personnel to deter and stop miners who were polluting the rivers through dredging.

Specialized courts

The Government introduced specialized courts with abridged legal processes to attend to claims by artisanal and small-scale operators and fast-track prosecution of non-compliant miners who refuse to formalize. Litigation through the traditional court process can be extremely slow due to case overload and limited number of courts. The specialized courts were therefore created to overcome this problem as they would be focused on only mining cases, thereby expediting the cases. Specifically, the courts prosecute people engaged in illegal mining, help enforce the laws governing mining operations, adjudicate resettlement disputes. The courts are also mandated to incorporate alternative dispute resolution (ADR) mechanisms into their processes.

3.2.5 Remaining challenges

Despite the significant achievements made in the formalization drive, Ghana still faces some challenges, which are yet to be fully addressed. While progress has been made in improving registration of artisanal miners, registration is still being done manually due to the absence of a centralized electronic register of miners. It is, therefore, difficult to authenticate documents presented by miners, as some unscrupulous miners present forged documents like the Environmental Protection License and Water Permit during inspections by the Operation Vanguard team - a Military Police Joint Task Force created by the President of Ghana in 2017 to help curb illegal mining activities. The manual authentication of documents and other information provided by miners creates both an additional burden for the Minerals Commission and more opportunities for falsification. Another major challenge that is yet to be resolved is the undocumented transfer or assignment of concessions by small-scale concession holders without routing it through the Minerals Commission.[170] As a result, concessions are not properly tracked and large parts of the sector are reverting to informality.

Other challenges include willful falsification of the membership lists of mining cooperatives as a means to acquire mineral licenses.[171] Since some of the concessions are given based on membership strength, cooperatives may inflate their membership list in order to reach a certain threshold. A smaller, but still remaining, issue is the prevalence of mining activities outside legally assigned concessions. This continues to occur as not all artisanal miners have embraced the formalization drive and the enforcement efforts of the government are unable to cover all mining areas.

Another challenge which persists in Ghana is the existence of foreign illegal miners, especially of Chinese origin. In 2013, over 4,500 Chinese nationals were deported by the Government of Ghana as part of its effort to clamp down on the illegal activities of Chinese nationals.[172] Illegal

[170] Kwabena Frimpong-Boateng, "Regularizing the Mining Sector and Enforcement of Mining Laws."
[171] Kwabena Frimpong-Boateng, "Regularizing the Mining Sector and Enforcement of Mining Laws."
[172] Afua Hirsch, "Ghana deports thousands in crackdown on illegal Chinese goldminers," *The Guardian*, July 15 2013, https://www.theguardian.com/world/2013/jul/15/ghana-deports-chinese-goldminers.

mining by foreign nationals have continued after the formalization efforts. As recently as April 2019, 194 foreigners were deported for illegal mining activities.[173]

Corruption also continues to pose a challenge for the formalization process. Specifically, the corrupt practices of some members of the regulatory bodies set up to curb the activities of illegal miners continues to be a major barrier impeding the realization of the President's formalization drive. For instance, on the 10th November, 2018, Myjoyonline, an online news portal, published the story of the arrest of 3 members of Operation Vanguard for allegedly engaging in bribery and extortion.[174] A recent documentary by an undercover journalist, titled "Galamsey Fraud," also showed, in a secret recording, the Secretary of the IMCIM accepting cash on three different occasions to aid artisanal miners whose mining permits had expired in bypassing the renewal process.[175] As a result of the documentary, the Chairman of IMCIM had to step down.

[173] Daily Guide, "Ghana Deports 194 Foreigners For Illegal Mining," Peace FM, April 25, 2019, http://www.peacefmonline.com/pages/local/news/201904/380847.php.
[174] Daily Guide, "3 Operation Vanguard Officers Arrested for Extortion," *Joy Online*, October 11, 2018, http://www.myjoyonline.com/news/2018/November-10th/3-operation-vanguard-officers-arrested-for-extortion.php.
[175] *Galamsey Fraud*, produced by Anas Aremeyaw Anas, February 27, 2019.

3.3 Mongolia

3.3.1 Relevance to Nigeria

Mongolia is a developing country endowed with rich natural resources such as copper, coal, and gold.[176] Even though it is located in the heart of Asia, Mongolia faces development challenges similar to Nigeria's due to the nature of its economy. Mongolia's economy, like Nigeria's, is volatile because of its dependency on commodity exports.[177] As a result, high levels of income inequality and poverty remain.[178] As of 2017, 29.6% of Mongolia's population live below the poverty line,[179] a majority of which live in rural areas.[180]

In many rural areas, traditional herders have recently turned to artisanal mining as a source of income. According to the UN Environment Program (UNEP), as many as 60,000 people are employed in artisanal and small-scale gold mining in Mongolia (one-third of the rural workforce) indirectly supporting 180,00 people.[181]

Mongolia took a similar formalization approach to the one that we understand Nigeria is pursuing. Since 2004, the Mongolian government, in partnership with international development agencies and local ASM NGOs, has worked to formalize the ASM sector. The government first pursued legal and regulatory reforms. It, for example, amended the Minerals Law, the Land Law and the Personal Income Tax Law in 2010. In 2017, additional revisions were made to the Regulation for Minerals Extraction by Artisanal and Small-Scale Mining. The Bank of Mongolia (BoM) also implemented a gold buying program -- the Gold-II national program.[182]

The government has, moreover, been relatively successful in its efforts to incentivize miners to formalize. For example, it set up structures that allowed artisanal and small-scale miners to establish cooperatives or partnership and provided access to social and health insurance services.

[176] G.P. Thomas, "Mongolia: Mining, Minerals and Fuel Resources." AZOMining, December 12, 2013, https://www.azomining.com/Article.aspx?ArticleID=106.
[177] "Mongolia," Office of the United States Trade Representative, accessed May 11, 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/mongolia.
[178] "2014 Investment Climate Statement," U.S. Department of State, June 2014, https://www.state.gov/documents/organization/231251.pdf.
[179] "Poverty in Mongolia," Asian Development Bank, June 1, 2018, https://www.adb.org/countries/mongolia/poverty.
[180] Tirza Theunissen, "Poverty, Inequality, and the Negative Effects of Mongolia's Economic Downturn," *The Asia Foundation* (blog), June 25, 2014, https://asiafoundation.org/2014/06/25/poverty-inequality-and-the-negative-effects-of-mongolias-economic-downturn/.
[181] "Towards a Mercury-Free Future in Mongolia and the Philippines," UN Environment, April 2019, http://www.unenvironment.org/news-and-stories/press-release/towards-mercury-free-future-mongolia-and-philippines.
[182] "МОНГОЛ УЛСЫН ЗАСГИЙН ГАЗРЫН ТОГТООЛ," Legalinfo, accessed May 11, 2019, https://www.legalinfo.mn/law/details/12431.

In addition, the BoM slashed gold royalty rates and established gold purchase centers near miners. Consequently, ASM gold supplied to the BoM increased from a few kilograms in 2013 to 3.2 tons in 2014,[183] and to 6 tons in 2015.[184] Overall, it is estimated that 11% of miners were formalized between 2012-2015.[185]

3.3.2 Drivers of reforms

Mongolia's artisanal mining sector has grown rapidly since the early 2000s. However, due to the absence of legal structures and regulations, artisanal mining, locally know as "ninja mining,"[186] has caused major social, environmental, and health issues. In addition, the government of Mongolia started to identify the significance of the artisanal miners' contribution to improving people's livelihood and that the artisanal mining sector is an unrecognized source of revenue. More specifically, the following issues especially drove the reform efforts.

Widespread use of mercury in gold processing

In locations with no centralized gold processing plant, miners used mercury to process gold. According to a UNEP research report, nine provinces (out of 21) located in the Central and Govi regions were contaminated with mercury in 2006. Further, 53 hectares of land and dozens of wells were polluted by mercury and cyanide. As a result, the land used by nomadic herders became contaminated. The contamination posed a severe risk to the livestock and, thereby, the livelihood of the herders, as well as to human health. The government thus banned the use of mercury in ASM activities in 2008. This initiative, however, backfired. To avoid detection by the local government officials, miners started to process gold in their homes. This practice increased the exposure of household members, including children, to mercury.[187]

[183] Swiss Agency for Development and Cooperation in Mongolia, "'Mongol Gold' Campaign Launched," Sustainable Artisanal Mining Project, accessed May 11, 2019, http://sam.mn/post/325/.
[184] Swiss Agency for Development and Cooperation in Mongolia, *Factsheet: Sustainable Artisanal Mining Project*, 2015, https://www.eda.admin.ch/dam/countries/countries-content/mongolia/en/2015-SAM-Factsheet-EN.pdf.
[185] Marcena Hunter, Yolande Kyngdon-McKay, and Kate MacLeod, *Following the Money: Mongolia* (UNIDO, 2017), 13, http://www.levinsources.com/assets/pages/Follow-the-Money-Artisanal-and-Small-Scale-Gold-Mining-in-Mongolia-GEF.pdf.
[186] Artisanal miners are colloquially known as Ninja miners due to their resemblance to the Teenage Mutant Ninja Turtles when they carry their sifting pans on their backs.
[187] United Nations Environment Programme, *Analysis of Formalization Approaches in the Artisanal and Small-Scale Gold Mining Sector Based on Experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda* (Geneva: United Nations Environment Programme, June 2012), 4-6.

Loss of potential government revenue

All artisanal mining activity was informal until 2008 and a majority of the artisanally mined metals and minerals left the country through the shadow economy.[188] As such, the Mongolian government missed the opportunity to collect royalties and taxes from the sales and export of gold and other precious minerals. In addition, the Mongolian economy was absent of value-added products based on the commodities mined in the artisanal mining sector.

Exhausted gold reserves

Due to Mongolia's overreliance on the export of commodities, metal price fluctuations had a detrimental effect on the Mongolian currency, 'tugrug'. The BoM is mandated to ensure the stability of the currency. To increase the national gold reserves and stabilize the currency, the Mongolian Parliament passed a bill to mandate the BoM to act as a monopsony for buying, exporting and storing gold in Mongolia in 2014.[189]

3.3.3 Key stakeholders

The key to Mongolia's efforts to formalize the artisanal mining sector has been the participation of third-party development organizations in undertaking and leading the task. The SDC, the Asia Foundation, Fairmined and the Extractive Industry Transparency Initiative (EITI) played important roles to initiate and implement the formalization processes. The SDC's Sustainable Artisanal Mining (SAM) project has been the main force in advocating for environmentally sound mining and engaging stakeholders to create a responsible artisanal mining sector. From the government, the Ministry of Mining and Heavy Industry, Minerals Resources and Petroleum Authority of Mongolia, district governments and the BoM have played important roles in formalizing the sector.[190] In addition, Mongolian NGOs and newly established associations contributed to the implementation of the project. As of 2017, 67 NGOs have been established and registered to respond to the needs of artisanal miners and promote positive public attitudes and safe working conditions.[191]

[188] Kristi Disney Bruckner and Luke Danielson, *IGF Mining Policy Framework: Mongolia* (IISD, 2017), 33, https://www.iisd.org/sites/default/files/publications/mongolia-mining-policy-framework-assessment-en.pdf.
[189] *Алтны Салбарын Санхүүжилтийн Тогтолцоог Оновчтой Болгох Арга Хэмжээ* (Монгол Банк, 2014) §4-5, https://www.mongolbank.mn/documents/regulation/forex/20140430_A69.pdf.
[190] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 15.
[191] B Dulguun, "Artisanal and Small-Scale Mining in Mongolia," *UB Post*, June 30, 2017, https://www.pressreader.com/mongolia/the-ub-post/20170630/281500751266880.

3.3.4 Formalization reforms

To formalize the artisanal mining sector, Mongolia first updated the legal and regulatory framework for the sector. Despite these efforts, the artisanal mining sector in Mongolia did not see evidence of formalization.[192] Thus, the stakeholders in Mongolia's artisanal mining sector sought new ways to incentivize the artisanal miners to formalize and implemented the following reforms.

Economic incentives

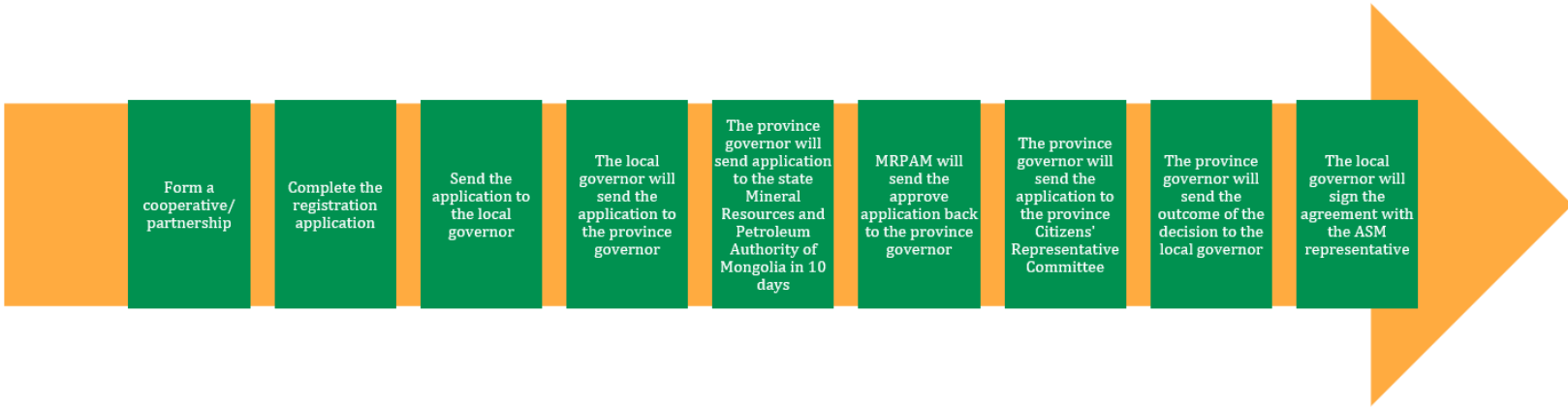
To increase the amount of gold purchased from the artisanal mining sector, the BoM initiated its Gold-II program (mentioned above in section 3.3.1). In addition to establishing new gold purchase centers and providing capacity training services to the artisanal miners, the gold royalty rate was slashed from 10% to 2.5% and other taxes were removed.[193] The BoM's Gold Program encouraged artisanal miners to participate in the formal ASM gold supply chain rather than informal networks. In addition, the BoM is planning to establish gold buying centers in close proximity to large ASM mining sites in order to reduce the layers of middlemen.[194]

Easier license application process[195]

Before the reforms, miners were required to obtain a license from the Minerals Resources and Petroleum Authority of Mongolia (MRPAM) in the capital city, Ulaanbaatar. Given the vastness of the country and the poor infrastructure, this process was burdensome for the artisanal miners. In 2010, regulation No. 308, "Regulation on Extraction of Minerals from Small-Scale Miners," made the artisanal mining license registration process more accessible by accepting applications at local government administrative centers (figure 5). The regulation also dropped the strict land evaluation and site assessment reports. Instead it required easily obtainable documents, such as a picture of the land (figure 6).

[192] Kristi Disney Bruckner and Luke Danielson, *IGF Mining Policy Framework: Mongolia* (IISD, 2017), 34, https://www.iisd.org/sites/default/files/publications/mongolia-mining-policy-framework-assessment-en.pdf.
[193] *Алтны Салбарын Санхүүжилтийн Тогтолцоог Оновчтой Болгох Арга Хэмжээ* (Монгол Банк, 2014) §4-5, https://www.mongolbank.mn/documents/regulation/forex/20140430_A69.pdf.
[194] "Орон нутагт алт худалдан авах нэг цэгийн үйлчилгээ нээнэ," Монголбанк - Монгол Улсын Төв Банк" [Open One-Stop Shop for Local Gold], April 2019, https://www.mongolbank.mn/news.aspx?id=1925&tid=1.
[195] Government of Mongolia Ministry of Mining and Swiss Agency for Development and Cooperation, *Бичил уурхайг зохион Байгуулалтад оруулах, алБажуулах гарын авлага* [Organizing Artisanal Mining: Official Guide].

Figure 1. ASM license registration process



The regulation also dropped the strict land evaluation and site assessment reports. Instead it required easily obtainable documents, such as a picture of the land (figure 2).

Figure 2. ASM license registration requirements

Application must contain the following information:

1. The names and addresses of the parties who are members of the partnership or cooperative
2. Land location
3. Extraction mineral type

The following documents should be attached to the application:

1. Cooperation/partnership agreement
2. Copies of National Identification card
3. National registration certificate of Cooperative/Partnership
4. Extraction site photo
5. Copy of Social Insurance booklet of members
6. Copy of income tax booklet
7. Justification for selection of site

(No fee for license application)

Access to social and health insurance

The revised Regulation for Minerals Extraction by Artisanal and Small-Scale Mining (Government Resolution No. 308, December 1, 2010), required registered miners to be covered by social and health insurance. To pay for social insurance, the applicant must pay 12% of his/her income (10% to social security, 1% to allowance/benefit insurance, and 1% to insurance against occupational injury and diseases). Most importantly, in the event of occupational accidents and disability, miners are eligible to receive allowances from the government. Health insurance is mandatory for all citizens of Mongolia and the premium is 1% of a person's income. Insured citizens pay 10% or 15% of total medical service costs to the government administrative centers, while uninsured citizens bear all costs of the medical expense.[196] Access to such services provided by the government has been an important incentive for ASM operators to formalize their mining practices: enrollments in social and health insurance schemes by ASM operators increased from 3,500 in 2013 to 15,451 in 2015.[197]

Access to capacity training through local NGOs

The international organizations in partnership with the local ASM NGOs facilitate training and information sessions for local miners to inform them about legal and regulatory changes and opportunities. For example, the National Federation of Artisanal and Small-Scale Mining consists of more than 6,500 members and collects a small fee to represent artisanal and small-scale miners' voice in the government and provides trainings on ASM laws, regulations, safety and mine management.[198] In total, as of 2017, 67 NGOs have been established to provide capacity-building training to ASM operators, and disseminate safe and environmentally sound mining practices.[199]

Flexible organizational structures

In 2017, the Government of Mongolia made amendments to the Regulation for Minerals Extraction by the ASM sector. Part of the amendment stated that miners could organize themselves into unregistered or registered partnerships, not only cooperatives, as a means of applying for and receiving the right to extract minerals from an area.[200] In so doing, the government decreased the burden associated with formalizing.[201] These flexible structures allow miners to use similar structures to the ones already used rather than forcing them into structures they may not be familiar with.

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[196] Swiss Agency for Development and Cooperation and Government of Mongolia Ministry of Mining, *Artisanal and Small-Scale mining Organization in Mongolia: Conventional Handout*, Sustainable Artisanal Mining Project, 2016, 8-10, https://drive.google.com/file/d/0BzzumgfifIF6MjVSR25ISU9ydXc/view.

[197] Swiss Agency for Development and Cooperation in Mongolia, *Factsheet: Sustainable Artisanal Mining Project*, 2015, https://www.eda.admin.ch/dam/countries/countries-content/mongolia/en/2015-SAM-Factsheet-EN.pdf.

[198] "Greetings from the Chairperson of National Federation for Artisanal and Small Scale Mining," Монголын бичил уурхайчдын нэгдсэн дээвэр холбоо, accessed May 29, 2019, http://bichiluurhai.mn/en/home/.

[199] B Dulguun, "Artisanal and Small-Scale Mining in Mongolia."

[200] Government Resolution of Mongolia No. 151 (2017) § 1.4, https://asmhub.mn/uploads/files/the-government-order-151-eng.pdf

[201] Angela Jorns (Levin Sources), interview by Capstone team, New York, March 5, 2019.

Figure 10: Picture from artisanal mining handbook of miners organized as a registered cooperative (*source*: Government of Mongolia Ministry of Mining and Swiss Agency for Development and Cooperation)

Mongolia's ASM Registration Structures

	Cooperative	Unregistered Partnership	Partnership
Legal entity	A Legal entity registered by the state. Receives a stamp and a registration No.	Not a legal entity. Not registered by the state.	A Legal entity registered by the state. Receives a stamp and a registration No.
Purpose	Increase income and improve members' livelihood	Increase profit and fulfil other missions	To make and increase profit
For profit?	Non-profit	For profit	For profit
Management structure	No less than 9 persons establish a cooperative	No less than 9 persons organize the partnership	No less than 9 persons (not registered with other partnerships)
Authority	Leaders are elected by the members of the cooperative	Leaders are elected by the members of the partnership	Partnership members - dependent on the size of the investment
Ownership	Joint ownership	Joint ownership	Partnership members
Participation	Members aggregate their assets and engage their own knowledge and skills (production, sales etc.)	Conduct activities in partnership	Fully responsible members – full participation, partially responsible members – full participation is not mandatory
Liabilities	Liabilities shall be borne by the amount of contribution to mutual fund and according to the agreement	Members are jointly liable for losses incurred arising from joint operations	Fully responsible members liable for all investment to the mutual funds as well as private assets, non-full responsible members liable for the amount contributed to the mutual fund

3.3.5 Remaining challenges

Despite the efforts made by the stakeholders and the government, Mongolia's artisanal mining sector remains largely informal.[202] The SAM project reached its final phase and ended in 2018. Insight into some of the remaining challenges is useful for Nigeria's pursuit to formalize its artisanal mining sector.

Corruption

Corruption is prevalent in Mongolia. According to Transparency International's Corruption Perceptions Index, Mongolia ranks 93 out of 180 countries.[203] Due to the financial flows associated with artisanal mining, the sector is particularly vulnerable to corruption. The constant changes to the mineral laws and regulation have made the registration process prone to bribery.[204] There are also reports of bribery to speed up the application process.[205] Since the new amendments to the registration process, local governors have started to play an important role in the artisanal mining sector. In some cases, governors have abused their power to hoard profits and interfere in the formal gold supply chain.[206]

Illegal trade with Chinese nationals

Ingrained networks remain prevalent due to the ease of doing business with Chinese nationals. Some stakeholders report that increased gold sales to the BoM have squeezed Chinese activity in Mongolia's artisanal gold mining sector.[207] International organizations, however, suspect otherwise. They suggest that Chinese nationals may have become better at hiding their business, for example by employing Mongolian nationals as the 'face' of the business.[208]

Middlemen

Middlemen, colloquially known as changers, play an important role in Mongolia's gold supply chain. These middlemen exist mainly due to Mongolia's vast geographical size and the cost of transportation. Artisanal miners cannot afford to spend time or resources on traveling to the capital or the nearest gold purchasing center to sell their gold. Gold usually passes through three different changers before it reaches Ulaanbaatar. Changers nearly always work in both the legal and illegal supply chains. They may thus sell both legally and illegally mined gold to the legal offtaker, the BoM. As such, the continuing role of changers as intermediaries between gold mining regions and Ulaanbaatar is a significant contributor to the ASM gold supply chain remaining

[202] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 13.
[203] "Transparency International - Mongolia," Transparency International, accessed May 11, 2019, https://www.transparency.org/country/MNG.
[204] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 17.
[205] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 17.
[206] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 37.
[207] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 27.
[208] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 7-8.

informal.[209] Without further decentralization of the gold assaying and purchasing centers from the capital city and without formalizing the middlemen, middlemen will remain an obstacle to formalization of the artisanal mining sector.

Processing centers

There are three mercury free gold processing centers at the district level in Mongolia. Two are privately owned and one is operated by the government. Two (one government and the other privately owned) of the three have been closed due to issues with their EIAs,[210] but it has been reported that one of these is still being run illegally.[211] At the local level there are other processing plants which typically operate illegally (due to the use of mercury, among other reasons). These processing plants also provide pre-financing to local artisanal miners, who will pay their loans after delivering the ore. Of concern, very little is known about the financial arrangements of processing centers and Chinese nationals are suspected to be major investors in them.[212] Since all ore extracted by artisanal miners must go through processing centers, ensuring that these centers operate legally and according to all regulations, especially environmental regulations, are crucial to formalizing the gold supply chain. Provided that the illegal processing centers remain open and illegal, middlemen will flock to these centers in pursuit of cheaper processing to realize higher profits. Without formalizing the operations of all processing centers, it will be challenging to incentivize artisanal miners to formalize.

[209] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 32.
[210] Sustainable Artisanal Mining Project, *Artisanal Mining Development Initiatives and Practices*, accessed May 11, 2019, 30, https://www.asmhub.mn/uploads/files/sanaachlaga-turshlaga.pdf.
[211] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 35.
[212] Hunter, Kyngdon-McKay, and MacLeod, *Following the Money*, 34-36.

3.4 Takeaways

The experiences of other countries, especially Ghana and Mongolia, in their efforts to formalize their artisanal mining sectors present a number of important takeaways for Nigeria, presented briefly below. Our specific recommendations for the SMDF, which are informed by the above experiences, are described fully in section 5.

Engage the community

Community engagement is key to developing incentives structures, managing gold-buying centers, and informing the formalization process as a whole. Participatory processes that engage and involves miners can be an effective tool in this regard. For example, collaboration with ASM NGOs in order to understand the local context and the motivations, wants, and needs of miners helped Mongolia design effective incentive structures. Community-based approaches have also helped ensure successful gold-buying programs in Colombia and Côte d'Ivoire.

Incentive structures should balance economic and non-economic incentives

Economic incentives can be powerful. As seen in Mongolia, miners may react strongly to changes in royalty rates. When the BoM, for example, announced that it would increase rates from 2.5% to between 5 and 10%, the gold supply dropped by 71.6% as miners returned to the shadow economy.[213] Economic incentives are, however, not always sustainable. Offering inflated prices may, for example, attract smuggling and make programs financially unstable, as discussed in section 3.1.1. Ghana and Mongolia have successfully used non-economic incentives such as capacity building and insurance in addition to economic ones.

Political willpower and coordination is critical for success

Political will power was critical for the success of Ghana, while multi-stakeholder engagement ensured the success observed in Mongolia. In Ghana, the direct support of the presidency, and inclusive composition and coordination role of the the IMCIM have been critical to achieving the outcomes recorded so far, as these has been the major factors keeping the IMCIM from experiencing significant resistance from key stakeholders. In Mongolia, the SDC served as an efficient third-party coordinator for the SAM project.

[213] "Mongolian Central Bank Sees Dramatic Decline in Gold Purchase in Q1," *Xinhua*, April 1, 2019, http://www.xinhuanet.com/english/2019-04/01/c_137941024.htm.

Consider sustainability from the outset

If formalization is to be successful in the long run, mechanisms to ensure sustainability should be incorporated from the start. Capacity-building training for miners on how to not only become formal, but remain so, should be offered as part of the formalization process. Local NGOs and ASM associations could be established, as was done in Mongolia, to continue to provide training and support implementation of best practices in artisanal mining. Additional sustainability mechanisms include setting up buying centers that rely on pricing structures designed for self-sufficiency and considering the rehabilitation of mines before operations begin. Alternative livelihood programs can also play a key role in supporting the sustainable formalization of artisanal mining since mining is inherently damaging to the environment and relies on non-renewable resources.

Technology can help solve tracking and enforcement issues

The use of technology has had a revolutionary effect on regulation and monitoring of ASM in Ghana. The GalamSTOP software, for example, has improved the registration, identification and monitoring of ASM activities, while the use of drones to monitor mining sites has positively impacted the enforcement efforts of the IMCIM. The registration and installation of tracking devices on earth moving mining and excavation equipment has, moreover, curbed the indiscriminate exploration and mining activities in unpoliced areas.

4. Barriers to success

Formalizing miners will not be an easy task. As identified in section 2, there are significant barriers to receiving and maintaining an SSML. While the current mining law and regulations address artisanal mining activities – mainly by focusing on the provision of extension services – they do not provide meaningful incentives to formalize. Any meaningful solution must address the social and economic motivations underpinning ASM activities and present a viable alternative to the current status quo. Based on past attempts at formalization by other countries, appealing to financial benefits alone will have an impact but will not be sufficient to induce long-term behavioral changes. These and other challenges currently pose substantial barriers to the success of the SMDF's attempts to formalize the sector.

4.1 Incentive structures

The PAGMI pilot scheme in its current form highlights economic incentives for miners, mainly higher gold prices and an official selling channel. To help the pilot and further programs succeed, we raise some questions regarding whether these incentives can stimulate sustained buy-in from artisanal miners.

First, it is possible that the artisanal miners will not actually enjoy a higher income as a result of the program. From the beginning, miners may conflate a government buying channel with having to pay taxes and consequently may be less motivated to approach the buying centers. Concurrently, middlemen may continue buying gold from miners and sell it to the new buying centers for a higher price rather than through illegal channels, as seen in Mongolia. If the government cannot control this process, artisanal miners may see no difference in the price they receive and the income they earn. Additionally, the black market may respond to the increased official price with a higher black-market price. If so, there would be little to no difference between the official and black-market prices and, thereby, no price incentive to formalize. While middlemen may only be able to maintain similar or higher prices than a government buying channel for a short time, this is long enough to discourage miners from partaking in the PAGMI pilot scheme and thereby discredit the government's formalization efforts.[214]

Beyond the challenges associated with monetary benefits, we see an inadequacy of service supply within current incentive structures as a barrier to success. For the purpose of formalizing artisanal mining, international best-practices and case studies from Mongolia and Ghana have shown that

[214] Adam Kendall (McKinsey), interview by Columbia Capstone team, Abuja, March 22, 2019.

miners are often provided with incentives other than a higher buying price. Mongolia and Ghana both provide social and health insurance; other examples of service-related incentives include access to better mining equipment, provision of training for local communities, guidelines for rehabilitation methods specific to artisanal mining, and alternative livelihood programs to support a transition to jobs in other sectors.

The many negative externalities of mining, discussed in section 1.1 and elsewhere, further highlight the importance of non-monetary incentives. While middlemen can, to some extent, provide capital, the government should provide healthcare, public safety, and education. Artisanal miners who are exposed to the dangers of the mining site day-by-day have have a consistent need for these services.

A minor point on the benefits of adding more services is that the demonstration of social impact plays a role in attracting investment. Venture capital and development impact funds operating in Nigeria are more passionate about sectors such as technology, healthcare and agriculture, which require less capital and engage a larger population.[215] By providing social services to the miners, the government may be able to show that mining is a green and innovative sector and, thereby, make the sector more attractive to investors.

4.2 Outreach

Another potential barrier to the success of the SMDF's efforts to formalize artisanal miners may be a lack of trust in government institutions and their provision of incentives and a lack of belief in the benefits of formalization.[216] The SMDF as well as its partners working on formalization will have to raise awareness of themselves as institutions in order to build trust and credibility with artisanal miners.

The basic fact is that artisanal miners will not formalize if they do not know that it is possible to formalize and beneficial for their well-being to do so. It is key that an awareness campaign reaches artisanal miners in the communities in which they work and live. Potential awareness campaigns should focus on the benefits of formalization and the ease with which it can be done to ensure awareness leads to action. Further, while the focus should be on general awareness and building trust, controlling the narrative is important as well to dispel rumors or false narratives that could decrease the rate of people who formalize.

The campaign should also be geared towards mining communities, especially people of influence and power who can be advocates for formalization. These can be chiefs, religious leaders, or other powerful people that hold political sway with community members. Middlemen should be

[215] Nigeria Sovereign Investment Authority, interview by Columbia Capstone team, Abuja, March 21, 2019.
[216] World Bank MinDiver, interview by Columbia Capstone team, Abuja, March 19, 2019; Alhaji Uba Saida Malami (Chairman of the Solid Minerals Development Fund), interview by Columbia Capstone team, Abuja, March 23, 2019; Abubakar Atiku Bagudu (Governor of Kebbi State), interview by Columbia Capstone team, Abuja, March 22, 2019.

especially targeted for awareness campaigns since miners often trust them.[217] Reaching this population holds a dual role. First it will help ensure that formalization receives buy-in from the wider community. Additionally, artisanal miners are more likely to approve of formalization if they hear about it from someone they trust in the community.

4.3 Government coordination

The Nigerian mining sector is highly regulated with clear roles for each agency. The MMSD is the agency primarily responsible for the sector. Other agencies such as the MCO, the NGSA, and the SMDF also have statutorily defined roles, albeit subordinated to the MMSD.[218] Additionally, there are non-governmental bodies, such as the Miner's Association and Nigeria Mining Geo-sciences Society, which do not have direct oversight of the mining industry, but which interface with the sector and can play a facilitatory role in driving formalization. We focus on coordination among government agencies at all levels as being particularly critical to the success of the formalization effort since the government, in its role as regulator of the mining sector, sets the direction for sector-wide change.

In order to properly harness the linkages between these bodies, effective synergy and coordination, as facilitated by the IMCIM in Ghana, are required. Currently, these are lacking. The lack of coordination presents a major obstacle to formalization. On the surface, the MMSD, which is the supervisory agency, should drive coordination. A number of factors, however, inhibit the Ministry from playing this role. First, there is a lack of a clear legal direction on this issue. The 2007 Act sets out a number of functions for the Minister (representing the Ministry) which include ensuring an orderly and sustainable development of mineral resources and a well-planned and coherent program of exploitation of mineral resources, creating an enabling environment for private investors, maintaining liaisons between investors and government agencies who have roles to play in developing the sector and collaborating with such agencies. The Act is, however, silent on how this should be done or which body should coordinate these efforts. Another inhibitory factor is the lack of a structure and the required capacity within the MMSD to facilitate effective coordination. If passed, the 2018 proposed bill would create a new "super"-regulatory agency for the mining sector, the Nigerian Mining & Minerals Commission, which could serve this coordination purpose.

While we did not observe any inter-agency rivalry in the sector, we did, however, note that there was no specific effort to ensure close coordination during our interaction and interviews with key personnel from the different agencies. Therefore, it seems that there is a lack of an overall strategic focus by the agencies towards achieving a collective goal, and a lack of established procedures to ensure that all relevant agencies coordinate with each other. Additionally, there is no central database or repository for data or information or even a centralized reporting or feedback system for the sector. While inter-agency coordination alone will not resolve all the issues in the sector, it is a useful tool for achieving sustainable results in the long and short-term.

[217] Goldman et al., *Artisanal and Small-Scale Gold Mining in Nigeria,* 51.
[218] Nigerian Minerals and Mining Act 2007, Pub. L. No. 20 (2007).

There may be other historical and institutional factors that entrench the lack of coordination. For example, some of the agencies like the NGSA predate the MMSD, while bodies like the Mining Cadastre Office and the SMDF are recent creations under the 2007 Act. In addition, due to the different functions and focus of each agency, there may be no point of convergence relating to formalization of artisanal mining. Notwithstanding the identified obstacles, there is existing statutory backing for the MMSD or the SMDF to play this central coordinating role (discussed further in section 6.1).

4.4 Middlemen

Mining does not happen in a vacuum. The entire supply chain is embedded in complex social systems. Interventions in the supply chain will therefore have major implications for Nigeria's communities. Below we raise some concerns about the plan to bypass current middlemen.[219]

Middlemen play a complicated role within the Nigerian supply chain. In our conversations with the government, they were often portrayed as exploitative strong men, criminals or worse. Experts from civil society and academia complicate this view by emphasizing that most supply chains depend on relationships deeply embedded in the social fabric of society.[220] It is certainly true that many middlemen exploit miners through predatory lending practices, debt obligations, and unfair pricing.[221] Some mines also seem to be implicated in criminal activity.[222] Additionally, smuggling appears to be common practice.[223] All middlemen, however, are not hardened criminals. Many are local businessmen whose engagement in informal and at times exploitative activities is within accepted customary standards.[224]

Bypassing these individuals would rob them of their livelihoods. Considering that middlemen often hold positions of status within a local community, they are unlikely to easily accept this change to the status quo. As such, they will likely use their influence to persuade miners not to participate in the gold purchasing program – presenting a major barrier to success. Instead of working around these middlemen, the program should work with them by helping them become part of the formal supply chain. If traditional middlemen see a benefit to formalizing, they will become an invaluable partner for the government in encouraging miners to formalize. The UN and NGOs such as IMPACT and PACT emphasize the importance of incorporating local middlemen in, not excluding

[219] Solid Minerals Development Fund, *Presidential Gold Initiative*, 12.
[220] Angela Jorns (Levin Sources), interview by Columbia Capstone team, New York, March 5, 2019; Christina Villegas (Pact), interview by Columbia Capstone team, New York, February 26, 2019; Ben Miller (CDA Learning Projects), interview by Columbia Capstone team, New York, February 23, 2019; Daniel Stapper (Pact), interview by Columbia Capstone team, New York, April 1, 2018.
[221] Goldman et al., *Artisanal and Small-Scale Gold Mining in Nigeria*, 53.
[222] Felix Onuah, Alexis Akwagyiram, and Catherine Evans, "Nigeria Suspends Mining in Zamfara State after Banditry Surges," *Reuters*, April 7, 2019.
[223] Goldman et al., *Artisanal and Small-Scale Gold Mining in Nigeria*, 50.
[224] Daniel Stapper (Pact), interview by Columbia Capstone team, New York, April 1, 2019.

them from, formalization processes.[225] Moreover, to address existing systems of exploitation perpetuated by the middlemen, the government should aim to regulate the behaviour itself rather than excluding the people. In this regard, it is important to recognize that all people doing bad things are not bad people. More likely is that they are forced to do bad things by the structure of their environment and the system in which they operate.

The PAGMI states that buying centers will be located at key mining sites.[226] Depending on how many sites are considered key and by what criteria sites are judged to be key, cutting out the middlemen by placing buying centers at many sites across Nigeria may be unrealistic and inefficient. The NGSA indicates that there are more than 80 deposits of gold in Nigeria.[227] Acknowledging that many of these deposits are not likely being mined at the moment, this still means establishing and overseeing a huge number of buying centers if the SMDF chooses to build centers at most sites. Currently, the SMDF has neither the capacity or funding to oversee that many centers. While possible to execute at the pilot stage, the proposed model may not be sustainable at scale. Furthermore, it may not be an efficient model. It could eliminate many benefits from economies of scale and unnecessarily duplicate infrastructure and capacities.

In cases where bypassing the middlemen is desirable due to their direct links with criminal activities and networks, there will still be unintended consequences, primarily increased violence. An escalation of violence will clearly prevent the success of the program. Increased security measures, as outlined in the PAGMI, may not be enough to prevent it.[228] Increased militarization of mines may, in fact, have negative impacts on local conflict dynamics. The community led engagement model referenced in the PAGMI is a step in the right direction.[229] Additionally, the government may wish to engage in participatory conflict mapping and local peacebuilding programming to address underlying conflict factors permitting criminals to spread violence in local communities. The mining police will play a crucial role in these activities. It is unclear, however, if they currently possess the capacity and training needed to act efficiently within these complex situations.

[225] IMPACT, *Just Gold: Bringing Responsible and Conflict-Free Gold from Artisanal Miner to International Markets* (Ottawa: IMPACT, April 2018), https://impacttransform.org/wp-content/uploads/2018/04/IMPACT_Just-Gold_April-2018-EN-web.pdf; Patience Singo and Kady Seguin, *Best Practices: Formalization and Due Diligence in Artisanal and Small-Scale Mining* (Ottawa: IMPACT, May 2018); Christina Villegas (Pact), interview by Columbia Capstone team, New York, February 26, 2019; Daniel Stapper (Pact), interview by Columbia Capstone team, New York, April 1, 2018; UNITAR and UN Environment, *Handbook for ASGM Formalization*; Goldman et al., *Artisanal and Small-Scale Gold Mining in Nigeria*, 51.

[226] Solid Minerals Development Fund, *Presidential Gold Initiative*, 7.

[227] Nigeria Geological Survey Agency, *Mineral Resources Map of Nigeria* (NGSA, n.d.) http://www.ngsa.gov.ng/sites/ngsa.gov.ng/files/maps/Mineral-Resources-Map-of-Nigeria.pdf.

[228] Solid Minerals Development Fund, *Presidential Gold Initiative*, 25.

[229] Solid Minerals Development Fund, *Presidential Gold Initiative*, 25.

4.5 Buying center management

According to the PAGMI, the SMDF will work with a gold processing company within the frame of a SPV to establish mineral buying centers and centralized processing centers in Kebbi and Osun (with the intention of expanding to other states). The SPV will be fully owned by the SMDF and governed by a Board of Directors.[230] The buying and processing centers will be owned by the SPV and managed by the private company under an operation and maintenance agreement.[231] Further, we understand that the buying centers will be responsible for primary processing (crushing and leaching) and for providing equipment and training to artisanal miners who sell to the center and that the processing centers will be responsible for value-added processing.[232] Under this structure, both the SMDF and the private contractor will have significant due diligence obligations, as described in the OECD Due Diligence Guidelines. It is important to note that the SPV will not exempt either party from these obligations.

As the SMDF does not currently have the organizational capacity to manage the buying and processing centers itself, outsourcing the management to an existing gold processing company has the potential to yield large benefits. Private companies are generally seen as delivering services in a timelier manner and being more innovative than governmental organizations in Nigeria. Additionally, running buying and processing centers demands specialized skills in mineral analysis and processing that the SMDF does not possess. The expectation of those involved in the PAGMI is that privately-run buying and processing centers will be more efficient and effective than ones run by the government.[233]

Some privately run mineral buying centers have been established in Nigeria already. These centers, however, have been ineffective at disrupting the informal artisanal mining supply chain.[234] Having the management of buying and processing centers be under the helm of a private company creates additional problems. These must be addressed in order to realize the potential benefits. Among the many new concerns that could arise, we highlight two as especially significant for the success of the PAGMI and, more broadly, formalization of artisanal miners in Nigeria: 1) misdirected or inadequate contract incentive provisions, and 2) inappropriate or outmoded performance measures and insufficient systems for communicating performance data.[235] We focus on how these potential issues relate to the planned buying centers, as the buying centers are the first new step in the National Gold Purchase Program value chain for formalized miners.

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[230] Solid Minerals Development Fund, *Presidential Gold Initiative*, 28.
[231] Solid Minerals Development Fund, *Presidential Gold Initiative*, 7.
[232] Fola Oyeyinka (Special Adviser on Economic Affairs, Office of the President), interview by Columbia Capstone team, Abuja, March 20, 2019.
[233] Fola Oyeyinka (Special Adviser on Economic Affairs, Office of the President), interview by Columbia Capstone team, Abuja, March 20, 2019.
[234] Tajudeen Badejo & Co (chartered accountants), *Solid Minerals Industry Audit Report*, 80-86.
[235] Steven Cohen, William Eimicke, and Tanya Heikkila, "The Art and Craft of Contracting," chap. 7 in *The Effective Public Manager: Achieving Success in Government Organizations*, 5th ed. (San Francisco: Jossey-Bass, 2013), 144.

Misdirected or inadequate contract incentive provisions

At the end of the day, the owner of the buying centers is not a private company, but rather the government: the SMDF and the government of Kebbi or Osun. It is the SMDF and the state government who the public, including the media, will hold accountable for the quality of the services provided by the buying centers. The use of an SPV to hold ownership will help insulate the government from financial risks associated with the buying centers, but not from responsibility. If the SMDF promises that the buying centers will deliver a number of high-quality equipment-related services and the buying center fails to do so or makes a large-scale mistake, it will hurt the credibility of not only the SMDF but the entire concept of the PAGMI. Such a scenario becomes plausible if the incentives for the gold processing company managing the buying centers are misdirected or inadequate to motivate the company to provide the services that the SMDF asks to be provided at the SMDF's desired quality level.

In the cobalt example (see box 1), the contract between the company and the government appears to have been developed in such a way that the company was incentivized to provide PPE, but nothing more. In order for the gold processing company running the PAGMI buying centers to provide both equipment and training for PPE, excavation, and/or primary processing, the SMDF needs to understand 1) what types of incentives will make the company put in the effort to provide these items, and 2) what types of punishment will prevent the company from slacking on quality. Traditional hierarchical structures will not be the dominant feature of the relationship between the SMDF and the gold processing company. In their absence, the SMDF must find other ways to influence the company to provide equipment and training to artisanal miners. While the threat of contract termination is a clear incentive to perform well, this is an extreme option and one that could result in the buying centers being non-operational for a period of time, among other negative impacts. As such, the company will be aware that contract termination is an unattractive option for the SMDF, decreasing the weight that this threat has. Money is another incentive, but may not work in all instances and may not be sustainable for the government.[236]

Box 1: Public Private Partnership in the Democratic Republic of the Congo:

The provincial government of Lualaba province in the Democratic Republic of the Congo partnered with Congo Dongfang International Mining, a subsidiary of the large Chinese cobalt supplier Huayou Cobalt Co., to regulate artisanal mining and ensure it is carried out safely. The company was granted the exclusive right to buy ore from a large cobalt mine in the area in exchange for spending $12 million on machinery, safety, and resettlement expenses. As a result, the company provided basic personal protective equipment (PPE) each day to registered artisanal miners who mine in the area, but no official training

[236] Steven Cohen, William Eimicke, and Tanya Heikkila, 142-143 and 149.

Incomplete or outmoded performance measures and insufficient systems for communicating performance data

As stated by the World Bank in regard to public-private partnerships, the private sector "will do what it is paid to do and no more than that."[237] The gold processing company managing the buying centers has little incentive to improve efficiency and profits if performance requirements are not outlined upfront or performance measurements do not measure outputs of interest to the SMDF, are not easy for the SMDF to understand or monitor, or are not well-communicated to the SMDF.[238] Additionally, in the absence of effective performance measurements and, thereby, accountability, the company may prioritize its other operations over running the buying centers.

Box 2: Performance assessments around the world

Performance assessments of privately-run centralized gold processing centers in Nicaragua, Peru, Colombia, Indonesia, and Ecuador found that poor practices led to several environmental issues associated with these facilities. The main problems were identified to be:

- Lack of cyanide management (both use and disposal);
- Amalgamation of the whole gold ore resulting in increasing mercury losses with tailings;
- Use of cyanide to extract residual gold from mercury-contaminated tailings;
- Dumping tailings that contain mercury, other heavy metals, and cyanide down the drain directly into the environment; and
- Decomposition of mercury amalgams by evaporating the mercury without any recovery method or filter.[1]

The same rough model was used at the many processing centers observed. The processing centers would provide basic techniques for miners to use to extract their gold, leach the mercury-contaminated tailings with cyanide, and discharge the contaminated tailings into the environment. In fact, the processing centers were creating more pollution than had been present before they were established by performing harmful gold processing techniques on a larger scale. While there are many cleaner technologies that could be used by the gold processing centers, these require technical skills and investment, which owners of the processing centers were generally not willing to spend money on. Artisanal gold miners were too poor relative to the processing companies to have influence and the governments of the countries studied, with the exception of Ecuador, have not tried to influence the private sector to invest in technologies that are less polluting, but rather focused on formalizing the artisanal miners.[1] The result is that "formalization initiatives are only formalizing the pollution."[1]

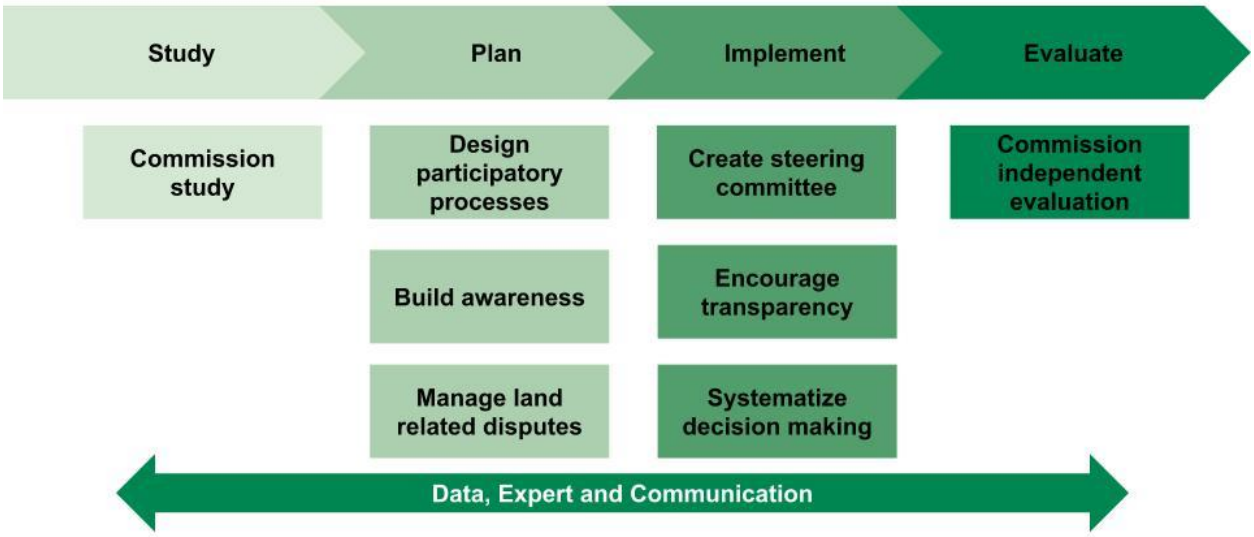
Performance assessments of privately run centralized gold processing centers in Nicaragua, Peru, Colombia, Indonesia, and Ecuador found that poor practices led to several environmental issues associated with these facilities.

[237] "Government Objectives: Benefits and Risks of PPPs," Public-Private-Partnership Legal Resource Center, World Bank Group, last updated October 31, 2016, https://ppp.worldbank.org/public-private-partnership/overview/ppp-objectives.
[238] Steven Cohen, William Eimicke, and Tanya Heikkila, 142-143, 148-150.

While the above example refers to centralized gold processing centers, the processes conducted at these centers – crushing and leaching – are the same as those that will be conducted at gold buying centers under the PAGMI pilot. Whether the SMDF can measure and monitor the performance of the company managing the buying centers is a critical determinant of the SMDF's ability to obligate the company to follow procedures that help, rather than harm, the health of miners and the environment.

5. Recommendations

Drawing on the identified barriers to success and the lessons learned from established best-practices and Ghana's and Mongolia's experiences, the Capstone team has developed the following recommendations for the SMDF. It should be noted that these recommendations are not comprehensive and that the SMDF and other government entities will face additional challenges, not addressed by our recommendations, as they move to formalize the artisanal mining sector (see section 6 for a discussion of remaining roadblocks).



5.1 Incentive structures

Include more participatory processes in the planning and implementation of formalization programs:

To understand the needs of artisanal miners and what incentives will be most effective in encouraging miners to participate in the PAGMI pilot and, more broadly, formalize, the SMDF should engage miners and mining communities in participatory processes. Such processes will help the SMDF to identify which types of incentives should be prioritized. For more detail, please refer to section 3.1.3, which outlines some international best-practices in designing and engaging in participatory processes related to artisanal mining.

5.2 Outreach

Launch education and sensitization campaign in mining regions

The SMDF should build trust and awareness among artisanal miners and mining communities around the government's specific formalization programs. To achieve this, there should be an education and sensitization campaign that combines different forms of communication (radio, text messages, billboards, and other) that targets artisanal miners. The campaign should actively counteract common misconceptions and false information and emphasize the benefits of formalization to artisanal miners. Refer to the brochures created in Mongolia to communicate best-practices for additional information.

Engage local leaders to become formalization advocates

People with influence in mining communities, whether they be chiefs, local business men, including middlemen, or religious leaders, have an important role in educating and influencing artisanal miners to formalize. The buy-in of community leaders will have a network effect and will make the awareness campaign more powerful and should increase the number of miners who formalize.

5.3 Government coordination

Create a one-stop-shop for miners

The SMDF would do well in designing buying centers as one-stop-shops for artisanal miners. The service can be modeled after the one-stop investment centre in the Nigerian Investment Promotion Commission,[239] which assists foreign investors in registering a business in Nigeria, but at a local level. The functions of this government entity should be clearly stated to include facilitating the registration of artisanal miners, helping them to obtain necessary permits and approvals, and providing basic services and capacity building to incentivize registration and formalization

Coordinate with other government agencies

There is a need to ensure that the relevant government stakeholders in the mining sector understand the coordination objectives and functions of the SMDF, so that it can drive the necessary linkages required in the industry to bring about growth, increased funding and greater synergy. The success of any coordination effort will depend heavily on the buy-in of stakeholders and this can only be obtained with proper and targeted information dissemination. There should therefore be a deliberate and strategic approach to inter-agency engagement about the adopted strategy and the coordination role of each agency.

5.4 Middlemen

Formalize all actors in the sector

Miners are unlikely to formalize at a large scale if middlemen are not positively engaged in the process. Rather than bypassing these actors, interventions should aim to integrate them into an entirely formal supply chain. The SMDF should, therefore, include middlemen in their formalization plans and provide incentives for them to become licensed buyers.

[239] https://nipc.gov.ng/iguide/getting-started/#osic

Institute direct lending and payment systems to minimize middlemens' predatory behaviour

The systems in which middlemen do business today allows exploitative behaviour. We understand that the government is already focusing on paying artisanal miners through mobile money systems as part of the PAGMI[240] and believe their use can be further prioritized and expanded. Buying centers should, specifically, require all payments to be digital in order to minimize the opportunities for exploitative behavior by middlemen. Digital payment will also create a channel to promote individual identification.[241] Through such a system, payments could be made directly to the miners rather than through the middlemen. Predatory lending practices may, additionally, be addressed by providing miners direct access to capital from the SMDF, the Bank of Industry or NEXIM, as discussed in section 2.2.

Support capacity building for mining cooperatives and the Mines Police

Eliminating criminals' sources of funding is likely to have negative effects on local conflict systems. The SMDF could mitigate some of these effects by supporting capacity building for mining cooperatives as part of the community led engagement model set to be established as part of the PAGMI pilot program.[242] Additionally, the Mines Police will be a key partner in eliminating criminality within the supply chain and in addressing the unintended consequences of these actions. The SMDF could support the Mines Police to build this capacity.

5.5 Buying center management

Develop a verifiable and appropriate set of performance measures for buying centers

The SMDF must be able to accurately measure the performance of the private gold processing company managing the buying centers under the PAGMI pilot scheme to understand and monitor the output and outcomes of the centers. Without this information, the SDMF cannot hold the private operator accountable for providing the services the SMDF intends the buying centers to offer. We recommend that the SDMF develop a set of indicators of performance that are a) easy for the SMDF to measure and interpret, and b) match the SMDF's goals and mandate.

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[240] PAGMI, p. 18; interview with Chairman of SMDF

[241] As discussed in 2.1, the cadastre system itself is not designed to register individual miners. Digital payments and identification could be facilitated using the existing BVN system. Compared with the national ID, BVN reached more registration over a shorter period of time due to a widespread network, including 5,000 bank branches with 10,000 stations nationwide.

Safdar, Zaid, and the Digital Development Team of the World Bank. "ID4D Country Diagnostic: Nigeria." Identification For Development. Washington D.C.: World Bank, 2016. http://documents.worldbank.org/curated/en/136541489666581589/pdf/113567-REPL-Nigeria-ID4D-Diagnostics-Web.pdf., Accessed April 30, 2019: 29.

[242] PAGMI, p. 25

Include reporting requirements in the contract that obligate the private operator to participate in the SMDF's performance measurement system

We expect that the private operator will have more expertise than the SMDF in mining, processing, and assessment techniques. As the day-to-day operations of the buying centers will be overseen by the private operator, we further expect that the private operator will quickly have more data on buying center operations than the SMDF. In order for the SMDF to remain informed of the performance of the buying centers and exercise control over their operation as needed, we recommend that the SMDF obligate the company to adhere to clear and detailed reporting requirements in the contract. Ideally, the reporting requirements would be based on a performance measurement system developed by the SMDF per the above recommendation.

Commission independent reports and audits of performance for the buying centers

The SMDF should take into consideration the judgement of third-party experts, in addition to specific performance indicators and reporting requirements per the above recommendations, when analyzing the performance of the private operator and the PAGMI pilot program as a whole. Independent third-party evaluations of performance can provide valuable insights into the private operator's overall performance and the impact of the pilot program. Independent reports and audits of buying center performance may also carry greater credibility with artisanal mining actors and both domestic and foreign investors, potentially leading to greater buy-in to the pilot program and increased investment

Include a requirement in the contract that the private operator provide adequate training to artisanal miners to disseminate best practices of the buying center

The private buying and processing center operators involved in the PAGMI pilot scheme are in a position to influence the behavior of artisanal mining communities through their role in raising the income of artisanal miners by offering higher mineral buying prices and improved yields. As discussed in section 4.5, however, the private sector will not undertake behavioral interventions unless it is paid to do so. To take advantage of the influence of buying centers, we recommend that the SMDF engage with the private operator of the buying centers early regarding adequate training of artisanal miners in areas such as safer and cleaner mining and processing techniques and include the provision of such training as a requirement in the contract.

Hire at least one person with extensive experience in managing contracts and contractors or hire a consultant to help the SMDF's staff learn how to manage contractors

Due to the information imbalance mentioned above, it is critical that the SMDF have someone on staff who has a deep understanding of the business of running buying and processing centers and is capable of interpreting the performance measurements reported by the private operator and incorporating them into subsequent actions. If the SMDF does not have a staff member who is able to analyze the private operator's output and interpret the accomplishments it claims to have achieved, the private operator will be able to report falsified or misleading output and

provide low-quality buying and processing services to artisanal miners regardless of how clearly reporting and performance requirements are set out in the contract. We recommend that the SMDF either hire at least one person with extensive experience in managing contracts and contractors or hire a consultant to train the SMDF's staff on how to manage contractors.

6. Remaining roadblocks

Even if the SMDF executes the PAGMI pilot and manages the scale-up of the program well, the artisanal mining sector in Nigeria will be far from formalized. The SMDF and the government at large face many potential roadblocks to achieve this goal. The SMDF is in no position to solve or address many of these challenges. Such challenges will, however, be important to keep in mind, and by highlighting some of them, the Capstone team hopes to spur additional government action in the sector.

6.1 Legal and regulatory challenges

Section 2.1 highlighted some of the existing challenges with the legal and regulatory requirements. As it stands, the registration process weighs heavily against formalization for most miners. The SMDF and the government as a whole therefore have to provide substantially more incentives than they otherwise would in order for miners to formalize. These challenges should be addressed to facilitate the formalization process.

An important step in this direction would be for the legislature to create a new artisanal mining lease, separate from the SSML, as proposed in the draft 2018 Nigerian Minerals and Mining Bill.[243] This would provide flexibility in the licensing process and allow the government to create a license that is more suitable for the needs and abilities of artisanal miners. For example, Sierra Leone created two separate licenses for artisanal and small-scale mining in 2009. This allowed the government to, among other things, mandate that small-scale operators do a full EIA while artisanal miners must only provide a statement of the likely effects of the proposed mining activities on the environment and the local community.[244]

The current legal framework also does not provide a clear statutory mandate for a coordination function regarding the formalization process to any government agency. The role of coordination is assumed to exist by inference, but there is no specific direction in the law for this purpose. While the draft Bill provides broad functions for the proposed Minerals Commission,[245] it still falls short of providing a clear coordination mandate. The draft Bill is an opportunity to provide for coordination as a specific function to be carried out by the regulatory agencies under the Bill. The Nigerian government may want to consider creating a specific agency that will carry out the coordination function, or impose the duty on a specific agency. This is important, as it is not

[243] Nigerian Minerals and Mining Bill 2018, H.B. 1313 (2018).
[244] Sierra Leone Mines and Minerals Act 2009 (2010) §84-104.
[245] Nigerian Minerals and Mining Bill 2018, H.B. 1313 (2018) §4.

enough to state that there should be coordination, but rather a specific body should have the mandate to do so and this should include powers to enforce the mandate and be recognized as the central coordination point for the sector. This power could be given to the proposed Minerals Commision or even the SMDF, which could play the role given its overall mandate in the sector.

The requirement that an individual licence holder has not been convicted of a criminal offense is, additionally, unnecessarily strict. The Criminal Code Act of Nigeria classifies offences into three distinct categories; felony, misdemeanor and simple offences. Section 3 of chapter one provides that all offences, other than felonies and misdemeanors, are simple offences with a maximum penalty of less than six months imprisonment or imposition of a fine. For instance, Section 206 of chapter nineteen stipulates that any person who willfully causes disquiet or disturbs any meeting of lawful religious gathering is guilty of a simple offense and liable to 2 months imprisonment or a fine of ₦10. By inference, a violation of section 206 disqualifies a person for life from legally engaging in artisanal mining activity. This blanket restriction is bound to create an impediment to existing artisanal miners who have committed a simple offense from formalizing their activities.

A remaining limitation of the current regulation is the widespread discretionary powers associated with dispute resolution vested in the Minister responsible for Mines and Steel Development. Section 19 of the 2007 Act establishes the MIREMCO as an intermediary for the local communities, state and federal government, miners and investors or mining companies (for more information on MIREMCO's current role, refer to discussion in section 1.3). Subsection (3)(h) of section 19 clothes MIREMCO with the responsibility of advising the Minister in resolving conflicts between stakeholders. Per the wording of the relevant provisions of the Act, MIREMCO's role in relation to conflict resolution is advisory in nature and as such non-binding. Additionally, section 15 of the 2011 Regulations vests power in the minister to set up a committee to enquire and resolve any dispute that may arise between applicants, holders of mineral rights and third parties. Subsection 2 extends the scope of the minister's power to include any act or omission connected with mining operation. Generally, having a level of state discretion in the legal framework of a country's mining regime is not unusual. The concern, however, is whether such discretion will be properly exercised since an improper use could frustrate and bring into disrepute the neutrality of the arbitration process.

The fact that both the 2007 Act and the 2011 Regulations make provisions for a conflict resolution mechanism is commendable. The discretionary power vested in the Minister with regard to dispute resolution, however, remains a concern. Any activity undertaken by the MIREMCO, which falls outside the ones enumerated in section 19 (which specifies that the MIREMCO's role is to advise the Minister in particular in resolving conflicts between stakeholders) is *ultra vires* (an action beyond MIREMCO's legal authority). A body charged with handling of dispute must have the legal authority to do so and must equally be empowered to enforce agreements reached by parties in a conflict to ensure compliance.

Due to the challenges identified above, it would be prudent to set up an independent body with an exclusive mandate as the first arbiter of conflicts arising out of mining-related activities, with presence in each state to ensure accessibility. This body, in order to carry out its mandate effectively without bringing into disrepute the neutrality of the arbitration process, especially where the government is a party to the conflict, should be totally decoupled from the Ministry

and any parastatal institution in adherence with the principles of separation of powers and checks and balances. Most importantly, the body should be vested with the requisite legal mandate of enforcement of agreements. Enhancing the powers of the MIREMCO may be another option to address the identified challenges.

Lastly, the government may wish to take steps to ensure that all criteria used to grant a license are objective and not open to interpretation. The World Bank identifies the "no subjectivity in evaluation criteria" as an important principle for effective mineral rights management under a cadastre system, meaning that no discretion should need to be used when considering and evaluating criteria for granting a license. The World Bank cites the requirement for a miner to demonstrate adequate financial capacity as an example of a commonly used requirement that is difficult to objectively assess.[246] This requirement exists within the current 2011 Regulations.

6.2 Transparency

While the SMDF has been undergoing a restructuring in order to carry out its mission more effectively, there have been close to no public accounts of its work. Transparency in government operations is widely regarded as an important precondition for fiscal sustainability, good governance and reduced corruption.[247] Transparency increases the political risk of unsustainable policies, which is corroborated by cross-country studies that suggest a positive relationship between broadly defined transparent budget practices and fiscal discipline.[248] Furthermore, increased transparency of the SMDF's processes will make it easier for companies to access the information they need to carry out effective due diligence, which could ultimately give artisanal miners greater access to international markets. Increased transparency could, as such, help ensure the effective operation of formalization programs and make the effort more sustainable.

The NSIA provides a model for some of the first steps the SMDF may wish to take to improve transparency. The NSIA's 2017 Annual Report was focused on "Integrity, Discipline and Transparency" and recognized "that the observance of and adherence to best practices in corporate governance contribute to the long-term success of the Authority."[249] Furthermore, the governance structure of the fund (see the figure below) strengthens operational efficiency and drive effectiveness across the organisation which helps ensure the use of effective corporate principles. By utilizing transparency as a springboard, the NSIA has launched successful bond issuances that have bolstered its ability to carry out its objectives while providing fiscal security for future transactions.[250] The International Monetary Fund recently confirmed that the NSIA "is

[246] Ortega Girones and Pugachevsky, "Mineral Rights Cadastre," 16-17.
[247] George Kopits and Jon Craig, *Transparency in Government Operations*, Occasional Paper 158 (Washington, DC: International Monetary Fund, 1998).
[248] Sanjeev Khagram, Archon Fung, and Paolo De Renzio, "Overview and Synthesis: The Political Economy of Fiscal Transparency, Participation, and Accountability around the World," in *Open Budgets: The Political Economy of Transparency, Participation, and Accountability.* (Washington: Brookings Institution Press, 2013).
[249] Nigeria Sovereign Investment Authority, *Making a Difference: Integrity Discipline and Transparency*, 2017.
[250] "Infracredit's Guarantee Supports North South Power's Issuance of the First 15-Year Corporate Green Infrastructure Bond in Nigeria" (InfraCredit, January 3, 2019), http://nsia.com.ng/~nsia/sites/default/files/press-

applying transparency practices that are aligned with the Santiago Principles of transparency, good governance, accountability and prudent investment practices."[251] While transparency is not the only factor in the NSIA's success, it provides a country specific model for a successful fund that the SMDF can emulate.

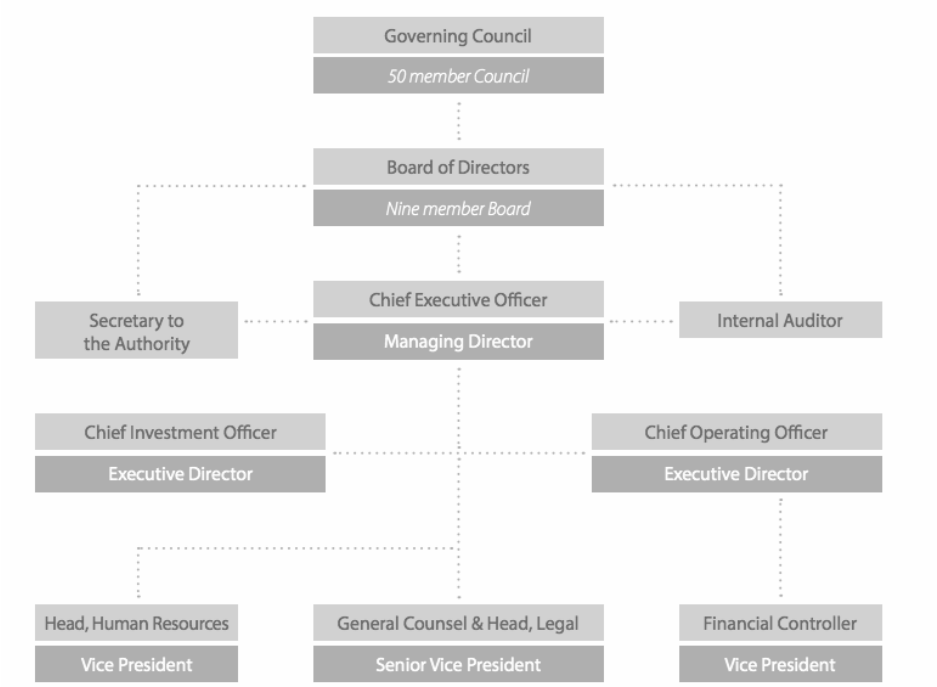

Figure 12: NSIA's governing structure (*source*: NSIA, *Making a Difference,* 31)

6.3 Corruption

Corruption has the potential to be a significant roadblock to the formalization of artisanal mining in Nigeria. If formal institutions and processes suffer from widespread corruption, artisanal miners are less likely to benefit from formalization. Miners will, for example, see less profits if they are required to pay bribes at processing centers and registration will be more cumbersome for most miners if the registration process is facilitated by criteria unrelated to a miner's ability to mine, such as personal or political connections.

As discussed in section 1.4, there is a perception that corruption is widespread in Nigeria and the artisanal mining sector is not an exception. Artisanal mining, as an informal and cash-based

release/Press%20Statement%20-%20NGN8.5Bn%20Guaranteed%20Corporate%20Green%20Infrastructure%20Bond.pdf.

[251] "IMF Clarification on Nigeria's Sovereign Wealth Funds," *International Monetary Fund*, April 12, 2019, https://www.imf.org/~/media/Files/Countries/ResRep/NGA/20190412-imf-clarification-on-nigerias-sovereign-wealth-funds.ashx.

sector, is more susceptible to corruption. Corruption may persist even after the sector is formalized. Nigeria does not currently have anti-corruption regulations specific to the artisanal mining sector.[252] Corruption is, additionally, not directly addressed in the documents introducing the PAGMI or the Gold Buying Program. The Nigerian government may want to consider taking additional steps to prevent corruption in the artisanal mining sector and establish clear anti-corruption mechanisms. As the National Gold Purchase Program continues to be developed, there may be opportunities to include corruption more openly in discussions with stakeholders and create program-specific steps aimed at minimizing corruption.

6.4 Infrastructure

While the government is aware of Nigeria's infrastructure shortcomings and is taking actions to address the deficit, as discussed in section 1.3, it must be reiterated that a lack of infrastructure continues to be a major roadblock for artisanal, small- and large-scale mining. The irregular supply of electric power costs the Nigerian state millions of dollars in lost funds and government revenue due to slack capacity and loss of foreign investment to other West African nations every year.[253] Moreover, the lack of internet capacity inhibits the productivity of the population and slows the growth of commerce. According to Open Signal, an independent network testing company, Nigeria ranked 82nd out of 87 countries with internet speeds of 4.13 Mbps in 2017.[254] With the acceleration of mobile phone technology throughout the world, digital infrastructure in Nigeria has never been more important; by some estimates, more people will have cell phones than access to running water in 2020.[255] If artisanal miners have weak access to reliable cellular technology, it will be a hindrance to their ability to transact through mobile banking and restrict the ability for individuals and government to work transparently together.

Across the whole of the country, 120,546 miles of road exists and it is generally in poor condition. Potholes are common and often lead to drivers swerving dangerously, causing unnecessary accidents and traffic deaths, approximately 5,000 annually.[256] In some instances, in more remote states, roads are largely impassable and particularly so during the rainy season from May to October. Despite allocating $1 billion for infrastructure in 2010, roads continued to be unsafe and problematic for transportation of people and goods. By some accounts, Nigeria has one of the highest rates of road accidents in the world.[257] As such, it is far from easy for artisanal miners

[252] Kunle Obebe and Bode Adegoke, "Anti-Corruption and Bribery in Nigeria," Lexology, accessed May 29, 2019, https://www.lexology.com/library/detail.aspx?g=4fab7b2c-247c-496a-9793-777fac327c16.
[253] Udochukwu B. Akuru and Ogbonnaya I. Okoro, "Economic Implications of Constant Power Outages on SMEs in Nigeria," *Journal of Energy in Southern Africa* 25, no. 3 (August 2014): 47–61, 26.
[254] Adeyemi Adepetun, "Nigeria's Internet Speed Ranks Low at 82nd Position," *The Guardian Nigeria*, March 15, 2017, https://guardian.ng/technology/nigerias-internet-speed-ranks-low-at-82nd-position/.
[255] Amy Zegart and Michael Morell, "Spies, Lies, and Algorithms," *Foreign Affairs*, May 2019, https://www.foreignaffairs.com/articles/2019-04-16/spies-lies-and-algorithms, 90.
[256] Lexa W. Lee, "Quality of Roads in Nigeria," USA Today, accessed May 29, 2019, https://traveltips.usatoday.com/quality-roads-nigeria-100932.html.
[257] Lee, "Quality of Roads in Nigeria."

to transport the gold they mine on their own or with the help of middlemen due to the poor road conditions. This adds unnecessary costs to the entire supply chain, whereby deliveries are unpredictable and costly. Without more road options and better road conditions artisanal miners are unlikely to be able to transport their minerals to prospective buying centers or even be able to register for mining licences[258].

Looking ahead to the prospect of enticing foreign direct investment and growing local companies, transportation logistics remain the primary issue facing the facilitation of exports of solid minerals due to the weight of the product and the absence of good roads, railways and inland waterways, as well as congestion at ports.[259] A more multi-modal form of transportation infrastructure would assure future investors that should any unexpected delays occur, alternative export methods are available. Currently, heavier minerals like lead and coal cannot be exported economically even to neighboring countries like Ghana at competitive rates due to the lack of reliable roads, or alternative transportation options.[260] There is the desire from big purchasers in China to export iron ore, but again, the lack of infrastructure disincentivizes the purchase of these minerals.[261] More focus from the Nigerian federal government is needed to allocate funds for the construction of these projects and not rely on outside companies to build key infrastructure for the state. Working with development banks on toll roads/railways could help alleviate the costs of these projects.

6.5 Preventing conflicts between artisanal and large-scale miners

If the government successfully reaches its goal of attracting LSM companies to Nigeria, ASM and LSM will inevitably come in contact. Across the world, such contact has led to latent and direct conflict. In 2008, for example, ASM-LSM interactions led to conflicts in Sierra Leone, Ghana and the DRC in relation to diamonds, gold, copper and cobalt.[262] Similar conflicts are very likely to occur in Nigeria as well. As discussed in section 1.5, formalizing artisanal miners will help to reduce the likelihood of such conflicts and facilitate conflict resolution. However, conflicts still occur between formalized artisanal miners and larger operators. To prevent, mitigate and resolve such conflicts the government should immediately consider taking additional actions.

The most important role of the government in preventing the outbreak of ASM-LSM conflicts is to guarantee the sanctity of land titles. If LSM titles are prioritized over licenses held by artisanal

[258] Assuming that miners need to drop off hard copies of their application paperwork to register, as is currently the case.
[259] NEXIM, interview by Columbia Capstone team, Abuja, March 19, 2019.
[260] NEXIM, interview by Columbia Capstone team, Abuja, March 19, 2019.
[261] NEXIM, interview by Columbia Capstone team, Abuja, March 19, 2019.
[262] Remi Pelon and Gotthard Walser, *Mining Together: Large-Scale Mining Meets Artisanal Mining, A Guide for Action*, (CASM and the World Bank, 2009), 6, http://documents.worldbank.org/curated/en/148081468163163514/pdf/686190ESW0P1120ng0Together0HD0final.pdf.

miners or the government issues large concessions to majors on land already titled to small operators, all the hard work to formalize artisanal miners will be for nothing. As such, it is important to ensure that mineral governance frameworks do not favor FDI over artisanal mining.[263] The government can also play a role in facilitating multi-stakeholder dialogues between artisanal miners, multinational companies and mining communities. Mongolia has successfully created such dialogues on issues such as reducing conflicts between stakeholders.[264] It is critical that such engagement starts early, preferably before concessions are granted to LSM companies. In order to resolve conflicts, the government could provide arbitration mechanisms. The specialized court system created in Ghana (see section 3.2.4) is one example of a potential action in this regard.

6.7 Geodata and technology

SMDF is mandated to provide geological information services to miners and to invest in geo-service systems.[265] As discussed in section 1.3, the government is taking steps to improve the quality and availability of geodata, including contracting with the BGS to complete full geochemical mapping of Nigeria. Beyond the introduction of new technology, a broader challenge is utilization. To command the technology and use it, both policy practitioners and miners need training. Further, to develop innovative solutions, Nigeria needs a large pool of geological talents. Yet our conversation with experts reveals an undersupply of technical talent.[266] It is recognized that Nigeria has developed local research and development capability in oil and gas. Mining, however, is a different sector, with low FDI and a brief modernization history.

One potential mitigation strategy may be external sources. In Mongolia's case, international development agencies and NGOs provides expertise (see 3.3.1). Another good first step of technical training is from government departments with a strong motivation to adopt advanced technology, such as the Mines Police under the MMSD and other law enforcement agencies. In 2017, India, for example, adopted a satellite-based Mining Surveillance System to curb illegal mining activities. The system uses a mobile app and website that combines geodata services with platforms for citizens to report illegal activities.[267]

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[263] Morgane Fritz et al., *Global Trends in Artisanal and Small-Scale Mining (ASM): A Review of Key Numbers and Issues*, (IISD, January 2018), 36.

[264] "The Asia Foundation in Mongolia Holds Closing Workshop for "Engaging Stakeholders for Environmental Conservation" Program," News, The Asia Foundation, June 13, 2013, https://asiafoundation.org/2013/06/13/the-asia-foundation-in-mongolia-holds-closing-workshop-for-engaging-stakeholders-for-environmental-conservation-program/.

[265] 2007 Act, section 34d

[266] Adam Kendall (McKinsey), interview by Columbia Capstone Team, Abuja, March 22, 2019.

[267] Government of India Ministry of Mines, "Mining Surveillance System: Challenges & Way Forward", https://mines.gov.in/writereaddata/UploadFile/ncmm2017mss.pdf, Accessed May 1 2019

7. Conclusion

Nigeria is facing a grand challenge in formalizing the artisanal mining sector. The SMDF has a unique role to play in this endeavor and can serve as a catalyst for change. To realize the many potential benefits of having a formal artisanal mining sector, such as increased government revenue, a smaller environmental impact, and community development effects, the SMDF, as well as the rest of the Nigerian government, will have to address many existing challenges and barriers to success. Among them, a current lack of government coordination, overemphasis on economic incentive structures, limited contextual specificity, difficulties associated with a reliance on private operators, and a burdensome registration process are the most significant.

Drawing on in-person interviews with key governmental stakeholders and mining experts conducted during the team's travel to Nigeria, best practices established across the world, lessons learned from case studies of Mongolia and Ghana, and interviews with non-profit and multilateral organizations, artisanal mining experts, and academics, the team has formulated context- and institution-specific recommendations to the SMDF. To reemphasize, we especially recommend that the SMDF make a greater use of participatory processes when implementing current programs to formalize miners and designing new programs. We further suggest that the SMDF does not try to bypass local middlemen but rather design a formalization program in which the entire supply chain is targeted for formalization. The SMDF would, additionally, do well in placing a greater emphasis on cross-government coordination and developing a verifiable set of performance measures for buying centers to help ensure effective management for social change.

While the SMDF can play a catalytic role in the formalization effort, it cannot formalize the sector itself. As described above, there are currently a number of important roadblocks which will inhibit effective formalization unless addressed. Reforming the legal and regulatory code could lower the burden of registering and maintaining a license for artisanal miners. Transparency and anti-corruption should be championed both for effective public management and to lower the current costs to miners associated with formalizing. Moreover, actions should be taken to meet the current infrastructure needs of both artisanal and larger-scale miners, as well as improve the state of the geological data environment. These, and other actions discussed above, will require buy-in and action from the government as a whole, not just the SMDF.

In closing, the Columbia Capstone team would like to extend our gratitude to the SMDF and other stakeholders in Nigeria and elsewhere who have graciously offered their time and expertise to us. Without such invaluable help, this project would not have been possible. As no single best model for how a country should formalize artisanal mining exists, it is our hope that the report's targeted recommendations and analysis of opportunities and challenges for Nigeria will add value to the SMDF's efforts to grow the mining sector and ultimately contribute to improving the lives of Nigerian miners and their communities

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