

RESEARCH ARTICLE

Evaluation of Artisanal and Small-Scale Mining Operators' Access to Finance in Nasarawa State

Onekpe, Sunday Amedu^{1*}, Nwachukwu, Chinedu Chidinma² & Iyi, Edmund Amuezuoke³

¹Department of Quantity Surveying, Enugu State University of Science and Technology (ESUT), Enugu State

²Department of Project Management Technology, School of Logistics and Innovation Technology, Federal University of Technology, Owerri

³Department of Urban and Regional Planning, Enugu State University of Science and Technology (ESUT), Enugu

***Corresponding Author**

ABSTRACT

The artisanal and small-scale mining (ASM) sector is a vital component of resource-based economies, contributing significantly to both employment and mineral production. This study assesses financial accessibility for ASM operators in Nasarawa State, identifying challenges and proposing solutions. Data was collected through surveys and interviews involving 402 participants, including 380 artisanal miners and 22 deposit money bank (DMB) executives, averaging four participants per Local Government Area (LGA). Obstacles hindering ASM operators from accessing financial support include their informal nature, associated risks, and reluctance from commercial banks to extend credit. Key barriers encompass insufficient collateral, limited business planning and record-keeping capacity, and a lack of corporate governance structures for effective loan assessment and documentation. Many ASM operators also lack skills to produce necessary documents like feasibility studies, further inhibiting their access to funding. Despite ASM's significance in sustaining livelihoods, its contribution to Nasarawa State's economy remains suboptimal due to limited financial access. Addressing these constraints requires collaborative efforts from stakeholders in Nasarawa's mining value chain. This entails formulating and implementing policies to formalize artisanal mining, providing training in financial management, bookkeeping, and loan terms. Establishing a risk-sharing mechanism with incentives can mitigate ASM-related risks, promoting cooperation and responsible conduct among the state government, financial institutions, and artisanal miners. This approach enhances resilience in the face of uncertainties and unlocks the potential of the ASM sector in Nasarawa State.

Keywords: Artisan; Small-Scale Mining Operators; Revenue Generation; Finance; Nasarawa State

Introduction

Artisanal and Small-Scale Mining (ASM) operations play a pivotal role in providing income and sustenance to residents in rural, semi-urban, and low-income communities within Nasarawa state and Nigeria. These activities are projected to expand further, continuing to offer employment opportunities and a source of revenue. Similar to various regions in Nigeria, inhabitants of less privileged rural areas in Nasarawa state engage in ASM due to the absence of alternative economic prospects. Globally, it is estimated that over 100 million individuals rely directly or indirectly on ASM for their livelihoods. However, due to the use of rudimentary tools and practices, ASM activities contribute significantly to environmental degradation and social disruptions.

This underscores the necessity of addressing inadvertent adverse environmental and social impacts associated with mining activities if ASM is to effectively drive economic progress and development. Given their informal and unstructured nature, ASM enterprises are often perceived as high-risk ventures by financial institutions, leading to a reluctance in extending conventional banking credit. Consequently, the restricted access to formal financial channels leaves ASM practitioners reliant on informal financing methods, which, although historically utilized in Nasarawa state and Nigeria, are generally ineffective and unsustainable. Within this

context, it becomes essential for the upstream, midstream, and downstream facets of mining operations to secure funding from established lenders, bolstering their business capacities. However, formal financial institutions adhere to stringent credit procedures that ASM operations, due to their informal characteristics, struggle to fulfil. To

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facilitate a productive collaboration between ASM and formal lenders, proactive measures must be taken to equip ASM operators with the prerequisites that financial institutions carefully assess before granting financing.

Statement of the Problem

Artisanal and small-scale mining (ASM) constitutes a vital source of livelihood for numerous individuals residing in rural and semi-rural communities within Nasarawa state. In an ideal scenario, ASM operators should have equitable and uninhibited access to formal financial resources, enabling them to invest in their operations, enhance productivity, and contribute to the economic growth of their regions. This would require financial institutions to recognize the potential of the ASM sector, extend appropriate credit, and support its sustainable development. However, a significant portion of these operators lack access to formal financial channels due to their perceived high-risk nature. If these challenges remain unaddressed, the consequences could be detrimental on various levels. The ASM sector's potential to contribute significantly to local and national economies will remain largely untapped. Operators will continue to struggle with limited resources, hindering their ability to modernize their operations, adopt environmentally responsible practices, and improve their socio-economic well-being. Consequently, the research problem is on how to identify and eliminate real and perceived barriers to ASM access to formal finance with a view to attracting capital to the sector to enable the operators contribute to the economic development potentials of Nasarawa state.

Objectives of the Study

The main aim of this study is on evaluation of artisanal and small-scale mining operators' access to finance in Nasarawa State. The specific objectives of the study are:

- i. Identify the factors militating against artisanal and small-scale mining access to finance.
- ii. Determine how the factors militating against artisanal and small-scale mining access to finance can be eliminated.

Research Questions

To gather pertinent information on the subject at hand, the following research questions were formulated:

- i. What are the factors militating against artisanal and small-scale mining access to finance?
- ii. To what extent can the factors militating against artisanal and small-scale mining access to finance be eliminated?

Significance of the Study

This study will assist stakeholders in the mining sector of Nasarawa state, that is, the government and operators in the value chain to identify the barriers to accessing finance and develop strategies to eliminate them and hence ensure the growth and development of the economy. In addition, this study will serve as reference material for future research in the mining sector.

Review of Related Literature

Conceptual Review

Artisanal and small-scale mining (ASM) represents an informal and often technologically simple form of mining undertaken by individuals or small groups, typically in remote and economically marginalized regions. The scope of ASM activities is broad, encompassing everything from the extraction of minerals to their subsequent processing and trading. This sector's distinguishing features lie in its lack of formal organization, limited financial resources, and reliance on basic technologies.

While ASM serves as a significant catalyst for poverty alleviation, rural development, and local employment generation, it also brings forth a host of environmental and social challenges. The informal nature of these operations can result in detrimental environmental impacts, ranging from deforestation and land degradation to water pollution and habitat destruction. Moreover, ASM activities are often associated with precarious working conditions and inadequate safety measures for laborers.

In this context, the access to financial resources emerges as a pivotal determinant that significantly influences the productivity and sustainability of ASM operations. The absence of convenient entry to formal financial institutions and their services creates a bottleneck, hindering crucial investments in modern equipment, advanced technologies, safety protocols, and environmentally responsible practices. As a result, ASM operators frequently resort to informal channels for funding, leading to onerous interest rates and a cycle of indebtedness that further constrains their growth potential.

Given the aforementioned challenges, it is imperative to comprehensively evaluate the mechanisms through which ASM operators obtain financial support. This inquiry aims not only to shed light on the financial constraints they encounter but also to uncover viable pathways for sustainable growth. By understanding the intricacies of ASM operators' access to finance, stakeholders can formulate targeted interventions that alleviate their financial burdens, promote responsible mining practices, and unlock the sector's latent potential for broader economic and social development.

Theoretical Frameworks

In the evaluation of artisanal and small-scale mining operators' access to finance in Nasarawa state, several basic theorems come into play, guiding the process and providing insights into the outcomes. The theorem that is fundamental to the evaluation of artisanal and small-scale mining operators' access to finance in Nasarawa state is financial inclusion. The framework of financial inclusion emphasizes the importance of providing affordable and accessible financial services to underserved populations. ASM operators, as a marginalized group, can benefit from interventions that enhance their financial literacy and enable them to access formal financial services. ASM access to finance in Nigeria is limited because of several factors. Apart from mine titles, lenders' main preoccupation remains the borrowers' ability to repay the loans, the level of risk involved in mineral extraction, and the viability of the project itself (Siwale & Siwale, 2017). ASM borrowers cannot meet the requirements of formal lenders and thus, in reality, even if they formalise their operations, they will continue to suffer from lack of access to formal funding. As indicated by Perks (2016), this could also be due to the inexperience of local banks in a technical field such as mining. Inability to provide physical collateral in form of property to be pledged by a borrower to a lender if the borrower defaults on payments limit access to finance as it is regarded as a credit risk. Binks et al. (1992) opine that small businesses have trouble securing loans because they have no or insufficient physical collateral. Collateral can take several forms; these may include real estate, cash, equipment, inventory, or property on paper, as long as there is a recognisable value associated with them (Cozad, 2022).

Empirical Review

ASM's access to finance in Nigeria faces significant limitations due to various factors. Aside from the ownership of mining rights, the primary concern of lenders revolves around the borrowers' capacity to repay loans, the inherent risk associated with mineral extraction, and the overall viability of the project itself (Siwale and Siwale, 2017). Unfortunately, ASM borrowers find it challenging to fulfill the requisites set by formal lenders. Even if they opt to formalize their operations, the persisting lack of access to formal funding is a stark reality. Perks (2016) suggests that this situation could stem from the local banks' lack of expertise in a technical domain like mining.

The primary reason for the formalisation of ASM was to strengthen their capabilities so that they could be integrated into the formal economy. One crucial objective of formalisation is to incorporate the extra-legal economy into the mainstream formal economy (Siegel & Veiga 2009). Also, the ASM formalisation was expected to improve their access to finance. ASM operators who are regarded as formalised and have mining licences are assumed to be eligible for a formal loan. However, they are exposed to different requirements by formal lenders (Seccatore et al., 2014). Social capital is gradually becoming recognised as a form of asset in microfinance lending.

Postelnicu et al. (2014) define social capital as a pool of resources embedded in one's social ties. Microfinance institutions use group lending with joint liability by obtaining cross guaranties to improve repayment of the facility they extend to the members of the group. Being an active member of a self-help group such as a cooperative society could be seen as a form of social capital. Postelnicu et al. (2014) therefore posit that by being jointly bound for the repayment of a group loan, borrowers pledge the capital they have in their social ties, that is, they provide social collateral. Therefore, not being a member of any mining cooperative society can be considered a form of risk to access to formal finance.

The consequences of the limited financing available to ASM operators is that they become mere preys in the hands of large mining companies. Thus, whereas the ASM operators who are mostly locals discover these minerals, many of these deposits usually make their way into the hands of the big players in the industry (Hentschel et al., 2002). In effect, ASM operators only make enough to cater for daily subsistence, which is the main reason for the perpetuity of their poverty. Spiegel (2012) points out that inequitable access to credit fuels this poverty. In the final analysis, given that formal lending arrangements do not provide sufficient window to accommodate ASM operations, they are left no option than informal credits to keep their businesses going.

Methodology

Research Design

This study used primary and secondary sources to obtain relevant data and information. Primary sources involved administration of questionnaire while secondary sources entail review of literature, textbooks, and internet to understand ASM as a subject and risk assessment in lending. The questions were designed in such a way to minimize biases of the researcher. The qualitative research analysis method was used to generate leads and ideas about the factors that directly and indirectly influence ASM access to finance.

Area of Study:

Nasarawa state in north central Nigeria is the chosen study area. The state has 13 (thirteen) local government areas comprising Akwanga, Awe, Doma, Karu, Keana, Keffi, Kokona, Lafia, Nasarawa, NasarawaEggon, Obi, Toto and Wamba. The map of Nasarawa state is shown in figure 1 below.

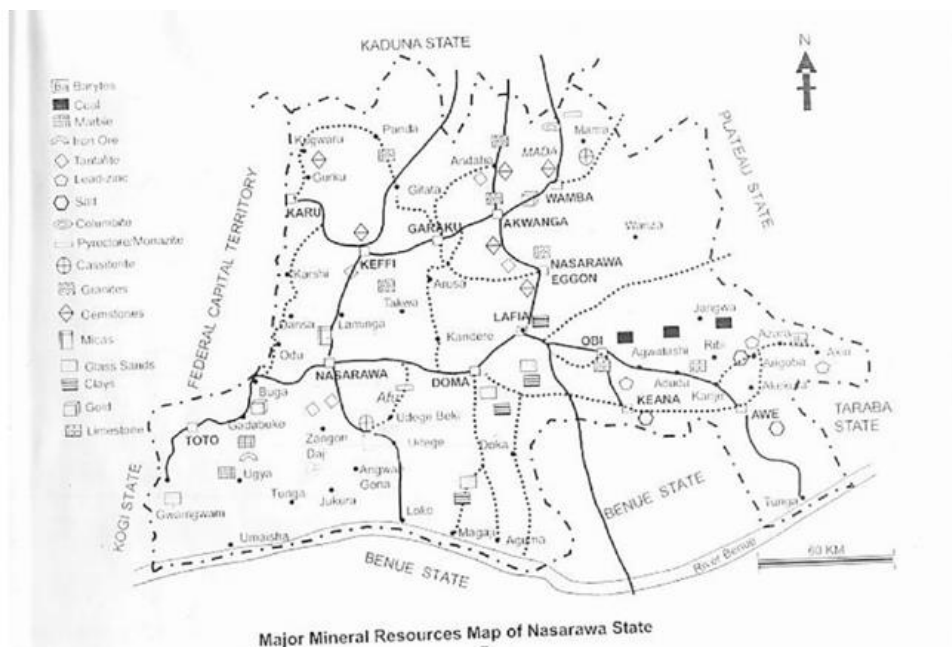


Figure 1: Area of study

Available at: https://www.researchgate.net/figure/Major-Mineral-Resources-Map-of-Nasarawa-State-Adapted-from-6_fig3_321263421

Sources of Data Collection

Data and information were collected through two sources. The first was through literature review on ASM access to finance in Nigeria and other jurisdictions. The second source was through a physical survey which involved administration of questionnaires and face-to-face interviews.

Population of the Study

The population for this study includes artisanal miners and DMB executives in charge of evaluating loan requests and granting credit to customers in Nasarawa state. A total of 402 participants comprising 380 artisanal miners and 22 DMB executives were given the questionnaire. This gives an average of 4 participants per LGA. The population selected was 402 participants drawn from ASM operators and DMB executives in Nasarawa state using stratified random sampling method. Out of this number 360 were returned representing 89.6% while 42 were not returned representing 10.4%.

Sampling Techniques

The research utilized stratified random sampling technique. This is a probability sampling technique that involves dividing the population into distinct subgroups or strata based on certain characteristics and then selecting a random sample from each stratum.

Instrument

The questionnaire serves as an essential instrument employed in this study. The questionnaires that were administered in this study are closed-ended. The questionnaires were distributed to artisanal miners, and DMB executives in the proportion of 380, and 22 respectively. However, a total of 360 questionnaires were completed and returned by the respondents.

Validity of Instrument

The researcher carried out a pilot survey by distribution 5 copies of the questionnaires to respondents in Awe, Doma, and Karu LGA to ensure it accurately captures factors it is designed to evaluate. Thereafter, the comments from the pilot survey were incorporated into the questionnaire before quality controlling it with my project supervisors and inputs from them guarded the researcher in restructuring the instrument for final production and distribution to respondents.

Reliability of the Instrument

The researcher ensures is free from measurement errors by carrying out a test-re-test method of reliability was adopted for the study in which 15 copies of the questionnaire were distributed to other local government areas outside the study: 5 copies to each of 3 LGA. The instrument was tested using Cronbach Alpha Coefficient testing tool. See tables 1 and 2 below. The reliability result indicated 0.872, implying a high degree of items consistency.

Table 1: Cronbach Alpha Reliability Test

	₦	%	
Cases	Valid	15	100
	Excluded ^a	0	0
	Total	15	100

a. Listwise deletion based on all variables in the procedure

Source: Field Survey, 2023

Table 2: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.885	0.872	15

Source: SPSS 20.0 Output

Method of Data Analysis

In this study, a combination of qualitative and quantitative data analysis techniques was employed. The quantitative methodology encompassed the conversion of responses into frequencies and percentages. These percentages were subsequently utilized to generate graphical representations, effectively conveying the data visually when deemed appropriate. The visual presentations helped to improve data interpretations because they improve data clarity. The

software, Statistical Package for Social Sciences (SPSS) was applied to actualize these tasks. Data for this study were analyzed using frequency distribution, table, percentage, mean, standard deviation, and inferential statistics in line with the stated objectives.

Data Presentation and Analysis

A total of 402 questionnaires were distributed to respondents in area of study and out of this number, 360 representing 89.6% were duly filled and returned while 22 or 10.4% were not returned by the respondents. See table 3 below for details.

Table 3: Status of Distributed Questionnaire				
Total Distributed	Returned		Not Returned	
	Number	%	Number	%
402	360	90	42	10
Source: Researcher Construct				

The demographic information of the respondents spread across the mining communities 3 LGAs covered in this study are presented in table 4 below.

Table 4: Demographic Information		
Type of settlement		
Town	53	14.7
Village	205	56.9
Hamlet	102	28.3
Total	360	100
Type of Community		
Mining	350	97.2
Non-Mining	10	2.8
Total	360	100
Local Government Area of Study		
Akwanga	140	38.9
Karu	120	33.3
Doma	100	27.8
Total	360	100
State of Study		
Nasarawa	360	100
Nationality		
Nigerian	360	100
Gender		
Male	332	92.2
Female	28	7.8
Total	360	100
Marital Status		
Single	103	28.6
Married	257	71.4
Total	360	100
Source: Research Construct		

From table 4 above, 53 (14.7%) of the locations are towns, 205 (56.9%) are villages and the remaining 102 (28.3%) are hamlets. As regards the type of community surveyed, 350 (97.2%) are mining communities while the remaining 10 (2.8%) are non-mining communities. This implies that mining communities were adequately covered in the survey. In terms of the LGAs studied, an average of 120 respondents were drawn from each while all the 360 respondents sampled, representing 100% are from Nasarawa state. Concerning gender of respondents, 332 (92.2%) are males while the remaining 28 (6%) are females. This suggest that more males participated in the survey than

females as there are more males involved in ASM activities within the study area. In terms of the marital status of the respondents, 103 (28.6%) are singles while 257 (71.4%) are married.

The data obtained from questionnaires administered to respondents were analyzed and the analysis was done based on the rationale of achieving the research objectives. A total of five questions were asked and the analysis of the responses are presented in the tables to 5 below.

Table 5: Application for a loan			
Question 1	Answer	Respondents	
		Number	%
Have you ever applied for a loan from a bank?	Yes	316	88
	No	44	12
Total		360	100
<i>Source: Field Survey, 2023</i>			

Out of the total number of respondents surveyed, 316 or 87.8% stated that they have applied for a loan from a bank while 44 or 12.2% have never applied for a loan from the bank. This indicates that ASM operators in the State need the banks to finance their operations.

Table 6: Was the loan granted to you by the bank?			
Question 2	Answer	Response	
		Number	%
Was the loan granted to you by the bank?	Yes	0	0.00
	No	360	100
Total		360	100
<i>Source: Field Survey, 2023</i>			

Table 6 above showed that none of the respondents got loan from the bank. This a clear indication that the ASM operators in the State are unable to meet the stringent condition of commercial banks for granting loans to customers. The mining sector should be incentivized to encourage commercial banks to lend to ASM operators.

Table 7: Reasons for loan denial by the bank			
Question 3	Response	Number	%
What were the reasons for not granting you the loan by the bank?	Lack of collateral	6	1.67
	Inability to produce feasibility studies	5	1.39
	Poor records keeping and corporate governance	7	1.94
	All reasons stated above	342	95.00
Total		360	100.00
<i>Source: Field Survey, 2023</i>			

As presented in table 8 above, 342 representing 95% of the respondents stated that they were unable to get bank loan because of lack of collateral, inability to produce feasibility studies and poor record keeping including corporate governance. On the other hand, 6 or 1.67%, 5 or 1.39% and 7 or 1.94% stated they were unable to get bank loan because of lack of collateral, inability to produce feasibility studies and poor record keeping and corporate governance respectively. This further implies the need for government to intervene in this critical sector by de-risking it through the introduction of incentive-based risk sharing system so that stakeholders can mutually share risks and rewards for the ultimate benefit of the citizens of Nasarawa state.

Table 8: Sources of finance for mining activities			
Question 4	Responses	Number	%
What are the sources of finance for your mining activities?	Personal savings	295	81.9
	Loan from family members	50	13.9
	Loan from friends	15	4.2
	Loan from commercial bank	0	0.0
Total		360	100
<i>Source: Field Survey, 2023</i>			

On sources of finance for mining activities as presented in Table 9 above, 295 representing 81.9% of the respondents carry out their operations using personal savings, while 50 or 13.9% got loans from family members for their operations. In addition, 15 or 4.2% obtained loans from their friends while none got loan from commercial banks. This shows ASM operators in the State finance their operations mainly from personal savings and little support from family members and friends. This again bring to the fore, the need to develop and implement strategic initiatives that will make the sector attractive to commercial banks to enable them to extend their financial inter-mediation role to ASM operators.

Table 9: Government Financial Support			
Question 5	Answer	Response	
		Number	%
Have you received any financial support government?	Yes	6	1.7
	No	354	98.3
Total		360	100
<i>Source: Field Survey, 2023</i>			

As depicted in the table above, majority of the respondents, that is, 354 or 98.3% have not received financial support from the Government, while 6 or 1.7% have received financial support from the Government. This implies that the majority of ASM operators in the state have not received any financial support from the Government. In line with this finding, it is important the Government should take extra steps to support the ASM operators financially as this will help to harness the potential embedded in the sector.

Findings

Access to finance: Financial accessibility stands as a pivotal determinant for the success of artisanal and small-scale mining within Nasarawa state. However, because of their informal nature and the type of their operations, Deposit Money banks are not readily willing to grant them credit because of their perceived risks. The factors which constrain ASM access to finance in Nasarawa state based on this study are stated below.

Lack of collateral: Artisanal and small-scale miners in the Nasarawa state do not have adequate collateral that are acceptable to financial institutions to secure loans from them. For this reason, lenders are hesitant to provide financing to them because if they are unable repay the loan, there is nothing of value that the financial institution can fall back on to recover the money.

Informal Operations: Many of the artisanal and small-scale mining operations in Nasarawa state are carried out informally. Most of them are not members of any mining association or cooperative society as part of the formalization efforts of the government to bring them into mainstream of the economy. The implication is that there is little or no capacity for business planning and records keeping neither do they have corporate governance structure that are needed for proper loan evaluation and documentation.

Knowledge and Skills

- i. Many artisanal and small-scale miners in Nasarawa state have limited knowledge and skills in business management. For this reason, they are unable to produce feasibility studies and other documentations needed by the lenders. Financial institutions would normally require those they are entrusting with their money to have requisite knowledge, skills and attitude before allowing them access to their finance.

Conclusion

Artisanal and small-scale mining in Nasarawa state is undeniably a critical sector that provide livelihoods for many people. However, its contribution to the State's economy is generally far below average because the operators do not have access to finance. The researcher is of the opinion that these narratives can change if appropriate interventions are made by government.

Recommendations

To address the factors limiting ASM access to finance in Nasarawa state requires that all actors in the mining value chain need to come together with a view to designing and implementing strategic policies and initiatives.

Formalization of Artisanal Mining

Encourage and support the formalization of artisanal mining operations. This includes providing miners with legal recognition, licenses, and permits, which can help them access formal financial services. Formalization also makes it easier to track and monitor mining activities, which can lead to improved compliance and sustainable practices.

Training and Capacity Building

Provide training and workshops to miners on financial management, bookkeeping, and understanding loan terms and conditions. This will help them manage their finances more effectively and make them more creditworthy in the eyes of lenders. Educate miners about formal financial systems and the benefits of using them, including building credit history and accessing larger financial opportunities.

Incentive-Based Risk Sharing System

De-risk ASM operations by developing an incentive-based risk-sharing system for mining lending. This mechanism will encourage the state government, financial institutions and artisanal miners to share risks and rewards in a cooperative and mutually beneficial manner. Under the arrangement, the State government will on the one hand provide guarantees to financial institutions and incentives to the miners to encourage lending to the sector. This mechanism for managing risks in complex situations fosters cooperation, encourage responsible behaviour, and promote resilience in the face of uncertainties.

References

- Bank of England. (2022). The bank rate increased to 1% - in May 2022. <https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/2022/may-2022>
- Benning, I. (2000). Bankers' perspective of mining project finance. *The Journal of The South African Institute of Mining and Metallurgy*, 100(5/6), 145–152.
- Binks, M. R., Ennew, C. T., & Reed, G. V. (1992). Information Asymmetries and the Provision of Finance to Small Firms. *International Small Business Journal*, 11, 35–37. <https://doi.org/10.1177/026624269201100103>
- Cozad, M. (2022). Collateral: Definition, Types, and Examples. <https://study.com/academy/lesson/collateral-definition-types-examples.html>
- Eniowo, O. D., Meyer, L. D., Kilambo, S. R., & Gerber, L. J. (2022). Implications of credit constraint on the formalization of artisanal and small-scale mining (ASM) in sub-Saharan Africa. *The Journal of the Southern African Institute of Mining and Metallurgy*, 122(3), 97–106.
- Ezenagu, A. (2021). Boom or bust, extractives are no longer saviors: The need for robust tax regimes in Gulf countries. *The Extractive Industries and Society*, 8(2), 100848.
- Hilson, G. (2020). 'Formalization bubbles': A blueprint for sustainable artisanal and small-scale mining (ASM) in sub-Saharan Africa. *The Extractive Industries and Society*, 7(4), 1624–1638. <https://doi.org/10.1016/j.exis.2020.11.001>
- Hilson, G., & Ackah-Baidoo, A. (2011). Can Microcredit Services Alleviate Hardship in African Small-scale Mining Communities? *World Development*, 39(7), 1191–1203. <https://doi.org/10.1016/j.worlddev.2010.10.004>
- Hilson, G., & McQuilken, J. (2014). Four decades of support for artisanal and small-scale mining in sub-Saharan Africa: A critical review. *Extractive Industries and Society*, 1(1), 104–118. <https://doi.org/10.1016/j.exis.2014.01.002>
- Hilson, G., Zolnikov, T. R., Ortiz, D. R., & Kumah, C. (2018). Formalizing artisanal gold mining under the Minamata convention: Previewing the challenge in Sub-Saharan Africa. *Environmental Science and Policy*, 85(April), 123–131. <https://doi.org/10.1016/j.envsci.2018.03.026>
- Hinton, J. J., Veiga, M. M., & Veiga, A. T. C. (2003). Clean artisanal gold mining: A utopian approach? *Journal of Cleaner Production*, 11(2), 99–115.
- Kumah, R. (2022). Artisanal and small-scale mining formalization challenges in Ghana: Explaining grassroots perspectives. *Resources Policy*, 79(102978).
- Lawal, M. A. (2002). Constraints To Small Scale Mining in Nigeria: Policies And Strategies For Development. *CEPMLP Research Publications*, 6, 1–27.
- Nigeria Mineral and Mining Act. (2007). The Federal Republic of Nigeria. A479 – A539.
- Oluyole, F. (2021). National Integrated. Retrieved from NNN website: <https://nnn.ng/tag/national-integrated-mineral-exploration-project-nimep/#:~:text=NIMEP is a project designed for the Fourth Industrial Revolution>.
- Oramah, I. T., Richards, J. P., Summers, R., Garvin, T., & McGee, T. (2015). Artisanal and small-scale mining in Nigeria: Experiences from Niger, Nasarawa and Plateau states. *Extractive Industries and Society*, 2(4), 694–703. <https://doi.org/10.1016/j.exis.2015.08.009>
- Owolabi, A., & Opafunso, Z. (2017). Quality Assessment of Water Bodies in Selected Mining Communities of Plateau State, Nigeria. *Archives of Current Research International*, 7(1), 1–7. <https://doi.org/10.9734/acri/2017/32323>
- Owusu, O., Bansah, K. J., & Mensah, A. K. (2019). Small in size, but big in impact: Socio-environmental reforms for sustainable artisanal and small-scale mining. *Journal of Sustainable Mining*, 18(1), 38–44. <https://doi.org/10.1016/j.jsm.2019.02.001>
- Perks, R. (2016). I loan, you mine: Metal streaming and off-take agreements as solutions to undercapitalization facing small-scale miners? *Extractive Industries and Society*, 3(3), 813–822. <https://doi.org/10.1016/j.exis.2016.04.007>
- PlanetGOLD. (2020). Access to finance: Options for artisanal and small-scale mining. In Global Environment Facility (GEF). UN Environmental Programme. <https://doi.org/10.4337/9781785360510.00027>
- Postelnicu, L., Hermes, N., & Szafarz, A. (2014). Defining social collateral in microfinance group lending. In R. Merseland & R. O. Strom (Eds.), *Financial and Social Performance of Microfinance Institutions* (pp. 187–207). Hampshire, UK: Palgrave Macmillan.
- Reichel, V. (2019). Financial inclusion for women and men in artisanal gold mining communities: A case study from the Democratic Republic of the Congo. *Extractive Industries and Society*, 0(October 2018), 0–1. <https://doi.org/10.1016/j.exis.2019.05.003>

- Seccatore, J., Marin, T., De Tomi, G., & Veiga, M. (2014). A practical approach for the management of resources and reserves in Small-Scale Mining. *Journal of Cleaner Production*, 84(1), 803–808.
<https://doi.org/10.1016/j.jclepro.2013.09.031>
- Siegel, S., & Veiga, M. M. (2009). Artisanal and small-scale mining as an extra-legal economy: De Soto and the redefinition of ‘formalization’. *Resources Policy*, 34(1–2), 51–56.
<https://doi.org/10.1016/j.resourpol.2008.02.001>
- Siwale, A., & Siwale, T. (2017). Has the promise of formalizing artisanal and small-scale mining (ASM) failed? The case of Zambia. *Extractive Industries and Society*, 4(1), 191–201.
<https://doi.org/10.1016/j.exis.2016.12.008>
- Spiegel, S. J. (2012). Microfinance services, poverty, and artisanal mine workers in Africa: In search of measures for empowering vulnerable groups. *Journal of International Development*, 24, 485–517.
- Spiegel, S. J., & Veiga, M. M. (2005). Building capacity in small-scale mining communities: Health, ecosystem sustainability, and the Global Mercury Project. *Eco Health*, 2(4), 361–369.
<https://doi.org/10.1007/s10393-005-8389-9>
- United Nations Economic Commission for Africa (2002). Compendium on best practices in small-scale mining in Africa. Addis Ababa.
- Van Bockstael, S. (2014). The persistence of informality: Perspectives on the future of artisanal mining in Liberia. *Futures*, 62, 10–20. <https://doi.org/10.1016/j.futures.2014.02.004>
- Verbrugge, B. (2014). Capital interests: A historical analysis of the transformation of small-scale gold mining in Compostela Valley province, Southern Philippines. *Extractive Industries and Society*, 1(1), 86–95.
<https://doi.org/10.1016/j.exis.2014.01.004>
- World Bank. (2012). Implementation Completion and Results Report (IDA-401120) on a credit in the amount of SDR 80.1 million (US\$120 million equivalent) to the Federal Republic of Nigeria for a Sustainable Management of a Mineral Resources Project. *The World Bank Report No: ICR2258*.