

Full Length Research Paper

A study of the challenges of gemstones artisanal and small-scale mining in Nigeria

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With over 44 different types of minerals, the mining sector is of great importance to the economic development of Nigeria. Despite the fact that the industry has the most significant propensity to contribute to the country's gross domestic product (GDP), create jobs, and become a formidable economic development driver, not much has happened in its development since the country's independence in 1960. The purpose of this qualitative study was to investigate the difficulties of gemstone artisanal and small-scale mining, as well as, provide ways to mitigate the challenges. In using the phenomenological approach, twelve participants participated in an interview process, to obtain their opinion on issues surrounding gemstone processes in Nigeria. NVivo analysis software was used in analyzing transcribed data; dominant themes emerged based on participant's responses. Findings of the study can be utilized by policy makers and investors to ensure development in the sector.

Key words: Mining, gemstones, challenges, miners, artisanal, small-scale, stakeholders, regulation, policy, Nigeria.

INTRODUCTION

Developing countries portray mining operations as a source of employment, which is interrelated to subsistence livelihood in rural communities. Mining is a process of extracting valuable minerals that occur naturally from underneath the earth and has been in existence since prehistoric times. Furthermore, mining has a long history of existing as a household economic activity (Kessey and Benedict, 2013). Mining in a sustainable and environmentally friendly manner is vital to the development of an evolving nation such as Nigeria.

The mining sector is a potential driver of economic growth and poverty reduction at both local and International levels. According to Ahmed and Orunoye (2016), the sector emphasizes economic expansion that directly leads to more significant economic, social interaction, and development within the mining industry as Nigeria is rich with enormous natural resources. Therefore, this study explored how businesses can better perform and further developed to become a significant driver of the Nigerian economy by providing jobs, alleviating poverty, improving environmental considerations, and positively contributing to the national

economy.

According to Mallo (2012), the establishment of the Geophysical Survey Office of the Northern Protectorate by the British Colonial Government in 1902 paved the way for mining operations. Currently, small-scale and artisanal groups are the primary miners in Nigeria.

This research highlighted the challenges in the gemstone mining industry in Nigeria from the perspectives of the miners and stakeholders. This study used outcomes of the investigation to articulate the recommendations for dealing with the challenges in the sector by different interested parties.

Artisanal and Small-scale Mining (ASM) is known to be "poverty-driven" as an increasing number of rural inhabitants are turning to it to feed their families. Hilson (2011) claimed that ASM employs millions worldwide; the estimate is between 11.5 and 13 million people, who are employed in the industry directly, and as many as 100 million people depend on its existence for livelihoods. According to Reed and Mberu (2014), Nigeria has a population of over 186 million people with 64% of individuals living in the rural area. A development of

ASM, which primarily occurs in the rural area, is expected to have a positive effect on the economic well-being of much of the rural population regarding poverty reduction, as well as rural economic development.

The absolute dependence on the oil and gas sector in Nigeria occasioned total abandonment of the mining industry with major and big mining companies leaving it in the hands of ASMs. If the government is serious about improving the contribution of the mining sector to the national economy, it is essential to look at the challenges and solutions from the perspective of the stakeholders in the industry. According to Maduaka (2014), the presence of sufficient common assets, especially minerals, has a noteworthy impact on the advancement of a country's economy. With the intention to capitalize on the presence of a vast amount of solid minerals in the country and recognition of the vital role played in mining, the government of Nigeria is engaging in some range of approaches for promoting artisanal and small-scale mining. With the Nigerian government's ambitious projection to increase the contribution of the mining sector from less than \$1 billion in 2016 to \$25 billion in 2026 (Fayemi, 2017), the need for a concerted effort by all stakeholders is essential.

Mallo (2012) affirmed that mining of gemstone is carried out by artisanal and small-scale miners who are typically untrained and contribute largely to environmental degradation, with poor quality operational techniques, which accounts for the loss of mineral output. The mining of gemstones is an informal and illegal process with no government regulation or oversight supervision of the miners. Gemstones artisanal and small-scale miners in Nigeria face many challenges in the mining and marketing of the stones. According to Talabi et al. (2015), many of the miners have minimal education, and they do not know their environmental obligations under the Minerals and Mining Act. The ASMs are also facing diverse challenges that can be resolved to enable sustainable growth in the sector. Nigeria has a large deposit of gemstones, and the country stands to lose from the non-development and disorganization that exist in the industry. This study focused on experiences and perceptions of ASMs and stakeholders concerning the challenges of gemstones artisanal and small-scale mining operations in Nigeria.

Purpose of the study

The purpose of this phenomenological study was to conduct a research study of gemstone ASM and stakeholders in Nigeria by conducting interviews with artisanal miners, government officials, and private stakeholders. The purpose of the interview was to discover patterns and themes regarding each of their lived experiences in the mining activities. Likewise, to understand the challenges faced in each stage of the

sector and proffer solutions that may encourage the development of value-added new businesses in the industry. Qualitative research analysis was used to generate leads and ideas about human behavior and habits, which directly and indirectly impact the analysis of the research work. The phenomenological research approach, which involves trying to understand the purpose of a phenomenon by examining the opinions of individuals who experience a specific event (Williams, 2007) helped address particular problems identified within the gemstone business setting.

This study interviewed a total of twelve participants that included artisanal miners, government officials in charge of the development and implementation of policies in the mining sector, and members of the Organized Private Sector; there were four participants in each group. Knowledge gathered at relevant conferences and seminars was also utilized for the research.

The following research question guided the study. What perceptions do artisanal, small-scale miners, and mining stakeholders have about mining activities of gemstones in Nigeria concerning the regulatory framework and proper organization of the sector?

LITERATURE REVIEW

The topic of mining in developing countries has generated interest amongst academics over the years, leading to research work in various aspects of the subject by different experts and institutions. Diverse communities regard mining activities as a part of the traditional economy. People living in communities near or in areas where minerals are discovered, engage in mining operations as a dwindling substitute source of livelihood. Hota and Behera stated that "the expansion of mines has employed locals directly as well as indirectly, which has helped to increase financial as well as physical capitals" (2016, p. 1)

According to Erhum (2015), the Nigerian mining industry is known to have a highly significant share in the world's mineral industry as it plays an essential role in the economic and social development of the country. The primary concern of the study was the contribution of the gemstones sector to the Nigerian economy, challenges faced by the artisanal and small-scale miners and the organization of the sector. These three issues have the potential to increase the contribution of the gemstones mining sector to the economic development of the nation.

Artisanal and small-scale mining (ASM)

Artisanal and small-scale mining (ASM) is an informal or formal operation using a simplified form of exploring, extracting, processing, and marketing of minerals. According to Funyufunyu (2013), the mining sector

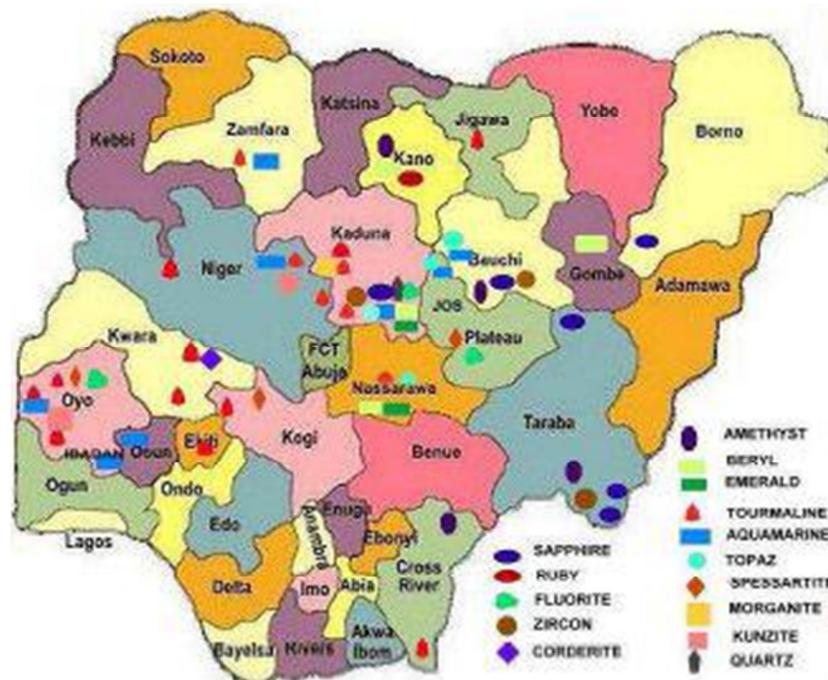


Figure 1. Map of Nigeria showing gemstone mineralization. Source: Nigeria Ministry of Mines and Steel Development, 2012

presently portrays an insignificant production of minerals, poor or low-level mining, processing and extraction practices, and illegal trading associates with artisanal and small-scale mining.

Nature of artisanal and small-scale mining

ASM is the process of extracting and exploring minerals using crude implements. There are many definitions and opinions about ASM as no commonly agreed definition has been established. Stakeholders define artisanal and small-scale mining to suit their particular purpose while different countries define ASM in their legislation according to their peculiar criteria. Melodi and Opafunso (2013) purported that artisanal and small-scale mining is carried out by people working with simple tools and equipment; usually, this is an informal sector, outside the legal and regulatory framework. In most cases, there is lack of regulation of ASM operations. These are usually informal and transient whereby the processing techniques used often result in degraded environmental, safety, health and social conditions (Macdonald et al., 2014).

Siswanto et al. (2012) similarly defined ASM as an informal and unregulated system of mining majorly practiced illegally and poorly regulated. Artisanal and small-scale mining is a common practice by men, women, and children in the rural areas. The need for an alternative means of income from agriculture, unemployment, and poverty has attracted rural dwellers

into the sector. ASM occurs in a casual framework and likewise, ignoring ethical mining practices.

Verbrugge (2015) perceived ASM in recent years as experiencing significant growth worldwide, with the current estimate of those involved in what they defined as labor-intensive, low-tech mineral exploration and processing at 20-30 million internationally. Veiga and Angeloci (2014) postulate that more than 30 diverse kinds of minerals are being extracted using basic methods that cause environmental degradation by more than 30 million individuals in approximately 80 countries across the globe. According to Collins and Lawson (2014), ASM occurs, and it is still witnessing massive expansion due to its poverty-driven nature. Artisanal and small-scale mining represents a variety of mining activities ranging from individuals and organized operations in search of gemstones and other minerals.

Nigeria is very rich in minerals mineable through ASM, which currently dominates the sector with over 90% of mining activities being illegal (Melodi and Opafunso, 2013). Nigeria is amongst the countries having abundant mineral resources with a variety of colored gemstones. Some of the gems found in Nigeria include tourmaline, sapphire, ruby, beryl, topaz, garnet, spinel, and quartz. The availability of these gem deposits has increased the interest of individuals and groups in searching and acquiring it to improve their revenue base. The inflow of people into this sector in Nigeria has grown the number of artisanal and small-scale miners and their activities (Figure 1).

Challenges of artisanal and small-scale mining

In recent years, activities of ASM have increased due to factors such as increased population, lack of employment, and migration of people from agricultural activities into mining activities. Due to the chaotic nature of the sector, the contribution of the mining sector to the social and economic development of the nation falls below expectation. The primary drivers of the gemstone mining industry in Nigeria are the artisanal miners. These miners face various challenges that hinder the smooth running of their operations. Some of these difficulties are the evacuation of mining sites, lack of equipment and machinery, lack of access to credit and finance, health hazards, environmental impact, lack of market information and market assess, lack of institutional support, and other factors like political stability and infrastructural development.

1. Evacuation of mining sites: Artisanal and small-scale miners carry out their activities on lands without legal permits or titles. Some of them acquire these lands by inheritance or through the community leaders, and they do not have the license to back up the legality of their mining activities. When large mining companies or investors show interest in such places, they acquire the land through titles backed by law from the government. This forces artisanal miners out of their sites.

2. Lack of equipment and machinery: Artisanal and small-scale miners in most mines in Nigeria use basic tools, portable machines, low-level and traditional equipment in excavating the minerals. Ahmed and Oruonye (2016) assert that mining in Taraba State in Nigeria is controlled by informal mining activities by people who individually, or as a group, depends mainly on manual labor with the use of simple implements and methods. The use of this labor-intensive technology leads to high losses of value and time by the miners as the miners tend to acquire little precious minerals over an extended period. According to Mdee (2015), lack of modern technological equipment causes small-scale mines to stop digging after spending a lot of time and energy due to the challenge of shaft support materials, increase of rock hardness and ventilation mechanism.

3. Lack of access to credit and finance: Obtaining credit and finance is practically impossible for artisanal and small-scale miners in Nigeria. Banks are wary of ASM operators, who are usually in the informal sector, work in rural areas illegally, and lack acceptable forms of collateral. Bankers regard lending to ASM's as high-risk loans and charge high-interest rate. Mkubukeli and Tengeh (2016) purport that despite the full advantage of opportunities available to artisanal and small-scale miners, lack of access to funds impede them and cause indolent growth to their business.

4. Health hazard: Artisanal and small-scale mining operations are usually carried out in hazardous working

conditions as a result of inadequate technologies used by the miners. Mdee (2015) avers that artisanal and small-scale miners work without personal protective equipment's for their hands, ears, eyes and respiratory organs as part of the human body needs protection with protective devices. One of the health hazards of ASM is the danger in the use of crude or low-level technology equipment to the miners themselves. Miners are at a high rate of risk exposure. As implied by Kyeremateng-Amoah and Clarke (2015), significant health risks associated with ASM includes exposure to dust which may cause silicosis from inhalation chemicals, vibration from machinery and consequences of poor ventilation. Other health hazards from ASM activities include lead poisoning, malaria, and bilharzia. For example, mercury used to extract gold can institute health and safety risk to humans and the environment through inhalation or the consumption of contaminated water, animals, or crops.

5. Environmental impact: Artisanal and small-scale sector activities are associated with numerous environmental impacts. Artisanal and small-scale miners tend to focus on the immediate gain of their mining operations, rather than its long-term consequences. According to Mkubukeli and Tengeh (2016), the environment is threatened by air pollution because of the utilization of some chemicals in the mining of certain minerals. Melodi and Opafunso (2013) and Ako et al. (2014) agree that ASM is usually seen negatively by most environmentalists and governments due to its potential for environmental damage, social disruption, and conflicts. Many mining community residents are impoverished and live in rural settings that lack basic resources such as health care services and clean potable water. Basu et al. (2015) see mining activities as capable of destroying landscapes, grossly contaminate water resources, and stress water tables. Additionally, ASM activities exert pressure on community livelihood system through deforestation and arable land declination (Ikemefuna, 2012).

6. Lack of market information and market access: Artisanal and small-scale miners dwell in rural settlements. Selling their products is a challenge as they rarely have access to potential buyers. Mkubukeli and Tengeh (2016) identified access to markets as well as lack of human and financial capital as some of the major challenges that prevent small-scale mining entrepreneurs from establishing a successful business. Due to the illiteracy that exists among miners, they lack the knowledge for pricing their products, which most times may result in selling lower than the value of the mined products. Inaccessibility to the market also forces miners to sell through informal, illegal and less lucrative channels.

7. Lack of institutional support: The ASM sector in Nigeria is practically known to lack institutional support. The institutional structures are supposed to monitor, regulate, and oversee mining activities in the

communities. The support will give miners access to their rights and enforce miner's responsibilities. Some other challenges facing ASM in Nigeria include the lack of political stability, an efficient transport system, working conditions, child labor, lack of access to information and lack of umbrella organizations.

Legal and policy framework of ASM in Nigeria

According to Cawood and Minnitt (2001), Nigeria, like South Africa, Indonesia, and India, has created a simplified system of mineral rights holding legislation that gives the nation's mineral wealth to the government for custody. The justification is to protect and assure that the extraction and development of mineral resources become beneficial to the landowners of the minerals and the rest of the citizenship. A stable and efficient legal and regulatory framework is an essential requirement to achieve sustainable growth in the mineral sector of the country. According to Hilson et al. (2017), to improve regulation, and occasionally intensify the delivery of assistance to the industry particularly in sub-Saharan Africa, many are of the opinion of bringing operations into the legal domain where ASM can be regulated, supported, and monitored effectively. As the Federal Government of Nigeria realizes, the solid mineral sector is an important alternative source of national wealth. Therefore, the Federal government is currently initiating some policy changes to re-position the erstwhile neglected mining industry.

Acts and rules that govern the rights of citizen and government in extracting and processing of natural resources in the mining sector are called the mining legal framework. There has been the existence of the legal framework for the Nigeria Mining Sector 1940, with about six mineral acts and decrees between 1940 and 1999. Some of these Acts are Mineral Act and Regulations of 1946, Quarries Act, Gold and Diamond Trading Acts and Regulations of 1969, Minerals and Mining Act 2007 with the most recent Roadmap for the Growth and Development of the Nigerian Mining Industry 2016. For proper formalization of the ASM sector, legislation and policies are impeding (Hilson et al., 2017). The development of the roadmap for the growth and development of the Nigerian mining industry 2016 places particular emphasis on the critical issues and challenges needed for value creation in the immediate, short, mid-term and long-term periods.

Socio-economic impacts

The socio-economic concept involves the social systems where people interact through roles and relationships defined by gender, age, ethnicity, and other social variables and economic strata. David et al. (2016)

believed that economic development involves a progression in the provision of livelihood on a sustainable basis, access to education, along with access to primary healthcare for the majority of the population. Furthermore, Wilson et al. (2015) agreed that social and economic evidence implies that at the microeconomic level, the main reason for people to involve themselves in ASM activities is meeting livelihood goals. Economic hardship, poverty, limited employment opportunities, additional income generation, low revenue from agricultural products are some of the driving factors that influence people in engaging in artisanal and small-scale mining.

According to Mallo (2012), the social and economic characteristics of small-scale mining adequately reflect the challenges of the Millennium Development Goals (MDGs), including health, environment, gender, education, child labor, and poverty eradication. Small-scale mining communities, for instance, are highly vulnerable to communicable diseases including malaria, tuberculosis, influenza, cholera, yellow fever, sexually transmitted infections, and HIV/AIDS. Social impacts of mining activities are related to protests, tension, and are flashpoints for conflicts between miners, firms, and communities.

Veiga and Angeloci (2014) and Nichols et al. (2015) perceived the centralization process of ASM activities as impacting socially through an increase in density of miners at the facility, thereby, creating new social dynamic and potentially exacerbating known social issues such as crime, prostitution, and drug and alcohol use. Opening up of a new mine or discovery of a precious stone can cause a significant influx of people into the environment, which most times lead to conflict. For example, Perkins and Pardieu (2016) reported that an influx of about 45,000 miners occurred due to the exploration of some large highly saturated sapphires. A mining area of about 2.5 km long being occupied by about 45,000 miners poses a risk and conflict in the environment. This type of finding has a high social impact as there is bound to be social unrest, an outbreak of law, conflicts, an outbreak of diseases as a result of poor living conditions, lack of clean drinking water and poor sanitation. Sudden gust like these can make ASM unsettling as it is related to in-migration. With an influx of people in the location, they can come into conflict with residents; this causes violence, social, and health problems. According to Patel et al. (2016), conflict is bound to occur frequently in areas with long histories of mining and frequent overlaps between the mining sectors.

The methods of achieving the development of the gemstones mining sector of the Nigerian economy include the improvement of the regulatory framework to attract investors to the industry and the reform of the mineral regulatory framework. A review of the Nigeria Mineral and Mining Act 2007 and the adoption of a

roadmap for the growth and development of the Nigerian Mining Industry will help promote new investments in the sector. Despite the recognition of ASM's by the government, little is done to implement new policies, which lead to increased challenges for ASM's. According to Fayemi (2015), the government of Nigeria has developed a framework strategy to drive growth in the mining sector. The elements of the plan are in three dimensions; these include government aspirations, the location Nigeria should focus on, and how Nigeria intends to win. Identification of these can be achievable through the proper use of research.

METHODOLOGY

The research study was conducted to understand the challenges of gemstone Artisanal and Small-scale Mining (ASM) in Nigeria. The purpose of the study was to explore how stakeholders in the gemstone industry in Nigeria can appropriately organize the mining sector while indicating the impacts of the mining activities on gemstones and jewelry business.

The qualitative research analysis method was used to generate leads and ideas about human behavior and habits, which directly and indirectly, influence the project. A phenomenological study was used to understand the different challenges and opportunities affecting the gemstones mining sector in Nigeria, with participants that are artisanal miners, mining stakeholders, and policymakers. Artisanal miners are the laborers in the remote villages that dug out the gemstones; mining stakeholders include marketers, industrialist, and retailers while policymakers are government officials saddled with the responsibilities of creating and enforcing policies. Each respondent was involved in activities concerning the development of the gemstone mining sector.

Research question

According to Alvesson and Sandberg (2013), an essential step in all theory development is articulating innovative research questions that will result in interesting and significant research. Also, Alvesson and Sandberg (2013) noted that a familiar way for arriving at research questions means recognizing or creating gaps in existing theories, rather than challenging their assumptions.

RQ: What perceptions do artisanal, small-scale miners and mining stakeholders have about mining activities of gemstones in Nigeria concerning the regulatory framework and proper organization of the sector?

Research method and design

The study assessed artisanal miners and their opinions of

policymakers and stakeholders using a set of interview questions. The first step in conducting successful research is the ability to formulate interesting research questions; therefore, each of the research questions was designed to relate to its target participant. The questions were designed in such a way to minimize alleged biases of the researcher. Questions are also designed to be easily understood by the target audience and open-ended with the purpose of establishing a conversation between this researcher and participants.

The questions were directed by the researcher to participants according to the role they play in the gemstone mining sector of Nigeria. Twelve participants were randomly selected. According to Ediawe (2011), random sampling is believed to increase the likelihood of data to be a representative of the whole population of interest. Participants were selected randomly from artisanal miners, government officials, and private stakeholders in the mining industry.

The research approach used was based on a paradigm of personal knowledge and subjectivity, which was concerned with the study of experience from the participant's perspective, assumptions and usual ways of perceiving. Galeon (2015) affirmed that phenomenology defines the meaning of lived experiences of a concept or phenomenon. The phenomenological research approach is based on description rather than explanation and starts from a perspective free from preconceptions and hypothesis. Additionally, "phenomenological study enables the investigator to abstain from making suppositions, focuses on a specific topic freshly and naively, constructs a question or problem to guide the study, and derives finding that will provide the basis for further research and reflection" (Moustakas, 1994, p. 45).

Population

The population for this study includes artisanal miners, the government executives in charge of regulation of policies from the Federal Ministry of Mines and Steel Development and other stakeholders from privately owned companies, individuals and corporate bodies such as associations. A sample of twelve participants was selected. The participants had over ten years of experience in their various capacities as regards gemstone mining activities.

RESULTS AND DISCUSSION

This phenomenological qualitative study investigated the problem faced by the Nigerian gemstone sector, which was as a result of the underdevelopment of the gemstones mining processes, lack of adequate policy on ASM, health hazards, environmental and poverty issues. These problems can lead to the inability of the sector in contributing its quota to improved business processes

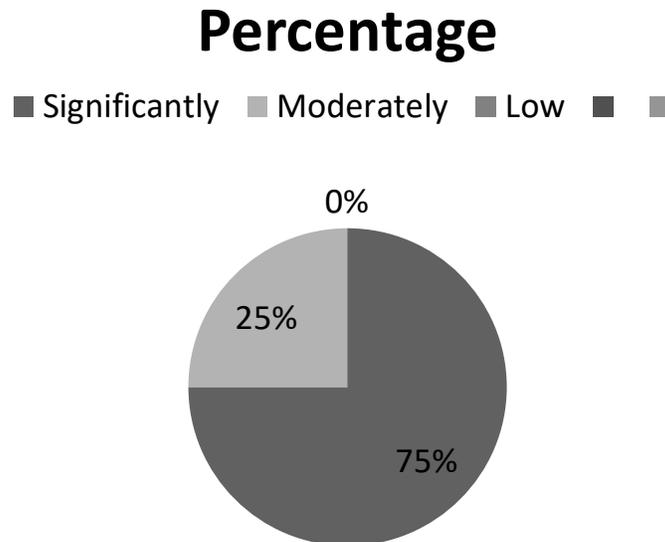


Figure 2. Proportion of contribution to miner's household income.

and the economic development of the country. Artisanal and small-scale mining is of great economic importance. However, it occupies a marginal position in the economic agenda of sub-Saharan Africa (Labonne, 2014).

The research question for this study was: "What perceptions do artisanal, small-scale miners, and mining stakeholders have about mining activities of gemstones in Nigeria concerning the regulatory framework and proper organization of the sector?" The interview questions were divided into three categories based on the research participants; the question for each category was developed to expedite an understanding of the gemstones mining sector about relevant stakeholders.

Participants in this study were placed in three categories as the study expands data collection to involve all related stakeholders to get their opinion from the lived experience they have had in the sector. The three groups include artisanal miners, government officials, and private stakeholders. Artisanal miners are often referred to as illegal miners as they carry out mining activities informally. They comprise of men, women, and children with diverse age groups who work on the mining site. The miners locate the areas where gemstones are available, dig pits manually, and retrieve stones from it. In a developing nation like Nigeria, artisanal mining is an important socioeconomic segment for the rural poor.

Government Officials have spent not less than ten years working for the Federal Government of Nigeria in various capacities relating to the mining sector. They are individuals with lived experiences on policy recommendation, law, enforcement, and regulations of mining activities. Private stakeholders in the mining sector are those that contribute largely to the development of the sector. According to Bryson (1995, p.

48), a stakeholder can be defined broadly as "any person, group, or organization that can place a claim on an organization/industry resources, or output or is affected by that output." The private stakeholders are involved in decision making concerning driving the economic development of the gemstone sector. Hence, their opinion on the challenges and how to develop gemstones artisanal and small-scale sector was essential to conclude this research study.

The interview questions of each category were to gather information on the experiences of individuals, observations, description of activities, opinions, suggestions, and recommendations.

Some of the themes generated from NVivo analysis are discussed as follows:

Artisanal miners were asked the contribution of the mining activities to their household income?

75% of artisanal miners interviewed stated that mining contributes significantly to their household income (Figure 2).

Gemstone extraction method/low-cost mining equipment

The research study revealed that artisanal miners use the crude method of extraction with simple tools such as hammer, chisel, digger, and shovels to break rocks before accessing the gemstone. Participant 10 answered that "We have to do a lot of walking around in the bush to locate veins of the gemstone." Participant 8 stated that "its manual method we are using, we use digger, shovel, chisel, hammer, at some point we blast, where we cannot penetrate we drill and blast."

Government institutions such as Raw Material

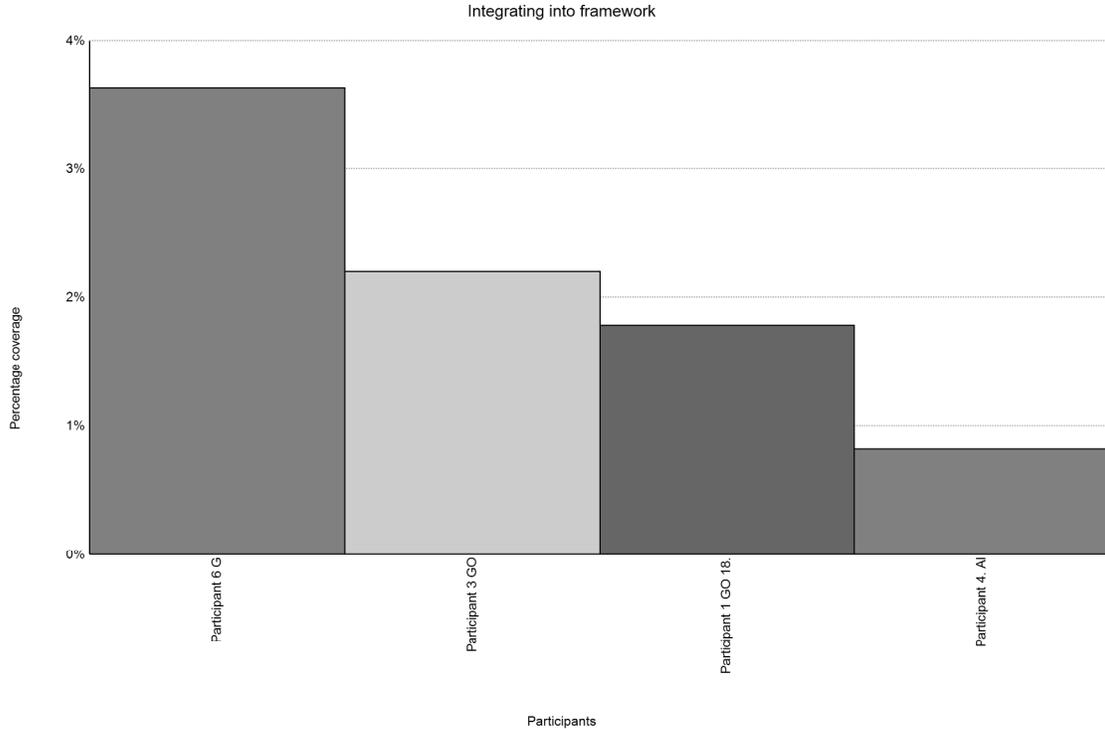


Figure 3. A chart showing government efforts in regulating gemstone sector (NVivo).

Research and Development Council, and the Metallurgical Institute, are established to fabricate and to produce low-cost equipment for mining and agriculture. 25% of participants were of the opinion that the government organizations are not performing their duties as expected, which could be due to lack of funding. 50% stated that the government through the Ministry of Mines and Steel Development give grants to some identified mining cooperatives to enable them to acquire simple equipment. The World Bank also assists in giving grants to organized miners as stated by 75% of the participants.

Policy and legal framework

The second category of research participants were Government Officials. It dealt with government efforts in integrating gemstone mining operations into a regulatory framework, the legal framework and the implementation of the law. All four participants under this category gave their opinions on government action in organizing the gemstone mining sector into a formal regulatory and operational framework. Due to the importance of ASM in contributing to the national economy, the sector deserves to have the attention of policy and regulatory authorities. The policy relating to mining tends to favor large-scale mining companies than artisanal miners, as large-scale mining companies often forcefully drive away artisanal miners from the location they might have been working

for months without any regard for them, claiming they have legal ownership of the land. ASM that attracts the focus of this study have policies characterized by discrepancies, bureaucracy, and lack of implementation. 50% of participants were of the opinion that as of today, government policies as regards ASM are not implementable, as the policies are not feasible and that the Federal Government lacks the capacity for effective implementation of policies in rural areas where ASM occurs (Figure 3).

The study revealed that there is a recognized and sustainable monitoring process for artisanal miners. The Artisanal and Small-scale Department, the Surveillance Department, and the Mines Inspectorate Department of the Federal Ministry of Mines and Steel Development have the responsibility of monitoring the artisanal mining process. According to Participant 3, there is a recently set up Presidential Mine Surveillance Committee for monitoring miner’s activities. Participant 4 stated that “there were normal inspectorate activities from three different departments and they successfully monitor artisanal miners.”

Capacity development

All the respondents agreed that there was a need to develop the capacity of gemstone artisanal miners and other stakeholders in the mining sector. During the time

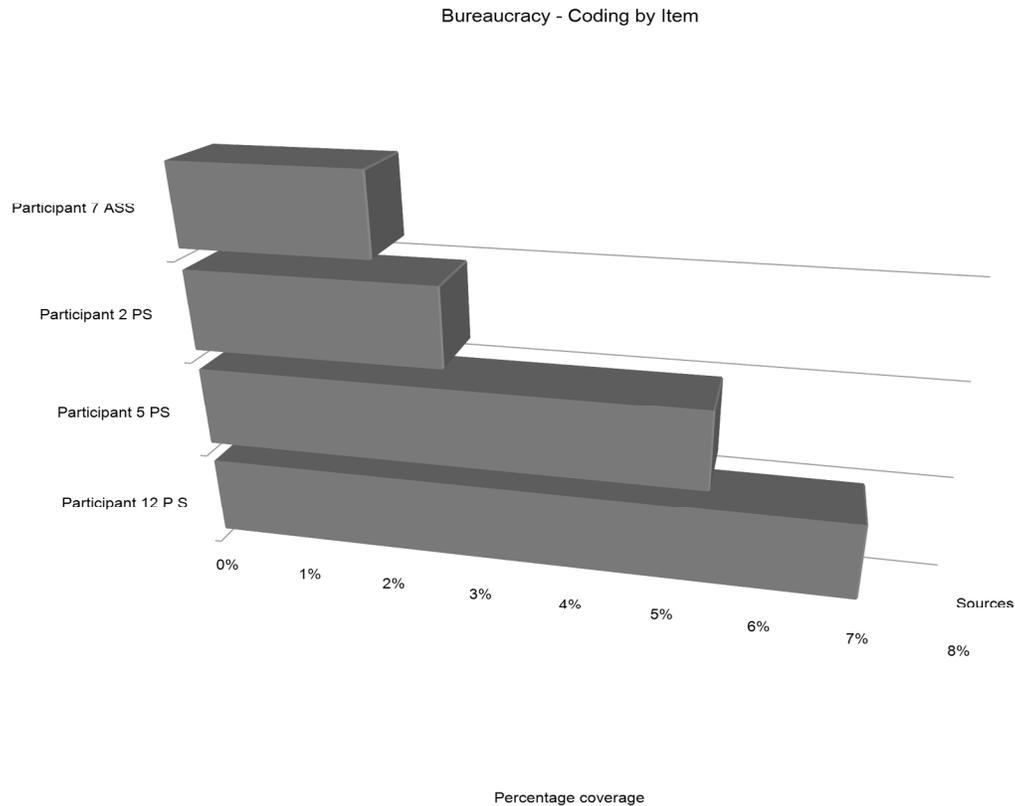


Figure 4. Chart shows the percentage coverage of participant's responses to Bureaucracy (NVivo)

this study was conducted, the only gemological institute in Nigeria, the Gemological Institute of Nigeria (GIN) was newly incorporated and yet to commence training. Though some universities in the country offer geology and mining-related courses, the curriculum is mostly academic. The only institute offering practical and technical courses in gemology and lapidary services is the Nigerian Institute of Mining and Geosciences (NIMG) in Jos, and their facilities are grossly inadequate for the number of artisanal miners in need of training in the sector.

Government and private stakeholders should collaborate to establish laboratories and training centers to facilitate needed capacity training across the gemstone value chain. According to Participant 5, the government should designate, encourage, and support the private sector to provide the needs required for skills development as a matter of policy. An improvement in developing the capacity of the various stakeholders in the industry will ensure growth in the gemstones industry.

Bureaucracy

Bureaucracy in the administrative process is a major challenge for artisanal and small-scale miners in following

due process while carrying out the mining activities. The process of obtaining permit and license to mine or export products was said to be tiring, time and resource consuming. Another issue raised by the participants is the multiplicity of government agencies whereby investors have to move from one office to another to get things done. Participant 5 suggested the establishment of a one-stop shop in the mining sector, putting up clear rules that are not pedantic and as much as possible encourage the use of Information Technology (IT) to make the application process less complex. According to Golosinski (2001), incorporating IT in various aspects of mining activities can significantly improve the effectiveness and efficiency of the mining industry (Figure 4).

Conflicts in the gemstone mining sector

75% of participants were of the opinion that conflicts arise due to lack of information and illiteracy. They also agreed that adequate communication amongst the various stakeholders and the host communities could mitigate conflict. Participant 5 shared that the mining laws in Nigeria recognize alternate dispute resolution mechanisms to arrest conflicts. They noted that when the

process of mining follows due process, there will be no room for conflicts.

Access to finance in the gemstone mining sector

All participants attest that funding of mining activities is capital intensive and almost impossible to access funds from any bank for mining activities in Nigeria. Participant 7 who is an executive member of the Miners Association of Nigeria stated that “our problem has been to find finance for our members.” Participant 2 was of the opinion that the role of the private sector in providing a solution to ASM access for financing depends largely on how ASM organizes their operations.

The study opined that disbursing grants and interventions adequately will alleviate some of the problems associated with finance for artisanal miners. The main findings of this study aligned with Anyona and Rop (2015), which stated that government assistance in strengthening ASM groups’ economic planning and in educating banks could be a useful step in making credit services more accessible to the poor. Findings from the study regarding artisanal miners access to finance revealed ongoing actions taken by the government and private stakeholders. According to Participant 1 (government official), “grants are given to ASM through the World Bank assisted projects, miners can also access loan from the Bank of Industry (BOI) at a single digit interest rate.

Miners are engaged and incorporated into a mining operation that provides support to them regarding tools and equipment to increase their productivity. To proffer solution to the challenge ASM face in accessing finance, participant suggested “there should be a special purpose vehicle to fund mining like a mining bank and other development banks should have a portfolio designed specifically for the mining sector.”

Cooperatives and value for gemstones

Cooperative is the coming together of three or more people with a similar goal. Members of cooperatives mine under an agreeable consensus issued to the group. There is an assigned leadership structure for each cooperative to oversee daily activities of miners and stand as entities acknowledged by the government. All government officials and private stakeholder participants of this study agitated for the formation of cooperatives among artisanal miners. The advantage of having miners in groups includes:

- (a) Being able to identify and interact with them as dealing with miners individually could be cumbersome.
- (b) A platform for government and international organizations can reach the miners with sensitization

campaigns.

(c) Capacity development programs.

(d) Provision of financial and technical assistance.

(e) Cooperatives also give voice to artisanal and small-scale miners as a body to make a request on the government and pursue the acts and regulations with intensity.

Infrastructure development

Infrastructure developments in the mining sites are a source of concern. The findings of the study revealed lack of infrastructure at the mining sites. According to participant 11, “artisanal miners have the problem of water supply, the laborers need water.” To add value to the gemstone and make the products presentable to buyers, artisanal miners need to wash off debris and sand from the stones. Lack of water supply deterred the miners from effectively carrying out the process.

Participant 11 stated that artisanal miners need power at the mining site and the surrounding environment. Findings from the study revealed challenges faced by artisanal miners at the mining site due to lack of power. The mining sites become dangerous and inaccessible at night due to lack of electricity. Miners are also compelled to use manual tools to extract gemstones from using some mechanized equipment that require the use of power. Roads leading to mining sites are almost none existent due to their deplorable state. Accessing the mining site by the researcher was difficult and challenging. Roads are important for miners to gain access to their workplace, transportation of goods and services, as well as economic development of mining communities. The findings on poor infrastructure in the mining sites align with the poor state of infrastructure in Nigeria, which at present is about 35% of gross domestic product (GDP) (Chima and Ekeghe, 2017). The challenges of the absence of critical infrastructure at the mining site have a negative impact on the miner’s productive ability.

Conclusion

Findings from this study revealed that challenges associated with the gemstones ASM include poverty and lack of alternative economic opportunities, while, existing mining and mineral policy drives such challenges. Other challenges identified from the study included a deficit of capacity development programs in the gemstone industry, the absence of adequate training institutions, as well as the absence of formal buying centers for gemstones marketers and dealers.

This study revealed that the government and private stakeholders require substantial efforts to improve

business opportunities in the solid mineral sector. Therefore, there is a need for government to enact laws that will support the private sector to institutionalize and formalize sustainable programs that will favor all parties involved in the development of the sector. Likewise, information gap between government and artisanal miners should be bridged; strategies should be developed to address the challenges of ASM as regards environmental, health, and economic policies with appropriate implementation plans. The study revealed that the private stakeholders in the mining industry are eager to contribute their quota in the development of the sector. Therefore, the government should ensure they provide an enabling business environment, which will encourage improved private sector investment in the sector.

Recommendation

There should be a review of illegality attributed to artisanal miners. Artisanal and small-scale miners are professionals in their field. To develop and contribute their quota in the economy of a developing nation like Nigeria, miners need the support of the government and private stakeholders. Based on results of this study, policymakers and regulators should develop policies that are actionable, sustainable, and realistic. The sector should be duly recognized, and ASMs should be considered in policy development to improve their working conditions with the expected attendant increase in productivity, poverty reduction and sector development. There should be a review of present policies relating to the identification and registration of artisanal mining activities and the strengthening of the cooperative system. Funding of mining activities should be made paramount by the government, while sustainable programs of the World Bank and the Bank of Industry (BOI) in funding and giving credit to ASMs should be improved. The gap between the government and artisanal miners should be bridged so that there can be a flow of information. Furthermore, sensitization campaign on mining activities on the environment, health, safety, and capacity development programs should be carried out on a regular basis by the government and other stakeholders.

As suggested by the private stakeholders interviewed in this study, there is a recommendation for the establishment of assessment and buying centers through public-private partnership (PPP) in mining environments. The centers will identify, provide some valuation, and issue reports for gemstones. The provision of facilities, such as assessment and buying centers will ensure appropriate documentation of gemstones movement in and out of the economy, while artisans can also pay the required royalty on their minerals concurrently; thereby removing the tag of illegality in their activities. To avoid bureaucracy and the use of discretion by government

officials in obtaining permit and licenses, the government can consider creating a single super regulatory agency that can handle all requests in a unified manner, with the use of IT, as well as clear and simple requirements. The use of IT in the mining sector enables strategic planning, acquisition, and exploration of resources, as well as related logistics (Golosinski, 2001).

Promoting investment in the gemstone mining sector is achievable when Ministries, Departments, and Agencies (MDAs) saddled with the responsibility of regulating and promoting the sector are pragmatic about the various stakeholders. The organization of the sector is achievable through the development and implementation of promotional activities, and an active resolve to provide solutions to the various challenges affecting the development of the sector. Participant 6 spoke on the formalization of the sector through sustainable government programs. The study recommends that the government should encourage the development of an enabling business environment that will provide the needed stimulus through the implementation of good policies. Implementation of good policies will also encourage the influx of both local and foreign investment into the mining sector.

In the area of capacity development, both the government and the organized private sector should consider the setting up of more mining schools in the country. At the time this study was carried out, only one mining institute existed in Jos, Nigeria; while the newly established Gemological Institute for Nigeria (GIN) was yet to commence operations. Recommendations from this study contribute to the effort of other researchers in ensuring the development of the sector.

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