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Factors Undermining the Development of Artisanal and Small-Scale Mining in South Africa: A Pathway to the Transformation of the Mining Industry

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ABSTRACT

This study seeks to identify the impediments to the development of the ASM industry in South Africa with a focus on prospecting and mining licencing processes. A literature review of the South African mining legislation underpinned the hypothesises formulation. This study used quantitative research methodology. Survey method was used for data collection using items that were self-developed based on study variables. A total of 50 respondents who participated in this study were selected through probability sampling. The empirical results confirmed that despite the fact that ASM provides opportunity for local community members to exercise their rights to participate in and benefit from natural resource management, the regulatory framework for the ASM needed to be revised to holistically address the following challenges: limited access to geotechnical information and technical expertise, lack of institutional support, limited or no access to capital (investment), limited technical ability. The study provides practical recommendations to the ASM industry and policymakers on how to streamline the prospecting and mining licensing processes while simultaneously effectively addressing current challenges. The study fills a knowledge gap on ASM in South Africa because of the dearth of studies on ASM. As a catalyst for equitable economic development, the study also suggests mainstreaming ASM into the economy, taking into consideration the socioeconomic realities and opportunities provided by small deposits.

Keywords: Artisanal and Small-Scale Mining, Prospecting, Illegal Mining, Regulation, Mining Communities.

INTRODUCTION

South Africa's endowment of mineral wealth positions it as a pivotal player in the global economy. The country's rich deposits of precious metals, base metals, industrial minerals, and semi-precious stones (Denhere, 2024) have historically been exploited primarily by large- and medium-scale mining operations controlled by multinational corporations (Khubana, 2023). These operations have undeniably contributed to economic development by spurring secondary industries, generating employment, and creating substantial physical infrastructure (Mineral Council of South Africa [MCSA], 2020). Yet, this narrative of wealth creation coexists with stark contradictions: the economic benefits of mining are unevenly distributed, often bypassing historically marginalized communities and amplifying socioeconomic inequality (Khubana, 2021).

The paradox of South African mining lies in its dual capacity to generate both wealth and social harm. Large-scale mines frequently leave unrehabilitated sites that become hubs for illegal mining, which is often intertwined with criminal networks, human trafficking, and illicit financial flows (Geldenhuys & Flynn, 2024). Tragic incidents such as the Stilfontein disaster, where 78 illegal miners—predominantly undocumented immigrants—died underground, exemplify the human cost of unregulated mining. These developments underscore a systemic failure: the Department of Mineral Resources and Energy (DMR) relies on manual record-keeping to monitor mineral rights, hindering its ability to enforce legislation,

rehabilitate abandoned sites, and mitigate illegal mining activities.

Artisanal and small-scale mining (ASM) represents a potential solution to these challenges, offering pathways to employment, community development, and poverty reduction. Globally, governments have pursued diverse strategies to formalize ASM, achieving varying degrees of success (Arthur-Holmes & Ofosu, 2024). In South Africa, ASM gained formal recognition post-1994; however, its potential remains largely untapped, reflecting systemic inefficiencies and regulatory barriers that constrain indigenous participation in the sector (Mulaba-Bafubiandi et al., 2023; Zvarivadza, 2018).

The broader implications of South Africa's mining sector reflect a classic "resource curse" scenario, wherein natural wealth generates economic growth without fostering inclusive human development. Large-scale mining projects frequently displace communities, compromise access to livelihoods, food, and water, and exacerbate inequality (Arthur-Holmes & Ofosu, 2024). The persistence of neoliberal policy frameworks has favored corporate and financial interests over the needs of host communities, perpetuating wealth accumulation for a few while undermining socioeconomic transformation (Khubana, 2021). Despite abundant mineral resources and opportunities for beneficiation, indigenous South Africans remain largely excluded from ownership and control, limiting their ability to capture the high returns associated with mineral wealth (Opakas, 2023).

Recognizing these structural challenges, the African Union introduced the Africa Mining Vision (AMV) in 2009, designed to reposition mineral wealth as a driver of broad-based economic and social development (Busia & Golla, 2024). Key objectives include optimizing knowledge and benefits across all levels of mining, integrating ASM into national economies, fostering environmentally and socially responsible mining, building human and institutional capacities, and ensuring transparent governance. Implementation tools, such as the Country Mining Vision (CMV), are intended to align national mining policies with these pan-African development goals. Yet, for these frameworks to be effective, governments must abandon rent-seeking practices and prioritize equitable wealth distribution.

Comparative examples, such as Ghana, the first African country to liberalize its mining codes to counter the resource curse illustrate the potential of ASM as a driver of rural employment and economic diversification (Kumah, 2022; Maconachie, 2022). Across the continent, ASM employs an estimated 20 million people directly and stimulates numerous upstream and downstream economic activities (Moyo et al., 2022). South Africa's ASM sector, however, lags behind countries with similar mineral endowments, due largely to regulatory inefficiencies, bureaucratic hurdles in the issuance of prospecting and mining rights, and exclusionary practices that marginalize indigenous communities.

South Africa's legal framework, anchored in the Mineral and Petroleum Resources Development Act (MPRDA, 2002), vests ownership of all minerals in the State and empowers the Minister of Mineral Resources to award prospecting and mining rights. Although regulatory requirements and the Mining Charter are intended to promote economic viability and social equity, practical barriers persist, impeding broader participation by indigenous people. Existing studies remain limited in identifying the systemic factors that obstruct access to these rights, particularly in the ASM sector.

This study contends that to unlock the socioeconomic potential of ASM, it is imperative to examine the procedural, legal, and institutional impediments associated with the granting of prospecting and mining rights. By evaluating the current regulatory framework and assessing interventions aimed at promoting indigenous participation, the study seeks to identify strategies for streamlining access, fostering equitable economic inclusion, and mitigating the paradoxes inherent in South Africa's mineral economy.

The study employed a quantitative research method to examine emerging miners' perspectives on factors constraining the development of the artisanal and small-scale mining (ASM) industry in South Africa, complemented by a comprehensive literature review to understand the legislative and regulatory frameworks governing prospecting and mining licensing processes. The quantitative approach was adopted due to its capacity to minimise bias and enable hypothesis testing, with key variables and hypotheses derived from existing literature (Creswell & Creswell, 2017). An evaluation of South African mining legislation was conducted to identify regulatory shortcomings affecting ASM development, particularly in the allocation of prospecting and mining rights, thereby informing evidence-based policy recommendations. Despite official recognition of ASM shortly after 1994, the sector has not realised its full potential, as emerging miners continue to face challenges such as limited access to mineral rights, markets, finance, skills, information, appropriate technology, and institutional support, with many

participants being indigenous individuals seeking livelihoods through minerals such as iron, manganese, and chrome (Minerals Council South Africa, 2021). On average, approximately 30 licences for iron ore and manganese are awarded annually to emerging miners by the Department of Mineral Resources and Energy, while illegal mining activities of similar scale continue to increase, particularly in Gauteng, Mpumalanga, Limpopo, and North West provinces, where both authorised and unauthorised operations are prevalent (Minerals Council South Africa, 2020). The study population comprised all individuals involved in ASM registered in the active mines database, from which a sample of 70 respondents representing 30 small mines was targeted, yielding 50 usable responses; directors and owner-managers were purposively selected due to their direct involvement in prospecting and mining rights processes. Probability sampling was applied to ensure equal selection opportunity for all population members (Etikan et al., 2016), with the Department of Mineral Resources and Energy database serving as the sampling frame. Data were collected using a self-administered structured questionnaire employing a seven-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7), drawing on established measurement scales and self-developed items informed by an extensive literature review (Joshi et al., 2015). The measurement instrument's validity and reliability were rigorously assessed, with face, content, and construct validity evaluated through exploratory factor analysis (Janse, 2021), and reliability confirmed using Cronbach's alpha coefficients, with values of 0.7 and above deemed acceptable for this study (Matthews & Ross, 2010).

LITERATURE REVIEW

Importance of the South Africa mining industry

South Africa is renowned for abundance of mineral treasure resources. The country owns and produces a significant proportion of the world's minerals: nearly 90 per cent of platinum metals, 80 per cent of manganese, 73 per cent of chrome, 45 per cent of vanadium and 41 per cent of gold are located in South Africa (Goodman et al., 2019; Plagerson & Stuart, 2018). A substantial variety of other minerals are extracted, including iron ore, copper, nickel, diamonds, coal, building materials and other non-metallic minerals (Brand South Africa 2019).

South Africa's wealth has been built on its vast resources and the mining industry is therefore crucial. South Africa's valuable minerals are estimated to be worth close to 30 trillion South African rand (Mineral Council South Africa 2020). Furthermore, the mining industry is also South Africa's biggest employer, with over 510,000 employees and another 400,000 employed by suppliers of goods and services to the industry. Cole and Broadhurst (2022) argue that South Africa's mining industry is probably the world's most highly developed. With a strong background as a major mining country, its strengths include high levels of technical and production expertise, as well as comprehensive research and development activities.

The country has some of the most highly developed primary processing facilities worldwide, covering the carbon steel, stainless steel, and aluminium industries, in addition to gold and platinum. It is also a world leader of new technologies. The industry suffers, however, from price fluctuations due to shifts in world demand for mining products and, presently, the absence of mineral beneficiation before export (International Council on Mining and Metals 2014).

Artisanal and small-scale mining in South Africa

Artisanal mining includes the activities of individuals using mostly rudimentary mining methods, manual and rudimentary tools to access mineral ore. These mineral deposits are usually available on surface or at shallow depths. Although in South Africa, such mining often occurs at relatively deep levels. Artisanal and small-scale miners conduct their activities mostly for subsistence. This activity is labour-intensive and poor in capital, mechanisation and technology. Small-scale mining as opposed to large-scale mining (LSM) is conducted on a lesser scale than that of big mining houses.

The history shows that small scale mining long existed before large scale mining. In fact, there is an argument advanced by some that all large mines started from small scale mines, not only in South Africa but across the globe. The discovery of copper and gold in South Africa was the product of small-scale mining activity, despite much of history being written about the significance of large-scale mining to South Africa's development narrative. Some examples of early development of small-scale mining enterprises include the discovery of copper mining in Namaqualand, Northern Cape Province. In fact,

ASM is not a new activity in South Africa, but it was largely ignored by the apartheid regime and became part of the national agenda only after the change in government after 1994 (Madimu 2024).

In the South African context, small-scale mining includes concepts such as junior and emerging mining. This aspect of mining typically involves smaller producers undertaking mining activities sanctioned by approved rights or permits and other authorisations granted by the Department of Mineral Resources in terms of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) and relevant environmental legislation. Legal mining generally constitutes mining activities undertaken in accordance with an approved mining right, permit or licence and the associated environmental authorisation(s) issued by the Department of Mineral Resources in terms of the MPRDA and the National Environmental Management Act 107 of 1998 (NEMA).

According to the Mineral Council of South Africa (2020), in South Africa there is a view that integrating the ASM sector into the formal economy can help miners and communities by increasing security, creating a path towards more stable incomes, and ensuring that safer and more environmentally sustainable practices are employed. It could also spur longer term economic and social development and ensure that the entire nation benefits from the extraction of natural resources. The extractive activities (especially the artisanal and small-scale mining (ASM) and development minerals sectors) are an important form of livelihood for many marginalised poor people. In many other countries, ASM has increasingly become a source of income for many indigenous people, for, example, in Ghana. Recent years have seen an unprecedented and widespread shift from agrarian to informal mineral extractive economies. In 2016, the IIED estimated the number of people supported by ASM-related activities to be 100 million to 150 million and growing across the globe.

The main object of Minerals and Petroleum Resources Development Act (MPRDA 2002) is to redress the past imbalances of the apartheid regime whereby the mineral rights in South Africa were held in the hands of the few minorities. In order to redress the imbalances of the past, the government sought to create an opportunity for the indigenous people of South African to actively participate in the mining economy not as labours but entrepreneurs. To participate meaningfully in the mining economy, the indigenous people of South Africa would have to firstly acquire the licences for exploration and mining from the State as the custodiam of all minerals. The State would grant licences to emerging mining entrepreneurs. The failure to grant licences means the ownership and entrepreneurship patterns remain unchanged. In addition, the notation that mining field is levelled in terms of the fairness of the processes for both the economically advantaged South Africans and the historically disadvantaged remains controversial.

Khubana (2021) argues that mining industry plays a critical role in the economic and social development of South Africa, and that the industry could be a catalyst for socio-economic justice when managed properly. The fact that there too many requirements set out in the current mining regime shows that indigenous South Africans will remain excluded from the mainstream economy, because of the failure to fulfil all the conditions. To this end, it may be argued that the regulatory requirements of the small-mining industry in South Africa do not favour entrance of indigenous people into the mining industry. This view was supported by research undertaken by Bowmans (2014) which compared how mining rights and prospecting is regulated in different African countries and found that South Africa was lagging behind countries like Ghana. This is because policymakers who equate the expansion of large-scale mining with 'development' have established an extractive model that favours large corporate operators over the ASM sector. Hence, in South Africa ASMs are seen as illegal or operating in the margins of legality having little security of tenure. This study argues that ASM should be recognized as a distinct sector that requires a totally different approach from a policy and governance perspective.

The MPRDA already makes provision for applications for prospecting rights, mining rights and permits, which small-scale miners can apply for, but there are limitations because the process does not acknowledge the size and challenges of the applicants. Furthermore, Section 27 of the MPRDA which deals with the licensing regime for the ASM industry, has been seen largely as prohibitive to the development and growth of the sector. Moreover, context-specific legal and policy frameworks for ASM are required, and the importance of ASM must be reflected in national and local agendas, policies and plans. Department of Mineral Resources and Energy (2021)'s newly published Draft ASM policy is aimed at fostering the creation of a formalised Artisanal and Small-Scale Mining Industry that can operate optimally in a sustainable manner while contributing to the economy in the form of taxes and royalties

and through job creation, and for the elimination of illegal ASM operations.

The study contends that in order for South Africa to experience effective small-scale mining growth, the legislative framework must be amended with a clear focus on regulating illegal operators, enhancing access to finance, mineral and land rights, and training, among other things.

Regulatory Landscape of the South Africa mining industry

The Constitution (South Africa 1996), particularly under Section 24, makes provision for environmental rights and sustainable development. Kidd (2011:22) argues that Section 38 evenly distributes access to justice to all stakeholders. In line with the provisions of the legislative requirements stipulated in the MRPDA, every mining organisation is responsible for ensuring that their social and environmental impact aspects have been adequately considered before the Department of Mineral Resources awards mining permits (Khubana 2021:61).

Mining legislation in South Africa is administered and enforced by the Department of Mineral Resources and Energy. In terms of Section 5 of the MPRDA, prospecting rights and mining rights are limited real rights in respect of the land to which they relate. In simple terms, this means that prospecting and mining rights constitute limitations on the rights of ownership of the landowner. Moreover, Section 5 of the MPRDA expressly authorises the holder of a prospecting right or mining right to enter the land in question, together with his or her employees, and to bring onto that land any plant, machinery or equipment and build, construct or lay down any surface, underground or undersea infrastructure that may be required for the purpose of prospecting, mining, exploration or production, as the case may be.

In other words, a prospecting right or mining right encompasses not only the right to exploit the minerals in question, but also the surface rights necessary for the exercise of such right. Prospecting rights and mining rights are obtained by means of an application submitted in a prescribed form to the Regional Manager of the DMRE in the province or region where the proposed mining operation is to take place. The application must be submitted online, accompanied by the prescribed application fee and motivated by means of detailed documents describing the manner in which the applicant proposes to conduct the prospecting or mining operations in question. Moreover, the application must comply with the other requirements set out in the legislation, and these documents include:

1. a prospecting or mining works programme containing a detailed description of the geology of the resource being mined, the method and time schedule according to which the resource will be mined and a financing plan setting out the economics of the operation and the proposed method in which it will be financed;
2. documents demonstrating how the applicant will comply with black economic empowerment requirements;
3. a social and labour plan, indicating how the mine will contribute to the sustainable socio-economic development and empowerment of its workers, surrounding communities and labour-sending areas; and
4. an application for an environmental authorisation.

On submission of the application to the DMRE, an applicant must submit the relevant environmental reports as required in terms of the National Environmental Management Act 1998 (NEMA) whereafter and on acceptance of the application, it will be required to consult in the prescribed manner with the landowner, lawful occupier and any interested and affected party and include the result thereof in the relevant environmental reports. Where an environmental impact assessment has been identified as the environmental instrument to be utilised in informing an application for an environmental authorisation, the environmental impact assessment is not submitted together with the other documents when the application is first submitted to the DMRE but is conducted and developed over the course of the time when the mining right application is being processed.

The mining industry in addition to Mineral and Petroleum Resources Development Act (MPRDA) is also guided by Black Economic Empowerment Act, thus the Mining Charter of 2018. This legislative instrument assist mining companies to utilise natural resources in a way that ensures sustainability (Muswaka 2017). Various requirements applicable at the application phase for prospecting and mining rights are discussed in the following sections:

Prospecting rights

The Department of Mineral Resources and Energy under the executive leadership of the minister in line with section 3 of the MPDA (2002) may grant, issue, refuse, control, administer and manage any reconnaissance permission, prospecting right, permission to remove, mining right, mining permit, retention permit, technical co-operation permit, reconnaissance permit, exploration right and production right. The MPRDA (2002) also states that the holder of a mining right, prospecting right or mining permit is prohibited from mining without an environmental authorisation and without giving the landowner or lawful occupier of the land at least 21 days' written notice of intention to exercise allocated rights in terms of section 5A of the MPRDA.

A prospecting right is valid for five years and may be renewed for a period of no longer than three years. An ordinary prospecting right is granted by the minister upon application, if the requirements of section 17 of the MPRDA are met. Section 104 (1) of the MPRDA also provides for the granting of "preferential right to prospect or mine" to a traditional community to prospect on community land. The legislative requirements for the granting of a prospecting right are set out in section 17 of the MPRDA. If the minister refuses to grant such a right, he or she must "within 30 days of the decision, in writing, notify the applicant of the decision with reasons stating why the permit could not be granted". In terms of this Act, the Minister may delegate his/her power to grant or refuse an application for a prospecting right to the Deputy Director-General of Mineral Development.

Mining rights

A mining permit should be submitted together with an application for environmental authorisation. The application for a mining right will be granted if the legislative requirements as set out in section 23 of the MPRDA are met. If the minister refuses to grant the mining right, he should notify the applicant of his decision within 30 days with reasons. A mining permit may be renewed for three periods, each of which may not exceed one year, and may not be transferred, ceded, let, sublet, alienated or disposed of. It may, however, be encumbered or mortgaged for the purpose of funding or financing, but only with the minister's consent (MPRDA 2002).

Environmental authorisation

In line with the provisions of the legislative requirements stipulated in the MRPDA, every mining organisation is responsible for ensuring that their social and environmental impact aspects have been adequately considered before the Department of Mineral Resources awards mining permits (Khubana 2021:61). Although the MPRDA does not legally require that a water use license be obtained before mining/prospecting operations begin, the National Water Act criminalizes operating mines without obtaining the water use license. Any person who wishes to apply to the Minister for a mining right, prospecting right or mining permit must simultaneously apply for an environmental authorisation and must lodge the application at the office of the Regional Manager.

According to Muswaka (2017), National Environmental Management Act 107 of 1998 sets out environmental management principles that should guide environmental decision-making throughout the mining life cycle. Environmental authorisations (EAs) are required for prospecting and mining operations. Hence, mining operations cannot take place without an EA.

Community consultation report

All applicants for prospecting rights, mining rights, or mining permits are required in terms of the provisions of Section 29 (a) of the MPRDA to submit a consultation report strictly in accordance with parts G and H of the guideline for consultation with communities and interested and affected parties, within 30 days of notification by the Regional Manager of the acceptance of such application.

Applications process and system

South Africa's mining licencing process is managed by SAMRAD, a system which provides for all applications to be submitted electronically. However, the manual lodgement of applications is still possible despite the introduction of SAMRAD. Corruption Watch Report (2018:28) states that "SAMRAD is a credible initiative, but it has not had the desired effect of streamlining the application process and may have the opposite effect of inhibiting further growth an of already stressed mining sector." The benefits of SAMRAD when it was first introduced by the DMRE was to streamline the

application process, increase transparency and accessibility.

According to CMSA (2016), one of the biggest challenges affecting development of mining projects include delays in issuance of prospecting and mining rights, misinterpretation of legislation and guidelines as well as duplication of mining rights. This shows that the SAMRAD has not been effective in streamlining the application processes. In addition, Corruption Watch Report (2018) also emphasis that despite the DMRE implementing SAMRAD to help improve ease of access and speed evaluation process, the system has been plagued by irregularities in the mining rights process (corruption) and inaccessibility, and in some cases the double-granting of mining and prospecting rights (where a new applicant is granted rights over the same property portion as an existing prospecting or mining right). The double granting of mining and prospecting rights could be attributed to a number of reasons, for example, corrupt officials manipulating the application process, technical failure of the system to identify applications for prospecting and mining rights on the same portion of land, and or political influence.

RESULT AND DISCUSSION

Demographic profile of respondents

Questionnaires were distributed to approximately 70 potential respondents, with 49 (70% response rate) of them being useable for analysis. Males made up most of the respondents (63,3%), while females made up 36,7% of the sample. Furthermore, most respondents (59,2%) were people between the ages of 35 and 44, with 16,3% representing people between the ages of 25 and 34, and 16,3% and 6,1% representing respondents between the ages of 45 and 54, and 56 and 64, respectively. Most respondents (63,3%) held postgraduate degrees while 30,6% and 6,1% held undergraduate qualifications.

Most of the respondents were from the black population group (85,7%), followed by the White population group at 12,3%, while coloured represented 2%. In terms of experience in the sector, majority (30,6%) of the respondents has experience of approximately 11 and 15 years, followed by a ground of respondents of experience of between 6 and 10 years.

Overall, the respondents were directors/owners (14,3%), executive/top managers (16,3%), middle managers (34,7%) and lower-level managers/supervisors (34,7%) who came from mining organisations dealing whose main commodities are chrome (10,2%), coal (34,7%), diamond (8,2%), gold (10,2%), platinum (10,2%) and industry contractors/ associations (16,3 %). 83,7% of the mines were privately owned with small mines accounting for 22,5%, medium 22,5% and large operations accounting for 55%.

The study's demographic profile largely reflects trends observed in the South African mining sector. The workforce remains predominantly male, with women underrepresented in senior roles, despite policies like the Mining Charter aimed at increasing female representation in core mining staff (Commission for Gender Equality {CGE}, 2018). Racially, the sector continues to be largely Black, consistent with prior research, indicating a stable workforce composition (Kaggwa, 2020). Most respondents are aged 35 - 44, representing the peak of professional careers, and a significant proportion hold postgraduate qualifications, suggesting that the sector attracts highly educated individuals to meet its technical and managerial demands (CGE, 2018; Kaggwa, 2020). Experience is valued, with many respondents having 11 - 15 years in the industry, and managerial roles are distributed in a hierarchical, pyramid-shaped structure. Overall, these findings align with existing research but highlight the need for further study on age distribution and educational attainment to inform strategies for improving diversity and inclusion in the mining sector.

Validity and reliability of the measuring instrument

The validity of the measuring instrument determines whether the research instrument is accurate in the measurement of the intended data and truthful to the research objective. In this study, variables (Access to geotechnical and development information, Application process and related costs, financial and technical abilities, and institutional support) were assessed for validity of the questionnaire and to reduce the number of variables to smaller subsets establishing construct validity (Sürücü & Maslakçi, 2020).

A pilot survey of 20 potential respondents was conducted to pre-test the measuring instrument for content validity, and no revisions were made since the respondents understood the questionnaire

items. Furthermore, internal consistency of the measuring instrument was assessed to ensure reliability. Hence, this study utilised factor analysis and Cronbach's alpha coefficients to assess validity and reliability respectively (Table 1).

Table 1. Summary results pertaining to validity and reliability

Variables	Exploratory factor analysis			Cronbach's alpha coefficients
	Items	Min	Max	
Geological and development information	5	0.56	0.75	0.97
Application process and system	10	0.44	0.67	0.85
Financial and technical abilities	5	0.55	0.69	0.87
Institutional support	5	0.68	0.87	0.96

Source: Researchers' own construction-based Cronbach's alpha coefficients result from the survey responses.

In addition to confirming the four variables of the study, the reliability confirmed that each item tested what it was designed to test. This is confirmed by the results of the Cronbach's alpha coefficients which are acceptably above 0.7.

Descriptive statistics

The results of descriptive statistics, as calculated and shown in Table 2, formed the foundation of the quantitative data analysis of this study. Table 2 shows the descriptive statistics of each variable, as measured on a seven-point Likert-type scale. Options 1, 2 and 3 on the scale represented the degree to which the respondents disagreed with the statements. Option 4 on the scale indicated a response of neutrality or indifference. Options 5, 6 and 7 on the scale indicated the degree to which the respondents agreed with the statements. Specifically, Table 2 shows the mean and standard deviation of each variable.

Table 2. Descriptive statistics for each variable: means and standard deviations per variable

VARIABLES	MEANS	STANDARD DEVIATION
Geological and development information	5,42	1,05
Application process and related costs	4,83	1,15
Financial and technical abilities	5,32	1,09
Institutional support	5,11	0,72

Source: Researcher's own construction

The empirical results confirm that respondents of the study viewed access to geotechnical and development related information, application process and related costs, financial and technical abilities as well as institutional support as the main variables that policymakers should be focus on in order to streamlining the application process for prospecting and mining right. Sürücü and Maslakçı (2020) asserts the similar distributions in respondents' perceptions of technical capacity, institutional support, and procedural processes, indicating moderate to high agreement levels across survey items. The current study's results, showing relatively high mean scores and limited variation across responses, suggest that the sample consistently evaluated access to geotechnical information, application processes, financial and technical capacities, and institutional support in a comparable manner (Ledwaba & Nhlengetwa, 2016).

DISCUSSION AND MANAGEMENT IMPLICATIONS

This study reviewed the legislation affecting the issuance of prospecting and mining rights as part of systematic review. In order to support the inferences drawn from the document review, empirical research was conducted in order to complement the findings. This study reveals factors that inhibit inclusion of the indigenous people in the mainstream activities of mining industry, namely, limited or lack of access to geological and developmental information, application process and system challenges (vulnerabilities), financial and technical abilities, and inadequate institutional support.

In this context, the study proposes that a forward-looking framework for streamlining the process of applying for prospecting and mining right is needed to accelerate development of ASM industry where indigenous people participate meaningfully. The framework should be geared toward promotions of equitable access to mineral resources and creation of sustainable opportunities for indigenous people of

South Africa to participate in the mining industry. Lastly, the framework should be used to formalise the ASM industry, thus, reducing the illegal mining activities that rob the communities of the benefits of exploitation of the mineral resources, formal employment opportunities and their social and economic welfare of mining communities.

The common challenges that South Africa needs to overcome are explained below based on the results of the study. In order to create an environment that is enabling for the development of ASM, the study posits that the following key issues should be addressed in streamlining the application processes for prospecting and mining permits.

Access to geological and development data

The study found these challenges to be valid, with a mean of 5.42, suggesting that majority of the respondents to the study agreed that this one a critical success factor development of ASM industry. Emerging miners often struggle to locate geological data which should inform the efforts for lodging exploration application. Similarly, for any mining development to be successful, it is important to understand the dynamic conditions of the local communities. This information is important not only for the social license to operate, but such data also enables the applicant to develop their business plans and SLPs in an evidence-based manner, which facilitates meaningful engagement with the local mining communities. Similarly, where geological data is readily available to the emerging miners, they applications for exploration and mining tend to have higher chance of approval, while at the same time such data can be used to plan sustainable operations. For example, the location of possible mineral deposits is fundamental to processing of application but also necessary for planning operations, including how the deposits will be sold to the market. Reliance on professionals is risky in terms of the financial costs, and it can easily lead to conflict of interest where the professionals withhold certain critical information either for purposes of pursuing own application or withholding important information in exchange to investment opportunity. It is also important to ensure that SLPs are aligned to the priorities of the local municipalities.

The study's finding that access to geological and development data is a critical success factor in the artisanal and small-scale mining (ASM) industry aligns with global trends. Schwartz, Lee, and Darrah (2021) highlight that limited access to geological information remains a significant barrier to the formalization and sustainable development of ASM operations worldwide. In South Africa, Bester (2023) discusses the drivers of artisanal gold mining, emphasizing the need for improved access to geological data to support responsible mining practices. These findings underscore the importance of enhancing data accessibility to foster sustainable growth in the ASM sector.

Application process and related costs

Although the SAMRAD system was considered to be an innovative step towards automation of application processes, respondents reveal that it remains a challenge that needs to be addressed, this, a mean of 4.83. This is because accessibility and functionality of SAMRAD work for people who have prior exposure. In addition, despite the DMRE relying on the system for processing of applications, turnaround times for processing of applications as set out in the MPRDA were not always adhered to, whilst at the same time the system was not able to detect where lodging for same portion of land. Moreover, the system was considered to be susceptible to corruption. The need for applicants to have environmental authorizations and water licenses which are applied for at different government institutions was not only time consuming but also showed the fragmentation of the processes. The costs of environmental studies undertaken by Environmental Assessment Practitioners were also not always affordable, considering that these are start-up mining projects.

A study by Mkubukeli and Tengeh (2016) confirm that Small-scale mining entrepreneurs in South Africa face procedural bottlenecks, high compliance costs, and fragmented regulatory requirements, which delay project implementation and increase financial pressures on start-up operations. Similarly, artisanal and small-scale miners in Ghana encounter complex formalization procedures and financial constraints, limiting their ability to operate effectively and sustainably (Kumah, 2022). These findings highlight the need for streamlined, accessible, and affordable application systems, along with integrated support mechanisms, to facilitate formalization and promote sustainable growth in the artisanal and small-scale mining sector.

Financial and technical abilities

With a mean of 5.32, majority of respondents agreed that emerging miners do not always have finances required to execute their mining works programme, let alone access to financing options that under normal circumstances are available at the commercial banks and the development funding institutions such as DBSA, IDC and Public Investment Corporation. Investors are also interested in funding small/junior mining operations due to the start-up phase of any business being considered to be too risky. In fact, research shows that emerging entrepreneurs, especially from historically disadvantages backgrounds struggle to raise capital because financiers/banks consider them to be too high-risk clients. In the absence of access to funding, the new applicants are denied access to technologically advanced mining equipment, resulting in them resorting to old mining methods which lends itself to illegal mining. Professionals such as geologists, surveyors and engineers are not affordable for the new applicants also. Lastly, new applicants have no provisions for rehabilitation of the mining sites and often have little or no access to the commodity markets. In the absence of direct access to the commodity markets, the emerging miners are not only susceptible to exploitation and exclusion from the mainstream mining economy but left to join illegal trades which are controlled by gangs and other corrupt individuals. This study males a clarion call for the financial institutions to develop initiatives for de-risking entrepreneurs in low-middle income countries in order to unlock full potential of inclusive growth. Government should amend the legislation to enable investing, alternatively, stand surety to prospective applicants, especially, where feasibility study show that such mining projects would be successful. The requirement that emerging miners should have a provision for rehabilitation of mining rights is valid but should not be made a requirement at application phase. This requirement should link to productivity level of the mine and profitability. Lastly, ASM should serve as skills development incubators thereby ensuring that people who seeking to enter the large mining industry should be required to serve certain number of hours at the small mining sites before they are allowed to move into large mining operations. The Mining Charter should be used to accelerate the pace of transformation in the mining and mineral industry by intertwining its transformation targets for beneficiation and ownership with support for smalling mining industry development as incubators.

The findings of this study align with existing research showing that limited financial and technical capacity remains a central barrier to artisanal and small-scale mining (ASM). In South Africa, the lack of affordable finance and modern technology undermines sustainability (Ledwaba & Nhlengetwa, 2016), while in Ghana similar constraints perpetuate informality and exploitation (Kumah, 2022). Globally, the absence of de-risking mechanisms for small-scale enterprises restricts their contribution to inclusive growth (Schwartz, Lee, & Darrah, 2021). Addressing these challenges requires innovative financing models, state-backed guarantees, and capacity-building to enable emerging miners' effective participation in the formal mining economy.

Institutional support

Mean for this variable is 5.11, indicating that the majority of the respondents believed that development of ASM was stifled by lack of institutional support. For instance, the landowner typically controls access to prospective mining territories with mineral wealth, and due to conflicting interests, they may accuse applicants of trespassing. Seldom are new small-scale miners arranged to best serve their interests as a group. The processing of prospecting and mining licenses may therefore be hampered by social and political barriers such government interference and corruption in the absence of a clear framework to defend their rights. The lack of transparency is detrimental to the industry and the levels and years of maladministration of the application process have destroyed industry confidence. The community consultations are susceptible to political challenges such as legitimacy of community leadership structures which at times excludes communities, while on the other hand municipal integrated development plan are a creation of political discourse, thus politicians dictate the goals of the communities which may not always be consistent with the needs of the people. Thus, this study recognises that there is a need to protect community development agenda in a way that support sustainable mining. Section 9(2) of MPRDA states that "when the Minister considers applications received on the same date, he or she must give preference to applications from historically disadvantaged persons". The MPDRA and Water Act, section 27(7)(b) should be amended to centralise (integrate) the

licensing process into one process that is undertaken through a single system that is under the custodianship of one department, preferably the DMRE. Similarly, section 27(6)(b) should be amended to ensure that environmental management plan is a function undertaken by the state practitioners than professionals appointed by the junior miners.

In general lack of capital could be caused by investors may not finding junior mining projects profitable due limited access to the market of their commodities. The MPRDA should be amended to include a provision allowing junior miners to borrow money from financial institutions, using their rights as a guarantee without transferring ownership from the hands of junior miners. Section 12 and 13 of the MPDRA should be amended to ensure that the act explicitly states how DMRE will assist the applicants to comply with all the requirements. The DMRE should establish teams of geological professionals and geotechnical specialists/experts to support applicants for prospecting and mining rights. This will enable junior miners to identify and verify presence of minerals at an affordable rate of professional fees without creating grounds for illegal mining. In addition, section 27(5)(b) of the MPDRA which requires that consultation of notification and consultation "with the landowner and lawful occupier and any other affected parties" should consider inclusion of how the state as the sole custodian will facilitate the engagement, with provisions of how non-cooperation will be dealt with without frustrating the application of junior miners. Capacity-building interventions should also be implemented to ensure that potential candidates and DMRE staff fully comprehend the application procedures and online system. In the absence of a unified body that represents the emerging miners, their influence in policy making processes and industry at large remains suppressed by large mining companies which are affiliated to the Mineral Council of South Africa for example. Lobbying for change in legislation and institutional support for junior miners should be supported by creation of multistakeholder platform.

The findings on weak institutional support for emerging miners align with existing scholarship, showing that fragmented regulatory systems, corruption, and opaque licensing processes undermine ASM growth (Mhangara, Tsoeleng, & Mapurisa, 2020). Studies in South Africa and other African contexts demonstrate that the lack of coordinated institutional frameworks and limited representation of ASM interests reinforces the dominance of large mining corporations (Ofosu et al., 2025). While formalization can improve environmental management and occupational safety, it remains insufficient without strong institutional support to address barriers such as limited access to finance and weak oversight mechanisms (Ofosu et al., 2025). These challenges highlight the need for integrated regulatory reforms and multi-stakeholder platforms that ensure equitable participation of emerging miners.

Proposed framework for development of the ASM industry in South Africa

Small-scale and artisanal miners are critical to the mining of development minerals such as industrial minerals, semi-precious stones, and building materials required to meet the increasing demands of infrastructure and construction. Recent research underscores that despite their importance, ASM actors remain constrained by fragmented regulatory frameworks, limited access to finance, weak technical support, and minimal representation in policymaking, which perpetuates the dominance of large-scale mining corporations (Chuma, Field, & Mutemeri, 2024; Ledwaba, 2017; Ofosu et al., 2025). These challenges indicate the urgent need for an evidence-based, integrated framework to develop the sector sustainably.

The opportunity has come for a paradigm change, one in which purposeful measures are implemented to protect the ecosystem and ensure small-scale miners receive equitable treatment. This change requires political will as well as legislative and policy frameworks that transform small-scale mining from disadvantaged communities into respected industry players. South Africa must establish effective and sustainable small-scale mining management strategies that accelerate real transformation in the lives of communities that were previously marginalised (Hilson & McQuilken, 2025; World Bank, 2020).

First, the government must establish and adequately support the setting up of a small-mines administration branch within the DMR, whose primary focus will be accelerating the development of this undervalued and underfunded sector. Such an institution would provide the DMR with the capacity to investigate artisanal mining enterprises, encourage their legalisation, and provide technical services to improve and manage health, safety, and environmental standards (Ledwaba, 2017; Bester, 2023).

Second, the government should raise artisanal miners' productivity and incomes by expanding

access to low-cost finance and efficiency-enhancing equipment. Empirical studies have shown that lack of financial and technological support remains one of the key barriers to ASM productivity and safety (Bester, 2023; Chuma, Field, & Mutemeri, 2024). Improving access to finance and modern equipment would not only enhance miners' performance but also mitigate socioeconomic issues associated with artisanal mining, such as child labour, gangsterism, and community-based violence fuelled by poverty. Properly managed, current small-scale mines have the potential to grow into medium-sized mining enterprises (World Bank, 2020).

Third, enacting enabling legislation and formalizing ASM operations can sever links with illicit supply chains while creating stable and diversified economic opportunities. Formalization enhances market access, improves compliance with environmental and safety standards, and empowers indigenous populations to participate meaningfully in the mineral value chain, including manufacturing and construction (Hilson & McQuilken, 2025; World Bank, 2020). Establishing formal artisanal mining requires clear legal and regulatory frameworks, access to mineral and geological data, organized business structures, and provision of capital, equipment, and technical assistance. Incentives, such as royalty exemptions for community-owned cooperatives, can encourage local participation and strengthen community-based ownership (table 3).

Table 3. Framework for streamlining prospecting and mining rights application process

- ASM must be defined in mining rights MPRDA and EIA Regulation.
- Cost expenditure estimation should allow for a year-to-year exploration budget instead of a full five (5) year upfront budget. This will allow for miners to evaluate exploration phases yearly and be able to raise financial resources for the upcoming phase based on the results at hand and the expectations for the next phase.
- Application system for prospecting and mining rights must be inclusive of water and environmental authorisations process in one single system.
- Government should serve as a credit guarantor or grantor of the seed funding for junior miners where the prospective mining feasibility study confirmed potential profitability.
- Time for processing of applications must be legislated, with clear route for recourse if and when government fails to respond timely.
- MPRDA provisions that deals with expropriation of land where prospecting or mining projects are unreasonably being denied or delayed must be strengthened to give effect to the objects of the Act;
- Government should consider establishing a dedicated Agency for ASM than having a Directorate within the DMRE;
- Amend the requirements for Direct Foreign Investments in relation to junior miners operations.
- Capacitate SOEs such as Mintek, CGS, MQA to assist aspiring junior miners with technical assistance through the mineral development value chain; and
- Develop a new transparent and reliable online mining cadastral system that limits corruption.
- Designate specific mining areas for ASMs;
- Mainstreaming ASM into national and regional economic programs;
- Providing artisanal and small-scale miners with geological information in support of more efficient mining for ASM actors;
- Creating space for effective participation and engagement of different ASM stakeholders in policymaking that impacts them, with special attention being paid to vulnerable and marginalized stakeholder groups, such as women and indigenous populations.
- Introduce certification of ASM for ethical mineral production, including performing due diligence of the suppliers and consumers;
- Legislate that where certain mineral resources are not economically viable for industrial production, large mining corporations should disclose such sites and make them available for ASM through a bidding process;
- Private sector actors such as banks and mining companies began to engage with artisanal

miners.
- Establish a tax structure for ASM

Fourth, sensitive and environmentally valuable areas should be consciously protected by the government and large mining corporations. For instance, old mining shafts must be rehabilitated, and small miners should be considered when large-scale operations cease while mineral reserves remain extant (Girard, 2022). This approach strengthens environmental stewardship while safeguarding the rights and opportunities of ASM actors.

Beyond the establishment of an ASM Directorate within the DMR, the government must establish an ASM governance agency at both national and local levels. This agency would provide institutional support for ASM by enforcing policies, certifying operations, facilitating market access, and promoting capacity-building initiatives (Hilson & McQuilken, 2025; Southern Voices Network, 2016). It could also serve as a marketplace for ASM minerals, boosting investor confidence and enabling financial institutions to support emerging entrepreneurs effectively.

Collectively, these measures, rooted in empirical evidence and global best practices, create a foundation for a sustainable, inclusive, and professional ASM sector in South Africa.

CONCLUSION

The results of the study highlighted the need to give attention to the challenges that affect the application process for prospecting and mining rights in South Africa. The challenges that have been confirmed by this study include amongst others, limited access to geotechnical information and technical expertise, lack of institutional support, limited or no access to capital (investment), limited technical abilities, and lack of access to the land and markets. In addition, legislative uncertainty, political meddling and lack of a functional system have also been identified as other challenges that negatively affect the application process. ASM, if properly managed, presents inclusive growth opportunities, particularly in low-income communities that are located near the mining sites. In addition, mining has the potential to not only to improve the local economy, but also to respond to other challenges affecting communities (Khubana, 2021) which amongst other include unemployment and poverty. However, the effect of resource-cursed is that countries that endowed with mineral worth do not only lag behind in terms of development, but also in eradication of poverty and inequality. In fact, ddisparities in the distribution of mining-related economic benefits remain arguably the most significant in South Africa. While local communities, which are typically impoverished, bear the brunt of the environmental effects of mining activities, such as pollution, infrastructure dilapidation, and degraded landscapes, the narrative surrounding the mainstream mining industry's contribution to development is dominated by the creation of wealth for those in power. As a result, implementing the suggested framework for streamlining prospecting and mining application processes will advance inclusive growth through empowering indigenous peoples with access to the mining value chain. Similarly, this will establish artisanal mining as a formal economic activity, consequently changing ownership patterns and contributing to the creation of formal employment opportunities for communities who would not otherwise have them.

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