



Assessing the status quo of artisanal and small-scale mining in South Africa: Opportunities, challenges, and future directions

by N. Rembuluwani¹, L. Diko-Makia¹

Affiliation:

¹University of Venda, Department of Earth Sciences, Venda

Correspondence to:

N. Rembuluwani

Email:

ndivhudzannyi.rembuluwani@univen.ac.za

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ORCID:

L. Diko-Makia
<http://orcid.org/0000-0001-8101-0224>

Abstract

Artisanal and small-scale mining is crucial for the mineral sector in South Africa, but it also presents both opportunities and challenges. This paper presents an overview of the South African artisanal and small-scale mining sector, the socio-economic significance of artisanal and small-scale mining, the regulatory environment, and the environmental impacts, which are currently the status quo of this sector in South Africa. The paper identified ways in which artisanal and small-scale mining can support local development, create employment opportunities, and reduce poverty. The case of informatisation, ecological damage, and social insecurity has shown social conflicts, potential land degradation, and criminal behaviour. Finally, the paper discusses the future of artisanal and small-scale mining in South Africa, which will largely depend on improved legislation, enhanced personnel capacity, and more sustainable practices to ensure that the positive outcomes of the industry outweigh the negative ones. These propositions include recommendations to all stakeholders, including the government, industry, and civil society, such as stricter environmental regulations, improved working conditions for miners, and the promotion of responsible mining practices.

Keywords

artisanal and small-scale mining; socio-economic significance; regulatory environment; local development; poverty alleviation

Introduction to artisanal and small-scale mining in South Africa

Artisanal and small-scale mining (ASM) plays a significant role in South Africa's mining landscape, contributing to employment, economic development, and mineral extraction. In the fourth quarter of 2023, the unemployment rate in South Africa was 32,1% (StatsSA, 2023), and the poverty level was at 55% of the general population (World Bank, 2020). Most mining communities are located in the poorest areas of South Africa, where alternative livelihoods are particularly complex (DMR, 2018). The ASM sector has the potential to employ these disadvantaged communities. However, ASM operations face various challenges, including informal practices, environmental degradation, and inadequate regulation. The sector's sustainability can help enhance the country's economic position by generating royalties and taxes (DMRE, 2022). Understanding the status quo of ASM in South Africa is crucial for identifying opportunities for improvement and sustainable development. While there is no universally recognised definition of artisanal and small-scale miners, the 2022 Artisanal and Small-Scale Mining Policy in South Africa, which outlines the rights and responsibilities of ASM operators, provides the following definitions for these terms:

Artisanal mining means traditional and customary mining operations using traditional or customary ways and means. This includes the activities of individuals who mainly use rudimentary mining methods and manual tools to access mineral ore, which is usually available on the surface or at shallow depths.

Small-scale mining means a prospecting or mining operation that does not employ specialised prospecting, mechanised mining technologies, chemicals, including mercury and cyanide, or explosives, or the proposed prospecting or mining operations do not involve investment or expenditure which exceeds such amount as may be prescribed (DMRE, 2022).

Overall, these definitions clarify the scale, methods, and technologies associated with artisanal and small-scale mining, helping to differentiate between these types of operations within the mining sector. Artisanal mining refers to a less formal and less sophisticated approach to mining, typically conducted by local communities or individuals with limited capital investment. Small-scale mining involves more organisation and planning than artisanal mining, but still requires a smaller scale compared to more extensive mining operations.

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Artisanal and small-scale miners in South Africa extract a range of minerals, including clay, gravel, sand, aggregate, gold, diamonds, and gemstones. These miners typically work independently or in small groups, often in remote or rural areas where larger mining companies are absent. According to Munakamwe (2018), the population in the ASM sector generally comprises foreign nationals from Lesotho, Mozambique, and Zimbabwe, with their numbers exceeding that of locals. The demographics of the population in the sector include men, women, and children; Ledwaba et al. (2019) noted that these miners are of different ages and are primarily people of colour (Ledwaba, 2016). Their operations typically rely on manual labour, essential tools, and simple processing methods, and they are often informal, requiring formal regulation.

Historical background and evolution of ASM in South Africa

South Africa is renowned for its diverse range of minerals. It is the home to the largest deposits of chrome, manganese, platinum group metals, vanadium, and vermiculites (Debrah et al., 2014). However, artisanal and small-scale miners tend to focus more on gold, diamonds, and construction materials such as clay, gravel, sand, and aggregate (Mutemeri, Petersen, 2002). The ASM sector was first recognised post-apartheid in South Africa. The country's mining history mainly focused on large-scale mining companies, although there has been evidence of ASM operations (Mintek, 2016; Ledwaba, 2017).

ASM in South Africa was largely overlooked during apartheid (Solomon, 2012), however, it was identified by the Reconstruction and Development Programme (RDP) as one of the vital socio-economic programmes to benefit from the new government (Government Gazette, 1994). In the spirit of stimulating entrepreneurial culture and better utilisation of mineral resources, ASM was earmarked to address the imbalances of apartheid (ANC, 1990; Kekana, 1999). The assistance to the ASM sector included skills development, financial support, technical aid, and access to mineral rights (Government Gazette, 1994).

In 1998, the white paper on the Minerals and Mining Policy of South Africa's small-scale mining section centred on the following pillars: developing the ASM sector, encouraging the participation of previously disadvantaged communities, and addressing the sector's challenges. In 2002, the Mineral and Petroleum Resources Development Act (MRPDA) was developed to formalise the ASM sector, focusing mainly on environmental issues, licensing, labour relations, and rehabilitation. The MPRDA was perceived to be biased towards large mining companies because the ASM sector lacked the resources to implement the requirements of the act (African et al., 1994; Solomons, 2012; Fakir, 2016), although some of the issues are being addressed (Ledwaba, Nhlengetwa, 2015).

The ASM sector has shown considerable growth since 1994, with several participants estimated to be between 10,000 and 30,000 (Mutemeri, Peterson, 2002; Buxton, 2013). According to the Department of Mineral Resources (DMRE), over 1,000 permits were issued between 2004 and 2010. In 2011, the Mine Health and Safety Council estimated that there were 1,030 registered small-scale miners. ASM activities in South Africa are primarily located in rural communities with access to mineral resources. However, there is a high involvement rate in poverty-stricken provinces, such as Limpopo, the Northern Cape, Northwest, and Eastern Cape (Ledwaba, 2017), where the unemployment rate is also high (StatsSA, 2016).

Importance of ASM to the South African economy and society

For 150 years, mining has been the backbone of the South African economy (Baxter, 2015; DMR, 2015). In 2023, the mining industry contributed R202.1 billion in gross domestic product and employed 475,561 South Africans (StatsSA, 2023). Large mining companies dominate 90% of the South African mining industry, with the artisanal and small-scale mining sectors comprising the remaining 10% (Lundu, 2014). In the past, the South African government had developed policies that disadvantaged ASM while favouring large mining companies (African et al., 1994; Solomons, 2012; Fakir, 2016). This limited employment opportunities for rural and poor communities, as they often lack the skills required by large mining companies (Ledwaba, 2017; Jansen, 2017; Hentschel et al., 2003). Before democracy, the policies mainly catered for a minority population. However, infusing ASM into the economy can help boost the local economy. The ASM sector is known to utilise rudimentary tools that are mostly locally crafted, which is essential for enhancing local purchasing power.

According to the fourth quarter of Stats SA (2023), the unemployment rate stood at 32.1%. The labour-intensive nature of the ASM sector can help to provide jobs for rural unemployed communities (Thwala et al., 2023). The sector is estimated to support 44 million people through direct employment and 136 million in industries that support the sub-sector worldwide (World Bank, 2022; IISD, 2017; Perks, McQuilken, 2020). In South Africa, the sector is estimated to employ 30,000 people, although it is believed that the number has grown substantially (Mutemeri, Peterson, 2002; Buxton, 2013; Ledwaba, 2015; Ledwaba, Nhlengetwa, 2016). Buxton (2013) states that the ASM sectors employ ten times more people than the extensive mining industry. The ASM sector focuses on minerals that are deemed uneconomic for large mining companies. Large mining companies primarily focus on exploiting large deposits, leaving a niche for the ASM sector to mine, which provides employment (Kaufmann et al., 2019; Kesari et al., 2020). This sector has the potential to contribute to addressing the country's unemployment rate.

Legal and regulatory framework

Overview of the legal framework governing ASM in South Africa

The legislation that addressed mining issues in the past was the MPRDA of 2002; this legislation was biased in favour of large mining companies. DMRE, in March 2022, developed and published a policy for the ASM sector to legalise the industry; the policy has taken a holistic approach to addressing ASM-related issues, focusing on fostering industry sustainability. One of the most significant challenges of the MPRDA of 2002 was that it covered issues of both ASM and large mining companies under one umbrella, which could have been more favourable for the ASM sector. Section 27 of the MPRDA deals with licensing, which is prohibitive to the development and growth of the industry. The issues covered in the MPRDA include environmental management, water use, land use, health and safety, and the provision of required financial resources.

Analysis of relevant legislation, policies, and regulations affecting ASM operations

In 2022, the Ministry of Mineral Development developed a policy specifically addressing the ASM sector. The first point of the

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ministry's call was to define the concepts of artisanal and small-scale mining, so as to gain a better understanding of the sector. The threshold for investment was one million rand for artisanal miners and 10 million rand for small-scale mining, with a provision for graduation between the categories based on increased levels of investment. The act also proposed a dual licensing process, which involved a first-come, first-served basis, with consultation with the Council of Geosciences (CGS). The CGS is mandated to provide geological data that may be used to demarcate areas where the ASM sector can mine. Furthermore, the council will also assess the water and land risks, minimising the possible risks that the ASM sector can pose to the environment. Preference will be given to South Africans and cooperatives during the area reservation process. Other pieces of legislation that ASM need to adhere to include the following:

Income tax

Mining companies are liable for various taxes, including income tax, capital gains tax, withholding tax, VAT, transfer duty, and securities transfer tax, as per the Income Tax Act of 1967. The Artisanal and Small-Scale Mining (ASM) industry is also required to pay taxes and royalties, contributing to socio-economic growth, despite the informal nature of the sector, which often obscures its revenue contributions.

Health and safety

The Mine Health and Safety Act of 1996 governs the health and safety practices in mines. The act primarily focuses on ensuring a safe working environment, including the provision of required health and safety equipment by mining companies, the appointment of a health and safety representative, and the development of mine health and safety policies. As attractive as all this may seem, some of the provisions of the act do not necessarily apply to the ASM sector, as they lack the expertise and resources to implement them.

Environmental management

A suite of legislation governs ecological issues in South Africa, including the National Environmental Management Act of 1998, the Mineral and Petroleum Resources Development Act of 2002, the Environmental Impact Assessment (EIA) guidelines of 1997, the Environmental Conservation Act of 1986, and the National Environmental Management Act of 1998. An application for environmental authorisation in South Africa can range from R1,000 to R10,000 per requirement, covering EIA, scoping, biodiversity assessment, integrated permitting system, and amendments. However, these costs do not include the expenses associated with hiring an environmental practitioner. Implementing this legislation is costly and is seen as a barrier to entry into the mining sector. Additionally, requirements include developing an environmental management plan and setting aside funds for rehabilitation.

Water management

The Department of Water Affairs has developed guidelines for water use in small-scale mining, with the National Water Act of 1998 serving as the primary legislation for enforcing water management. Best Practice Guideline A1 categorises water use depending on impact as high, medium, or low, where the water use activity with high impact requires a license to use water, medium impact requires general authorisation, and the one with low impact requires no license.

Labour relations

South Africa's key employment law statutes include the Labour

Relations Act of 1995, the Basic Conditions of Employment Act of 1997, the Employment Equity Act of 1998, and the Skills Development Act of 1998. These laws safeguard workplace rights and promote economic development, fair labour practices, peace, democracy, and social development. While some requirements of these statutes pertain to fundamental human rights and are relatively straightforward to adhere to, the artisanal and small-scale mining (ASM) sector, due to its informal nature, often does not comply with any of these acts (Mutemeri, Peterson, 2002).

Challenges, gaps, and prospects in the regulatory framework and enforcement

The reasons for the ASM sector not adhering to the pertaining laws include a lack of knowledge of the laws, a limited understanding of the implications, and insufficient resources to implement such legislation (Ndlazi, 2021). On the government side, the main challenge with legislation is the lack of enforcement and monitoring. Small-scale miners also believe that there is a lack of institutional support, funding, market access, infrastructure, and land availability. Currently, the Directorate of Small-Scale Mining lacks collaboration with other government departments and resources to support the ASM sector.

The Artisanal and Small-Scale Mining Policy of 2022 will serve as a beacon of hope for the ASM sector. It addresses the issues overlooked in the MPRDA, the structure of this policy, and individual issues that have affected the ASM sector in the past. The issues addressed in this policy include application systems, resource constraints, limited access to DMRE offices, and difficulty in accessing information and securing funds. According to the speech given by the Minister of DMRE in 2022, Mintek trained 630 artisanal miners between 2019 and 2021 in four provinces: Gauteng, Mpumalanga, Northern Cape, and North-West. They are also training 200 women to operate as artisanal and small-scale miners. In January 2024, at the emerging miners' symposium, the deputy minister also indicated that the DMRE facilitated and opened funding opportunities for ASM, intending to fund 13 miners, with priority being given to women. This is being done in collaboration with the Industrial Development Corporation (IDC). In promoting inclusion, DMRE has committed R40 million towards exploring minerals for the ASM sector to access and mine ore bodies. With this level of government support, the ASM sector has a genuine opportunity to thrive in South Africa

Environmental, health, and social impacts of ASM

The ASM sector has shown substantial growth and benefits in poverty alleviation in poor communities. Still, it is also known to significantly impact the environment and the health of workers and the surrounding communities (Telmer, Stapper, 2007). Artisanal and small-scale mining (ASM) can have significant environmental impacts due to various factors inherent in its operations. The impacts include deforestation, land degradation, river siltation, solid waste disposal, landscape impairment, water pollution, acid mine drainage, and mercury and cyanide contamination (Elmes et al., 2014; Isidro et al., 2017; Lobo et al., 2015; Mhangara et al., 2020; Fianko, Boadua, 2021; Macháček, 2019).

Although it is acknowledged that health risks are significant and access to occupational health services is limited (Tsang, 2019; Hentschel, 2002), there remains a lack of comprehensive descriptions of the actual occupational hazards associated with artisanal and small-scale mining (ASM) (Howlett et al., 2023). Due to the lack of proper safety measures and equipment, miners

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in ASM face numerous occupational hazards, such as accidents, injuries, and fatalities. Working in confined spaces, collapsing roofs, handling explosives, and operating machinery without adequate training can increase the risk of accidents (Kyeremateng-Amoah et al., 2015; Singo et al., 2022; ILO, 2015; Rupprecht, 2015).

Water pollution

ASM operations can contaminate water sources with chemicals such as mercury and cyanide, as well as other pollutants used in the extraction and processing of minerals (Hilson, 2003). Other impacts include the depletion of water resources, increased levels of siltation, turbidity, and heavy metal content, as well as disturbance of aquatic life and its habitats (Mujere, Isidro, 2016). The pollution of water due to mining affects the health of the community, particularly the residents living near the mines, as rural communities often lack access to municipal water facilities and rely on river water for domestic purposes (Lobo et al., 2016; Heath et al., 2004; Taux, 2022).

Deforestation and habitat destruction

Before any mining activity commences, vegetation needs to be removed to access the ore. This removal of vegetation results in the loss of biodiversity and the destruction of local ecosystems and habitats, leading to the decline of wildlife (Harlow et al., 2019; Siqueira-GayJuliana et al., 2020; Sonter et al., 2018; Mhangara et al., 2016).

Soil erosion and land degradation

The ASM sectors is not known for rehabilitation, and the removal of vegetation can lead to soil erosion, which depletes the soil's fertility (Magidi, Machingo Hlungwani, 2022; Obodai et al., 2023).

Air pollution

Mining and processing activities, such as blasting and crushing, can release particles into the air, which can pollute the environment, resulting in respiratory problems for the public (White et al., 1991; Csavina et al., 2012; Schwarzenbach et al., 2010; Tavares et al., 2017; Silva-Rêgo et al., 2022).

Land reclamation and rehabilitation

The ASM sector does not invest in land reclamation and rehabilitation. They leave the mining sites dilapidated, leaving behind pits that pose a health and safety risk due to physical and chemical wastes (Mhlongo, Amponsah-Dacosta, 2016; Kim, Jung, 2004; Rodriguez, 2011; Mhlongo, Akintola, 2021).

Economic contribution and challenges

Contribution of ASM to the South African economy

ASM is labour-intensive, enabling the sector to employ a large number of people. The sector is estimated to support 44 million people through direct employment and 136 million in industries that support the sub-sector worldwide (World Bank, 2022; IISD, 2017; Perks, McQuilken, 2020). South Africa is estimated to employ approximately 30,000 people, although it is believed to have grown substantially (Mutemeri, Peterson, 2002; Buxton, 2013; Ledwaba, 2015; Ledwaba, Nhlengetwa, 2016).

Most people involved in ASM are from impoverished communities with complex alternative livelihoods, so this sector provides them with an opportunity to support their families. In the current economic climate, where securing employment for graduates is daunting, it should be even more challenging for those without formal education, hence, people often turn to ASM at the

subsistence level. ASM sectors also focus on minerals extraction deemed uneconomic by large mining companies, resulting in minimal overlap between this sector and large mining companies (Zvarivadza, Nhleko, 2018).

Most families in Africa are led by women who must ensure that there is food on the table for the family; the ASM sector has shown substantial growth in employing women from rural communities (Hilson, Garforth, 2012, 2013; Arthur-Holmes, Abrefa Busia, 2022; Arthur-Holmes et al., 2022). The ASM sector in South Africa is contributing to improved living standards for low-income communities by providing affordable construction materials, including clay, aggregate, sand, and gravel (Kaufmann et al., 2019). Focusing on the diversity of minerals, the sector provides technical skills and employment opportunities for local communities (Kesari et al., 2020).

Challenges faced by the ASM sector

Over the years, challenges confronting the ASM sector have been well-documented. These problems include limited access to mineral deposits, lack of appropriate skills and technology, limited access to capital and markets, and lack of institutional support (Nellie, Petersen, 2002; Hoadley, Limpitlaw, 2004; Department of Mineral Resources (DMR), 2011; Ledwaba, Nhlengetwa, 2016; DMR, 1998; Love, 2015). These challenges are discussed in the following:

- *Limited access to mineral deposits and markets* – the absence of policies that address the ASM sector specifically has resulted in the sector operating outside the legal domain, which limits their access to mineral deposits and markets (Mutemeri, Peterson, 2010). Love (2015) noted that miners find the process cumbersome, even in countries where ASM-specific legislation is in place. The fact that these miners operate illegally leaves them vulnerable to intermediaries and forces them to sell their products at less than market value (Mutemeri, Peterson, 2002; Ledwaba, 2017; Nhlengetwa, 2019).
- *Lack of appropriate skills and technology* – the sector is primarily poverty-driven, resulting in minimum investment in mining and processing technologies (Mutemeri, Peterson, 2010; Mutemeri, Peterson, 2002; Ledwaba, 2017). These circumstances also result in a lack of finances for training. Hence, they rely on indigenous knowledge systems for mining, processing, and business management.
- *Limited access to capital* – artisanal and small-scale miners mainly operate outside the legal domain, which hinders them from getting financial support from lending institutions and governments (Ledwaba, 2017; Heath et al., 2004). This traps the miners in a vicious circle of poverty.
- *Lack of institutional support* – artisanal and small-scale miners are from the poorest communities and lack representation in senior government offices where policies are made (Nhlengetwa, 2019; Heath et al., 2004). This results in them being discriminated against.

Gender dynamics in ASM

According to the Mineral Council of South Africa (2020), women represent 12% of South Africa's total mining labour force of 454,861 people. Of this number, there is no representation of women in small-scale mining. Although there is limited literature on women's involvement in ASM in South Africa, 40%–50% of the African workforce in ASM comprises women (Weldegiorgis et al., 2018; Ofosu et al., 2022). The ASM sector is often viewed as a

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male-dominated industry in South Africa, with the involvement of women being overlooked (Bester, 2019; Munakawe, 2018; Chuma, 2021). The World Bank (2019) also noted that no empirical data on women's involvement in ASM is available county-to-county. Women play various roles in ASM, contributing to the sector's operations and supporting livelihoods within mining communities. Women often engage in ore processing activities. However, women employees at ASM sites typically do not have access to the more profitable tasks, such as "digging or excavation" and "supervision," as noted by Koomson (2019). This is because such roles are often viewed as masculine (Danielsen, Hinton, 2020). Besides being miners, women are also engaged in various activities, including petty trading, food vending, bar management, and operating shops (Geenen et al., 2022).

Women are heads of households worldwide (Nwosu, Ndinda, 2018), with 42% of children living with their mothers only (StatsSA, 2021). Their involvement in artisanal and small-scale diamond mining (ASDM) also helps women generate income to support their families. The ASM sector accounts for 17.4% of the South African workforce (StatsSA, 2018), and nearly 50% of its workforce comprises women (Dladla et al., 2022). One of the benefits of women's involvement in the ASM sector is that it enhances their resilience and ability to cope with potential economic shocks (Den Haan et al., 2020).

Women's challenges in the ASM sector include economic, legal, cultural norms and taboos surrounding sexuality, institutional, and decision-making (USAID, 2020). In Sub-Saharan Africa, men in the ASM sector feel that women are inferior, resulting in limited access to productive and management roles (Buss et al., 2019; Hinton, 2016). This results in an income gap between men and women in the ASM sector, with women working longer hours as well as facing challenges in accessing resources, finance, and ownership; hence, they get paid less than their male counterparts (Eshun, 2016; Lahiri-Dutt, 2018; Buss et al., 2017, 2019; Yakovleva, 2007; GEM, 2012; AMDC, 2015). Hausermann et al. (2020) highlighted that women face exploitative challenges where they are coerced into sexual activities with miners, which not only violate women but leave them prone to severe physical and mental health challenges (USAID, 2019).

In numerous developing countries, subsurface mineral acquisition is governed by legal and customary tenure systems, where customary tenure takes precedence, and women face greater difficulties in obtaining mining and mineral rights (Deere, Leon, 2003; Buss et al., 2017). Hence, women opt to work illegally, which

leaves them more vulnerable to intermediaries. Even though there are numerous challenges for women in the ASM sector, they still forge their way in the industry; this is evident in Rwanda and Uganda, where women are showing potential to obtain higher income than men in the same contexts (IGF, 2018; Yakovleva, 2007; Buss et al., 2019).

Future directions and recommendations

Table 1 presents a SWOT analysis summarising the state of the ASM sector. It can assist stakeholders in understanding the dynamics of the sector, allowing them to leverage its strengths, address its challenges, capitalise on its opportunities, and mitigate threats.

After reflecting on the current state of the ASM sector in South Africa, the following future directions and recommendations are proposed. These include strategies to help develop the sector aim to address the identified challenges that the sector faces. The primary objective of this section is to lay the groundwork for the sustainable growth and success of the sector.

Formalisation and regulation

With the development of the new ASM policy in 2022, this policy is a ray of hope for the ASM sector because it covers a wide range of issues that used to hinder the sector's sustainability. The country will also be better positioned to benefit from the sector by collecting royalties and taxes. With the possibility that most artisanal small-scale miners will be registered, the government will be in a better position to enforce legislation that benefits the environment.

Gender-sensitive approach

Since most households in South Africa are headed by women, strategies that are gender-sensitive and can assist women's growth in the industry need to be developed. More research is needed on women's involvement in ASM.

Capacity building

The government should support the sector by providing capacity-building initiatives to improve technical skills, promote entrepreneurship, and comply with legislation. In doing this, the sector stands a fighting chance in the current economic climate.

Stakeholder engagement

The government needs to facilitate dialogues between ASM miners, NGOs, large mining companies, and educational institutions in order to develop ways in which the sector can be assisted.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Provides employment and income. • Resource accessibility. • Community engagement. • Health and safety issues. 	<ul style="list-style-type: none"> • Informality and lack of regulation. • Flexibility and adaptability. • Environmental impact. • Economic instability.
Opportunities	Threats
<ul style="list-style-type: none"> • Formalisation and regulation. • Technological advancements. • Market expansion. • Community development. 	<ul style="list-style-type: none"> • Regulatory challenges. • Environmental and social risks. • Market fluctuations. • Health and safety risks.

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