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Women and mine closure: A case study of policy in South Africa

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ARTICLE INFO

Keywords: Migration Patriarchy Women in mining Mine closure Gender

ABSTRACT

The social aspects of mine closure remain a challenge to the mining industry. Its tendency to deal with problems towards the end of a mine's life cycle, rather than planning for them from the start, is partly responsible for the gendered impact of mine closure. Using documentary evidence, the literature on how mining affects women, and the history of discrimination against black women in South Africa, we examine South African policy on women in mining and how mine closure affects them. The paper contributes towards a more nuanced understanding of the social aspects of mine closure. We recommend a more comprehensive policy focus on the local and regional social consequences of mine closure for women.

1. Introduction

The global mining industry struggles to deal with the social effects of mine closure, including the effect on women. It has generally excluded women from mine employment and paid little attention to the gender aspects of mine closure.¹ However, mine closure poses a long-term threat to the mining industry's commitment to sustainability. Finding appropriate ways to deal with the social aspects of mine closure has become critical to the industry. Environmental and legal aspects dominate the mine closure literature. The body of literature on the social aspects of closure is much smaller. Because of the limited attention to women in the mining industry, issues of gender have not received much attention in the context of closure. In a review of the literature, Bainton and Holcombe (2018, p. 475) ask: "How does mine closure affect gender relations and gender roles?" Although there has been an increase in the literature on women in mining, the research seldom links gender and mine closure. The literature focuses mainly on the small scale of women's employment in mining and how mining affects women and gender relations (Eftimie et al., 2009; Lahiri-Dutt, 2012; Perks and Shultz, 2020). Despite, the growth of literature linking mining and gender, the closure literature underplays gender concerns. However, recent publications have started to pay attention to the social aspects of closure, particularly as they affect women and gender issues (ICMM, 2008; Bainton and Holcombe, 2018; World Bank, 2018). Our paper investigates how South African mining policy deals with this question.

Much information is available on reserves of resources but far less on mine closure – especially in the developing world. We have no more recent estimate than that from the World Bank (2002), predicting that 25 large mines would close in the developing world in ten years' time. This estimate was never verified, monitored or updated. Policy guidelines tend to view mine closure as an environmental concern (Vivoda et al., 2019) and emphasise financial provisions for closure. Recent research has started to challenge the focus on the environment and to argue for a more comprehensive approach that would include the social aspects (Bainton and Holcombe, 2018; Owen and Kemp, 2018; Vivoda et al., 2019). The South African literature on closure has mostly used urban case studies to reveal the many aspects of mine closure (Binns and Nel, 2001; Marais, 2013a, 2013b; Nel and Binns, 2002; Siyongwana, 2018).

Against this background, the paper analyses South African mining policy and policy guidelines on the relationship between mine closure and women. We ask three main questions: How does policy conceptualise downscaling and closure? How does policy conceptualise and respond to women's concerns? How could policy and policy guidelines integrate concerns about closure and gender? Methodologically, we base the paper on a document analysis of the most prominent mining policies, legislation and policy guidelines.

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https://doi.org/10.1016/j.resourpol.2021.102059

Received 18 October 2020; Received in revised form 27 February 2021; Accepted 27 February 2021 Available online 31 March 2021 0301-4207/© 2021 Elsevier Ltd. All rights reserved.







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¹ Although our paper focuses largely on women and closure we realise that the broader issue of gender is important. A focus on women cannot ignore the role of men and appropriate policy responses require a gender approach rather than a focus on women alone.

1.1. Women and mining

1.1.1. Global trends and practices

Three issues dominate the debates on women and mining: the unequal employment of women in the mining industry, the social effects of mining communities on women, and women's under-representation during the process of obtaining a social licence. Despite the global progress made towards the attainment of equal rights, employment in the mining industry remains "heavily attributed with masculinity" (Lahiri-Dutt, 2012, p. 389). This masculinity results from low female employment in the industry (Eftimie et al., 2009). Approximately 14% of the industry's workforce of seven million people consists of women and there is slow growth in this percentage, which is slightly higher than the 11% female employment in construction (Perks and Shultz, 2020).² In Australia, women's employment in the mining industry stands at 17% while it is only 6% in India (down from about 44% at the beginning of 1900) and 13% in the US (Measham and Zhang, 2019; Kansake et al., 2021). The low percentages are also mirrored in the top 100 mining companies' boards, with only 8% of board members being women (Kansake et al., 2021). When women work in the industry, they earn up to 40% less than men (Perks and Shultz, 2020). Perks and Shultz (2020) point to the benefits of equal employment for women: long-term per capita growth, productivity gains, improvement in women's status, larger household savings, better nutrition and health, and a decrease in household poverty. The primary reasons for mining employment practices favouring men, social norms and discriminatory practices, education and training, and gender-based violence and sexual harassment (Perks and Shultz, 2020). Other reasons include difficult working conditions, security problems, infrastructure concerns, the physical requirements of mine work, the remote locations of mining sites and workplace violence against women (Kansake et al., 2021). However, women's participation in artisanal mining has been high and there is a growing body of literature on women working in artisanal mining. The work in Africa points to how the government's formalisation (Hilson et al., 2018) and environmental policies could affect women (Zolnikov, 2020). and how complying with international treaties on the use of mercury have implications for women in artisanal mining (Hilson et al., 2020). Although women's participation in artisanal mining remains high, several policy directions might have severe consequences for their continued participation.

The patterns described above have historical roots. Lahiri-Dutt (2020, p. 389) explains how the Mines and Collieries Act of 1842 in the UK "wiped out the long and impressive history of women's labour in the mining industry, and pushed women into more insecure areas of work". The Act was intended to improve working conditions for women and children in the mines, but it provided the basis for unequal employment practices for over 150 years. In the 1920s and 1930s, the ILO (International Labour Organization) used the provisions in the Act to promote legislation across the world to protect women and children from poor working conditions in mines. Because women do not benefit from mining equally, their already vulnerable position in mining societies might be reinforced by mine closure.

Although we should take care not to portray women only as victims in mining (Lahiri-Dutt, 2012), Jenkins (2014, p. 333) argues that "women are disproportionately affected by many of the negative impacts of mining". Common characteristics of mining societies include patriarchy, alcohol abuse, violence against women, sex work and social networks in which men play a dominant role (Gibson, 1992; Jenkins, 2014). In contrast, women have smaller social networks and tend to have fewer friends (Sharma, 2009). Many mining settlements are in remote locations and when families relocate because of men finding work, the female partners find it difficult to develop new social networks. Consequently, women in mining communities tend to define themselves in terms of their home and family (Hall, 2004). In contrast, men find it easy to build new networks as they occur naturally through their work environment and contact with other men. Women in mining communities must deal with their male partners' work stress, caused by working in dangerous situations (Petkova et al., 2009), and they may experience higher levels of gender-based violence (Byford, 2002). Mining communities also experience higher levels of domestic violence (Hinton et al., 2006). Women in mining areas have poorer mental health outcomes than men (Lovell and Critchley, 2010; Macdonald and Rowland, 2002). The increased use of shift work in the mining industry also affects women's ability to take an active part in the economy as they have to take responsibility for children (Sharma, 2009, 2010), and environmental health concerns affect women disproportionately (Bose, 2004; Macdonald and Rowland, 2002). Mining has distinct cultural consequences and often contributes to social stratification along gender lines, with men dominating power relationships. The mining industry emphasises its role in sustainable development, yet independent assessments find that the industry's contribution remains small (but see Endl et al., 2021 as an exception). The mining sector identifies gender equality and empowerment as an industry challenge but does not consider it a cross-cutting problem (Endl et al., 2015). Endl et al. (2021) assessed the European mining industry against the sustainable development goals and found no reporting of impacts associated with Goal Five on achieving gender equality and empower all women and girls.

Finally, research shows that women participate less than men in processes establishing mine-community relationships so as to obtain a social licence to operate (Jijelava and Vamclay, 2014; Bastian et al., 2015; Measham and Zhang, 2019). Women and men value mining differently, and this "translates into different behavioral intentions, differences in trust and perceived procedural fairness" (Measham and Zhang, 2019, p. 363). Overall, men find mining more acceptable than women (Bastian et al., 2015) and participate more actively in mining and activities to ensure a social licence (Jijelava and Vanclay, 2014). One of the reasons for lower female participation is that mining companies view communities as homogeneous, "without taking into consideration the different roles, positions and situation of women and men" (Lahiri-Dutt and Ahmad 2011, p. 118). This lack of participation at the opening of a mine means that when closure threatens, women's views do not receive adequate attention. Consequently, women might benefit less than men from social and other investments by mining companies and this pattern will probably continue after the mine closes.

1.1.2. Mining and the shaping of gender roles in South Africa

The mining industry was responsible for the first extensive migration wave in South Africa. The migration of people from rural areas resulted in black urbanisation. The first wave of urbanisation resulted from diamond mining in Kimberley (1867), followed by gold mining on the Witwatersrand (1886). Influx control, migrant labour (because of both mining and government policies) and rural structures (all associated with mining in one way or another) had severe implications for women and undermined their right to equal treatment in South Africa (Walker, 1990). Compared to men, only a small number of women migrated to mining areas. For example, only one in nine residents in the "European" suburbs of Kimberley (the first large mining town in South Africa) was female in 1877 (Walker, 1990).

Various pieces of urban legislation, such as the Urban Areas Act of 1923, prevented the urbanisation of black women (Walker, 1990). Women who did not have a male relative in a mining town had to live in work-seekers' depots until they could find work. Non-complying women were sent back to rural areas (Hindson, 1987). These measures also prevented women from brewing traditional beer – a measure taken to prevent them from claiming that they were working. Influx control mechanisms remained on the law books until repealed by the apartheid government in 1985.

In addition to influx control mechanisms, the colonial and apartheid

² This percentage does not take into account high levels of female employment in artisanal mining.

governments used rural structures to prevent the urbanisation of women. Traditional authorities and missionaries emphasised family and aimed to maintain a rural stability in which the domestic and household roles of women were prominent (Parpart, 1988). The missionaries believed urbanisation encouraged "loose morals". However, Mathis (2011) claims that in practice urbanisation would mean that the missionaries would lose women who worked on their farmland. Walker (1990) argues that women labourers in rural areas helped the mining companies to keep wages in the industry low. Because their labour provided food for the rural households, they did not become too dependent on wages from the miners in the towns.

The restriction on women's urbanisation prevented them from working in the mining industry or benefiting from the economic advantages of urbanisation. The UK-based legislation of 1842 and the ILO's protecting women from poor working conditions contributed to the systematic exclusion of women from the formal mining industry. The effect was felt in South Africa too. South African legislation prevented women from working underground up to 1996 (Kaggwa, 2020). Although there are now equal political rights and economic access for all women, the historical legacy remains. Despite an increase in the number of women working in South African mines (about 10% of the workforce), concerns remain about sexual harassment of female mineworkers (Botha, 2016).

2. Mine closure

Economic transitions are not new to the world and mine closure is one example of an economic transition (Digby, 2012). However, many mining companies view closure from the environmental and financial angles. It is more difficult to define the social and economic objectives than the tangible environmental and financial aspects. This section reviews the most recent literature on mine closure and asks what implications closure has for women in mining areas.

Vivoda et al. (2019) list 13 social aspects related to 30 elements of mine closure (see Table 1), and the ICMM (2008) proposes essential social questions for developing a closure plan (see Table 2).

A comparison of the two tables shows some overlap. Both documents refer to issues of women and gender. Yet there is little integration of gender issues across the themes. Another concern is that the ICMM's toolkit mainly takes a positive spin on closure. For example, it refers continually to the possible benefits of mine closure. It uses simplistic expressions like: maximise the benefits of closure, collating the goals and views of various stakeholders, acting to meet the goals, or mitigating risks (ICMM, 2008). Although such an approach does have merit, it can easily disguise the problems associated with mine closure. The ICMM toolkit emphasises the importance of mines asking its list of questions on closure, but it does not say who they should address the questions to. We have already cited research that says women's voices are limited at the start of the mining process. There is a likelihood that this will also be the case during closure planning.

Owen and Kemp (2018) emphasise that appropriate mine closure requires what they call a back-end approach as opposed to the current Table 1

Social	aspects	of	mine	closure
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Social aspect	Indicators
Economic	Local economic activity (diversity and dependence) Household income
Business	Local living standards Local business development opportunities in the mining sector
Employment	Local employment opportunities in other sectors Local employment opportunities in other sectors Local employment opportunities in other sectors
Security, education and training infrastructure	Social order and safety (e.g. tensions, crime and violence) Local skills development in mining and other sectors
	Access to quality education and training Local transport (e.g. public buses, roads and airports)
Amerikian	Critical infrastructure (food supply, power supply, water supply, telecommunications)
Amenities	heritage sites, parks and recreation areas, communal areas)
Livelihoods	Local culture, arts and sports (including facilities) Local livelihoods (e.g. access to land, food, water and shelter that affect livelihoods)
Land	Local land access, ownership and use
Housing and health	Recognition of traditional, customary ownership Local housing quality, availability and affordability Community health and well-being
Environment	Environmental aspects that affect social conditions (e.g. quality of air, water, land, ecosystem)
Demography	Local population dynamics (e.g. growth/decline,
Participation	Stakeholder participation in closure planning, and closure and post-closure processes (including designed making)
Inclusion	decision-making) Inclusive stakeholder engagement, including vulnerable and otherwise marginalised groups (e.g.
	indigenous peoples, women, ethnic minorities, disabled, elderly, young) in closure planning, and closure and post-closure processes (including
Social (general)	decision-making) General socio-economic considerations
Social (general)	Social considerations in financial assurance mechanisms

Source: Vivoda et al. (2019), p. 8.

front-end approach.³ The "front-end approach" refers to the effort made by mining companies at the beginning of the mining process to deal with the social aspects of mining. This usually entails large investments to make sure communities "buy into" the mining processes (often referred to as a social licence to operate). A back-end approach requires thinking about closure much earlier. It requires three responses: the pro-active planning of an appropriate financial response at the end of the mining life, the inclusion of social aspects of closure in the life cycle planning of a mining operation, and responding to the social aspects of closure after

 $^{^3}$ The literature uses the term "front-end approach" to refer to the fact that the mining industry requires huge investment when it starts. All projects are planned in such a way that investments dwindle as the project continues (breakeven in mining projects could come only in 10–12 years – although with opencast mines this period is getting shorter). This is different from other business investments that often require reinvestment to adjust to changing demand and break even at 5–7 years. The problem is that as mining projects come to an end, mining companies try to avoid new investments – in fact they seldom plan for these. The same is true of social and economic programmes. To get the social licence to operate, mining companies make huge promises and invest in community projects. They seldom think about these social aspects at closure. And when closure comes there is no money for the social consequences. This is reinforced by government policy in South Africa.

Table 2

Primary questions to be asked about the social impact of mine closure.

Category	Question
Poverty	What social or socio-economic values and gains can be
	achieved in poverty reduction?
Hunger	What social or socio-economic values and gains can be
	achieved in hunger reduction?
Education	What social or socio-economic values and gains can be
	achieved in education reduction?
Gender equality	What social or socio-economic values and gains can be
	achieved in gender equality?
Child mortality	What social or socio-economic values and gains can be
	achieved in child mortality?
Maternal health	What social or socio-economic values and gains can be
	achieved in maternal health?
HIV/AIDS, malaria and	What social or socio-economic values and gains can be
other diseases	achieved in HIV/AIDS, malaria and other diseases?
Health care	What social or socio-economic values and gains can be
	achieved in health care?
Water supply	What social or socio-economic values and gains can be
	achieved in water supply?
Employment	What social or socio-economic values and gains can be
	achieved in maternal health?
Youth employment	What social or socio-economic values and gains can be
	achieved in youth employment?
Employability	What social or socio-economic values and gains can be
	achieved in employability?
Technology	What social or socio-economic values and gains can be
	achieved in technology?
Recreation	What social or socio-economic values and gains can be
	achieved in recreation?
Infrastructure	What social or socio-economic values and gains can be
	achieved in infrastructure?
Indigenous	What social or socio-economic values and gains or
	losses are inherent in indigenous affairs?
Culture	What social or socio-economic values and gains or
	losses are inherent in cultural affairs in the
	community?
Enterprise	What social or socio-economic values and gains can be
	achieved through the generation of enterprise?

Source: ICMM, 2008.

the formal closure. Mining companies should consider the social aspects of closure beyond the life cycle. In the predominantly masculine mining societies, mine closure might have specific gender implications and appropriate closure planning requires thinking about these at the beginning and at closure, including the consequences after the formal closure. The challenge is to avoid creating long-term dependencies by emphasising the social aspects of mining at the beginning of the mining cycle. Such dependencies will be hard to break when the mine closes.

Closure is often a slow process of downscaling and care and maintenance rather than immediate complete closure - although there are exceptions (Vivoda et al., 2019). This slow process might involve the original firm, but it could also involve smaller firms to whom the original firm has sold mining assets. The smaller firms then operate these assets at higher efficiency but usually with fewer employees and fewer capital investments. The ICMM (2008, p. 48) summarises the main consequence of this in the following words: "The burden of closure, therefore, moves from owner to owner, and the challenges and costs of closure become a negotiating point in merger/acquisition deals." Changing mine ownership can create problems for mining communities as the mining representatives they engage with might change frequently, closure priorities might shift budgets and closure plans might change. Research has questioned these smaller firms' financial ability to manage closure and we think that the social aspects of closure will be the first to lose traction in these cases. Placing mines in care and maintenance is another way of avoiding closure. Care and maintenance can mean that mining companies do not devote much attention to closure as technically the mine remains open. Although decline and closure is usually a slow process, closure can also occur unexpectedly. In such cases, the challenge is to adjust existing plans rapidly (ICMM, 2008).

The international literature on mine closure suggests several lessons for managing mine closure. Firstly, there is a consensus that closure planning should start when the mine opens and these plans could be adapted across its life cycle (Andrews-Speed et al., 2005; ICMM, 2008; World Bank, 2018). Applying this principle in practice is difficult. Many mines first require a social licence to operate and getting community buy-in at the beginning will overshadow notions of mine closure. It is not easy to talk about mine closure when the primary purpose is to get local buy-in for a mining project.

A second lesson from the literature is that mine closure requires an inclusive process and dialogue (World Bank, 2002; ICMM, 2008; World Bank, 2018). Such a process must get mines, governments and NGOs around the table for a process that could last 20 years or longer. We have already alluded to the gender implications of this for closure. There is the risk that women's concerns about closure might not be considered because participatory processes under-value the role of women. The ICMM (2008) argues that it is possible for various groups to find common ground concerning mine closure. It states that: "The closure planning group should have detailed input to the decommissioning and post-closure planning processes to ensure that the focus on environmental and social issues is maintained during and after the transition process of decommissioning" (ICMM, 2008, p. 26) We think this might be a somewhat optimistic viewpoint and that the conflict that goes with mine closure can easily be ignored. Where participation processes for mine closure only start once mines shed jobs, men's outmigration might make it hard for women to participate (Jijevala and Vanclay, 2014; Sesele et al., 2020).

Thirdly, determining the cost of mine closure is essential. Although the ICMM toolkit mainly focuses on the direct costs of closure, it pays little attention to the long-term social and economic costs. Closure requires a substantial amount of money from both the mines and government to mitigate social damage. The evidence from coal mine closure in Europe points to the importance of mines and governments cofunding the social consequences of closure (World Bank, 2018). Often mining creates long-term interdependencies that closure disrupts. The cost of closure seldom considers the cost of breaking these interdependencies. Sudden closures further complicate the determination of cost. Sudden closure requires a quick update of the closure plan, which means it is unlikely to consider the detailed social costs.

Fourthly, mine closure is also more difficult in places with narrow economic bases and limited local government capacity (Strongmen, 1992). The World Bank (2018) argues that mine closure has adverse impacts on mono-industry coal towns and that losing a dominant economic sector creates economic vulnerabilities. Consequently, one of the critical objectives of mine closure should be to mitigate the damaging effects of mine closure on local people and communities. A narrow economic base also means that women find it difficult to find jobs when their partners might lose theirs in mining.

Finally, the World Bank (2018) acknowledges that women might be affected more adversely than men by mine closure. The burden on women might result not only from direct job losses but also from increased domestic responsibilities (World Bank, 2018; Sesele et al., 2020). Early engagement with women should be central to dealing with the problems of mine closure. A decline in funding for social infrastructure could have a more adverse effect on women than on men. The World Bank also thinks that domestic violence and alcohol and substance abuse might increase.

3. Mining, women and closure in South Africa

We start by providing an overview of mine closure followed by an assessment of the relevant mining policy and legislative frameworks in South Africa: the White Paper "A Minerals and Mining Policy for South Africa" (DME, 1998), the Mineral and Petroleum Resources Development Act (MPRDA) (2002), and the Social and Labour Plan (SLP) Guidelines. We do not discuss the extensive environmental legislation

but focus on the social aspects. We also do not discuss the Mining Charter (RSA, 2018) as it does not refer to mine downscaling or closure. Any references it makes to women and gender are on the topic of increasing female ownership of mining. We end the section with a discussion of the implications of closure for women in South Africa.

3.1. The scale and nature of mine closure in South Africa

South Africa has seen many gold mines close over the past three decades, with employment dropping from 550 000 in 1986 to 110 000 by 2018 (Global Insight, 2019). Gold mining areas like Matjhabeng, Matlosana and the West Rand have been severely affected (Marais, 2013a; Marais et al., 2017). Closures in the South African coal industry will follow in the next decade (Marais et al., 2022). Some gains have been achieved in iron ore, manganese and platinum, but closure threatens these mines as well. Figs. 1 and 2 show the extent of the country's abandoned mines and mines expected to be closed in the next ten years.

In a country with a long history of mining, the large numbers of abandoned mines are not unexpected. According to the Auditor-General (2009), South Africa has approximately 6000 such mines. Mining companies can abandon their mining activities for a long time. In 1991, legislation changed and companies had to close mines according to legislation. But mine closure processes are slow and often take years to finalise (Miralas et al., 2014; Watson and Olalde, 2019). The Minerals Act of 1991 required mining companies to develop a management programme to deal with the environmental consequences, a rehabilitation plan and provisions for environmental liabilities (Swart, 2003). These requirements were further reinforced by the Mineral and Petroleum Resources Development Act (2002) (Watson and Olalde, 2019). This legislation focuses primarily on the environmental aspects and has little to say about the social aspects of mine closure.

3.2. Policy and closure guidelines

3.2.1. The 1998 White Paper

The post-apartheid government was keen to develop an appropriate mining policy for South Africa. Consequently, the Department of Minerals and Energy established a Mineral Steering Committee in 1994, consisting of representatives of the executive and legislative branches of government, organised business and labour. This committee published a Mineral and Mining Policy of South Africa Green Paper in 1995 and consolidated comments on the discussion document in May 1997. Following this initial process, the government released the 1998 White Paper. Four factors were highlighted in the new policy direction: ownership and management in the mining industry (with an emphasis on advancement of black people and women), labour legislation, environmental protection, and workplace health and safety. Far less prominent were women's concerns and the social aspects of mine closure.

The process of developing the White Paper (1995–1998) coincided with declining profits and downscaling in the gold sector. Gold mine production had declined since 1975, when South Africa mined 700 000 kg of gold. In the mid-1980s the industry employed 560 000 workers, but by 2013 this had dropped to 110 000 (Marais and Nel, 2016). Between 1990 and 2012, gold production declined by 72% (Chamber of Mines, 2013). But, as mentioned earlier, there was substantial growth in iron ore, manganese, platinum and coal. The main policy aim was to ensure that the South African mining industry could compete globally.

In analysing the White Paper, we identified five main points about mine downscaling and closure. First, the White Paper acknowledges that, because of the finite nature of mining, and also because of mechanisation and more open-cast mining, mine closure has become a reality and employment in mining will keep declining. The White Paper says the government's response will be to monitor the declining trend in mine employment. It is not clear what the purpose of such monitoring would be or whether a simple focus on monitoring would be sufficient. Second, the White Paper acknowledges that mine downscaling and





Fig. 1. Abandoned mines in South Africa. Source: Crouse at al., 2021.



Fig. 2. Mines under maintenance or approaching closure in the next ten years. Source: Crous et al. (2021).

closure will have regional consequences. It says: "A decline in a longestablished mining centre has enormous knock-on effects for regions and provinces, particularly when volatile economic events dictate the pace of contraction" (DME, 1998, p. 51). It does not provide details of these potential knock-on effects and the lack of an appropriate framework stands in sharp contrast to the framework suggested by Vivoda et al. (2019, see Table 1). However, it does acknowledge that downscaling and closure are a reality and require a response from the government. It says the government will "ameliorate the social consequences of sizeable downscaling and mine closure" (DME, 1998, p. 48). It channels this responsibility to municipalities to solve through their strategic plans (called integrated development plans or IDPs) and local economic development (LED) plans. It also assumes that the various spheres of government will have funds available to address the consequences of mine closure. Research on mine closure in the Free State Goldfields shows that such an assumption may be a mistake (see for example Marais, 2013a).

Third, the White Paper acknowledges the potential plight of mineworkers who would lose their jobs. It emphasises the importance of consulting with the workforce before downscaling, helping employees to find alternative employment, retraining them and providing counselling services. These steps are essential and mining companies would become responsible for carrying them out. The White Paper does not say how local planning should react to mine closure.

Fourth, the White Paper sees downscaling and closure as an opportunity for smaller mining companies. This could broaden the participation of people who have historically been excluded from the mining industry. And in practice this has happened (Marais et al., 2005; Marais, 2013a). However, as our review of the mine closure literature points out, smaller firms do not always have the financial means to manage closure properly and this could negatively affect the social planning process associated with the closure.

And fifth, the White Paper says that in response to mine downscaling and closure the government will encourage mines to establish social plan funds (DME, 1998). The MPRDA that followed the White Paper built on this idea of a social fund to address the social consequences of mining by instituting SLPs. However, in practice this fund has seldom considered issues of closure.

In talking about mine downscaling and closure, the White Paper mostly refers to the environmental and financial aspects. It refers to women only once (not in relation to closure) and does not refer to gender. However, there has been a parallel government process to increase the employment of women in the mining industry but progress has been slow. To sum up, although the White Paper does acknowledge the social consequences of mine downscaling and closure, it says nothing about the social consequences for women specifically.

3.2.2. The Mineral and Petroleum Resources Development Act

The MPRDA was promulgated in 2002. It aimed to facilitate change to the ownership structure of the mining industry and provide for mining licences to enable mining companies to mine resources belonging to the state (previously the resources belonged to the mining companies). Like the White Paper, the MPRDA emphasises environmental rehabilitation at closure and under-represents the social aspects of closure. It requires mining companies to develop a closure plan and a social and labour plan (SLP). Its objectives, set out in Section 2(e), are to:

- Promote economic growth and mineral and petroleum resources development in the Republic;
- Promote employment and advance the social and economic welfare of all South Africans;
- Ensure that holders of mining or production rights contribute towards the socioeconomic development of the areas in which they are operating as well as the areas from which the majority of the workforce is sourced;
- Utilise and expand the existing skills base for the empowerment of historically disadvantaged South Africans and serve the community.

The likelihood of closure is one of the primary reasons for requiring mining companies to develop SLPs. An SLP is a prerequisite for the awarding of a mining licence. Among other things, it introduces closure planning into the mine's life cycle planning and is mostly concerned with the environmental aspects of closure. Yet, as the international literature shows (Owen and Kemp, 2018), many social consequences might occur long after closure, which means that life cycle planning might not always be useful. The MPRDA emphasises expanding women's ownership in the industry and getting the mines to reflect the gender and racial composition of the country on their boards. Legislation like the MPRDA only reflects the main issues. The policy guidelines for developing SLPs provide more detail.

3.2.3. Social and labour plans

In addition to the legal requirements for SLPs, the government has produced guidelines for developing them. The SLP must have five main sections: 1. human resource development programmes, 2. a minecommunity development plan, 3. a housing and living conditions plan, 4. an employment equity plan, and 5. a plan to save jobs and manage downscaling and closure.

Section 1 must contain reference to human resources, employment equity and the closure process related to human resources. Section 2 requires consultation with communities and an action plan for local community development. Section 3 must focus on the historical problems of mine housing, ownership and the phasing-out of the compound system. Section 4 must mainly address the historical exclusion of black people from management positions. The guidelines do not refer to women's exclusion. Section 5 must collate the various elements of closure under one heading. Most of the sections require attention to the mine's location, but they must also focus on labour-sending areas. The inclusion of labour-sending areas provides ample opportunity for including women's concerns, but the SLP guidelines do not create such a link.

Overall, the focus is on preventing retrenchments, saving jobs and regenerating local economies. The guidelines mainly emphasise the workers, but they make some reference to government and communities. The focus on workers is evident in the establishment of a future forum (a forum for the mines to meet regularly with representatives of the unions to discuss the future of the operations). However, such a future forum only needs to consist of representatives from the mining company and workers. Finally, an SLP must provide a plan (Section 5) to deal with the potential adverse social and economic consequences of mine closure for the regional economy. But only minimal guidelines are provided for doing this and the consequences are not defined. The lack of definition means that there is little clarity on what the government thinks the social effects of closure will be.

We identified another problem: an SLP is valid until the mining company obtains a closure certificate. This requirement thus compels the company to be involved until closure, deal with the consequences as they occur, and apply the SLP during care and maintenance. Despite good intentions, this practice might create problems. For example, how would the authorities be able to enforce the SLP during care and maintenance? Revoking the mining licence during care and maintenance would merely result in the national department becoming responsible for the closure's financial requirements.

Once again, there is minimal reference in the SLP guidelines to issues of gender or women's concerns. Admittedly, the regional profiles required by the SLP guidelines have to disaggregate data for gender, but there is little consideration of gender in the rest of the guidelines.

3.3. Reflections on mine closure as it affects women

The post-apartheid government does not consider the social consequences of closure and how they could affect women. The policy could benefit from a more nuanced understanding of these aspects.

3.3.1. The vulnerable position of women

Two factors make women vulnerable at mine closure: their limited employment in the industry and their low participation rates in minecommunity interactions. As men dominate mine employment (constituting 90% of the workforce), it can be expected that any focus on redeployment and government support will be directed to men. Women's lower participation in mine-community relationships is likely to disadvantage them during the mine closure process. The risk is that SLPs might not reflect the needs and aspirations of women. The danger remains that closure will simply reinforce some of the existing inequalities.

3.3.2. Closure concerns

We have four concerns about how closure is attended to in the current policies. The first is that since concerns about workers' rights dominate the policies and guidelines this inevitably means a focus on men (Sesele et al., 2021) Consequently, the broader local and regional issues associated with mine closure do not receive enough attention. Finding alternatives to undiversified economies is not easy, but should be central to mine closure processes. Therefore, it is essential to understand worker rights within the broader regional and social context of finding an alternative to mining.

Secondly, we are concerned about the effect of the social licence on women. The international literature has pointed to the heavy emphasis on mining companies acquiring a social licence at the start of the mining process (Owen and Kemp, 2018). The SLPs represent such an approach and the SLP guidelines refer to the SLP as a social licence to operate. Even more problematic is that this front-end approach could contribute to liabilities and dependencies between mining companies and communities at the time of closure (such as women depending on men who have been made redundant) (Marais, 2018). The overemphasis on homeownership could lock households into mining locations after closure (Ntema et al., 2017). And these lock-ins could be more damaging for women. There is an urgent need to think about the long-term consequences of decisions and programmes during the lifetime of mining operations. For example, the SLPs make provision for the development of a community development plan to deal with the social implications of mining. Yet such a plan does not require the mining company to think beyond the life of the mine and deal with the social consequences of closure. In practice, such plans can reinforce the front-end approach of mining or even create long-term liabilities and dependencies for communities beyond the mine's life cycle. The guidelines for creating a community development plan also do not refer to closure or require such a plan to avoid long-term liabilities for communities. There is a likelihood of low levels of women's participation in these processes, which will further hamper the recognition of women's concerns when it comes to closure.

Thirdly, we are concerned that the legislation requires SLPs to remain in place until a final closure certificate is received. This is an example of linking social aspects of closure to mine life cycle planning, but many of the long-term social consequences will materialise once the mine has closed.

Our fourth concern is that policy shifts the responsibility for dealing with the social aspects of closure to local government. The international evidence points to the vital role of the national government in mine closure. Marais (2013b) has argued that South Africa requires a national policy response to the social aspects of mine closure, and Van Asche et al. (2018) argue, for the case of Canada, that the government should not leave the responsibility for mine closure entirely to local authorities and affected communities. Local governments in South Africa do not have the capacity to deal with the social consequences of closure.

3.3.3. Women's concerns

The White Paper, the MPRDA and the guidelines for the development of SLPs ignore gender issues and pay little attention to women's concerns. They contain virtually no reflection on the social consequences of mine closure for women. We identified three reasons for this neglect.

First, the initial policy development processes for the White Paper ignored concerns expressed by NGOs with gender interests (Sesele, 2020). The post-apartheid government wrote the White Paper in the expectation of continued mining growth, positioning the South African industry within the global context. The White Paper states specifically that "the cornerstone of any policy to promote investment must be market principles and economic efficiency" (DME, 1998, p. 5, p. 5). This focus on global competitiveness did not leave much room to think about the social aspects of closure and how they affect women. Secondly, the policy did not consider the gender implications of mining and was therefore unlikely to consider the gender implications of mine closure. There is a need for a conceptual understanding of how mining affects women. Thirdly, the reference to mine ownership (to a lesser degree) and mine employment shows awareness of the structural imbalances caused by apartheid, even though the redress thereof is relegated to market forces (women ownership not considered). Dealing with the deep-rooted gender dynamics of mining communities has not been a direct concern of mining policy.

3.3.4. Possible ways of linking gender and closure

Is it possible to link closure and gender appropriately? We argue that women bear a double burden: low employment in mining but high risk of suffering from the social implications of mine closure. Both these factors will continue to have adverse effects after mine closure. We think the industry and policymakers should consider the following.

First, policy and policy guidelines could both expand their current thinking about the social aspects of mine closure and the potential effect on women. Therefore, as a first step, the policy should acknowledge that the industry affects women adversely and that mine closure might well reinforce such thinking. Achieving equal rights and equal opportunities is not sufficient to address the concerns of women in the industry or when a mine closes. A second step would be to analyse the gender implications of the wide range of closure concerns shown in Tables 1 and 2

Secondly, women's unequal access to mine work remains a concern even in a period of mine closure. It means that, in most cases, women cannot prepare in the same way as men for potential closure problems. Their smaller social networks also make it more difficult for them to respond to closure. Because the mines consider their employees first, they offer closure benefits and new economic opportunities to existing employees, mostly male. Men are also more mobile (partly because of better social networks) and can market their skills and experience in other mining towns when closure looms. The problem is that the inequality in employment access is likely to continue beyond mine closure. Mechanisation is one way of increasing female employment in mining. But mechanisation might also speed up periods of boom and bust. At least with an increase in female employment (through mechanisation or other means), the consequences could be shared more evenly between women and men.

Thirdly, policymakers must understand that although mine closure does not directly affect women (for example they do not lose their jobs in the mining industry), the adverse social and economic consequences of mine closure affect the whole of society. Women's role in the economy is seldom monetised and the international literature states that women in mining communities define themselves in terms of home and family. Consequently, mine closure might place more pressure on women's social and economic roles in society. Mine closure is likely to affect women's household obligations and duties and their relationships with men as well as diminish their income from their economic activities (Sesele et al., 2020). The international literature also points to the potential danger of gender-based violence in mining societies, which mine closure could exaggerate (Byford, 2002). The SLP guidelines could go much further to acknowledge these consequences and find ways of addressing them. For example, counselling services to deal with the psychological aspects of mine closure could be made available to families and not only the mineworkers (who are mainly men).

Fourthly, policymakers could initiate a process to frame the complex nature and gender implications of mine closure that are shown in Tables 1 and 2 A good starting point would be to conceptualise such thinking on the basis of the frameworks in those tables. For example, if mine closure results in the non-availability of social infrastructure (for example health care), how will this affect women? How will the outmigration of mineworkers affect women? The research already shows that women's social networks in mining communities are smaller than those of men (Sharma, 2010). If women remain behind in a mining town after closure, they will bear the brunt and not be able to use local social networks effectively to buffer the shock of lost jobs and split families.

Fifthly, local planners could use the current concerns about women in mining societies as a starting point to think about the possible consequences of closure. There have been attempts to sensitise local government to the need to include gender issues in their integrated development plans (IDPs), and the guidelines for the development of the mines' SLPs could benefit from such a reminder too. As we noted above, the only reference to gender in that document is the requirement that it should be aggregated for men and women. Although such aggregation is a good starting point, it does not integrate broader social concerns of women in mining societies.

Finally, the international literature emphasises problems of power differences between men and women during participatory processes. The closure plans required by the SLPs need a much broader representation of stakeholders than is currently the case. The consultation process that is required in the SLPs should ensure women's participation and it could become a policy requirement.

4. Conclusion

The mining industry finds it difficult to deal with mine closure and especially as it affects women. In this paper, we have asked how mining policy, legislation and guidelines link women and mine closure. We find that issues of closure and women have not received adequate attention and that policy does not consider the effect of mine closure on women. South Africa is no exception in this respect. In the documents we examined we found minimal reflection on the social aspects of closure, so inevitably almost no consideration was given to women's concerns. The paper highlights the problem of gender-neutral approaches to the problem of mine closure. Effectively, mine closure policy should become far more gender-sensitive.

The mining industry tends to take what is sometimes called a frontend approach and only attends to closure problems towards the end of a mine's life cycle. Furthermore, mining companies often place their operations under care and maintenance (rather than total closure) and the usually slow process associated with closure makes planning for closure difficult. Although the industry has gone a long way towards including closure concerns in life cycle planning, many social consequences of mine closure will require a response beyond formal closure. The gender implications of closure have received little attention globally and the evidence from this paper shows that policy does not mainstream the implications of mine closure for women in South Africa. Although there are politico-economic reasons for this reality, we think that a range of other factors also play a role. The primary focus on linking social aspects with the mining licence means that these aspects receive attention mostly when mining starts. At the same time, there is limited understanding of the broader social effects of mine closure, as Table 1 shows. There is room for the SLP guidelines to expand their conceptual understanding of closure. Mine closure could exacerbate many of the current concerns about women in mining societies. But because these concerns do not receive much attention, there is no conceptualising by government or the mining industry of these concerns after closure. Finally, the participatory process should also ensure that all relevant voices are heard.

Considering the absence of an appropriate policy link between closure and women, we think several considerations would initiate a process to think through the consequences. There is still much room in the industry to ensure equal employment. Although this will not help to prevent the consequences of closure, it will give women and men equal opportunities to deal with those consequences. Furthermore, if the research points to the effects of mining societies on women, there is an argument for thinking about the implications for women of not being directly involved in mine employment. There is also much room to provide a gender framework for the social consequences of mine closure.

Declaration of competing interest

We had not conflict of interest in completing this research.

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