Women in mining: A conceptual framework for gender issues in the South African mining sector

by Doret Botha[*] and Freek Cronjé[**]

Abstract

New mining legislation aims to rectify previous inequalities and disadvantages in the mining sector and specifically provides for the inclusion of women in core mining activities. Although there is no lack of good will, the achievement of gender equality in the male-dominated mining sector remains one of the biggest equity challenges in the country and numerous problems accompany the deployment of women in core mining activities.

The main objective of the study was to critically analyse gender issues in the mining sector and then to develop a conceptual framework that will enable the mining sector to contribute to and ensure the sustainable employment of women in this sector. A literature review was carried out to gain an in-depth understanding of the variables that have an impact on women in the mining sector specifically. An empirical study was conducted to identify and investigate relevant gender-related issues in the mining sector. Quantitative and qualitative research paradigms were used.

The research revealed that various factors need to be considered for the successful and sustainable deployment of women in the mining sector. The study concludes by making recommendations and offering a conceptual framework that could be implemented and used by various stakeholders in the mining sector

Key words *conceptual framework, core mining activities, gender equality, gender issues, mining industry, women in mining*

1 Introduction

There has been a global increase in women's participation in the labour force over the past 30 years, mainly due to expanding economic opportunities and equal employment opportunity legislation, which have drawn many female workers into the market. According to the World Development Report: Gender Equality and Development (World Bank 2012), women now represent 40% of the global labour force, 43% of the world's agricultural labour force and more than half of the world's university students. Despite women's growing involvement in the labour force, Eftimie, Heller and Strongman (2009) postulate that it is extremely rare to find any extractive industry companies anywhere in the world with over 10% female employees, with many companies having less than 5%. This view is supported by a recent study (2013) conducted by Women in Mining (United Kingdom) in collaboration with PricewaterhouseCoopers, in which it was found that

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globally the level of female participation in the industry at all levels is astonishingly low (Moolman 2013).

In South Africa, after 1994 the newly elected democratic government initiated substantial socio-political and economic transformation. Post-1994 not only drastic political changes but also significant transformative socio-economic changes were introduced. Nearly every sector in the country was transformed and reshaped, including the mining sector. The vision of the new regime, the African National Congress, was to "transfer power to the people and transform society into a non-racial, non-sexist, united, democratic one, and change the manner in which wealth is shared, in order to benefit all the people" (ANC 2007). Accordingly, a number of laws were passed by the South African government in order to support its constitutional commitment to transform the country. The newly elected democratic government also introduced major gender-sensitive policies and practices to reshape the socio-economic framework of the country and to normalise society and the workplace and, in so doing, promote a sense of equity and justice in the country.

Transformation in the South African mining industry is governed by the provisions of the Mineral and Petroleum Resources Development Act 28 of 2002, which was promulgated and implemented on 1 May 2004, and the Broad-based Socio-Economic Empowerment Charter (hereinafter referred to as the Mining Charter), which was signed in October 2002 and formally published on 13 August 2004. The Act and the Charter are aimed at improving equity, opportunities and benefits for historically disadvantaged South Africans (HDSAs). According to the Act and the Charter, the mining industry was supposed to reach a quota of 10% women in core mining activities by 2009. "Women employed in core mining activities" implies that women should hold positions equivalent to those of men, in other words, fill positions in mining that include, among other activities, mining, metallurgy, engineering and geology (Harmony Gold Mining Company 2008). They are also required to do the manual labour associated with mining (Burtenshaw 2005). The amendment of the Mining Charter for the South African Mining and Minerals Industry (implemented in 2010) imposed further requirements in terms of employment equity targets. Apart from the requirement of a 40% HDSA representation in core and critical skills by 2015, a further requirement is a 40% representation in management at the junior management level by 2011, the middle management level by 2013 and the senior/executive management level by 2015 (Cliffe Dekker Hofmeyr & Reid 2010).

Despite all the legislative measures and well-intended initiatives, the number of women in mining in South Africa is still relatively low and they are mainly employed in administrative and supportive positions in the industry. Furthermore, the nature of work in mines, specifically underground, is hazardous and extensive training is required (Wynn 2001). Women also face a range of obstacles in the mining sector, such as insufficient professional and career development, including poor mentoring systems and career paths; inadequate infrastructure facilities; health and safety issues; physical ability challenges; resistance by male workers; sexual harassment; shift work; and issues related to pregnancy and working hours (Badenhorst 2009; Fourie 2009; MTS 2011; Women in Mining Canada 2010). Although there is no lack of good intentions, the gender issue in the mining sector is fraught with difficulties. In general, the problem under investigation can be approached from the following three directions: Firstly, establishing gender equality in the male-dominant mining sector is currently one of the biggest equity challenges in the country. Secondly, there are numerous problems associated with the deployment of women in core mining activities. Finally, mining companies run the risk of losing their mining licences to operate if they do not adhere to

the requirements of the Act and the Mining Charter.

The purpose of the article is firstly to identify gender-related issues in the South African mining sector and secondly to propose a conceptual framework (regarding gender issues) for the mining industry that can be implemented and used in order to ensure sustainability and equity in the sector.

2 Research methodology

2.1 *Research approach*

The meta-theoretical basis for the methodology for this study lies in both positivism and phenomenology. A mix-method research design, derived from these two meta-theoretical angles, was followed by applying both a quantitative and a qualitative research approach.

2.2 *Empirical context*

2.2.1 *Research participants*

The research setting was limited to the following three mines: a copper mine (underground), a platinum mine (underground) and a phosphate mine (open-cast). The mines were selected on an availability basis (convenience sampling).

For the purposes of quantitative research, the study population consisted of an availability sample of management as well as male and female employees working in core mining activities at the three mines. In total, 156 responses were received: 68 from the copper mine, 38 from the platinum mine and 50 from the phosphate mine.

Purposive or judgemental sampling was used to select participants for the qualitative research. In total, 12 individual interviews and 19 group interviews (with 69 participants) were conducted. The researcher aimed to gain information from various operations; therefore, the participants selected ranged across various categories of employment and mining disciplines.

2.2.2 *Measuring instruments*

Quantitative data were collected by means of a structured questionnaire. Qualitative data were collected by means of individual interviews and group interviews. Both the individual interviews and the group interviews were semi-structured, as an interview guide was utilised. Data collected were audio and video recorded and written notes were taken.

In addition, the researcher attended two Women in Mining Conferences. The conferences highlighted and outlined barriers and challenges facing the mining industry in respect of successfully bringing women into the mining sector. Both conferences concluded with an interactive workshop. The researcher took detailed notes during the conferences.

The qualitative approach supported the quantitative approach and aimed to provide more reliable results because the researcher could ask probing questions of the participants to avoid the questions being misunderstood and gain a better insight into the phenomenon of interest. In addition, the researcher was able to gain a deep understanding of the variables that have an impact on women in the mining sector.

2.2.3 *Research process*

The researcher formally requested permission from mine management to conduct research at the three mining companies. After permission had been granted, a formal

appointment was scheduled with mine management to explain the nature and extent of the research. In each research setting (mines), a contact person (human resource officer targeted with women in mining) was allocated to the researcher to provide the necessary assistance and support during the research, which included the following: distributing and collecting the quantitative questionnaires, selecting appropriate participants for the individual and group interviews, and scheduling interviews and organising the underground field trip as well as visits to surface mining operations. Most of the individual and group interviews were scheduled between shifts so that they did not interfere with the work responsibilities of the participants. Ethical considerations, as recommended by Babbie and Mouton (2011), were taken into account while conducting the research.

2.2.4 *Data analysis*

Quantitative data obtained through the questionnaires were analysed with the support and assistance of the Statistics Consultation Service of North-West University. The statistical software program SPSS 21.0 for Windows was used to analyse the data. Qualitative data obtained through the individual and group interviews and observations were analysed by means of conceptual (thematic) analysis.

2.2.5 *Reporting*

Descriptive statistics and frequencies were presented first, differentially in terms of the three mines included in the study. Descriptive statistics were reported per statement as means. The means can be interpreted as follows:

- Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.
- Ratings of above 2 indicate that the majority of the research participants agreed to strongly agreed with the indicator statement. (The maximum in terms of responses for every statement would be 4.)

Secondly, a factor analysis was conducted to explore the factorial structure of the section; these findings are also reported and discussed. Thirdly, effect sizes were measured. Because an availability sample was used, p-values were not relevant and differences between means were examined for practical significance with effect sizes. Lastly, the findings of the qualitative inquiry were reported.

2.2.6 *Limitations*

A limitation to the study lies in the accessibility of the mining sector as a research setting. Past research has shown that it is sometimes extremely difficult to interview employees and representatives of mining companies and to get their members to fill in questionnaires. It was not an easy task to gain access to the mining companies. Several visits and much correspondence took place before permission was granted for the research. In addition, the platinum mine experienced many difficulties and labour unrest occurred while the research was being conducted. Several interviews with management therefore had to be postponed and eventually cancelled. Despite numerous attempts on the part of the researcher, no quantitative responses (questionnaires) were received from the management target group at the platinum mine. Furthermore, not all participants targeted for the semi-structured interviews and group interviews turned up for the meetings. Some of the participants could not stay for the duration of the interviews because of work responsibilities and emergencies. Others were drained and tired after shift work and wanted to leave for home as soon as possible to get some rest and take care of their family responsibilities before the start of

their next shift. The researcher made use of existing skills, knowledge and networks to overcome some of these problems.

3 Gender issues in the mining sector: Empirical findings

The findings of the research are presented differentially in terms of the various sections: Policies, Workplace opportunities, Infrastructure facilities, Physical ability, Health and safety in the workplace and Workplace relations.

3.1 *Policies*

The section on company policies was included in the survey to determine whether the participants are fully aware of the policies provided by the mining companies, to establish whether women working in core mining activities have sufficient knowledge of the content and operational procedures of the policies, to verify whether the policies are adequate and to identify gaps in the policies provided.

3.1.1 *Sufficient knowledge of company policies*

The descriptive statistics positively indicated that the various policies are in place across all three mines, with the exception of the mine closure policy. It is also evident from Table 1 that the majority of the research participants from the various mines indicated that they had sufficient knowledge of the various policies. However, low responses were received from the management target group of the phosphate mine (mean=2.1) and the male target group (mean=2.1) of the platinum mine for the mine closure policy.

Table 1
Participants' perceptions regarding sufficient knowledge of mining companies' policies

Indicator statement		Copper mine			Phosphate mine			Platinum mine	
		Male target group	Female target group	Management	Male target group	Female target group	Management	Male target group	Female target group
1	Employment equity	3.71	2.74	3.69	3.31	3.15	3.50	2.60	2.50
2	Skills development	3.47	2.55	3.75	3.15	2.95	3.33	2.53	2.35
3	Pregnancy	3.76	3.10	3.93	3.38	3.20	3.55	3.20	3.32
4	HIV/Aids	3.71	3.30	3.93	3.50	3.65	3.83	3.33	3.60
5	Sexual harassment	3.71	3.37	3.93	3.50	3.37	3.64	3.15	3.11
6	Remuneration	3.53	2.85	4.00	3.29	3.40	3.67	3.21	2.47
7	Recruitment and retrenchment	3.44	2.70	3.88	3.47	3.30	3.33	3.00	2.61
8	Health and safety	3.59	3.45	4.00	3.56	3.48	3.75	3.33	3.40
9	Mine closure	2.93	2.68	3.60	2.75	2.80	2.10	2.10	2.47

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

Source: Constructed by author (2013)

In the section "Sufficient knowledge of company policies", two factors (Factor 1: *Instrumental policies* and Factor 2: *Expressive policies*) that explain 56.2% of the total variance were extracted by means of Kaiser's criteria (Field 2005). The statements all loaded above 0.4 on the two identified factors. The means for the factors calculated at 2.89 (*Instrumental policies*) and 3.41 (*Expressive policies*) respectively. The factors show good reliability, with a Cronbach's alpha coefficient of above 0.8 (Factor 1=0.84; Factor 2=0.83), which is well above the required 0.7, and shows high reliability and internal consistency.

The quantitative results indicated that there is a perception that women working in the core business of mining have more knowledge of policies related to the *Expressive policies* factor (factor mean=3.41) than those related to the *Instrumental policies* factor (factor mean=2.89). Policies related to the *Expressive policies* factor are pregnancy, HIV/Aids, sexual harassment and health and safety. Policies related to the *Instrumental policies* factor are skills development, employment equity, recruitment and retrenchment, remuneration and mine closure. It can therefore be deduced that mining companies are more successful in communicating the content of policies related to the *Expressive policy* factor to employees than policies related to the *Instrumental policies* factor.

Table 2 indicates that the effect sizes of the three target groups of the copper mine for the *Instrumental policies* factor as well as the *Expressive policies* factor range from medium to large. It can therefore be concluded that on average, the participants of the male and management target groups of the copper mine thought that women have more knowledge of policies related to both the *Instrumental policies* factor and the *Expressive policies* factor than the female target group themselves. A medium effect is evident from the effect size of the women versus management target groups of the phosphate mine for the *Expressive policies* factor.

Table 2
Comparison of the three target groups from the different mines regarding sufficient knowledge of company policies

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs men	Women vs management
Factor 1: Instrumental policies	Phosphate	3.35	0.89	3.08	0.89	3.24	0.39	0.31	0.18
	Copper	3.44	0.51	2.68	0.78	3.79	0.36	**0.98**	**1.43**
	Platinum	2.60	0.70	2.44	0.87			0.17	
Factor 2: Expressive policies	Phosphate	3.48	0.70	3.39	0.58	3.71	0.35	0.13	**0.55**
	Copper	3.69	0.43	3.31	0.81	3.94	0.17	0.47	**0.77**
	Platinum	3.30	0.59	3.35	0.59			0.07	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8

Source: Constructed by author (2013).

The qualitative findings revealed a need for transparency and regular training and workshops on company policies, as noted in the following quotations:

The mine is self-centred when [it comes] to some or the majority of the outspoken policies. Mine does not do enough for the information to reach employees. There is a loophole between management and employees.

Women do not have sufficient knowledge of the content and operational procedures of policies. Policies must be communicated to employees of the mine, on a regular basis. Everybody does not have access to emails.

3.1.2 *Adequacy of company policies*

Although the intention of specific company policies is to coordinate and regulate particular aspects of the employment relationship, there is often a gap between policies and their implementation. Table 3 shows that on average the research participants of the various mines thought that the various policies were effective and adequate. Although the means were above 2 for the employment equity and skills-development policies of the male (platinum mine) and female (copper and platinum mines) research participants, this figure is still regarded as low and indicates that the policies are not effective and adequate and that there is scope for improvement.

Table 3
Participants' perceptions regarding the adequacy of mining companies' policies

Indicator statement		Copper mine			Phosphate mine			Platinum mine	
		Male target group	Female target group	Management	Male target group	Female target group	Management	Male target group	Female target group
1	Employment equity	2.88	2.58	3.13	3.14	3.25	3.58	2.53	2.68
2	Skills development	3.18	2.53	3.44	3.50	2.81	3.75	2.36	2.38
3	Pregnancy	3.65	3.20	3.60	3.40	3.35	3.45	3.29	3.47
4	HIV/Aids	3.65	3.55	3.75	3.65	3.48	3.75	3.62	3.50
5	Sexual harassment	3.59	3.30	3.69	3.56	3.29	3.83	3.46	3.37
6	Remuneration	3.18	2.82	3.44	3.33	3.33	3.75	3.00	2.79
7	Recruitment and retrenchment	3.31	3.00	3.31	3.63	3.48	3.50	3.07	2.84
8	Health and safety	3.65	3.74	3.75	3.44	3.52	3.67	3.57	3.63
9	Mine closure	3.40	2.83	3.50	2.92	3.10	3.25	2.50	2.83

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

Source: Constructed by author (2013)

In the section "Adequacy of company policies*",* two factors (Factor 1: *Instrumental policies* and Factor 2: *Expressive policies*) that explain 62.4% of the total variance were extracted by means of Kaiser's criteria (Field 2005). The statements all loaded above 0.5 on the two identified factors. The means for the factors calculated at 2.92 (*Instrumental policies*) and 3.49 (*Expressive policies*) respectively. The factors show good reliability, with a Cronbach's alpha coefficient of above 0.8 (Factor 1=0.88; Factor 2=0.86), which is well above the required 0.7, and show high reliability and internal consistency. According to the quantitative results, the perception exists that policies related to the *Expressive policies* factor (factor mean=3.49) are more effectively implemented than policies related to the *Instrumental policies* factor (factor mean=2.92).

Table 4 indicates that the effect size of the women versus management target groups at the copper mine are practically significant (the difference between the means has a medium effect) for the *Instrumental policies* factor. It can therefore be deduced that on average the participants from the management target group rate the effectiveness of policies higher than the female target group themselves.

Table 4
Comparison of the three target groups from the different mines regarding the adequacy of company policies

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs men	Women vs management
Factor 1: Instrumental policies	Phosphate	3.38	0.82	3.20	0.86	3.61	0.39	0.22	0.48
	Copper	3.15	0.76	2.71	0.91	3.36	0.53	0.49	**0.71**
	Platinum	2.54	0.77	2.76	0.97			-0.23	
Factor 2: Expressive policies	Phosphate	3.54	0.72	3.41	0.67	3.69	0.44	0.19	0.41
	Copper	3.63	0.57	3.46	0.56	3.70	0.44	0.30	0.44
	Platinum	3.34	0.69	3.63	0.45			-0.41	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8

Source: Constructed by author (2013)

The qualitative findings indicated that there are still gaps between policies and policy implementation and that the slow progress made in terms of achieving targets set by government leaves employees with the impression that policies do not comply with government guidelines. Furthermore, racism and nepotism were identified as persistent problems in the workplace. The following quotations provide an indication of some of the participants' opinions in this regard:

> *According to me I can say I'm now confused, because the policies are there, but they are not put in practice ... things are happening but they are not going according to policies.*
>
> *A lot of things looks good on paper, but the application thereof is quite a different thing.*
>
> *Implementation of policies by management must be fair, consistent, relevant and valuable.*
>
> *… all policies should be based on the best interest of the company to ensure productiveness/profit and sustainability.*

Against the background of the quantitative results and qualitative findings, it can be stated that some mines are faring better than others with regard to policy implementation. Furthermore, employment equity and skills development remain major challenges for mining companies and should be addressed, not only to comply with legislative requirements, but also to ensure an equitable and skilled mining workforce.

3.2 *Workplace opportunities*

Indicator statements on workplace opportunities aimed to verify whether women feel empowered to do their jobs effectively and to determine whether mining companies are

taking women seriously in the workplace and providing opportunities for further development of women in the core business of mining.

It is clear from Table 5 that discrepancies exist in the results obtained from the three mines as well as from the different target groups at the mines. Although the means for almost all the indicator statements calculated above 2, it is evident that the means calculated for the responses of the female research participants across all three mines were much lower than the responses obtained from the male and management target groups. It is clear that in terms of the different statement indicators on *Workplace opportunities*, much still needs to be done by mining companies to enable and empower women to do their jobs effectively. A lack of adequate opportunities and programmes in terms of training, skills and career development is evident.

Table 5
Participants' perceptions regarding workplace opportunities

	Indicator statement	Copper mine			Phosphate mine			Platinum mine	
		Male target group	Female target group	Management	Male target group	Female target group	Management	Male target group	Female target group
1	The mining company makes provision for skills development of women	3.41	2.72	3.38	3.29	2.67	3.58	2.53	2.27
2	The mining company offers training to women on a regular basis	3.29	2.52	3.31	3.12	2.52	3.67	2.33	2.05
3	The mining company provides specialised training to enable women to move into more technical areas of work	3.11	2.33	3.19	3.07	2.45	3.00	2.33	1.90
4	I/we (female employee(s)) feel adequately trained to perform my (our) job(s) effectively	2.94	2.97	3.00	3.13	3.42	3.42	2.38	2.86
5	The training programmes help to increase chances of promotion for women (e.g. of moving from lower-level jobs into better jobs within the mining company)	3.11	2.43	3.19	3.25	2.76	3.33	2.67	2.62
6	The mining company makes provision for career development of women	3.06	2.57	3.25	3.25	2.76	3.42	2.53	2.29
7	The mining company makes provision for women to enter managerial positions	3.24	2.29	3.13	3.13	2.65	3.58	2.20	2.14

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

Source: Constructed by author (2013)

Only one factor that explains 55.35% of the total variance in the section "Workplace opportunities" was extracted by Kaiser's criteria (Field 2005). The statements all loaded

above 0.4 on the identified factor. The factor mean calculated at 2.68, which indicates that a small majority of the participants positively agreed with the factor and its statements. The factor shows good reliability, with a Cronbach's alpha coefficient of 0.89, which is well above the required 0.7, and is indicative of high reliability and internal consistency.

Table 6 indicates that the effect sizes of the three target groups of the copper and phosphate mines for *Workplace opportunities* are practically significant (the difference between the means has a medium and large effect). It can therefore be deduced that on average, the participants of the male and management target groups are more satisfied with the workplace opportunities provided by the mining companies than the female target groups themselves.

Table 6
Comparison of the three target groups from the different mines regarding workplace opportunities

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs Men	Women vs management
Factor 1: Workplace opportunities	Phosphate	3.17	0.49	2.74	0.66	3.43	0.39	**0.66**	**1.06**
	Copper	3.17	0.42	2.59	0.63	3.20	0.85	**0.93**	**0.73**
	Platinum	2.35	0.62	2.30	0.50			0.08	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8

Source: Constructed by author (2013)

The qualitative findings revealed a need for recognition, more training opportunities, an effective mentoring system, proper career guidance, financial support and a development programme for internal employees, as illustrated in the following comments:

> *The mining company does not provide for career development of women, if I want to be trained in something, it should be done on my own. I want to be supported in the following ways: I would like the mining company to assist me with my studies, to provide bursaries and to provide me with a career development programme and plan.*
>
> *I intend to develop my career in mining, but the mining company does not provide clear steps for career development. A good mentoring system as well as exposure to mentors will assist with career development.*
>
> *Career paths will definitely assist women in making progress in their careers. We know what we want to achieve, but we don't know the steps to get there. We see the goal, but don't know the tools and techniques to achieve these goals.*

3.3 *Infrastructure facilities*

Given the fact that the mining industry previously excluded women from the core business of mining, infrastructure facilities were developed to provide only for the needs of men. As a result of the requirement of the 2002 Mining Charter (revised and amended in 2010) to employ 10% women in core mining positions, mining companies were obliged to upgrade and improve their infrastructure facilities in order to accommodate women in the mining workforce. Indicator statements aimed to determine

whether mining companies provide adequate infrastructure facilities (canteens, ablution facilities, changing rooms, crèches, security and company transport) for women working in core mining positions.

It is clear from the results in Table 7 that some of the mines are faring better than others with regard to the provision of adequate infrastructure facilities. Furthermore, higher scores were obtained from the male and management target groups for almost all the indicators. Much lower scores were recorded by the female target groups. Although the female participants from the phosphate mine reported positive responses on all the different indicators, this was not the case for the copper and platinum mines. Almost all the different indicators calculated a mean score of 2.5 and below, indicating that there is no or only very limited compliance in terms of the facilities.

Table 7
Participants' perceptions regarding infrastructure facilities provided for women working in core mining activities

Does the mining company provide adequate infrastructure facilities for women working in core mining activities?		Copper mine			Phosphate mine			Platinum mine	
		Male target group	Female target group	Management	Male target group	Female target group	Management	Male target group	Female target group
1	Canteens	3.29	2.41	3.21	3.24	3.11	3.17	1.71	2.10
2	Ablution facilities	3.20	2.52	3.38	3.00	2.89	3.08	2.80	2.50
3	Changing rooms	3.31	2.87	3.44	3.31	3.19	3.09	3.46	3.24
4.	Crèches	1.33	1.30	1.29	3.53	3.35	4.00	1.46	1.55
5	The ablution facilities and changing rooms in the workplace are women-friendly	3.06	2.53	3.19	3.31	2.75	3.17	3.31	2.45
6	The mining company provides facilities for women working in shifts, such as security at work and company transport	2.76	2.68	2.94	3.12	3.06	3.00	2.93	1.95

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

Source: Constructed by author (2013)

In the section "Infrastructure facilities" only one factor that explains 35.85% of the total variance was extracted by the Kaiser-Meyer-Olkin measure of sampling adequacy criteria (Field 2005:652). The statements all loaded above 0.4 on the identified factor. It was evident from the quantitative results that only a slight majority of the participants positively agreed on the statements relating to the *Infrastructure facilities* factor – the factor mean calculated at 2.69. The factor shows good reliability with a Cronbach's alpha coefficient of 0.75, which is above the required 0.7 and indicates high reliability and internal consistency.

A large effect (see Table 8) is evident from the women versus men and women versus management target groups at the copper mine, as the d-values calculated at 0.78 and 0.98 respectively, indicating that on average, the participants in the male and management target groups at the copper mine show more agreement on the statements relating to the factor *Infrastructure facilities* than the female target group

themselves. Contrary to the responses of the female participants from the copper (mean=2.36) and platinum (mean=2.36) mines, positive responses were obtained from all three target groups at the phosphate mine (mean=3.06) on all the indicators. It can therefore be concluded that although infrastructure facilities, such as ablution facilities, changing houses, canteens and transport, are provided, there are still limitations and deficiencies in this regard, especially at the platinum and copper mines.

Table 8
Comparison of the three target groups of the different mines regarding infrastructure facilities

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs men	Women vs magement
Factor 1: Infrastructure facilities	Phosphate	3.27	0.51	3.06	0.58	3.26	0.44	0.37	0.34
	Copper	2.82	0.59	2.36	0.58	2.93	0.53	**0.78**	**0.98**
	Platinum	2.61	0.39	2.36	0.60			0.41	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8

Source: Constructed by author (2013)

The quantitative results are reinforced by the findings obtained from the qualitative inquiry. Moreover, the qualitative inquiry revealed serious concerns with regard to changing houses and ablution facilities, childcare facilities, transport facilities and housing, as noted in the following comments:

> *The company tries to accommodate women by building more facilities, but the facilities are not adequate yet.*
>
> *The showers, they are not enough. There are four showers for approximately 65 to 70 women. We've got lockers. You put your clean clothes and your dirty clothes in there. They are not big enough.*
>
> *Childcare facilities will definitely help and will be convenient. It will save time for the company as well as for the mothers. Women will know that their children are safe. The facilities must be outside the premises of the mine.*
>
> *The concern is that the company transport collect and drop off at a given stop. Sometimes ladies must walk to the collection or drop-off place on their own at night, which make them feel not safe.*
>
> *The problem is there is no accommodation for women; I stay in a shack. The mining industry first it was for men, so the hostels are for men, there are no hostels for women, so for us to find accommodation it is a struggle. Although they do have family units, there are not a lot. We need family units, not hostels. They must also provide for women that are not married.*

3.4 *Physical ability*

Indicator statements aimed to determine perceptions regarding the physical ability and capability of women working in core mining activities. The descriptive results are presented in Table 9. The results are explained in terms of the factor analysis.

In the section "Physical ability" three factors were extracted by Kaiser's criteria (Field 2005) that explain 39.92% of the total variance. All statements have satisfactory factor

loadings of above 0.3. Questions 1, 2 and 5 loaded on Factor 1 (*Capability*), questions 3 and 4 loaded on Factor 2 (*Effectiveness*) and Question 6 loaded on Factor 3 (*Differential*). It is evident from the quantitative results that the majority of the participants across all three mines agreed with the statements contained in the *Capability* (mean=2.74), *Effectiveness* (mean=2.77) and *Differential* (mean=2.19) factors. Therefore, on average, the perception is that women are physically less capable than men, some mining tasks can only be done by men, temperatures in the workplace are regarded as a major problem for women (Factor 1: *Capability*), women have the physical ability to perform their daily tasks effectively, they do not have a problem with working in confined spaces (Factor 2: *Effectiveness*) and women should be treated differently from their male co-workers in the workplace (Factor 3: *Differential*). The *Capability* factor shows a Cronbach's alpha coefficient of 0.68, which could be regarded as an acceptable reliability. According to Field (2005), the Cronbach's alpha could realistically be below 0.7. The *Effectiveness* factor shows a Cronbach's alpha coefficient of 0.54, which could be regarded as a relatively low reliability. Factor 3 consists of one item only; therefore Cronbach's alpha is not applicable.

Table 9
Participants' perceptions regarding the physical ability of women working in core mining activities

	Indicator statement	Copper mine			Phosphate mine			Platinum mine	
		Male in core	Female in core	Management	Male in core	Female in core	Management	Male in core	Female in core
1	Women are physically less capable than men	3.50	2.56	3.19	3.13	2.26	2.92	3.25	2.50
2	Some mining tasks can be done only by men	3.56	2.62	3.31	3.31	2.84	3.08	3.13	3.05
3	I (women) have the physical ability to perform my (their) daily tasks effectively	2.63	3.41	2.75	2.59	3.30	2.67	3.07	3.32
4	I (women) find it easy to work in confined spaces	2.31	2.53	2.00	2.00	2.39	2.50	2.67	2.63
5	Temperatures in the workplace are regarded as a major problem for women	2.69	2.30	2.44	3.00	2.06	1.90	2.47	2.25
6	Women should be treated differently from their male co-workers in the workplace	2.00	2.00	1.75	2.00	2.71	2.25	2.40	2.15

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

Table 10 indicates that the effect sizes for the *Capability* factor show a medium and large effect for the female versus the male target groups at the phosphate and copper mines and the management target group at the copper mine, indicating that on average, these participants were more in agreement with the *Capability* factor than the

female target group themselves. The effect sizes for the *Effectiveness* factor indicate that the participants from the female target groups of the phosphate and copper mines were more in agreement with the *Effectiveness* factor than the participants from the male and management target groups at these mines. A medium effect is evident from the effect size of the female versus male target groups at the phosphate mine for the *Differential* factor, indicating that on average, the female research participants felt that they should be treated differently in the workplace, while this view is not supported by the male target group.

Table 10
Comparison of the three target groups at the different mines regarding physical ability

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs Men	Women vs Management
Factor 1: Capability	Phosphate	3.18	0.64	2.39	0.70	2.68	0.37	**1.12**	0.41
	Copper	3.25	0.55	2.49	0.66	2.98	0.74	**1.16**	**0.67**
	Platinum	2.90	0.54	2.65	0.53			0.47	
Factor 2: Effectiveness	Phosphate	2.29	0.79	2.83	0.61	2.58	0.42	**-0.67**	-0.39
	Copper	2.47	0.64	2.99	0.63	2.38	0.53	**-0,80**	**-0.96**
	Platinum	2.81	0.57	3.02	0.58			-0.36	
Factor 3: Differential	Phosphate	2.00	1.12	2.71	0.96	2.25	0.62	**-0.64**	-0.49
	Copper	2.00	0.97	2.00	0.80	1.75	0.68	0.00	-0.31
	Platinum	2.38	1.20	2.16	0.90			0.18	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8

Source: Constructed by author (2013)

It was clear from the qualitative findings that women are employed in all sections at the three mines and that there are no tools and equipment that women are barred from using. Furthermore, the findings show that women experience difficulty in performing mining work that requires physical strength and stamina as well as in operating heavy machinery such as load-haul-dump loaders, rubber dozers, rock drills and winches. The following quotes provide an indication of the female participants' opinions regarding the physical ability of women employed in core mining positions and the constraints experienced:

> *The loco is like a train, nè? It's hard to operate. The steering wheel and everything is hard. The brakes. And to be on it every day, yô, it is hard. When you go on period you have some pains. Your back it pains. And that thing, it vibrates. I'm on it eight hours every day.*

> *The work is really hard and need manpower. Like you need to open valves, you can't open valves with nails. You find your hands are so painful, then you call a man to come help you, then they say 'ja, this is why we don't want women, because they can't even open that'. But sometimes I try to prove a point that I can also do that, even though my hands are painful.*

The data also indicated that the male co-workers experience unique problems if women are appointed to positions that require physical strength and they are not capable of

performing the work activities required by these positions. These problems include the following: production targets are not reached, delays are caused, women are slow to react in crisis situations and male co-workers are often confronted by husbands and boyfriends. The following comments illustrate some of these points:

> *Last week I was talking to this other supervisor in the plant. He told me that in his shift, he prefers to have a male than to have a female, because he knows when he has 10 males he can do his job quicker. If he has nine men and only one woman he knows there will be some delays, because there are some jobs that a woman cannot do. This is one of the challenges.*
>
> *Some women they want to be treated like ladies; […] we don't have such a kind of chance to treat them like ladies, because we are always in a hurry. Underground everything is done against time and against production – the mining company wants production the whole time. Even if we are cleaning the haulage, it is not hard work, but they also cry. They want to do nothing. The ladies they want to be treated like glass, eggs. The production of the mine won't go anywhere.*

Although it was indicated by a large number of the participants (quantitative results as well as qualitative findings) that women should not be treated differently from their male co-workers in the workplace, the qualitative inquiry also revealed that the following aspects should be taken into consideration when appointing women to positions that require physical strength: the physical strength and stamina of women; appropriate and suitable language usage in the work environment; family responsibilities of female employees; and physiological aspects related to the female body, such as menstruation, pregnancy and birth. According to the participants, these aspects have a visible impact on the physical performance of women in the workplace.

3.5 *Health and safety in the workplace*

Indicator statements (related to underground work, night shifts, personal protective equipment [PPE], pregnancy, HIV/Aids and accidents) aimed to determine perceptions regarding the health and safety of women working in core mining positions.

It is evident from Table 11 that similar results were obtained for almost all the different indicators, across all three mines. Almost all the indicators calculated a mean of above 2.5 across all three target groups of the three mines, indicating that compliance with these statements is satisfactory. According to the quantitative results it can therefore be deduced that, on average, the participants are satisfied with the way the mining companies included in the study apply and implement health and safety measures in the workplace. The only low responses were reported for the following indicator statements: *It is safe for women to work the night shift* and *Alternative employment is provided for women during early motherhood and breastfeeding.*

Although low responses were reported for the statement *It is dangerous for women to work underground in the mining company*, the responses are not regarded as negative per se. They show that the vast majority of the participants thought that working underground is not dangerous for women.

In the section "Health and safety in the workplace" four factors that explain 67.50% of the total variance were extracted by Kaiser's criteria (Field 2005). The statements all loaded above 0.3 on the four identified factors (questions 1, 2 and 10 loaded on Factor 1; questions 6 and 7 loaded on Factor 2; questions 8 and 9 loaded on Factor 3; questions 3, 4 and 5 loaded on Factor 4). The quantitative responses showed mainly positive results as, on average, the participants across all three mines agreed with the statements contained in the four identified factors: the *Work environment* factor (Factor

1; mean=2.78), the *Motherhood* factor (Factor 2; mean=3), the *HIV/Aids programme* factor (Factor 3; mean=3.45) and the *Personal protection* factor (Factor 4; mean=2.83). The factors *Work environment* and *Motherhood* have a Cronbach's alpha coefficient of 0.51, which could be regarded as indicating relatively low reliability. The *HIV/Aids programme* factor has a Cronbach's alpha coefficient of 0.79, which is above the required 0.7, and shows high reliability and internal consistency. The *Personal protection* factor has a Cronbach's alpha coefficient of 0.61, which could be regarded as an acceptable reliability (Field 2009).

Table 11
Participants' perceptions regarding health and safety in the workplace

	Indicator statement	Copper mine			Phosphate mine			Platinum mine	
		Male target group	Female target group	Management	Male target group	Female target group	Management	Male target group	Female target group
1	I (Women) feel safe at work	2.94	3.15	3.00	3.00	2.90	3.08	3.13	3.09
2	It is dangerous for women to work underground in the mining company	2.29	2.12	2.00	2.15	2.47	1.71	1.81	2.09
3	It is safe for women to work the night shift	3.18	2.72	3.06	2.93	2.35	3.17	2.64	2.40
4	The safeguards (protective clothing, masks, etc) provided by the company are adequate	3.47	2.97	3.19	3.29	2.95	3.33	2.87	2.86
5	Protective clothing that women are obliged to wear is woman-friendly, in other words, designed with women in mind	3.24	2.73	3.00	2.76	2.70	3.33	2.67	2.65
6	Pregnant women are provided with alternative employment where they are not exposed to hazardous or dangerous circumstances	3.35	3.25	3.38	3.00	3.00	2.92	3.20	3.09
7	Alternative employment is provided for women during early motherhood and breastfeeding	3.06	2.44	2.69	3.00	2.74	2.45	3.27	3.05
8	The mining company is actively involved in HIV/Aids awareness programmes	3.65	3.65	3.56	3.69	3.48	3.67	3.40	3.43
9	The mining company works to mitigate and combat HIV/Aids in the mining industry	3.53	3.38	3.56	3.38	3.24	3.58	3.33	3.15
10	The mining company makes provision for rehabilitation in case of accidents at work	3.41	2.91	3.44	3.12	3.19	3.55	3.00	3.00

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

A large effect (see Table 12) is evident from the female versus male target groups of the copper mine and the female versus management target groups of the phosphate mine for the *Personal protection* factor, indicating that on average the participants in the male and management target groups at the copper mine as well as the management

target group at the phosphate mine are more in agreement with *Personal protection* than the female target group themselves.

Table 12
Comparison of the three target groups at the different mines regarding health and safety in the workplace

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs men	Women vs management
Factor 1: Work environment	Phosphate	2.81	0.31	2.90	0.49	2.99	0.46	-0.19	0.17
	Copper	2.88	0.44	2.72	0.30	2.81	0.30	0.37	0.31
	Platinum	2.61	0.50	2.73	0.43			-0.23	
Factor 2: Motherhood	Phosphate	3.00	0.42	2.88	0.76	2.71	0.54	0.16	-0.22
	Copper	3.21	0.64	2.84	0.65	3.03	0.53	**0.55**	0.29
	Platinum	3.22	0.73	3.05	0.74			0.23	
Factor 3: HIV/Aids programme	Phosphate	3.53	0.43	3.36	0.53	3.63	0.48	0.33	**0.51**
	Copper	3.59	0.48	3.53	0.46	3.56	0.51	0.12	0.06
	Platinum	3.34	0.75	3.28	0.62			0.09	
Factor 4: Personal protection	Phosphate	2.97	0.39	2.67	0.77	3.28	0.49	0.39	**0.79**
	Copper	3.29	0.51	2.79	0.59	3.08	0.54	**0.84**	**0.49**
	Platinum	2.75	0.59	2.63	0.73			0.17	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8
Source: Constructed by author (2013)

Although the quantitative results presented generally positive results, the qualitative findings revealed some loopholes. The main concerns raised related to the following aspects: PPE provided, treatment during pregnancy, effects of dust and vibration, and security during the night shift.

Although great progress has been made regarding the provision of PPE that is designed with women in mind, deficiencies and limitations are still prevalent. Some mining companies still provide overalls (shirts and trousers), shoes and gloves that are not woman-friendly and are designed with men in mind. The female body differs from the male body; therefore overalls, shoes and gloves designed for men do not fit women comfortably.

From the interviews and focus group discussions it also became clear that different views are held on female employees' experiences regarding treatment by the management of the various mining companies before, during and after pregnancy (early motherhood and breastfeeding). The data also show that treatment may vary within the same mining company. Some of the participants indicated that they were treated well from the moment they disclosed their pregnancies and they were employed in alternative positions that require light duty. If employed underground, they were moved to work on the surface. Others indicated that they were not treated well at all and were not given light duty; they had to ask to be moved to work on the surface.

Dust was indicated by participants as one of their main concerns. According to the female participants, dust affects their lungs, eyes and ears. The male participants indicated that women often get a rash from working in dusty areas and sometimes they need to take the next working day off to recover. The female participants felt that the

mining company could do more to reduce dust in the working environment. They suggested that dust masks be improved and that water be used to reduce dust in dusty working environments.

The female participants also indicated that working environments entailing vibration as well as the operating of heavy vibrating equipment and machines, such as locomotives, winding engines, rubber dozers and dump trucks, are not well-suited to women, even if they are not pregnant. It was indicated that vibrating equipment tends to affect their menstrual cycle.

Some female participants indicated that they do not feel safe when working the night shift. During some shifts one or two women have to work with a large group of men. Although security services are present at the main gates, a need was expressed for more security in each section/shaft. A need was also expressed for additional lighting in dark areas.

3.6 *Workplace relations*

The integration of women into the mining workforce has been accompanied by various challenges and has had many consequences, not only in terms of the adaptation and upgrading of physical infrastructure but also regarding workplace relations. It is not only management that face unique challenges, but also male co-workers and the newly employed women in core mining positions. Indicator statements (related to equality in terms of bonuses, promotions, opportunities, wages, acceptance by male co-workers, treatment by male co-workers and management, language, sexual harassment and sexual favouritism) aimed to determine the perceptions of workplace relations within the mining companies included in the study.

It is evident from Table 13 that the quantitative data obtained from the three mines included in the study yielded different results. However, agreement was found in the responses for some of the indicators. The results are explained in terms of the factor analysis.

In the section “Workplace relations”, four factors that explain 67.86% of the total variance were extracted by Kaiser’s criteria (Field 2005). The statements all loaded above 0.6 on the four identified factors (questions 1, 2, 3, 4, 5 and 6 loaded on Factor 1; questions 10, 11, 12 and 13 loaded on Factor 2; questions 8 and 9 loaded on Factor 3; Question 7 loaded on Factor 4). It is evident from the quantitative results that, on average, the majority of the participants across all three mines agreed with the indicator statements contained in the Employment relations factor (Factor 1; mean=3), the Complaints-handling procedures factor (Factor 2; mean=2.84), the Sexual harassment and sexual favouritism factor (Factor 3; mean=2.44) and the Language factor (Factor 4; mean=2.74). The means of the Sexual harassment and sexual favouritism factor as well as the Language factor reflect alarming responses, as they clearly indicate that sexual harassment and sexual favouritism do occur in the workplace and that language is a communication barrier to the effective performance of daily tasks. Factors 1 and 2 show good reliability with a Cronbach’s alpha coefficient of 0.83 and 0.77 respectively, which is above the required 0.7, and show high reliability and internal consistency. Factor 3 has a Cronbach’s alpha coefficient of 0.69, which could be regarded as an acceptable reliability. Only one question loaded on Factor 4, therefore Cronbach’s alpha is not applicable.

Table 13
Participants' perceptions regarding workplace relations

Indicator statement		Copper mine			Phosphate mine			Platinum mine	
		Male target group	Female target group	Management	Male target group	Female target group	Management	Male target group	Female target group
1	Men and women are treated equally in the workplace (in terms of promo- tion, bonuses, opportunities, etc.)	2.88	2.72	3.19	2.94	3.40	3.50	2.38	2.48
2	Men and women are paid equal wages	3.06	2.84	3.27	3.17	3.40	3.67	3.33	2.90
3	I (women) feel accepted by my (our) male co-workers	3.00	2.94	3.00	3.50	3.30	2.92	3.00	2.86
4	I (women) feel part of the work team	3.18	3.00	3.06	3.25	3.38	3.00	3.00	2.95
5	I (women) feel fairly treated by my (our) male co-workers	3.06	2.81	3.06	3.25	3.20	2.92	3.27	2.70
6	I (women) feel fairly treated by management	3.06	2.77	3.19	3.25	3.19	2.91	3.00	2.65
7	Language is a communication barrier in the effective performance of daily tasks	2.65	2.55	2.50	2.71	3.15	2.17	2.67	2.76
8	Sexual favouritism (in other words sexual favours for co-workers and management) is commonly practised in the mining company	2.29	2.37	1.56	2.64	2.00	1.82	3.13	2.52
9	Sexual harassment (for example threats, demands and bodily contact) is a general problem in the workplace	2.18	2.19	1.69	2.50	2.20	2.00	3.07	2.67
10	The mining company has a committee that investigates sexual harassment issues in the workplace	3.18	3.00	3.31	2.75	2.95	2.50	2.40	2.45
11	The mining company effectively addresses sexual harassment in the workplace	3.29	2.85	3.44	2.94	3.00	3.17	2.79	2.76
12	The mining company has an effective channel for women to voice their concerns to management	3.24	2.81	3.44	3.13	3.05	3.33	2.73	2.40
13	I am (women are) satisfied with the way in which management handles the concerns of women in the workplace	3.12	2.63	3.25	2.93	2.85	3.00	2.71	2.10

Ratings of 2 and below indicate that the majority of the research participants disagreed to strongly disagreed with the indicator statement.

Source: Constructed by author (2013)

As shown in Table 14, the d-values calculated for the women versus management target groups at the copper mine showed a large effect for the *Complaints-handling*

procedures factor and a medium effect for the *Sexual harassment and sexual favouritism* factor. A large effect was also evident from the women versus management target groups at the phosphate mine for the *Language* factor. This indicates that the participants in the management target groups are more in agreement with the indicator statements contained in the factors than the women themselves.

Table 14
Comparison of the three target groups at the different mines regarding workplace relations

Factor	Mine	Men		Women		Management		Effect sizes	
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Women vs men	Women vs management
Factor 1: Employment relations	Phosphate	3.23	0.40	3.31	0.48	3.16	0.32	-0.16	-0.32
	Copper	3.05	0.42	2.85	0.62	3.13	0.57	0.32	0.44
	Platinum	2.94	0.49	2.74	0.58			0.34	
Factor 2: Complaints-handling procedures	Phosphate	2.94	0.59	2.96	0.55	2.99	0.35	-0.04	0.04
	Copper	3.21	0.44	2.83	0.59	3.36	0.50	**0.64**	**0.90**
	Platinum	2.66	0.55	2.45	0.77			0.26	
Factor 3: Sexual harass-ment and sexual favouritism	Phosphate	2.56	0.73	2.10	0.70	2.00	0.74	**0.64**	-0.14
	Copper	2.24	0.64	2.27	0.92	1.63	0.56	-0.03	**-0.70**
	Platinum	3.10	0.76	2.58	0.78			**0.66**	
Factor 4: Language	Phosphate	2.71	1.07	3.15	0.75	2.17	0.72	-0.41	**-1.32**
	Copper	2.65	0.70	2.55	1.06	2.50	0.97	0.10	-0.04
	Platinum	2.69	1.01	2.75	0.55			-0.06	

(a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8

Source: Constructed by author (2013)

The qualitative findings revealed the following: although women feel reasonably accepted in the male-dominated mining workplace they are still subjected to discrimination; women still experience negative attitudes from male co-workers; women in leadership positions are often underestimated; women are not always treated with the necessary respect; they often feel isolated; sexual favouritism and sexual harassment occur in the workplace and women's concerns are not always effectively addressed. The following quotations provide an indication of the female participants' opinions in this regard:

> *Fifteen years ago, when I started my career in the mining industry, much more resistance against women were experienced than nowadays. Resistance against women in the industry has definitely decreased, but there are still areas where resistance is experienced.*
>
> *We are facing discrimination. When we apply for jobs, they don't want us actually. We are just there for the statistics, because the Department of Labour is behind them now. They don't develop us. They only want women to work in the offices, but for production, they don't really want us.*
>
> *If holding the same management positions than men, women are not taken seriously and male employees don't respect women enough.*

The mining company must employ more women. Women will not be that alone and will not feel so uncomfortable in the presence of males.

To be honest, we are sexually harassed. They take advantage of us, because we are women and we are working at night with them. It is very uncomfortable. Let me just stop right there, because it is very uncomfortable. But what can you do, because it is a small place.

4 A conceptual framework for gender issues in the mining sector

Through the research it became clear that various factors need to be considered for the successful and sustainable deployment of women in the mining sector. A few studies have endeavoured to identify these factors and could offer the mining sector some solutions. This study contributes to this contentious issue and accompanying debates by creating an understanding of the variables that need to be considered for the successful and sustainable deployment of women in the mining sector. A conceptual framework (see Figure 1) was developed that could be implemented and used by *various stakeholders in the mining sector to contribute to the successful and* sustainable deployment of women in that sector. The empirical results provided the basis from which this framework was developed. The main pillars of the conceptual framework, as identified and confirmed through deductive and inductive reasoning, are the following:

- Company policies
- Workplace opportunities
- Infrastructure facilities
- Physical ability
- Health and safety
- Workplace relations

The empirical results confirmed that the six pillars are all applicable and relevant to addressing gender issues in the mining sector. Although the means of some of the factors identified calculated above 2, the various factors are considered important for the successful integration of women into the mining sector. Furthermore, the findings of the qualitative inquiry revealed meaningful additional information with regard to the relevant pillars that mining companies should take into account. The six pillars are discussed below.

4.1 *Company policies*

Company policies and procedures are the elements that provide direction and regulate the activities of an organisation and its members. They also set the course for achieving objectives and outline the manner (game plan) in which the organisation will go about achieving its objectives (Venter, Levy, Conradie & Holtzhausen 2009). Policies and procedures further co-ordinate and regulate the labour relationship. Integrating women into the mining environment requires mining companies to introduce policies and procedures that are gender-sensitive and cater for the specific needs of women. These policies should be in line with South African legislation. The following key policies are among those that should be developed: an employment equity policy, a pregnancy/maternity policy and a sexual harassment policy. To be maximally effective, policies should be in writing and should be communicated to all employees.

Communication is an important aspect in any organisation and is "the glue that binds various elements, coordinates activities, allows people to work together and produce results" (Grobler, Wärnich, Carrell, Elbert & Hatfield 2006:14). Mining companies should also have a business plan in place to facilitate the implementation of policies. It may be necessary to draft specific employment relations procedures and to devise specific employment relations systems (including developing timelines for the implementation and allocation of responsibilities and budgets) to operationalise policies (Nel, Kirsten, Swanepoel, Erasmus & Poisat 2012).

4.2 *Workplace opportunities*

Adequate and transparent workplace opportunities, which include training and skills-development opportunities, career-development opportunities (for example mentorships, career paths and career guidance) and financial assistance (for example bursaries) will not only contribute towards a skilled workforce, but will also empower women to do their work effectively and could enhance productivity, personal satisfaction and job enrichment (Nel et al 2012). The development and mainstreaming of women in the core business of mining are critical for reaching employment targets, as prescribed by the Mining Charter, as well as for retaining women in the mining industry.

Human resource development is enforced by the revised Mining Charter. According to the requirements of the revised Social and Labour Plan, mining companies are obliged to provide a detailed skills-development plan outlining the "intent to offer employees development of requisite skills in respect of learnerships, bursaries (of core and critical skills), artisans, ABET training (levels I, II, III, IV and NQF 1) and other training initiatives" (South Africa 2010b:8). Furthermore, mining companies should provide career-development matrices for each discipline, develop individual development plans for employees and identify a talent pool to be fast-tracked in line with the needs (South Africa 2010b). Mining companies should also provide a mentorship plan for employees as well as a bursary and internship plan. All these plans should indicate the targets, timeframes and budgets for implementation (South Africa 2010b).

4.3 *Infrastructure facilities*

The inclusion of women in the core business of the mining industry requires the provision of adequate infrastructure facilities, such as adequate ablution facilities and changing houses, decent housing and living conditions, transport and childcare facilities. Proper ablution facilities and changing houses must be provided for women in order to ensure their privacy, protection and dignity. Female employees need a space of their own in which to wash and change before and after their shifts (Badenhorst 2009). These facilities should be in accordance with international standards and specifications. Failure to provide adequate facilities for women employed in core positions could lead to women feeling "uncomfortable in an already uncomfortable environment" (MTS 2011:16). Furthermore, the new Mining Charter explicitly requires mining companies to promote humane living conditions for mine workers and also sets the framework, targets and timetable for achieving these requirements (South Africa 2010a). Work/life balance strategies such as offering childcare facilities could also help employees to balance their work life and home life (Jacobs & Gerson 2004; Richardson & Robinson 2008).

4.4 *Physical ability*

Work in the mining sector is associated with difficult working conditions, and mining, especially underground, is considered one of the most physically demanding occupations (Schutte 2011). Because of the physical differences between women and men, women often find it difficult to perform certain work activities and tasks. Women's physical ability needs to be considered when appointing them to positions that require physical strength and stamina in order to avoid compromising the health and safety of female employees and their co-workers. According to Badenhorst (2009), a female employee can do any job that she is qualified to do, provided that she meets the requirements inherent for a specific job. Furthermore, an employee should not be employed in a job or conduct tasks for which he or she is not medically fit or for which he or she does not have the required physical and functional capabilities. The health and safety of the employee and co-workers should not be compromised (Badenhorst 2009). Therefore, Badenhorst (2009) suggests that a programme be introduced to ensure that minimum medical requirements are met by employees. This would include the laying down of minimum standards for fitness and comprise the following steps:

Step 1: Occupational health risk assessment

A clearly defined occupational health risk profile should be created for each occupation by identifying all relevant health hazards and the degree to which the various occupations are exposed to these hazards.

Step 2: Employee-job specification

The risks for all occupations should be documented and should cover both the inherent requirements of the jobs and the expected hazard exposures.

Step 3: Setting standards for medical surveillance

The medical practitioner should set medical standards for each of these occupations based on the risk profiles. These should include standards for the physical and functional ability required to perform certain jobs safely. A battery of tests to measure these abilities should be designed.

4.5 *Health and safety*

Work in the mining sector is categorised as high-risk work and falls into the category of perceived hazardous occupations. Women working in the core business of mining have unique health and safety needs owing to their anatomical and physiological makeup. Ill-fitting PPE, such as shoes, safety goggles, harnesses and overalls, could pose health and safety risks for female employees (Zungu 2012). Women also face psychosocial hazards owing to the tough working conditions of the mining environment, discrimination and sexual harassment (Mining Safety 2013). Furthermore, pregnancy and breastfeeding are two of the major challenges mining companies have to deal with when incorporating women into the mining workforce. Mining companies should have standard systematic procedures in place to accommodate pregnant and breastfeeding women by providing alternative placements. According to Badenhorst (2009), risk assessment is fundamental to the safe placement of female employees prior to or during pregnancy. The health and safety of employees are the responsibility of managers. Therefore, managers should ensure that employees are not unnecessarily endangered and that workers are fully aware of and properly trained and prepared for unusual workplace risks. A safe and healthy working environment can have a positive

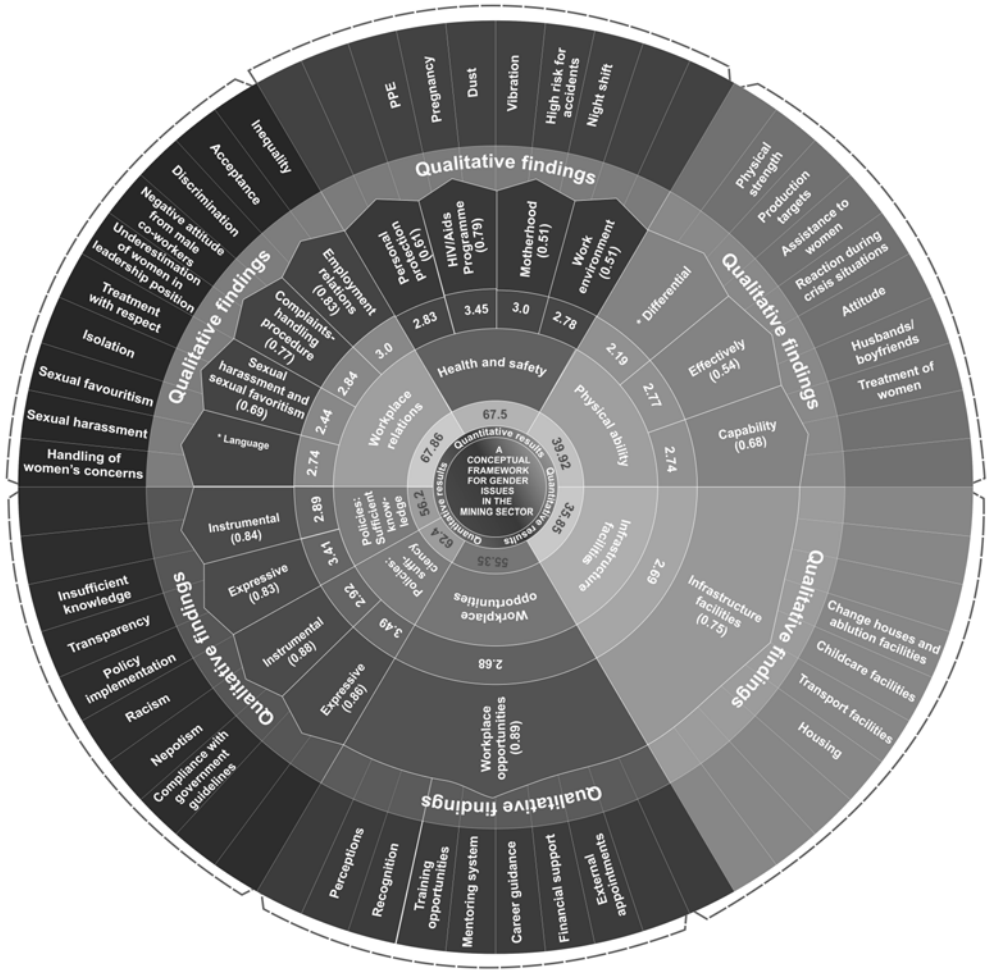
impact on the physical and psychological wellbeing of employees as well as on the productivity of the company (Nel, Werner, Poisat, Sono, Du Plessis & Ngalo 2011).

4.6 *Workplace relations*

The integration of women into the mining workforce is accompanied by various challenges and therefore all possible measures should be taken to create a working environment free from conflict and conducive to constructive and harmonious workplace relations. Mining companies should comply with the provisions of the Constitution of the Republic of South Africa, the Labour Relations Act and accompanying affirmative action legislation to foster a working environment free from discrimination, including racism, unequal payment, unequal awarding of bonuses and promotions, unequal development opportunities, sexual harassment and sexual favouritism. The successful management of a diverse workforce requires a specific set of new skills. If diversity is positively managed, it can be a source of increased creativity, innovation in organisations and improved decision making in which different perspectives are provided. On the other hand, if not properly managed, it could lead to a high turnover of employees, communication difficulties and greater interpersonal conflict (Robbins, Judge, Odendaal & Roodt 2009). Regular diversity training and workshops should be conducted to create awareness of men's and women's workplace issues and to stimulate an environment in which people's differences can be respected. Mining companies should also implement measures such as career counselling to support women in dealing with issues in the workplace. Career counselling could include the following: identifying women's strengths, helping them to confront myths and stereotypes in the workplace, learning negotiation skills, assisting women to balance home and work responsibilities, preparing women to handle sexual harassment in the workplace and setting up specific support groups for women (Stead & Watson 2010).

The above-mentioned six pillars should be considered and applied in conjunction with the recommendations provided in the conceptual framework (see Figure 1).

Figure 1
A conceptual framework for gender issues in the mining sector



A conceptual framework for gender issues in the mining sector	
Policies • Ensure transparency of policies • Ensure that policies are in writing and are communicated to all employees • Offer regular training and workshops on policies • Implement policies effectively • Eradicate discriminatory practices such as racism and nepotism • Regularly update policies to comply with government guidelines	**Physical ability** • Create health risk profiles for each occupation • Set medical standards for each occupation • Develop a battery of tests to measure physical and functional ability to perform jobs safely • Conduct medical tests before appointing employees • Offer regular training and diversity workshops

continued/

A conceptual framework for gender issues in the mining sector	
Workplace opportunities • Develop and implement: o training and skills development plan o bursary and internship plan o career development matrices for each discipline o individual development plans for each employee o mentorship plans • Ensure transparency regarding career development opportunities • Ensure clear lines of communication • Provide career support and counselling	**Health and safety** • Adhere to the requirements of the MHSA • Ensure that PPE is designed to fit properly and does not compromise the health and safety of female employees • Develop and implement a pregnancy policy • Adhere to the requirements of the BCEA in terms of the treatment of pregnant women • Apply the principle of the Code of Good Practice on the Protection of Employees during Pregnancy and after the Birth of a Child • Apply the risk assessment flow for pregnant and breastfeeding women as suggested by Badenhorst (2009) • Provide training and support to female employees on health-related issues • Enhance safety and security measures for women working night shifts
Infrastructure facilities • Ensure that ablution facilities and changing houses provide for the specific needs of women on the surface and underground • Ensure hygienic ablution facilities on the surface and underground • Provide separate ablution facilities for male and female employees on the surface and underground • Ensure that ablution facilities are close to the plant to enhance the safety of women • Provide childcare facilities • Provide transport facilities • Provide decent housing and living conditions	**Workplace relations** • Apply affirmative legislation to eradicate discriminatory practices such as racism and sexual favouritism • Offer regular training and diversity workshops • Provide career support and counselling to employees • Appoint more than one women in a work team to prevent isolation • Develop and implement a sexual harassment policy • Promote support systems for women in mining and make them visible • Develop and implement an effective complaints-handling procedure • Assign female representatives for women in mining and make them visible

Source: Constructed by author (2013)

5 Conclusion

The successful and sustainable integration of women into the mining sector requires dedicated attention from mine management, male co-workers, the women themselves and the relevant state departments. Currently there is a paucity of published data regarding women employed in the core business of mining and the handling of accompanying gender issues. Against this background, this research contributes to the body of knowledge on women in mining and provides practical recommendations by identifying and confirming critical pillars that could be implemented and used by various stakeholders in the mining sector to contribute to the sustainable deployment of women in the sector. By understanding the complexities surrounding the integration of women into the core business of mines, employment relations practitioners and labour experts could play a meaningful role in ensuring a smooth integration of women into the mining sector.

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