

CHAPTER ONE

INTRODUCTION, PROBLEM STATEMENT AND RESEARCH METHODOLOGY

Keywords: affirmative legislation; core mining activities; gender equality; gender inequality; transformation; mining industry; women in mining

1.1 ORIENTATION

For many years, mining has been considered the foundation of the South African economy, given the fact that to a large extent the economy is built on this sector. According to Zoli Diliza (CM, 2008:4), former Chief Executive of the Chamber of Mines in South Africa, “the mining industry in South Africa has been the main driving force of the country’s economy, contributing towards growth and development and providing the foundation for the strongest economy on the African continent”.

Although the mining industry in South Africa is currently under considerable pressure and experiences various challenges (including escalating operational costs, electricity tariff increases, safety-related issues and the associated production stoppages, poor productivity, labour unrest and reduced demand both globally and domestically), it remains a key contributor to the national economy and development of the country (IDC, 2013:9). The South African mining industry, currently the fifth largest in the world, accounts for over 5% of South Africa’s gross domestic product (GDP). In 2012 only, it helped to create 1 353 383 jobs in the South African economy, 514 760 jobs directly and 838 623 jobs indirectly. The dependency ratio of the South African mining industry is approximately ten to one, indicating that roughly 13 500 000 people were directly dependent on the 1 353 383 jobs created by the mining sector for their daily food. Furthermore, the mining sector plays a direct role in communities through its social responsibility programmes and Social and Labour Plan (SLP) initiatives; it contributes towards community development by providing skills development programmes, bursaries and health care services as well as involvement in community-development projects (CM, 2012a:11).

The newly elected democratic government in 1994 initiated substantial socio-political and economic transformation in South Africa. Post-1994 South Africa introduced not only

drastic political changes, but also significant transformative socio-economic changes. Nearly every sector in the country was transformed and re-shaped, primarily through sector-specific legislation, but also through 'negotiations' between government, industry and the labour unions to create and refine the so-called sector charters, which included the Mining Charter.

Transformation in the South African mining industry is governed by the provisions of the Mineral and Petroleum Resources Development Act (28 of 2002) (MPRDA), 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 required the upgrading from so-called old-order mining rights to 'new-order mining rights'. Companies were given five years for this process, which was due in April 2009. Companies were required to meet certain conditions before these new-order mining rights (for the issuing of a mining licence) were granted by the former Department of Minerals and Energy (DME).¹ The Mining Charter supported these required conditions and a Mining Scorecard, drawn up by the DME, listed the key elements of these.

In 2009, the DMR conducted a thorough impact assessment to determine the progress made regarding transformation in the mining industry against the Mining Charter objectives as adopted in 2002. This culminated in the Amendment of the Broad-based Socio-economic Empowerment Charter for the South African Mining and Minerals Industry, which was launched in September 2010.

The broad objective of the Act and the accompanying Mining Charter (and the amended Charter) was to rectify previous inequalities and disadvantages in the mining sector and as such aimed to ensure equity, accessibility and sustainability in the industry. Environmental impact assessments (EIAs) as well as SLP submissions, among others, were tools emanating from the Act. These initiatives were aimed at enhancing the proposed social changes. Except for the elimination of imbalances from the past regarding race and disability, the whole question of *gender* is central in this sometimes-emotive debate. According to the Act and the Charter, the mining industry was supposed to reach a quota of 10% of women in core mining activities by 2009. Core mining activities refers to positions in mining that includes, among other activities, mining, metallurgy, engineering and geology (Harmony Gold Mining Company, 2008:32). The amended Charter set further

¹ Currently, the two departments are split between mining and energy. The new 'mining' department is called the Department of Mineral Resources (DMR).

requirements in terms of employment equity targets; the Charter also required a 40% historically disadvantaged South African (HDSA) representation in core and critical skills by 2015 (see Chapter Three, 3.2.3.6.4(b)). HDSAs refer to black people (African, coloured and Indians), women and people with disabilities (Nel *et al.*, 2009:79).

Other legislation – also passed to rectify imbalances from the past – crosscuts through facets of the mining sector. The following acts (Grobler *et al.*, 2006:85) can briefly be mentioned and are attend to in Chapter Three:

The Constitution of the Republic of South Africa (108 of 1996)

The Constitution of the Republic of South Africa was promulgated on 18 December 1996 and was implemented during February 1997. The Bill of Rights is an important component of this Constitution and outlines the fundamental rights afforded to all South Africans.

The Labour Relations Act (66 of 1995)

The purpose of the Act is to advance economic development, social justice, labour peace and the democratisation of the workplace.

The Basic Conditions of Employment Act (75 of 1997)

The Basic Conditions of Employment Act (BCEA) has an effect on the individual employment relationship and contains certain minimum standards to which individual employers and employees must adhere. It implicates that the parties may not agree to terms and conditions of employment that are less favourable to the employee than those contained in the BCEA.

The Employment Equity Act (55 of 1998)

The Employment Equity Act (EEA) aims to achieve equity in the workplace by promoting equal opportunities and fair treatment in employment through the elimination of unfair discrimination in order to redress the disadvantages in employment experienced by designated groups.

The Promotion of Equality and Prevention of Unfair Discrimination Act (4 of 2000)

The purpose of the Promotion of Equality and Prevention of Unfair Discrimination Act (PEPUDA) is to redress historical and social inequalities, for example unfair discrimination, hate speech or harassment.

The above-mentioned legislation in general shares the purpose of a free and fair dispensation for all South Africans, thereby furthering gender equality in all spheres of the country.

1.2 PROBLEM STATEMENT

Given this broad context of socio-economic transformation, the mining industry has not been an obvious career choice of employment for women and has traditionally drawn its labour from a largely male rural workforce (AngloGold Ashanti, 2005). Until 1994, women were legislatively prohibited from being employed in operations underground in South Africa, but the Mines Health and Safety Act (29 of 1996) removed restrictions on women to work underground (Ranchod, 2001:22). Furthermore, the Constitution, the EEA and the PEPUDA (mentioned above) have placed women on the same footing as men by eliminating unfair discrimination.

As already mentioned (see 1.1), the Act and the Charter are aimed at improving equity, opportunities and benefits for HDSAs. In 2009, women should have constituted at least 10% of employees in the formal mining sector. Furthermore, apart from the requirement of a 40% HDSA representation in core and critical skills by 2015 in the amended Charter (launched in 2010), a further requirement is a 40% representation in management: junior management level by 2011, middle management level by 2013 and senior/executive management level by 2015 (Cliffe Dekker Hofmeyr & Reid, 2010).

Thus, the Mining Charter made specific provision for the inclusion of women in core mining activities and by doing so opened up many opportunities for women in the mining industry. However, 'women employed in core mining activities' implies that women should hold positions equivalent to that of men, in other words, do the manual labour associated with mining (Burtenshaw, 2005). Furthermore, the nature of working in mines and specifically underground is hazardous and extensive training is required (Wynn, 2001:34). Women also face a range of obstacles in the mining sector, such as resistance by male workers, sexual harassment, shift work, and issues related to pregnancy and working

hours (Fourie, 2009:48). Although well intended, the introduction of women in the very male, 'macho' mining environment created and still creates challenges, not only for managers, but also for male co-workers and the 'newly employed' female mineworkers.

Despite all legislative measures and well-intended initiatives, the number of women in mining is still relatively low and they are mainly employed in administrative and supportive positions in the industry. According to the Mining Charter Impact Assessment Report (DMR, 2009:8), only 26% of mining companies have managed to comply with the requirement of 10% women participating in mining in 2009. The average rate of female participation in the mining industry was 6%, of whom most were occupied in supportive functions and less than 1% held core management positions, which was largely filled by white women. Some of the major mining houses have indicated that the 10% target cannot be attained easily and have called it one of the industry's biggest transformation challenges (Bain, 2008:48). Although, the employment of women has indeed increased as mining companies scrambled to meet government's requirement to have 10% of mining jobs filled by women by 2009, there is still a long way to go in this regard for a number of companies. Companies also run the risk of losing their licenses if they fail to comply with the set targets (Onstad, 2006:20).

Although well intended, the gender issue is very problematic in the mining sector and the problem under investigation can be outlined along the following three themes: Firstly, to establish gender equality in the male-dominant mining sector is currently one of the biggest equity challenges in the country. Secondly, numerous problems accompany the deployment of women in core mining activities (such as shift work, sexual harassment, etc.). Finally, mining companies run the risk of losing their mining licences to operate if they do not adhere to the requirements of the Mining Charter. In order to solve the problem, a conceptual framework addressing gender issues relating to the mentioned three themes was developed and is presented in Chapter Eight.

1.3 RESEARCH QUESTIONS

Derived from the problem statement, the following research questions were posed:

- Which theoretical trends, approaches and perspectives related to gender and gender inequality are in existence and how can they contribute to a better understanding of the background and social structure regarding women in mining?
- What is the current state and impact of transformation and recent legislation on gender issues in the mining sector?

- What are the global and national trends and perspectives on women in mining?
- What are the gender-related issues in the mining sector (benefits, policies, workplace opportunities, infrastructure facilities, physical ability, health and safety, workplace relations and personal issues)?
- What can be done to harmonise and align the different gender issues in the mining sector?
- What would a conceptual framework for gender issues in the mining sector entail?

1.4 RESEARCH OBJECTIVES

The general and specific objectives of the study are discussed below.

1.4.1 General objective

The main aim of this study was to critically analyse gender issues in the mining sector and subsequently to develop a conceptual framework that will enable the mining sector to contribute to and ensure the sustainable employment of women in the mining sector.

1.4.2 Specific objectives

The following specific objectives were identified:

- To analyse applicable theories and perspectives on gender and gender inequality-related issues in order to obtain a better understanding of the background and social structure regarding women in mining
- To critically discuss and interpret the impact of transformation and recent legislation on gender issues in South Africa in general and in the mining sector specifically
- To determine and analyse global and national trends and perspectives on women in mining
- To empirically determine and investigate relevant gender-related issues in the mining sector (benefits, policies, workplace opportunities, infrastructure facilities, physical ability, health and safety, workplace relations and personal issues)
- To make recommendations based on the literature review (gender theories, gender legislative policies and global and national perspectives) and analysis of data (see Chapter Five to Seven) to address the different gender issues in the mining sector

- To develop 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.

1.5 CENTRAL THEORETICAL STATEMENT

Although women all over the world were involved in mining activities for centuries, mining has always been considered a dominantly masculine industry due to its heavily male-dominated workforce as well as the physicality of mining work. The mining industry has not been an obvious career choice and preferred place of employment for women due to the dirt and risk that accompanied mine work (Lahiri-Dutt & Macintyre, 2006:4). In addition, the mining environment was not organised to accommodate women in core mining activities and did not cater for the specific needs of women. Some of the work tasks are difficult to perform due to the physical differences that exist between women and men (Wynn, 2001:33). Generally, due to women's smaller physical work capacity and physical strength, they may experience undue physiological strain when performing prolonged and strenuous physically demanding tasks (George *et al.*, 2004:34).

The new democratic government of South Africa adopted a number of strategies (see Chapter Three) to open up the mining sector for HDSAs, including women, as part of its economic empowerment policy. In addition, the Mine Health and Safety Act (29 of 1996) removed restrictions prohibiting women to work on mines, including underground (Ranchod, 2001:22). Furthermore, the new mining legislation (MPRDA and accompanied Charter) required a 10% representation of women in core mining positions, which was due in 2009, and recent mining legislation (Amendment of the Charter in 2010) requires a 40% HDSA (which include women) representation in core and critical skills by 2015 (Cliffe Dekker Hofmeyr & Reid, 2010).

The inclusion of women in the mining sector had and still has various implications for the industry as well as for society at large. The introduction of women in the mining environment created and still creates new challenges for mineworkers, managers, mining bargaining councils, the relevant state departments as well as the women themselves (Zungu, 2011:4).

For this study, gender issues in the mining sector were investigated in the specific theoretical angle of feminist theory. The three broad phases of feminist thinking, namely the classical liberal theory, the modern social theory and the poststructuralist and postmodern theories were scrutinised in an attempt to found some answers for existing

gender inequalities as well as possible ways to address sexual and gender differences and inequality in society as well as in the workplace. In addition to these theories, relevant literature on women in the workplace revealed contentious themes, for example benefits, policies, workplace opportunities, infrastructure facilities, physical ability, health and safety and workplace relations, which also formed the framework for the empirical investigation of the study, especially the deductive inquiry.

1.6 RESEARCH METHODOLOGY

The research methodology of this study is based on both deductive and inductive reasoning. Deductive reasoning works from the more 'general' to the more 'specific'. According to Babbie (2007:22), "it moves from a pattern that might be logically or theoretically expected to observations that test whether the expected pattern actually occurs". Deductive reasoning took place by means of a literature study that firstly and briefly scrutinised the meta-theoretical 'anchors' of the study, namely feminist theory, and secondly, examined specific theories on gender inequality. Furthermore, an investigation of general workplace issues that women experience in the labour environment took place. It was only recently that the political and economic significance of gender relations was recognised by mainstream sociology. According to Bilton *et al.* (2002:488), three following broad phases in the development of modern feminist thinking can be identified to address sexual differences and inequality as social and political issues:

- Classical liberal theory
- Modern social theory
- Poststructuralist and postmodern theories.

The mentioned theories are put to the order in Chapter Two, and Chapter Three focuses on general and specific legislation regulating women in mining. Chapter Four outlines and analyses global and national trends and perspectives regarding women in mining. The researcher aimed to discover certain patterns and attitudes regarding women in mining in the 'theory', and to then put it to the test in 'practice'.

Inductive reasoning works from specific observations to broader generalisations and theories (Trochim, 2006). The researcher aimed, by engaging in specific empirical research, to obtain a thorough understanding of the impact of transformation and recent legislation on gender issues in order to develop a conceptual framework for gender-

related issues in the mining sector. The empirical data were re-contextualised against relevant feminist theories and other applicable literature.

The researcher mostly made use of descriptive and explanatory research. The primary aim of descriptive research is to accurately portray the characteristics of a particular situation – in this instance gender issues in the mining sector. Furthermore, transformative socio-economic changes introduced by the new government post-1994 are reported and described. Explanatory research aims to indicate causality between variables or events. This research method was used to explain the impact of transformation and recent legislation on gender issues in the mining sector and to determine the effectiveness of this legislation and these policies on an implementation level.

1.6.1 Research procedures

The methodology used in this study comprises two research procedures, namely the *historical procedure* and the *survey procedure*.

1.6.1.1 Historical procedure

In line with the historical procedure, the researcher undertook a literature study to provide a theoretical overview of legislation and gender issues in the mining environment (see the introductory part of 1.6).

A major limitation and obstacle to the study was that the issue of gender and mining in all its facets is under-researched. There are a limited number of scientific sources in this field. The following sources of information were consulted:

- The internet
- Scientific databases such as NEXUS, EBSCO, JSTOR, and others
- Legislative and regulatory documents, for example the MPRDA and the Mining Charter
- Journal articles
- Newspaper articles, press releases and conference proceedings
- Theses and dissertations in the field
- Books

- Other relevant documents, for example publications, mining reports, departmental guidelines, sustainability reports of companies, and others – the so-called grey literature.

1.6.1.2 Survey procedure

For the purpose of this study, the survey procedure was employed. Surveys may be used for descriptive, explanatory and exploratory purposes and are chiefly used in studies that have individual people as the units of analysis. Moreover, surveys serve as excellent vehicles for measuring attitudes and orientations in a large population (Babbie & Mouton, 2011:232).

The quantitative and qualitative research paradigms were used. The quantitative research paradigm was used by collecting data from questionnaires – a quantifiable measurement instrument. According to Welman *et al.* (2010:8), the purpose of quantitative research is to evaluate objective data consisting of numbers. As a result of dealing with numbers, quantitative researchers use a process of analysis that is based on complex structured methods to confirm or disprove hypotheses (Welman *et al.*, 2010:6). Quantitative research made it possible for the researcher to shed light on the posed research questions. This approach was used to obtain quantitative information from mine management as well as female and male employees working in core mining positions regarding gender issues in the mining sector.

Further investigation was done from the qualitative research paradigm. Qualitative research aims to study human action from the insiders' perspective. The goal of qualitative research is defined as describing and understanding rather than explaining and predicting human behaviour (Babbie & Mouton, 2011:53). The purpose of qualitative research is seldom to arrive at statistically valid conclusions (although it is possible), but rather to understand, gain insights into and create explanations (theory) (Ghauri & Gronhaug, 2002:120).

According to Ghauri and Gronhaug (2002:86), “qualitative research is a mixture of the rational, explorative and intuitive, where the skills and experience of the researcher play an important role in the analysis of data”. The qualitative research approach is widely used in the social and behavioural sciences where researchers want to understand human behaviour and functions. This approach is suitable where organisations, groups and individuals are studied (Strauss & Corbin, as cited in Ghauri & Gronhaug, 2002:87). Small-group research interaction (focus group discussions), personal interviews and life stories of research subjects are key measurement instruments of this approach.

The following skills are needed to do qualitative research and were applied throughout the data-collection phase (Ghauri & Gronhaug, 2002:86):

- Thinking abstractly
- Stepping back and critically analysing situations
- Recognising and avoiding biases
- Obtaining valid and reliable information
- Having theoretical and social sensitivity
- Having the ability to keep analytical distance while at the same time utilising past experience
- Having a sharp sense of observation and interaction.

Qualitative research differs from quantitative research in terms of the following key features (Babbie & Mouton, 2011:270):

- The research is conducted in the natural setting of social actors.
- The research is focused on the process rather than the outcome.
- The actor's perspective (the 'insider' perspective) is emphasised.
- The primary aim is in-depth ('thick') descriptions and understanding of actions and events.
- The main concern is to understand social action in terms of its specific context rather than attempting to generalise to some theoretical population.
- The research approach is often inductive in its approach, resulting in the generation of new hypotheses and theories.
- The 'qualitative researcher' is seen as the 'main instrument' in the research process.

The qualitative approach was used to obtain qualitative information from women and men working in core mining positions as well as from mine management regarding gender issues in the mining sector.

1.6.2 Research setting

The research setting was limited to the following three mines: a platinum mine (underground), a copper mine (underground) and a phosphate mine (open-cast). The mines were selected on an availability basis (convenient sampling). Letters were sent to selected mining companies to gain permission to conduct research at the mining companies (see Attachment G).

1.6.3 Sampling

For the purpose 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 of the three mines. This type of sampling is also known as convenience sampling and refers to sampling by obtaining people or units that are conveniently available (Zikmund *et al.*, 2010:396).

Purposive or judgemental sampling was used to select participants for qualitative research, in other words basic individual interviewing as well as focus group discussions. Purposive (judgemental) sampling is a type of non-probability sampling in which the units to be observed are selected on the basis of the researcher's judgement about which ones will be the most useful or representative (Babbie & Mouton, 2011:184). At all three mines, the human resource officer targeted with women in mining was responsible for selecting participants to be interviewed as well as scheduling the interviews.

1.6.4 Entrée and establishing the researcher's role

The researcher formally requested permission from mine management to conduct research at the three mining companies (see Attachment G). After permission was 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 of the quantitative questionnaires, selecting appropriate participants for the individual interviews as well as focus group discussions, scheduling interviews and focus group discussions, and organising the underground field trip as well as visits to surface mining operations.

Quantitative questionnaires were distributed to an availability sample of management as well as male and female employees working in core mining activities of the three mines. Individual interviews and focus group discussions were conducted to collect qualitative data. The researcher aimed to gain information from various operations; therefore, the participants selected varied from various categories of employment and mining disciplines, as indicated in Chapter Five, Table 5.1 (a–c) and Table 5.3 (a–c). Most of the individual interviews and focus group discussions were scheduled between shifts in order not to interfere with the work responsibilities of the participants.

The following procedure was followed during the interviews:

- The researcher introduced herself at the beginning of each interview and explained the aim and purpose of the research.
- The researcher assured the participants of their privacy, anonymity and confidentiality regarding information gathered during the study.
- The researcher informed the participants that their participation is voluntary and that no participant will be forced to take part in the research and that they were free to withdraw from the research at any moment in time.
- The researcher was guided by an interview guide and asked the questions accordingly. To avoid misunderstanding of questions and to gain better insight, the researcher asked probing questions to the participants.
- The interviews were recorded and notes were also taken.
- The interviews lasted approximately 45 minutes to an hour, depending on the availability of the participants.
- At the end of the interviews, the participants were thanked for their contribution and participation.

1.6.5 Data collection

Quantitative data were collected by means of a structured questionnaire. The questionnaire provided for closed-ended as well as open-ended questions. Closed-ended questions provide a greater uniformity of responses and are more easily processed. In open-ended questions participants get the opportunity to provide their own answer to the question. Open-ended responses must be coded before they can be processed. (Babbie & Mouton, 2011:233)

Questionnaires were distributed to an availability sample of the following different target groups (see Annexure A-C):

- Male employees working in core mining positions of the different mining companies
- Female employees working in core mining positions of the different mining companies
- Mine management from the different mining companies.

Qualitative data were collected by means of individual interviews, focus group discussions and direct observation. Both the individual interviews and the focus group discussions were semi-structured; an interview schedule was utilised (see Annexure D-F). The interview guide entails a list of topics and aspects regarding the research theme. According to Welman (2010:166), when employing an interview guide, the order of the questions may vary depending on the way in which the interview develops and some questions may be used in particular interviews depending on the organisational context that is encountered in relation to the research topic. The interviewer is also allowed to adapt the formulation of questions, including the terminology, to fit the background and educational level of the participants.

Individual semi-structured interviews were used on purposefully selected individuals and key informants in the different mining companies, for example male and female employees in managerial positions, male and female employees working in core mining positions, a medical doctor, and others (see Chapter Five, Table 5.1 (a–c)). Semi-structured interviews allow the interviewer to ask probing questions to clear up vague responses or to ask for elaboration on incomplete answers (Welman, 2010:167). The interviewer can therefore ensure that the responses obtained are of a high quality (Welman, 2010:164).

Focus group discussions were conducted with purposefully selected groups of individuals, consisting of five to eight people, depending on the availability of the participants (see Chapter Five, Table 5.1 (a–c)). Due to the sensitivity of the research topic, the focus groups mainly consisted of homogeneous groups, for example male and female employees working in core mining activities were interviewed separately. The more heterogeneous the groups, the more groups are required in order to separate idiosyncratic individual characteristics from data (Babbie & Mouton, 2011:293). Focus group discussions allow the researcher to question several individuals systematically and simultaneously. Subjects are selected on the basis of relevance to the topic under study

and are not likely to be chosen through rigorous probability sampling methods. More than one focus group is used in a given study to increase the creditworthiness of data collected (Babbie, 2007:308). Krueger (cited in Babbie, 2007:09) points to the following advantages of focus group discussions:

- The technique is a socially oriented research method capturing real-life data in a social environment.
- It has flexibility.
- It has high face validity.
- It provides speedy results.
- It is relatively low in cost.

Data were also obtained by means of observation. Observation is used complementary to the interview surveys and provides insights into variables that have an impact on women working in the core activities of the mines. The observation method entails listening and watching other people's behaviour in a natural setting to allow some type of learning and analytical interpretation. The main objective of this method is to interpret and understand the observed behaviour, attitude and situation more accurately (Ghauri & Gronhaug, 2002:90). Kelleher (cited in Babbie & Mouton, 2011:295) highlights the following advantages of observation:

- It forces the observer to familiarise him-/herself with the subject.
- It allows the observer to note previously unnoticed or ignored aspects.
- People's actions are probably more telling than their verbal accounts and observing these are valuable.
- It is unobtrusive and when obtrusive, the effect wears off in reasonable time.

Observations were done while visiting the following different settings: the underground environment, the smelter, the concentrator, the refinery and different shafts. The researcher experienced the cage lifts and spent some time with geologists and other women working underground as well as with women working on the surface in core activities at the mines.

In addition, the researcher attended two Women in Mining Conferences held in 2010 and 2011. The conferences highlighted and outlined barriers and challenges facing the mining industry in respect of successfully bringing women into the mining sector. Both conferences were concluded with an interactive workshop. The first annual Women in Mining Conference workshop focused on strategic solutions for women in mining, including the identification of key change agents and practical plans for achieving effective female participation in the core business of mining. The second annual Women in Mining Conference workshop critically reviewed the progress achieved in respect of the commitments made by the sector 12 months prior. Furthermore, the workshop aimed at laying the groundwork for updating the sector's Women in Mining strategy and entrenching core achievements to date. A particular focus was placed on how best to operationalise the Women in Mining concept across all levels and stakeholders in the industry to address the critical barriers of negativity and resistance (Intelligence Transfer Centre, 2011). The workshops were facilitated by Sue Brandt and Maritha Marneweck of Managing Transformation Solutions (Pty) Ltd. Reports were compiled by Managing Transformation Solutions (Pty) Ltd, highlighting the major issues of the workshops, and were shared with the participants. 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 to the participants and by so doing avoid misunderstanding of questions and gain a better insight into the phenomenon of interest. In addition, the researcher could gain a deep understanding of the variables that have an impact on women in the mining sector.

1.6.6 Data analysis

The following data-analysis techniques were utilised:

1.6.6.1 Quantitative data analysis

Quantitative data obtained by questionnaires were analysed with the support and assistance of the Statistic Consultation Service of North-West University. The statistical software program SPSS 21.0 for Windows was used to analyse the data. Descriptive statistics and an exploratory factor analysis for each of the sections were provided.

1.6.6.1.1 *Descriptive statistics*

Descriptive statistics are used to describe the basic features of the data in a study, providing simple summaries about the sample and the measures. They form the basis of virtually every quantitative analysis of data and are used to present quantitative descriptions in a manageable form (Trochim, 2006). Quantitative data collected from structured questionnaires were reported in the form of frequencies, percentages and means.

1.6.6.1.2 *Exploratory factor analysis*

Factor analysis can be defined as a technique for identifying groups or clusters of variables (Field, 2005:619). For this study, principle axis factoring as factor extraction method with oblimin rotation was used. The rotated pattern matrix was explored for each section of the questionnaire to determine which items loaded highly on a factor, and these items were then used to label factors. Running the factor analysis, the following important values were considered and measured:

- The Kaiser-Meyer-Olkin measure of sampling adequacy

The Kaiser-Meyer-Olkin (KMO) measure can be calculated for individual and multiple variables and represents the ratio of the squared correlation between variables to the squared partial correlation between variables. KMO statistics vary between 0 and 1. A value of 0 indicates diffusion in the pattern of correlations, suggesting that factor analysis is likely to be inappropriate. A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors (Field, 2009:647). KMO values can be interpreted as follows (Hutcheson & Sofroniou, cited in Field, 2009:647):

- Factor analysis is considered to be inappropriate for values smaller than 0.5.
 - Values between 0.5 and 0.7 are mediocre.
 - Values between 0.7 and 0.8 are good.
 - Values between 0.8 and 0.9 are superb.
- Bartlett's test of sphericity

When conducting a factor analysis, the first thing to do is to investigate the intercorrelations between variables (statements). For a good factor analysis, these

intercorrelations should be very small. Barlett's test of sphericity is conducted to determine whether sufficient intercorrelation is present. Barlett's measure tests the null hypothesis that the original matrix is an identity matrix. Barlett's test of sphericity should be significant (the value of 'Sig.' should be less than 0.05). A significant test indicates that the *R*-matrix is not an identity matrix, suggesting that there are some relationships between the variables (Field, 2009:659). Furthermore, it shows that the data are suitable to be subjected to multivariate statistical analysis, such as factor analysis.

- Communalities

Communality is the proportion of common variance within a variable (Field, 2009:637). A variable that has no specific variance (or random variance) would have a communality of 1; a variable that shares none of its variance with any other variable would have a communality of 0. Once factors have been extracted, it could be determined how much variance is really in common (Field, 2005:637). The closer the communalities are to 1, the better the factors are at explaining the original data. The more factors retained, the greater the communalities will be because less information is discarded. Therefore, the communalities are good indices of whether too few factors have been retained (Field 2009:642). According to Hair *et al.* (1998), no statistical guidelines exist to indicate exactly what is 'large' or 'small'. The authors suggest that at least 30% of the variance of each item should be accounted for and items with communalities of less than 0.30 should be considered possibly problematic.

- Cronbach's alpha reliability coefficient

Cronbach's alpha coefficients were calculated for each factor to determine the internal consistency reliability of factors. According to Field (2009:675), the Cronbach's alpha should preferably be above 0.7. The Cronbach's alpha is to a large extent dependent on the number of statements in the factor; the larger the number of statements, the larger the possibility that the Cronbach's alpha will be higher (Cortina, cited in Field, 2009:675). Therefore, a considerable number of statements could result in a large Cronbach's alpha; the factor is not necessary reliable. On the other hand, a small number of statements could cause a lower Cronbach's alpha (Field, 2009:675).

- Pearson correlation coefficient

Pearson correlation coefficient is a standardised measure of the strength of relationships between two variables (Field, 2009:791). The correlation matrix can be used to check the pattern of relationships. The correlation between statements should preferably be of a

value greater than 0.3. If any variable is found with a Pearson correlation coefficient greater than 0.9, it is possible that a problem could arise due to multicollinearity in the data (Field, 2009:657).

- Effect size

Effect size is a measure of practical significance and is independent of sample size (Ellis & Steyn, 2003:1). Because an availability sample was used, p-values were not relevant and differences between means were examined for practical significance with effect sizes. Effect sizes for all the different sections were measured.

1.6.6.2 Qualitative data analysis

The objective of data analysis is to bring order, structure and meaning to the mass of collected data. A qualitative researcher must understand and gain insight into phenomena. Interpretation plays an important role in qualitative research. Miles and Huberman (cited in Ghauri & Gronhaug, 2002:138) distinguish between the following components in qualitative data analysis: data reduction, data display and conclusion drawing/verification.

Data reduction includes the process of selecting, focusing, simplifying, abstracting and transforming data gained from field notes or transcriptions. The task of the researcher is to focus, simplify and abstract to create significance and meaning of the mass of words and to arrive at valid explanations. Data display refers to an organised, compressed composition of information and include conclusions. It can be in the form of figures or data matrices. Drawing conclusions refers to when the researcher understands a specific phenomenon and is able to make a valid explanation.

Qualitative data obtained through semi-structured interviews, focus group discussions and observations were analysed by means of conceptual (thematic) analysis. In conceptual analysis a concept is chosen for examination and the number of its occurrences within the text is recorded. Conceptual analysis begins with identifying research questions and choosing a sample or samples. The text must then be coded into manageable content categories. Coding choices were made according to the following eight category coding steps indicated by Palmquist (cited in Babbie & Mouton, 2011:492):

- Deciding on the level of analysis
- Deciding on how many concepts to code for

- Deciding whether to code for the existence or frequency of a concept
- Deciding how to distinguish between concepts
- Developing rules for the coding of texts
- Deciding what to do with the data that are irrelevant
- Coding the data
- Analysing the results.

Data collected by means of focus group discussions, semi-structured interviews and direct observation were audio and video recorded and written notes were taken.

1.6.7 Strategies employed to ensure the validity and reliability of data

Reliability relates to the findings of the research and the credibility of the findings. Furthermore, reliability refers to the extent to which the obtained scores may be generalised to different measuring occasions, measurement/test forms and measurement/test administrators. This means that scores assigned to individuals should be consistent irrespective of the time and measurement, the test used and the person administering the test (Welman *et al.*, 2010:145).

Validity refers to the extent to which the research findings accurately represent what is really happening in the situation. It means that an effect or test is valid if it demonstrates or measures what the researcher thinks or claims it does (Coolican, cited in Welman, 2010:142).

Triangulation, the use of multiple methods, is considered as one of the best ways to enhance the validity and reliability of research. Triangulation can take place according to paradigms, methodologies, methods, researchers, and so forth (Babbie & Mouton, 2011:275). This research was triangulated by means of the following:

- A literature study and empirical review were conducted.
- The quantitative as well as qualitative research paradigms were used.
- Various data-collection methods were used. Quantitative data were collected through questionnaires, while qualitative data were collected by means of focus group discussions, semi-structured interviews as well as observations.

- Male and female employees in management positions as well as male and female employees working in the core business of mining were interviewed to obtain different perspectives on various issues that have an impact on women working in the core business of mining.
- The researcher also visited the different research settings (mines) and experienced the underground environment while spending some time with women working underground. She also visited the smelter, the concentrator and the refinery and spent some time with women working in core activities on the surface.
- In addition, Women in Mining conferences were attended in order to broaden and deepen the researcher's insight into the variables that have an impact on women working in the core business of mining.

1.6.8 Ethical considerations

The ethics of research include moral principles and values that influence the way the researcher conducts the research activities. The researcher has a moral responsibility to give honest and accurate explanations for the data gained and to report results objectively and honestly (Ghuri & Gronhaug, 2002:18). It is also of paramount importance to deal with the research subjects in an ethical and responsible manner.

The following ethical considerations were taken into account while conducting the research, based on recommendations by Babbie and Mouton (2011:520):

- Voluntary participation / Informed consent – no participant was forced to take part in the research and the participants were free to withdraw from the research at any moment in time.
- The participants did not suffer any physical and/or psychological harm – no participant was embarrassed and the researcher ensured that the research did not have unpleasant consequences for the participants.
- The participants were assured of their privacy, anonymity and confidentiality regarding information gathered during the study.
- The participants were informed about the aim, purpose and procedures of the study and were not deceived in any way.
- The research was conducted in a gender- and culture-sensitive way.

- The analysis and reporting of data were done on an ethical level – research methods and techniques were revealed and the participants and sources consulted were acknowledged.

1.6.9 Reporting

Quantitative results and qualitative findings are presented in an integrated way, according to relevant thematic issues. Quantitative data collected from structured questionnaires are presented in frequency tables, graphs and diagrams. Qualitatively, views of research subjects in personal interviews, focus group discussions and direct observations are reflected.

1.7 LIMITATIONS AND OBSTACLES OF THE STUDY

A major limitation and obstacle to the study is, as already mentioned, that the issue of gender and mining in all its facets is under-researched. There are a limited number of scientific sources in this field, especially primary sources. Another limitation to the study lies in the accessibility of the mining sector as 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 correspondence took place before permission was granted for the research. In addition, the platinum mine experienced many difficulties and labour unrest during the time the research was conducted. Because of that, several interviews with management were postponed and eventually cancelled. Furthermore, not all participants targeted for the semi-structured interviews and focus group discussions turned up for the meetings. Some of the participants could not stay for the duration of the interviews due to work responsibilities and emergencies. Others were drained and tired after shift work and wanted to depart 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 (such as the study promoter, who has worked extensively in this field; networks from the Bench Marks Foundation; and civil society networks) to overcome some of these problems.

1.8 CONTRIBUTION OF THE STUDY

The contribution of the study is the generation of new knowledge on gender issues in the mining sector, with specific reference to women employed in core mining activities or positions. A conceptual framework was developed for the mining sector that can be implemented and used in order to ensure sustainable employment and involvement of women in core mining activities or positions. Through the research it became evident that there are still many barriers to overcome, not only for female mine workers but also for male co-workers and management. The conceptual framework provides theoretical and practical measures that can be utilised by mining companies in an attempt to successfully address and overcome some of the barriers experienced in order to promote women's participation in the mining industry.

1.9 PREVIEW OF CHAPTERS

Chapter One provides a broad introduction to the study and explains the problem statement, research questions, objectives, methodology and contribution of the study.

Chapter Two comprises a theoretical discussion of the meta-theoretical 'origins' of the study and analyses applicable theories and perspectives on gender and gender inequality-related issues in order to gain better understanding of the background and social structure regarding women in mining.

In Chapter Three a critical discussion and interpretation of the impact of transformation and recent legislation on gender issues in South Africa in general and in the mining sector specifically are given.

Chapter Four outlines and analyses global and national trends and perspectives in terms of women in mining.

In Chapter Five, Six and Seven an integration of relevant empirical data takes place against the theoretical (Chapter Two and Chapter Four) and policy/legislative (Chapter Three) background. The core objectives of the study (see 1.4) are the focus of the chapter. The following main themes are covered in the chapters:

- Biographical information, company procedures and policies and workplace opportunities
- Infrastructure facilities, physical ability and health and safety in the workplace

- Workplace relations and general issues regarding the deployment of women in mining.

Chapter Eight concludes the study and offers recommendations to all stakeholders based on the conceptual framework that was developed through the study.

1.10 CHAPTER SUMMARY

This chapter provided the introduction to the research. The problem statement was outlined and the research questions and objectives were stated. Furthermore, an extensive review of the research methodology was reflected. The limitations and contribution of the study were discussed and a preview of the chapters was also provided. The next chapter (Chapter Two) provides a theoretical review of gender and gender inequality. Feminist theory and other applicable theories on gender inequality are scrutinised in an attempt to find some answers to existing inequalities in society as well as in the workplace. Furthermore, attention is paid to general issues that women experience in the workplace.