



**Sector Skills Plan for the Mining and Minerals Sector
Submitted by the Mining Qualifications Authority
(MQA) to the Department of Higher Education and
Training**

Update 2015/16

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MINING QUALIFICATIONS AUTHORITY

SYNOPSIS

1. Introduction and Background

The Sector Education and Training Authority (SETA) for the Mining and Minerals Sector (MMS) and the Mining Qualifications Authority (MQA), prepared this Sector Skills Plan (SSP) Update in accordance with new guidelines and requirements of the Department of Higher Education and Training (DHET). The main purpose of this SSP Update is to guide and inform skills development initiatives in the sector.

2. Research methodology

The research methodology used for this SSP Update included both quantitative and qualitative research methods. Secondary (desktop) research was conducted on economic, social and development status and strategies. The socio-economic analysis was undertaken by a review of existing literature in the public space and documents made available to the research team. This was complemented by a range of research projects undertaken by the MQA which included the mineral beneficiation research report and green skills within the MMS research reports.

The MQA Workplace Skills Plans (WSPs) and Annual Training Reports (ATR) complemented the national datasets available and weighted to provide an extent of the size, shape and nature of the sector. Thus national data sources and a range of statistical publications by Statistics South Africa (Stats SA), the DHET, South African Reserve Bank (SARB), Bureau of Economic Research (BER), Quantec, the Department of Labour and data from industry associations were used in the research process. Stakeholder consultations were also undertaken to enable triangulation of this data.

3. Sector Profile

This chapter highlights the shape and size of the MMS and details the performance and the contribution of the sector in economic and employment terms. The analysis revealed that South Africa is an important hub in the global mining value chain. However, the sector is currently facing some challenges which include:

- The sector's contribution to GDP has been decreasing over the last few years from around 8.5% in 2009 to 7.8% in 2014.
- There has been a decrease in number of people employed from a peak of 628 750 in 2012 to 525 247 in 2015.

It has been concluded that the short to long term outlook of the sector would be improved if the sector implements the Mineral Beneficiation Strategy and takes advantage of the SIPs projects. The overall sector analysis of the MMS revealed the following:

- The sector has a diverse range of stakeholders which include government departments, SOEs, employer and worker representatives.
- The MMS employment profile is mainly concentrated in the North West, Limpopo and Mpumalanga, and the companies vary from SMMEs (which employ less than 50 employees) to large corporations (which employ more than 5 000 employees)
- The MMS is male-dominated with 13% female employee composition.

- People with disabilities represent less than 1% of the total MMS sector labour force based on the 2015 WSP-ATR submissions for the MQA.
- White representation is higher than other groups in the MMS at the management level for both males and females.
- These racial disparities in the demographic composition of the industry signal the urgent need for role-players to do considerably more to redress workforce imbalances.

4. Key Skills Issues

There are a number of factors that have significant impact on the operation of the MMS which include economic, governance, social and legal. Some of the factors such as the fluctuations in the exchange rate are however beyond the ambit of the sector, but have a considerable impact on the current and future viability of the sector given its exports orientation.

The skills implication of the various strategic objectives captured in the MQA Strategic Plan and their alignment to the National Strategies of Government was provided. MQA has developed programmes to cushion the industry from the negative impacts of these change drivers. Overall, a proper implementation matrix of the New Development Plan, New Growth Path, IPAP 4, Skills Accord, NSDSIII and HRD-SA by the MQA and other mining stakeholders will provide correct and relevant strategies in addressing these change drivers.

The main “key skills issues” derived from these drivers include:

- Change in technology and technological infusion through foreign direct investment.
- Environmental ‘green economy.’
- Mineral beneficiation.
- Occupational health and safety.
- HIV and AIDS and
- Environmental Sustainability

5. Extent of Skills Mismatches

Analysis of MQA WSP-ATR submissions received in the 2015/16 financial year and comments from stakeholders at regional meetings suggest that supply is meeting current demand, owing to the low numbers of vacancies per occupation (as a percentage of the total number employed for each occupation). Absorptions in occupational vacancies were found to be related to geographic location, employment equity and industry attractiveness. The MQA’s role to assist the MMS to address the above challenges through interventions have been considerable. The following are the key features:

- Community development projects
- Learnership programmes
- Partnerships with TVET colleges
- Skills programmes
- The Maths and Science project
- Adult education and training
- HDSA programmes to address transformation in the sector
- Career awareness

The MQA is committed to ongoing research, monitoring and evaluation of these interventions.

6. Sector Partnerships

There have been both challenges and successes with existing partnerships, and measures were identified for deepening them and recommending possible new partnerships. The MQA currently has formal partnerships with six TVET Colleges in the provinces where MQA has a regional presence. It was highlighted that better collaboration is needed between the MQA, TVET Colleges and industry for improving access to workplace experience. Other recommendations include development programmes for lecturers of MMS-related subjects to improve quality of lecturing; continuation of TVET College support to ensure eventual accreditation of qualifications; and funding to be proportionately and expediently allocated to upgrade workshop facilities and equipment.

With regards to minerals beneficiation, greater collaboration between the MQA, industry councils and jewellery manufacturers needs to be put in place and official partnerships formed with mutual firm commitments to strategise the way forward to revive the industry, and , in particular to understand what the skills demand from industry will be.

With regards to green skills, a partnership with the Department of Water and Sanitation is recommended to mitigate the challenge of significantly reducing water levels, to combine strengths and avoid any duplication of work. Partnerships will also be formed with companies with R&D departments that focus on cleaner production research in clean technology and processes, and in the effective remediation of the impacts of mining on air, soil and water quality.

7. Skills Priority Actions


One key to thriving in the MMS is to have a properly skilled workforce which has the required skills to successfully embrace the opportunities of the ever changing mining landscape. Mining companies and stakeholders need to position the right people with the right skills, in the right jobs; therefore it is necessary to understand in which areas critical skills are lacking. Key areas of concern were identified regarding the skills gaps and mismatches associated with MMS subsectors through desktop research. The following skills priorities have been defined by the MQA as a result of the analysis in this SSP:

- Priority 1: Support transformation of the sector through skills development
- Priority 2: Core mining skills must continue to be developed through skills programmes
- Priority 3: Monitor and develop the skills required for Minerals Beneficiation
- Priority 4: Continue to improve Health and Safety standards
- Priority 5: Develop skills for sustainability.

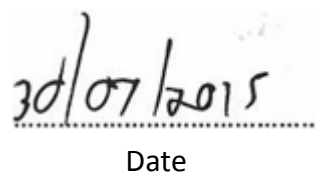
FOREWORD

The Mining Qualifications Authority (MQA) prides itself in ensuring that the Mining and Mineral Sector (MMS) remains at the cutting edge of skills development. In keeping up with this progression, this Board submits to the Department of Higher Education and Training (DHET) the Final Sector Skills Plan (SSP) update for the Mining and Minerals Sector for the period 2015/16.

The Sector Skills Plan has been prepared in accordance with the National Skills Development Strategy (NSDS) III for the period 2011 to 2016, and in accordance with the expectations of the DHET. This SSP has been presented to the Skills Research and Planning Committee. The improvement of the skills of our workforce is imperative for the economic development of our sector, for the improvement of our health and safety record and for the growth and wellbeing of all employees. The main purpose of this SSP annual update is to guide and inform skills development initiatives in the sector. It is the result of not only a thorough research process, but also of extensive data triangulation from primary and secondary data sources. The MQA scheduled stakeholder consultative sessions during the month of June 2015. Through stakeholder engagements the stakeholders take ownership of this plan and now all stakeholders are urged to work together to address the skills development priorities and to achieve the goals and objectives set in this SSP.



Mr David Msiza
Chairperson: MQA



Date

STAKEHOLDER ENDORSEMENT

This is the Sector Skills Plan update prepared by the Mining Qualifications Authority (MQA) for the Mining and Minerals Sector (2015 – 2016). It is submitted to the Minister of Higher Education and Training in partial compliance with the requirements of the Skills Development Act of 1998 as amended. The MQA was registered as a Sector Education and Training Authority for this sector on 20 March 2000. The Sector Skills Plan update is hereby endorsed by duly authorized representatives of the state, employer organizations and organised labour in this national economic sector.





Endorsed by	For	Title	Signature /Date
Mr David Msiza	State: Department of Mineral Resources, Trevenna Campus, Building 2 C, Cnr Meintjes and Schoeman Street, Sunnyside Pretoria. Private Bag X59, Arcadia 0007	MQA Board: Chairperson Chief Inspector of Mines - DMR	 30/07/2015
Mr Amon Teteme	Organised Labour: National Union of Mineworkers (NUM) 7 Rissik Str Johannesburg. P O Box 2424 Johannesburg 2000	MQA Board: Convener – Organised Labour Skills Development Officer - NUM	 27/07/2015
Mr Vusi Mabena	Employers: Chamber of Mines (COM) 5 Hollard Street Marshalltown. P O Box 61809 Marshalltown 2107	MQA Board: Convener – Employers Senior Executive: Transformation and Stakeholder Relations - COM	 27/07/2015
Mr Samuel Seepei	MQA: 7 Anerley Road Parktown, Johannesburg Private Bag X118, Marshalltown, 2017	Chief Executive Officer of the MQA	 27/7/2015

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ABBREVIATIONS AND ACRONYMS

Abbreviation / Acronym	Description	Abbreviation / Acronym	Description	Abbreviation / Acronym	Description
AET	Adult Education and Training	HRDSSA	Human Resource Development Strategy for South Africa	PGMs	Platinum Group Metals
APP	Annual Performance Plan	IMF	International Monetary Fund	PIVOTAL	Professional, Vocational, Technical and Academic Learning
ATR	Annual Training Report	IPAP	Industrial Policy Action Plan	PWC	Price Waterhouse Coopers
BBSEE	Broad-Based Socio Economic Empowerment Charter	IRM	Industrial Raw Materials	QCTO	Quality Council for Trades and Occupations
BEE	Black Economic Empowerment	KZN	Kwa-Zulu Natal	QES	Quarterly Employment Statistics
BER	Bureau for Economic Research	LDPM	Labour Demand Projection Model	QLFS	Quarterly Labour Force Survey
BRIC	Brazil, Russia, India and China	LED	Local Economic Development	R & D	Research and Development
BRICS	Brazil, Russia, India, China and South Africa	LP	Limpopo Province	RPL	Recognition of Prior Learning
B-Tech	Bachelor of Technology	LPC	Levy Paying Company	SA	South Africa
CEE	Commission for Employment Equity	LRA	Labour Relations Act	SAMDA	South African Mining Development Association
CLAS	Cement, Lime, Aggregates and Sand	MHSA	Mine Health and Safety Act	SANEDI	South African National Energy Development Institute
CPI	Consumer Price Index	MHSC	Mine Health and Safety Council	SARB	South Africa Reserve Bank
DBE	Department of Basic Education	MMCC	Mine Manager's Certificate of Competence	SBTC	Skills biased technological change
DHET	Department of Higher Education and Training	MMS	Mining and Minerals Sector	SDF	Skills Development Facilitator
DMR	Department of Mineral Resources	MNC	Multinational companies	SDT	State Diamond Trader
DoE	Department of Energy	MoA	Memorandum of Agreement	SERO	Socio-Economic Review and Outlook
DST	Department of Science and Technology	MoU	Memorandum of Understanding	SETA	Sector Education and Training Authority
DTI	Department of Trade and Industry	MP	Mpumalanga Province	SGB	Standard Generating Body
EAP	Economically Active Population	MPRDA	Minerals and Petroleum Resources Development Act	SHEQ	Safety, Health, Environment, Quality
EC	Eastern Cape	MQA	Mining Qualifications Authority	SIC	Standard Industrial Classification
ECSA	Engineering Council of South Africa	MTSF	Medium-term Strategic Framework	SMME	Small, Medium and Micro Enterprise
EM&D	Emerging Markets and Developing Economies	NC	National Certificate	SoEs	State-owned Enterprises
ETD	Education Training and Development	NC	Northern Cape	SSP	Sector Skills Plan
ETQA	Education Training Quality Assurance	NCV	National Certificate Vocational	Stats SA	Statistics South Africa
FDI	Foreign Direct Investment	NDP	National Development Plan	TVET	Technical and Vocational Education and Training
FET	Further Education and Training	NEET	Not in employment, education or training	UCS	Underhill Corporate Solutions
FS	Free State	NGP	New Growth Path	UoT	University of Technology
GCC	Government Certificate of Competence	NLPC	Non-Levy Paying Company	USD	United States Dollar
GDP	Gross Domestic Product	NQF	National Qualifications Framework	WC	Western Cape
GET	General Education and Training	NRF	National Research Foundation	WEO	World Economic Outlook
GP	Gauteng Province	NSA	National Skills Accord	WIL	Workplace-integrated Learning
HDSA	Historically Disadvantaged South African	NSDS	National Skills Development Strategy	WPPSET	White Paper for Post-School Education and Training
HEMIS	Higher Education Information Management System	NUM	National Union of Mineworkers	WSP	Workplace Skills Plan
HET	Higher Education and Training	NW	North West		
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome	OFO	Organising Framework for Occupations		
HRD-SA	Human Resource Development South Africa	OHS	Occupational Health and Safety		

1 SECTOR PROFILE

1.1. Introduction

The purpose of this chapter is to provide an overview of the Minerals and Mining Sector (MMS) in South Africa by describing the sector, to enable understanding of the:

- Scope of coverage,
- Key role players,
- How the sector contributes to the broader South African economy,
- The employer profile,
- The number of people employed in the sector and their demographics.

The methodology employed for the compilation of this chapter included extracting information from primary MQA data sources such as the WSP/ATR data (2015) which is representative of direct industry feedback to the MQA in respect of sector profile trends and skills requirements. Secondary data sources were utilised in the form of research publications from Stats SA (Labour Force Survey and Quarterly Employment Statistics), Quantec, the Department of Labour, the Department of Mineral Resources (DMR) and the Chamber of Mines. An analysis of the various sources of data mentioned above ensured that the characteristics of the sector were carefully considered and where inconsistencies were noted, these were corroborated to increase the reliability of the information sourced. One of the main challenges in using data from different sources is the methodologies and purposes for which this data was collected, which sometimes provides results based on their particular foci. Thus data from MQA includes a sector referred to as 'Services Incidental to Mining' which has important skills development implications for the remit of the SETA.

It is important to note that MQA data is based on weighted¹ WSP/ATR submissions received by MQA during the submission period.

Despite these limitations, the triangulation methodology allowed for credible analysis which enables this sector profile to provide the information necessary to an understanding of the context which is designed to inform the strategic planning required for skills planning in the 2015-16 financial year.

1.2. Scope of Coverage

The MMS is demarcated on the basis of the three-digit Standard Industrial Classification (SIC) codes that are used in capturing the data for the National Accounts. These mining activities are covered by the Standard Industrial Classification (SIC) codes 21000 to 29000, as well as a small component of manufacturing – namely the manufacturing of Cement, Lime and Plaster (SIC code 34240), Jewellery Manufacturing and Related Articles (SIC code 39210), the Cutting and Polishing of Diamonds (SIC code 39212) Jewellery and Related Articles (composed of precious metals, precious and semi-precious stones and pearls) (SIC code 39211) and Other Precious and Semi-precious Stones Precious and Semi-precious Stone Cutting and Polishing (SIC code 39219).

Based on the MQA SSP Update 2014/15-2020, the analysis of data covering the MMS SIC codes requires that the organisations in the sector be categorised into the following nine subsectors:

¹ An explanation of the weighting is found in Appendix B

- Coal Mining
- Gold Mining
- Platinum Group Metals (PGM) Mining
- Diamond Mining
- Other Mining, which includes the mining of iron ore, chrome, manganese, copper, phosphates and salt
- Cement, Lime, Aggregates and Sand (CLAS)
- Services Incidental to Mining
- Diamond Processing
- Jewellery Manufacturing²

The historical nature of mining is that not all subsectors fit neatly within the designated SIC codes and are classified under the category 'Services Incidental to Mining'. The categorisation according to SIC codes also assist the MQA in identifying scarce and critical skills and in planning for skills development for each category.

1.3. Key Role Players

1.3.1. National Government Departments

The MMS is a regulated industry and has several stakeholders, which range from government regulatory institutions, employer representatives and workers' unions. There are a number of government departments which are interlinked with the mining sector. The following tables set out the broad contributions that each department (Table 1), state owned enterprises (Table 2) and key industry stakeholders (Table 3) are making to the MMS.

Table 1: National Government Departments

Department	Role	Function in relation to mining sector and skills development
Department of Mineral Resources (DMR)	Mineral policy and regulation	<ul style="list-style-type: none"> • Mineral policy and promotion • Administer the Minerals and Petroleum Resources Development Act No. 28 of 2002 (MPRDA) • Mine health and safety and enforcement and monitoring implementation of the Mining Charter.
Department of Energy (DoE)	Energy minerals policy, regulation, & energy supply	<ul style="list-style-type: none"> • Promoting energy minerals. The main relevant commodity for MMS is coal.
Department of Higher Education and Training (DHET)	TVET, HET, Skills Development, School of Mines	<ul style="list-style-type: none"> • Planning for higher education provision to the mining sector • Setting up national skills development agenda via the regulation of SETAs, including MQA • Career awareness

² The full subsector SIC codes and description of activities is contained in Annexure B

1.3.2. State owned enterprises that play a role in the MMS

Table 2 below lists some of the main state owned enterprises (SOEs) which are involved in MMS research, compliancy monitoring, skills development and promotion of minerals among others.

Table 2: MMS State Owned Enterprises and their Roles

State Owned Enterprises	Role	Function in relation to MMS and Skills Development
Mine Health and Safety Council	Occupational Health and Safety	<ul style="list-style-type: none"> Improving and promoting occupational health and safety in the mining industry Liaise with MQA about MHS and skills development
Mintek	Mineral processing and Metallurgy	<ul style="list-style-type: none"> R & D expertise; intellectual capital-engineers, scientists and technologists Provide physical infrastructure of modern laboratories, pilot plant and workshops which can be used by MQA in skills development
Engineering Council of South Africa (ECSA)	Regulation of the engineering profession	<ul style="list-style-type: none"> Accreditation of engineering programmes, Registration of persons as professionals in specified categories, and Regulation of the practice of registered persons.
South African Diamond and Precious Metals Regulator	Diamond and Precious metals regulation	<ul style="list-style-type: none"> Regulation of diamond, gold and PGMs Skills transfer Business development support Local beneficiation
State Diamond Trader	Buying and selling of rough diamonds	<ul style="list-style-type: none"> Promote equitable access to beneficiation of diamond resources Develop South Africa's diamond cutting and polishing skills

1.3.3. MMS Key Industry Stakeholders

Table 3 shows some of the key industry stakeholders which are involved in advocacy, promotion and other industry development initiatives.

Table 3: Key Industry Stakeholders

Industry Stakeholder	Role	Function in relation to MMS and Skills Development
Chamber of Mines of South Africa	Creating partnerships with key stakeholders	<ul style="list-style-type: none"> Establish conducive policy, legislative and operating environment
Copper Development Association (Pty) Ltd	Copper industry representation	<ul style="list-style-type: none"> Promote and expand the use of copper and copper alloys Marketing and promoting skills which can be adopted in MQA learning materials

Industry Stakeholder	Role	Function in relation to MMS and Skills Development
Federation of SA Gem & Mineralogical Societies	Earth science clubs	<ul style="list-style-type: none"> • Assist in formation of earth science clubs and societies • Marketing and promoting skills which can be used in MQA training materials
South African Mining Development Association (SAMDA)	Lobbying to government and organised labour	<ul style="list-style-type: none"> • Junior mining³ initiative by South African junior mining investor. • Create enabling environment for raising finance. • Develop technical and other skills. • Practice responsible environmental management and sustainable development

1.3.4. MMS Worker Representatives

The mining sector is highly unionised with a great number of employees represented or affiliated to a union. Mine unions are amongst the most active and vocal unions in South Africa and their activities have a significant bearing on the productivity in the MMS. Amongst unions is the National Union of Mine Workers (NUM)⁴, which is recognised by the MQA. NUM represents and organizes the majority of mine, construction and energy workers and protects, promotes and advances the interests of its members.

1.4. Economic Performance

As a key sector in South Africa, the MMS has a vital role to play in South Africa's economic and social development. This section provides an overview of the importance of the sector to the country. The data used in this section is obtained from current information sources including DMR, Stats SA and current information from related publicly available data sources, eg. Chamber of Mines reports.

1.4.1. Overview of the Structure of the MMS

South Africa accounts for 96% of known global reserves of the platinum group metals (PGMs), 74 % of chrome, 26% manganese and 11% of gold reserves. As a leading producer and supplier of a range of minerals, the country offers a highly competitive investment location ensuring that it can meet specific trade and investment requirements of prospective investors and business people, whilst also meeting the development needs of its populace.

South Africa remains one of the largest net exporters of minerals and metals. In the mining industry South Africa is an important global hub with deep backward vertical integration and a fully-fledged supply industry serving both South African and foreign companies.⁵ The MMS has played a key role in the country's economic development, which has transformed South Africa into the most industrialized country in Africa. It has also been the principal driver of the current infrastructure network which now underpins jobs in many other sectors. The New Development Plan and New Growth Path both recognize the critical role that mining contributes in growing investments,

³ Junior mines have an asset base of between R50 million and R7 billion. Those above these thresholds are referred to as 'majors' and below these are 'small scale miners'.

⁴ Apart from NUM there are other unions which are active in the MMS.

⁵ African Economic Outlook, 2014.

exports, GDP and job creation. The finance from mining also circulates throughout the economy, affecting sectors as diverse as financial services and housing.

1.4.2. Overview of the MMS Subsectors

1.4.2.1. Coal mining

The South African coal mining industry is ranked 7th in the world in terms of production and 6th in terms of reserves, contributing 3.6% to global output. Total coal sales by value increased by 23% from 2010 to an amount of R87.8 billion. In 2011, 58% of local coal by value (roughly one quarter in terms of volume) was exported. South Africa exports coal to 34 countries, with the European Union being the primary market (84.5%). Over 80% of the country's saleable coal is supplied by the five largest mining groups. Coal reserves, and therefore mining activity, are predominantly in Mpumalanga and Limpopo⁶.

1.4.2.2. Gold mining

The South African gold mining industry is ranked first in the world in terms of gold reserves and fifth in the world in terms of production.⁷ Three of the world's ten largest gold mining companies have headquarters in South Africa and are multinational corporations with operations in Australia, West Africa and South America. Gauteng dominates in gold mining accounting for approximately fifty-percent of South Africa's production. North West follows (23.1%); Free State (21.3%); Mpumalanga (4.5%) and Limpopo (1.2%). Roughly 5% of South Africa's gold production is beneficiated locally to coins and jewellery.⁸

1.4.2.3. PGM mining

PGM consists of six chemically similar elements: platinum, palladium, rhodium, ruthenium, iridium and osmium. The South African reserve base constitutes of 87.7% of the global reserves and the country contributes around 58.7% to global production, ranking first in both categories. South African reserves are concentrated mainly in North West and Limpopo and these two provinces contribute 63.5% and 30.2% respectively to national production. The PGM mining subsector consists of a small number of very large companies.

1.4.2.4. Diamond mining

South Africa was ranked fifth in the world in terms of diamond production by value in 2009, after Russia, Canada, Botswana and Angola.⁹ In South Africa, deposits are concentrated in the Northern Cape and Limpopo. De Beers Consolidated Mines dominates South African diamond mining, with mines in South Africa, Botswana, Namibia and Tanzania. It contributed 29% of global production by mass and 41% by value in 2007. South African diamond production increased by 12.4% from 7.2 million carats in 2012 to 8.1 million carats in 2013¹⁰. There are, however, some alluvial mining activities on a small scale in diamond mining operations.

⁶ Mwape P, Roberts MJ, Mokwena E, Musi L, Tjatjie T, Mnguni M, Mashaba P, Kwata PG. *Part One: South Africa's Mineral Industry – General Review*. Department of Minerals and Energy, South Africa's Mineral Industry, 2007/2008.

⁷ Chamber of Mines. *Facts and Figures booklet*, 2012.

⁸ Mwape P, et al. (2008): *South Africa's Mineral Industry: Part One-General Review*. DMR

⁹ Chamber of Mines. *Facts and Figures booklet*, 2012.

¹⁰ Chamber of Mines, FACTS & Figures, 2014

1.4.2.5. Other mining commodities

Included in this bracket, are producers of uranium, copper, iron ore, manganese and salt. Uranium production is a by-product of gold mining and distribution of the sector mirrors that of gold mining. South Africa's copper deposits lie mainly in Limpopo with copper being mainly mined by one large company.

In terms of iron ore, South Africa is ranked 13th in the world for reserves; 6th for production and 5th for exports. Manganese is ranked 1st in the world in terms of reserves, 2nd in production and 2nd for exports. Manganese, copper and iron ore production increased respectively by 22.5%, 15.7% and 6.6% from 2012 to 2013¹¹. Iron ore and manganese deposits are concentrated in the Northern Cape Province.¹²

1.4.2.6. Cement, lime, aggregates and sand (CLAS)

The CLAS subsector is dominated by small and medium sized mining companies. The vast majority of small-scale mining applications (90%) also fall into this group of industrial commodities. Most sales are localised with aggregates with sand contributing 43% to total sales, limestone and lime 21%; and phosphate and concentrate 15%. Large firms in this subsector include cement manufacturers, phosphates, vermiculate and dimension stone producers. Dimension stone is also exported in bulk.

1.4.2.7. Services incidental to mining

The services incidental to mining consist of a large group of relatively smaller companies. The mining subsector consists of an array of companies that provide services to the mining sector. This includes organisations involved with research and development in the mining and mineral extraction, training, catering services, payroll services, manufacturing, distribution, hiring and maintenance of machinery and equipment used in mining, mining consulting services, and shaft sinking, transportation and logistics.

1.4.2.8. Diamond processing and jewellery manufacturing

The South African diamond processing industry consists of 221 licenced diamond manufacturers. The diamond trading company of De Beers is the major supplier of rough diamonds to the sector although some are sourced from local independent mines and others imported from Belgium, a major global diamonds buyer of rough diamonds. The Master Diamond Cutters' Association has 80 members which employ 95% of the employees in this subsector.¹³ South Africa's State Diamond Trader (SDT) was launched in February 2008 and is mandated to purchase 10% of South Africa's rough diamond production and to sell these to local beneficiaries.

Firms in the jewellery subsector benefit mining outputs such as precious metals (gold, platinum and silver) and diamonds in the manufacture of jewellery for both the domestic and the export markets. The majority of the companies in this subsector are small. The jewellery manufacturers are located mainly in Gauteng, Western Cape and KwaZulu Natal. Jewellery manufacturing is very often combined with the wholesale or retail sale of jewellery products, hence, many of the jewellery manufacturers are registered with the Wholesale and Retail SETA (W&RSETA).

¹¹ Chamber of Mines, FACTS & Figures, 2014

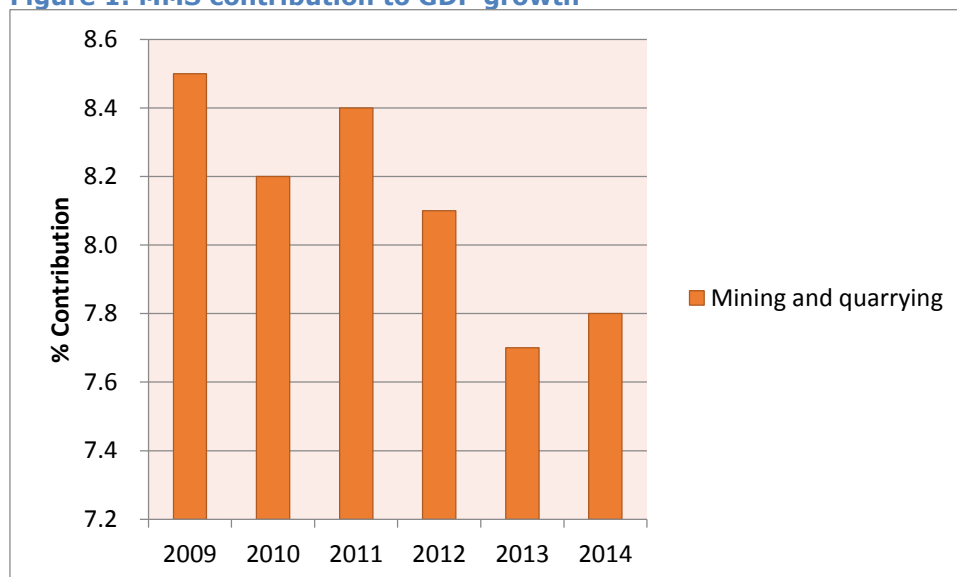
¹² Chamber of Mines, Facts and Figures

¹³ <http://www.essentialsjewelry.com/southafrica-gem-jewelry/south-africa-rough-diamond.html>

1.4.2.9. Sector contribution to GDP

The MMS¹⁴ was the 6th largest contributor to GDP¹⁵ in 2014. Figure 1 below shows that the MMS's contribution to national GDP has been decreasing over the years from 8.5% in 2009 to 7.7% in 2013, and marginally picking up to 7.8% in 2014.

Figure 1: MMS contribution to GDP growth



Source: Stats SA, 2014

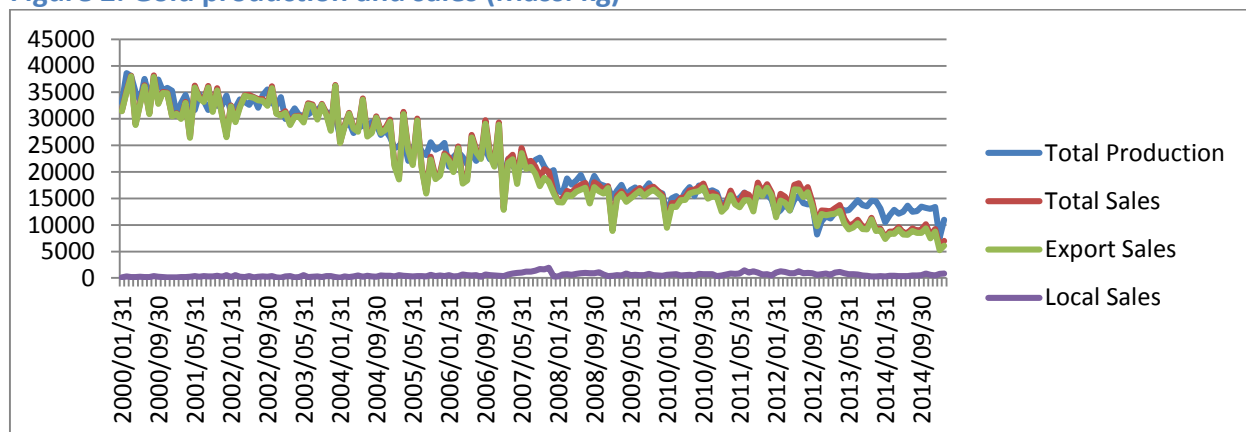
The mining industry was interrupted by widespread strikes in 2012, 2013 and during the first half of 2014, resulting in a decline in mining activity in the first quarter (with a decline of -22.8%) and second quarter (with -3.0% decline). This was followed by positive growth during the second half of the year, with mining expanding by 3.9% in the third quarter and 15.2% in the fourth quarter. The increased mining activity in the fourth quarter was due to higher production in the mining of 'other' metal ores (including platinum) and 'other' mining and quarrying (including diamonds).

1.4.3. Mineral Production and Sales Trends

Analysis of production and sales trends of major minerals gives a better picture of the MMS performance over the years. Figure 2 below shows that total gold production in terms of kilograms has been decreasing sharply. Total monthly production fell from around 40 000kgs in 2000 to less than 15 000kgs in 2015; a 67% decrease in 15 years. The same trend was recorded in silver, though the decline in silver is not as steep.

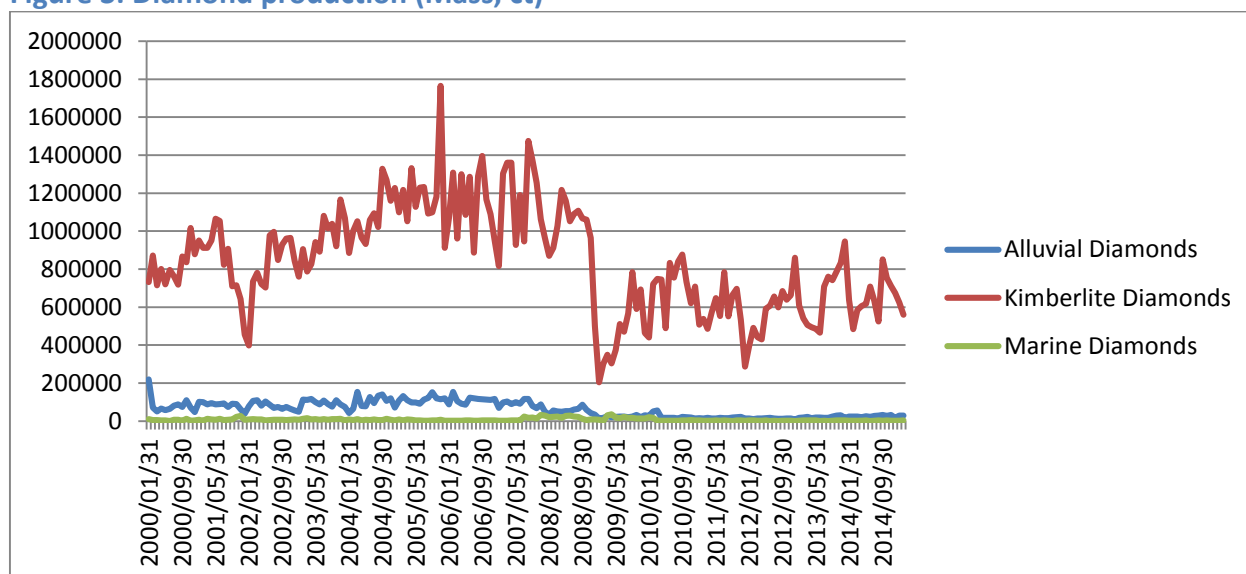
¹⁴ The national accounts data only covers mining & quarrying and not the total MMS. No separate information is available on the performance of the beneficiation components of the MMS (the diamond processing and jewellery manufacturing subsectors) and the services incidental to mining subsector. This economic overview thus focuses on the mining & quarrying sector.

¹⁵ The relative size of each industry for the year 2014 is the share of its real value added of the GDP for the year 2013.

Figure 2: Gold production and sales (Mass. kg)

Source: Quantec/DMR (2015)

Figure 3 below shows diamond production in SA from the year 2000 to the first quarter of 2015. The most popular type of diamonds is kimberlite followed by alluvial and marine. The production of the latter two types of diamonds has been decreasing over the years and is now 28 648 and 3 375 carats respectively for the month of February 2015. The general trend however is that total diamond production is decreasing.

Figure 3: Diamond production (Mass, ct)¹⁶

Source: Quantec/DMR (2015)

1.4.4. Mineral Sales and Exports

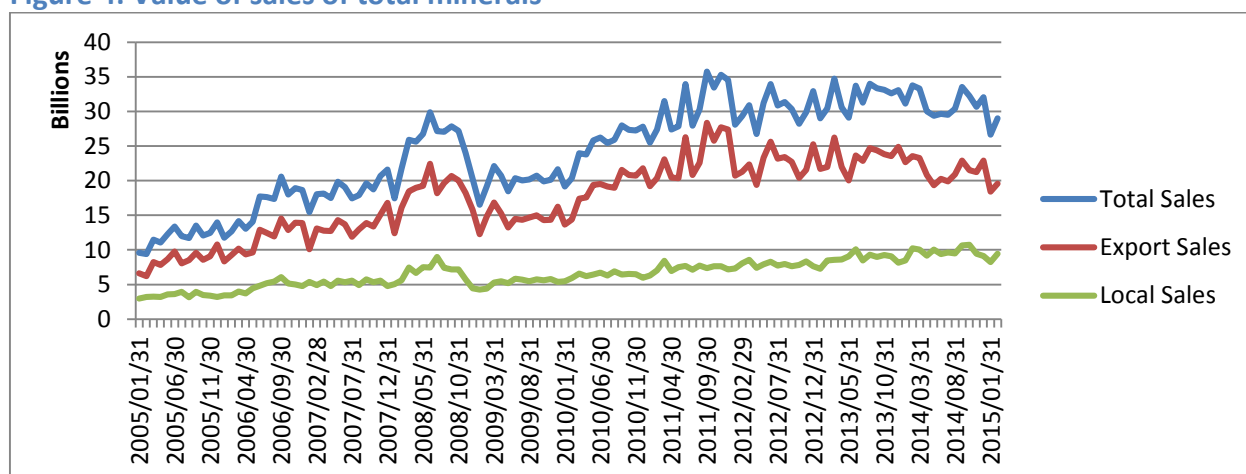
The trends for the demand of South African minerals as shown by the total sales for the period 2010-2014 indicate an annual average of R350 billion. Revenue decreased by 2.5% in 2014 from the total sales figure of about R385 billion in the previous year. Gold companies reflected the best growth with a 25% increase, while platinum companies recorded a 2% growth. The remainder of the companies recorded an average increase in revenue of 22%. Stagnant platinum revenues reflect the suppressed prices experienced since 2012 and lower production as a result of industrial action at Impala Platinum's Rustenburg operations.

¹⁶ The carat (ct) is a unit of mass equal to 200 mg (0.2 g; 0.007055 oz) and is used for measuring gemstones and pearls.

To highlight the fact that South Africa is one of the largest net exporters of minerals and metals in the world, sales of over R1.3 trillion went to the export market representing about 73% of the total mineral sales for the period 2010-2014. Local sales have also been on an upward trend with sales of R116 billion being 53% more than the 2010 sales. This growth can be partly explained by emergence of the “middle class” especially in view of the fact that the “middle class” is generally considered the “consumer class”.

Figure 4 below shows that total sales peaked around 2011 and have been decreasing gradually. The decrease is attributed to the decrease in exports, since local sales have been increasing steadily.

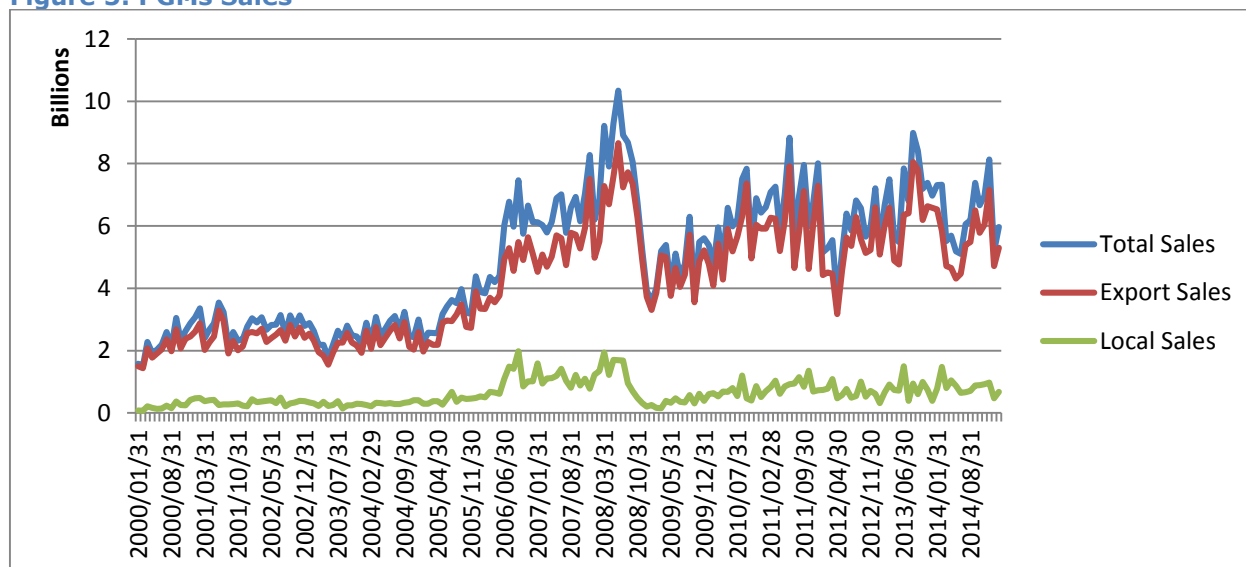
Figure 4: Value of sales of total minerals



Source: Quantec/DMR (2015)

Figure 5 below shows that sales of PGMs have been following the overall MMS trend. PGMs total sales peaked in 2008 then fell sharply in the same year. From then on the sector has been on the recovery path, but has not fully recovered to the 2008 peak. Local sales are relatively small.

Figure 5: PGMs Sales



Source: Quantec/DMR (2015)

Figure 5 also shows that there has been a lot of fluctuations in the production and sales of PGMs. The National Treasury¹⁷ attributes this weak performance to the persistent mining strikes, weaker global demand, electricity constraints and long-term maintenance requirements.

1.4.5. MMS future outlook

1.4.5.1. Mineral beneficiation

Beneficiation refers to the transformation of a mineral (or a combination of minerals) to a higher value product, which can either be consumed locally or exported. The term is used interchangeably with “value-addition” (DMR, 2011). Mineral beneficiation is premised on the proposition that “opportunities exist along the mining value chain from extraction, processing to shipping and beneficiation of minerals such as diamonds, copper, lead, zinc and manganese are some of the potential investment areas in the sector” (Underhill Corporate Solutions, 2013)¹⁸.

The government’s Beneficiation Strategy (DMR, 2011) selected ten strategic mineral commodities from which five value chains were outlined. The five mineral value chains and corresponding minerals are (i) energy commodities (coal and uranium and thorium), (ii) iron and steel, (iii) pigment and titanium metals production, (iv) autocatalytic converters and diesel particulate filters, and (v) jewellery fabrication (which includes gold, PGMs and diamond).

Exports data on iron and steel shows that ferroalloys are the highest exported commodity from South Africa. Ferroalloys are used as deoxidizers and alloy additives in the steel manufacturing process, and therefore are a raw material. If Ferroalloys are used locally, there is potential to boost the steel manufacturing industry and create the much needed jobs. The skills requirements for mineral beneficiation in jewellery manufacturing include jewellery designer/evaluator, diamond and gemstone cutter, gemmologist, diamond and gemstone setter, goldsmith, gemstone machine operator, product assembler and jewellery processing and finishing machine operators.

1.4.5.2. Strategic Infrastructure Projects (SIPs)

There are 2 out of 18 SIPs which have a direct bearing on the MMS; SIP 1: Unlocking the northern mineral belt with Waterberg as the catalyst, and SIP 4: Unlocking the economic opportunities in North West. According to Presidential Infrastructure Coordinating Commission (PICC, 2012)¹⁹ SIP 1 is the largest of the 18 SIPs projects by project value and is estimated at around R803 billion. The Waterberg Coal Complex in Lephalale is amongst the richest untapped mineral resources in the country and is a source for future coal reserves both for local and international use. The focus of SIP 1 is to unlock mineral resources which will generate thousands of direct jobs across the areas unlocked. The urban development in the Waterberg is championed as the first major post-apartheid new urban centre which will be a “green” development project. Primary minerals on SIP 1 include coal (18 bn tons), chromite (5, 5 tons), platinum (6, 3 tons) and palladium (3, 6 tons). On the other hand, SIP (SIP 4) is linked to mineral beneficiation. It involves the facilitation of development of the mining sector by opening up beneficiation opportunities in the North West province (PICC, 2012).

¹⁷ National Treasury (2015). 2015 Budget Review, <http://www.treasury.gov.za/documents/national%20budget/2015/review/chapter%202.pdf>

¹⁸

http://www.merSETA.org.za/Portals/0/merSETA%20Regional%20Sector%20Skills%20Plan_%20Free%20State%20%20Northern%20Cape%2004092013.pdf

¹⁹ PICC (2012) A Summary of the South African National Infrastructure Plan. http://www.gov.za/sites/www.gov.za/files/PICC_Final.pdf

Both SIP 1 and 4 would require new skills and there is potential for the creation of additional MMS related jobs. The major occupational categories likely to be in demand include artisans, project managers and other green related skills. The MMS therefore need to start preparing for the expected increase in demand for skills.

1.5. Employer Profile

The employer profile is obtained primarily from the weighted²⁰ data obtained from the WSP/ATR dataset obtained by the MQA for those companies that are required to submit these in 2015. An assessment of the proportion of companies submitting WSPs is illustrated below. It reflects a steadily increasing number of submissions from 2007 to the current year.

Table 4 below shows the number of levy paying companies in the MQA and the number of WSP submissions over the last 8 years. There are currently 1 682 levy payers in the sector, which is an increase of 30% from the 2007/2008 financial year. According to DHET (2015) statistics, the figures indicate that 35% of the levy payers submit their WSPs. For this financial year, the number of levy payers is 609 representing a 6% increase from last year.

Table 4: No of companies submitting WSPs

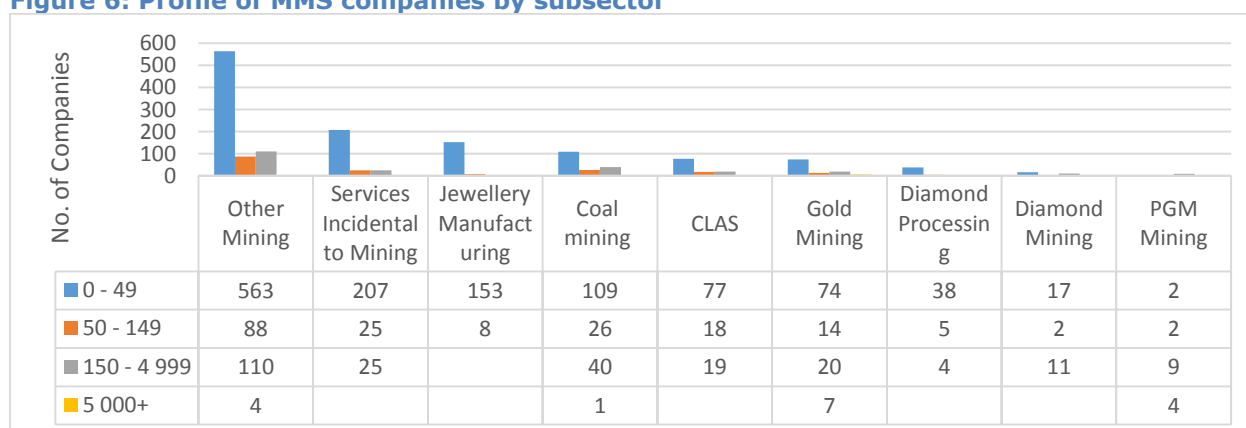
Year	Levy payers	WSP Submitted	%
2007/2008	1,289	307	23.8
2008/2009	1,442	373	25.9
2009/2010	1,294	466	36.0
2010/2011	1,480	598	40.4
2011/2012	1,398	612	43.8
2012/2013	1,616	607	37.6
2013/2014	1,539	585	38.0
2014/2015	1,564	573	36.6
2015/2016	1,682	609	36.2

Source: DHET (2015)

1.5.1. Size of companies in the MMS

The figure below shows the number of companies paying levies in the MMS by size.

Figure 6: Profile of MMS companies by subsector



Source: DHET (2015)

²⁰ The detailed explanation of the weighted data formula is contained in Annexure A.

Figure 6 above shows that the greatest proportion (74%) of MMS companies are categorised as small employers (less than 50 employees), followed by '150-4 999' which constituted 14%. There were 16 large employers of 5000 or more employees, which constitutes 1% of the number of companies in the MQA system.

An analysis of companies by subsector shows that a greater number of companies in the MMS are involved in other mining (765) followed by those who offer services incidental to mining (257) and the third highest is coal mining (176). Gold mining has the greatest number of big companies (7), which suggest that the mineral is capital intensive.

1.5.2. Mining start-ups and closures

In the MMS sector most mining operations are large but small-scale mining also forms an important part of the sector. On analysis of sustainability of mining entities in South Africa, mainly small scale entities experience challenges with sustainability which is attributed to the capital intensive nature of the industry as well as broader market dynamics. Small-scale mining is defined on the basis of the guidelines provided for in the National Small Business Amendment Act (2004) as mining activity that employs fewer than 50 people and has an annual turnover of less than R7.5 million and gross asset values of less than R4.5 million. However as entities do not fit neatly into this category, classification is often difficult.²¹ Using the number of employee categorisation, Table 4 above shows that the MMS has around 1 240 SMMEs.

Entrepreneurs in the small, medium and artisanal mining sector need to be supported so that they perform efficiently and within the codes and regulations of the sector at large. Historically entities within this categorisation have been challenged by issues of economic viability which has had a direct impact on levels of sustainability. In order to mitigate these challenges the MMS has prioritised the beneficiation of mineral resources into commercial products to ensure long term sustainability for small scale mining. The role of the MQA is to provide training and skills development in support of this strategy to ensure that SMMEs in the MMS enjoy increased support and mainstream participation in the mining sector.

During stakeholder engagement sessions conducted by the MQA in 2015, key stakeholder participants identified three major areas that impede sustainability and longevity of jewellery manufacturing which include:

- Finance-related issues: obtaining finance, obtaining equipment, etc.
- Labour issues: health and safety and working conditions.
- Legal and market constraints: obtaining permits, transport, tax regimes and selling arrangements.
- Difficulty and high cost of attracting and retaining suitably skilled people. Small companies, especially those in more rural areas are affected the most.

²¹ MQA-CSMI, Small Scale Mining Colloquium, Johannesburg, South Africa – Report and Analysis of Outputs, September 2010.

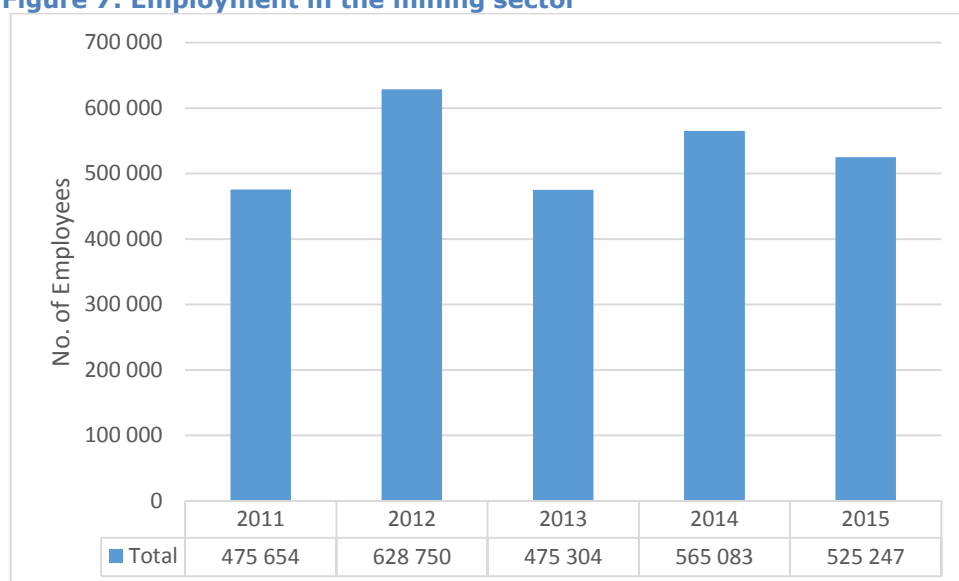
1.6. MMS Labour Market Profile

South Africa is faced with high unemployment. According to Statistics South Africa (2015), the unemployment rate is 26.4%²². Between 2008 and 2014, the number of employed persons increased from 14.6 million to 15.1 million.

1.6.1. Employment in the MMS

The MMS employed an estimated 525 247 people in the sector in 2015. As shown in Figure 7 below, total employment in the MMS peaked to 628 750 in 2012 and has been decreasing. This decrease in employment is following the same trend as mining production and sales (discussed above). The MMS declining performance is negatively impacting on jobs.

Figure 7: Employment in the mining sector

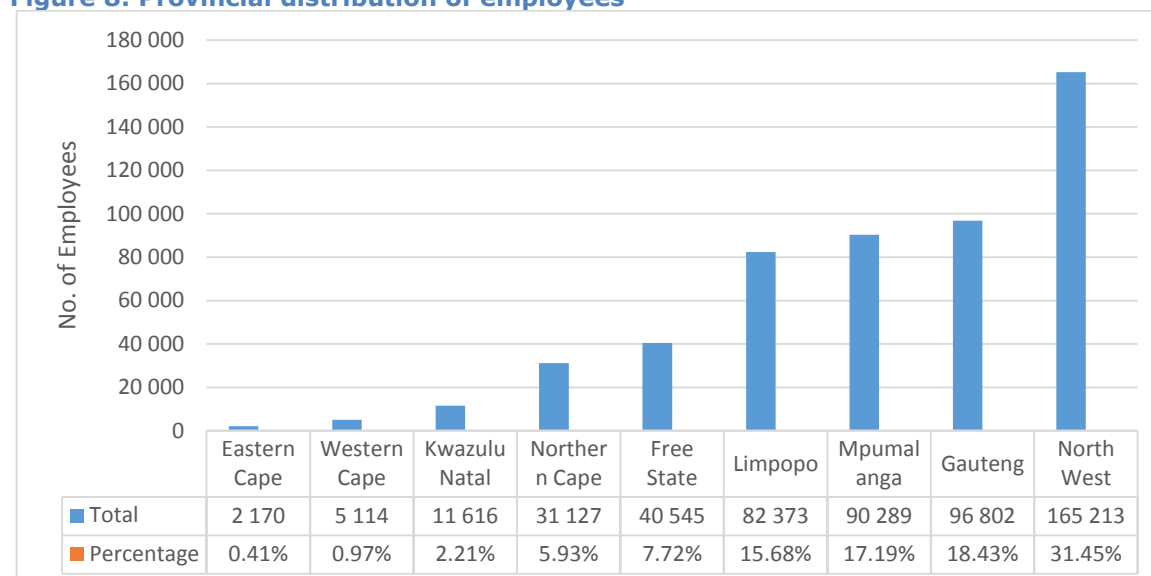


Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

1.6.2. Provincial distribution of employees

In terms of provincial distribution, there is a high density of mining employees in the North West, Gauteng, Mpumalanga and Limpopo Provinces. Collectively, employees in these four provinces comprise about 83% of total employment in the sector as displayed in Figure 8 below. Western Cape and KZN have lower employment numbers with the Eastern Cape having the lowest.

²² StatsSA:Q1 report

Figure 8: Provincial distribution of employees

Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

In terms of skills development, it is essential that adequate skills provision exist for provinces whose economies are reliant and highly driven by the MMS. There is a need to align skills development interventions to the local economic development needs of the particular provinces. This requires the MQA to analyse and understand provincial labour markets and economies²³. Training interventions may, however, vary from province to province based on the local needs.

1.6.3. Employment by occupational categories

Table 5 below shows current employment figures by occupational groups.

Table 5: MMS employment by main occupational category (2015)

OFO major groups	Total	%
Managers	14 165	2.7
Professionals	26 601	5.1
Technicians and Associate Professionals	61 145	11.6
Clerical Support Workers	22 315	4.2
Service and Sales Workers	6 419	1.2
Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers	39 677	7.6
Plant and Machine Operators and Assemblers	213 412	40.6
Elementary Occupations	131 172	25
Learners	10 341	2
Total	525 247	100

Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

The skills required for the mining sector vary from highly skilled managerial and professional occupations to unskilled labour (elementary occupations). The table above shows the proportions of occupational categories within the MMS. Table 5 above shows that the majority of the employees are plant and machine operators and assemblers (40.6%), followed by elementary occupations (25%) and technicians and associate professionals come at a distant third (11.6%). The

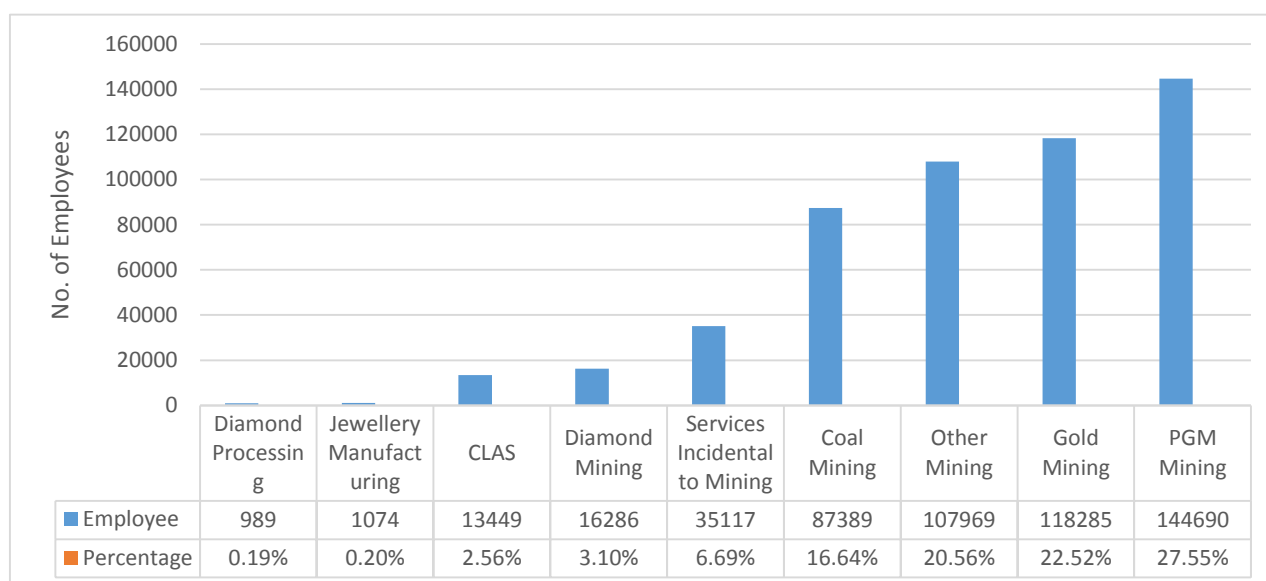
²³ MQA is currently conducting Regional SSPs which will help in identifying region specific skills development issues.

smallest category of workers is the service and sales workers, which constitute only 1.2%. Professionals constitute 5.1% while managers constitute 2.7% of the total MMS workforce.

1.6.4. Employment per subsector

Figure 9 shows employment trends by MMS subsector. The figures illustrate that most employment is in the PGM sector (27.5%) followed by Gold Mining (22.52%) and other Mining (20.5%) and Coal (16.6%).

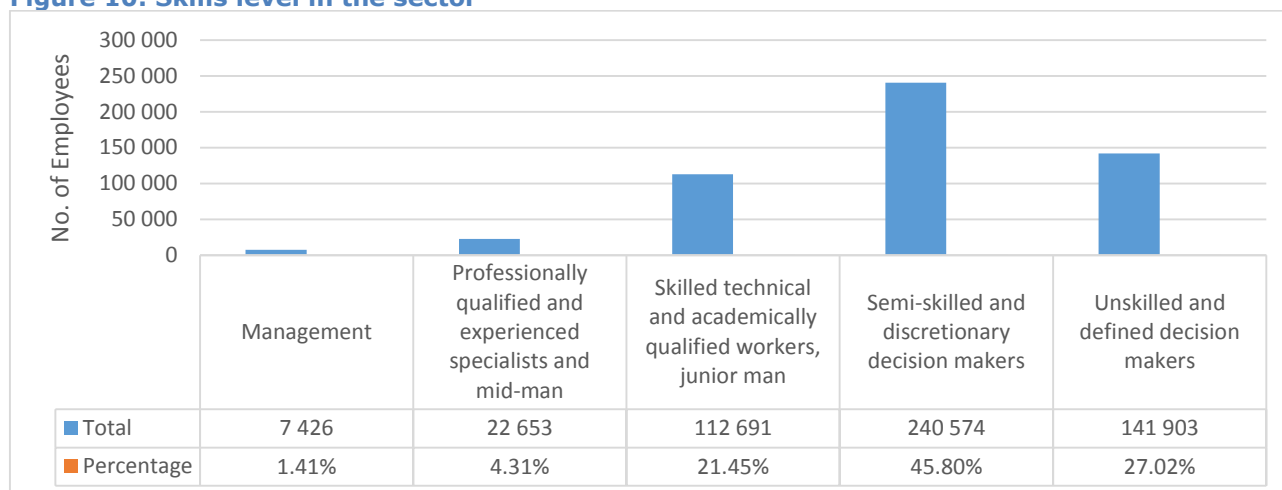
Figure 9: Employment per subsector



Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

The beneficiation sectors (Diamond processing, Jewellery Manufacturing) make up less than 1% of the total (Diamond Processing at 0.19% and Jewellery Manufacturing (0.25%). This means that there is potential for considerable expansion and job creating in this sub-sectors.

Figure 10 below shows the skills level in the mining sector. The majority of the employees are semi-skilled (45.8%) followed by the unskilled category (27%). This means that there is still considerable room for improving the skills levels in the workforce.

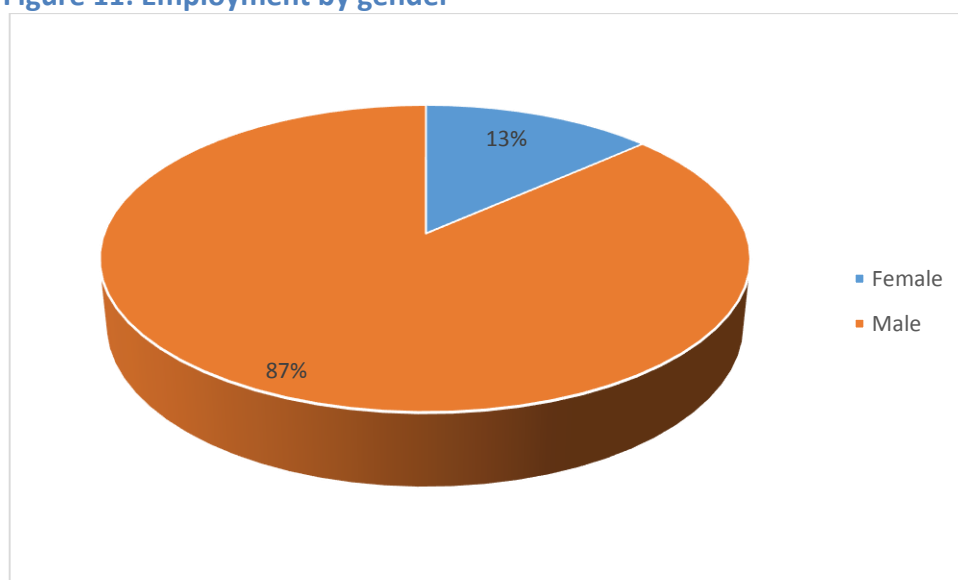
Figure 10: Skills level in the sector

Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

Stakeholder engagements revealed that there is lack of skilled middle managers in the MMS. Furthermore, the following skills have been identified as crucial to making MMS competitive: general management, supply chain management, project management, planning and exploration.

1.6.5. Employee profile

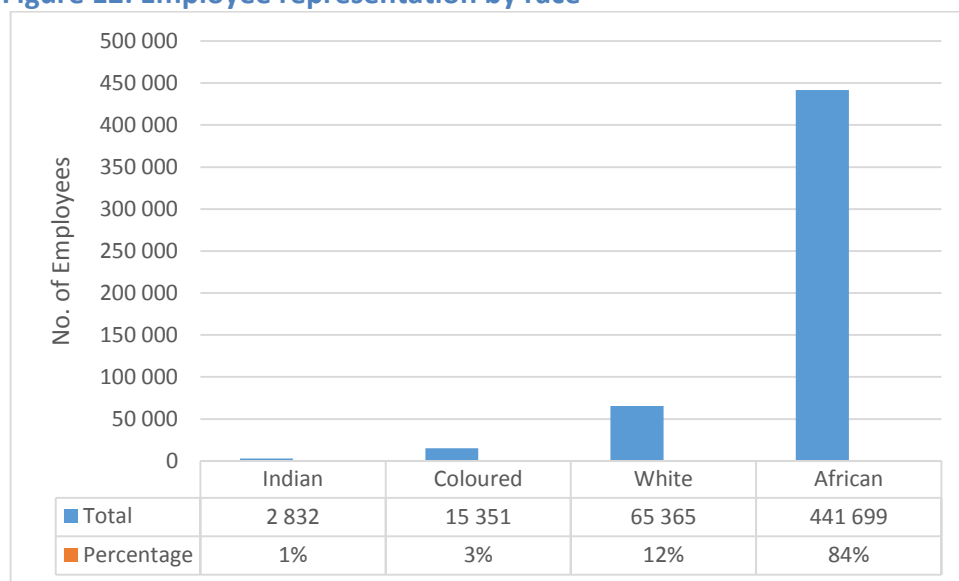
Figure 11 shows that males make up 87% of the MMS labour force and women constitute 13% in 2015. The 13% representation of women is well below the 2014 national average of 44% women in the labour force. This seems to depict that the MMS is a traditional male-dominated sector.

Figure 11: Employment by gender

Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

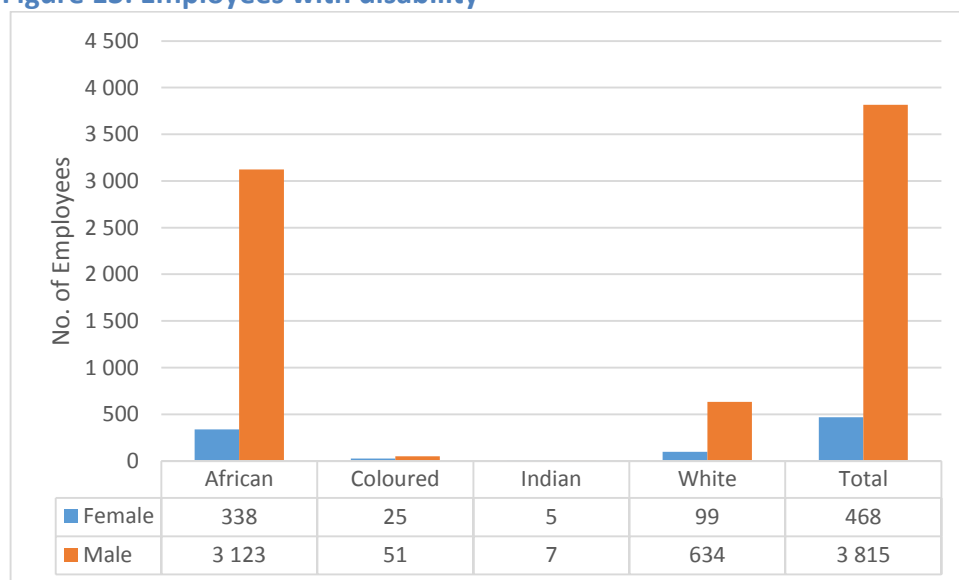
The major challenge as will be shown later is the small proportion of females in management positions.

Africans are the dominant group in the MMS with an 84% representation, followed by Whites (12%). The Indian group is the least represented in the MMS (1%).

Figure 12: Employee representation by race

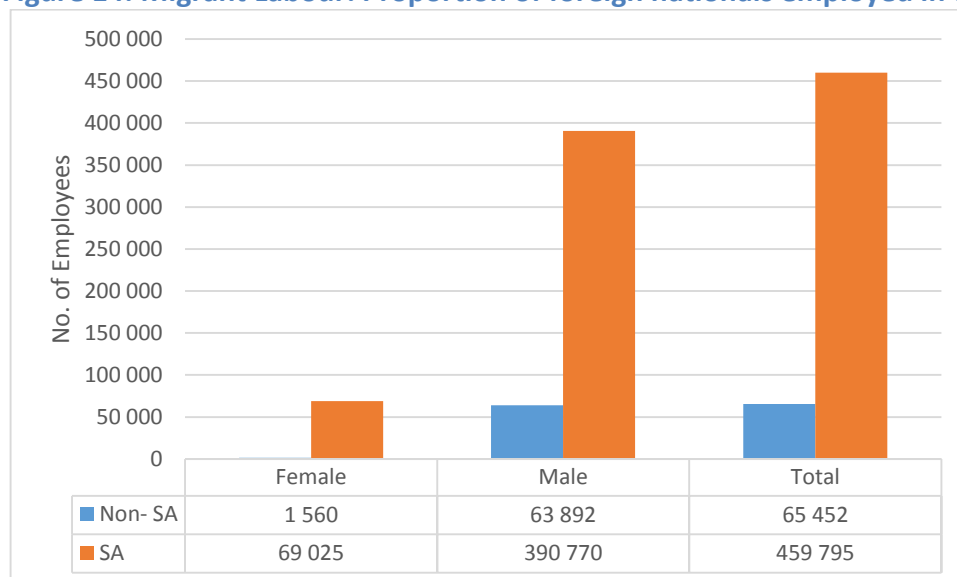
Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

Figure 13 below shows that a total of 3 815 disabled persons were employed in the MMS. The African component dominates this employee category followed by whites. However, people with disabilities represent less than 1% of the total MMS sector labour force based on the 2015 WSP-ATR submissions for the MQA. The MQA needs to play a far more active role in supporting people with disabilities to acquire skills to take up employment in the sector.

Figure 13: Employees with disability

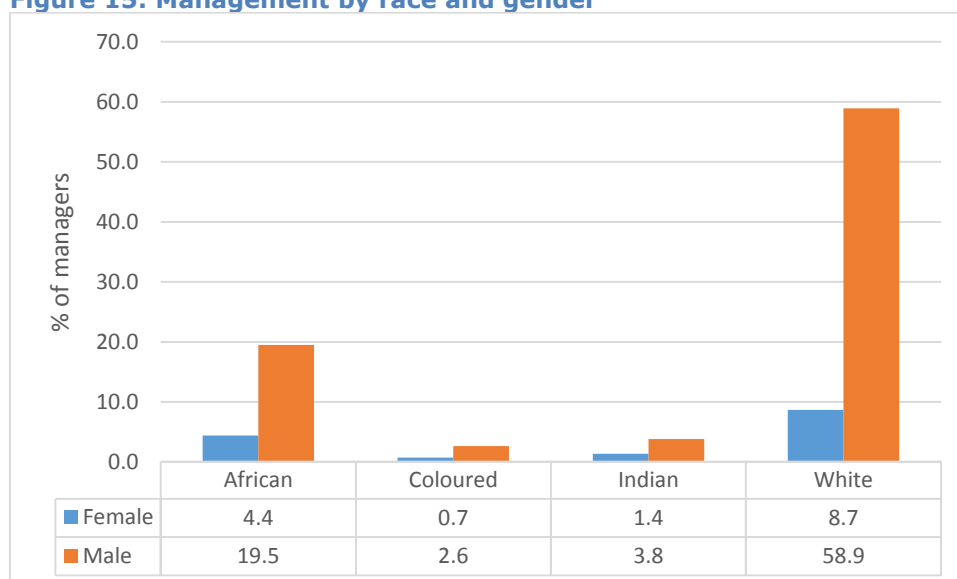
Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

The MMS plays an important role in employing the local nationals as shown in Figure 14. There is a total of approximately 459 795 South African citizens (88%). The remaining 12% is made up of non-SA citizens.

Figure 14: Migrant Labour: Proportion of foreign nationals employed in the sector

Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

White representation is higher than other groups in the MMS at the management level for both males and females in terms of Figure 15 below.

Figure 15: Management by race and gender

Source: Calculated from Weighted MQA WSP/ATR Submission (2015)

Progress has to be made in transforming the demographic profile of the workforce in the mining sector. These racial disparities in the demographic composition of the industry signal the urgent need for role-players to do considerably more to redress workforce imbalances.

1.7. Conclusion

This chapter highlights the shape and size of the MMS and details the performance and the contribution of the sector in economic and employment terms. The analysis revealed that South Africa is an important hub in the global mining value chain. However, the sector is currently facing some challenges which include:

- The sector's contribution to GDP has been decreasing over the last few years, from around 8.5% in 2009 to 7.8% in 2014.
- There has been a decrease in number of people employed from a peak of 628 750 in 2012 to 525 247 in 2015.
- It has been concluded that the short to long term outlook of the sector would be improved if the sector implements the Mineral Beneficiation Strategy and takes advantage of the SIPs projects.

The overall sector analysis of the MMS revealed the following:

- The sector has a diverse range of stakeholders which include government departments, SOEs, employer and worker representative.
- The MMS employment profile is mainly concentrated in the North West, Limpopo and Mpumalanga, and the companies vary from SMMEs (which employ less than 50 employees) to large corporations (which employ more than 5 000 employees)
- The MMS is male-dominated, with 13% female employee composition.
- People with disabilities represent less than 1% of the total MMS sector labour force based on the 2015 WSP-ATR submissions for the MQA.
- White representation is higher in certain occupational groups in the MMS, specifically at the management level for both males and females.
- There are racial disparities in the demographic composition of the industry signalling the need for role-players to do considerably more to redress workforce imbalances.

2. KEY SKILLS ISSUES

2.1. Introduction

This chapter is concerned with identifying factors that are driving change in the MMS which impacts on skills demand and supply. The aim of this chapter is firstly to identify the “key skills issues” and analyse their implications for skills development in the MMS. Secondly, the chapter provides an analysis of the alignment of MQA’s SSP to national strategies and plans such as the National Development Plan, New Growth Path, Human Resource Development Strategy for South Africa and the Industrial Policy Action Plan (IPAP 2015). Other relevant national social and economic policies and strategies have also been referenced.

2.2. Change Drivers

There are numerous factors that impact on skills development in the MMS. These factors are analysed based on the economic, social, technological, environment and legislative aspects. The relationship between the drivers is critical to determining their impact on the MMS. Their inter-dependencies mean that they may mitigate or reinforce each other’s impact, and it is therefore important to recognise these dynamics when analysing trends that impact on skills in the sector.

The drivers of change in this SSP Update were based on extensive desktop research and stakeholder meetings. Some of the change drivers are non-sector specific, meaning they are not directly related to the sector but exert change in the broader environment in which the sector operates. The change drivers discussed here nevertheless have direct implications for skills development in the MMS.

2.2.1. Technology

Technological change remains at the forefront of the sector’s ability to become as efficient, effective and economical as possible to maximise on productivity and profit margins. The impact of new, more sophisticated technologies and innovations transforms the mining and metals processes and operations. In addition, the type, level and mix of skills required to streamline mining operations presents a challenge to the sector as a result of increased technological change. The implications to MQA in terms of skills is that learnerships must engage new mining technologies, new tools, systems and processes. Mining and metals enterprises must start developing the technologies to operate in a clean, affordable and safe environment in frontiers previously considered inaccessible. There is an intensified rate of technological change and mechanisation in the MMS sector and this has affected numerous occupations including but not limited to rock drill operator, blaster, and drill rig operator. The employer response to technological change has been in the form of mining production and investment shifting towards newer, better performing export sectors, such as iron ore, coal and manganese (National Treasury, 2015).

2.2.2. Foreign direct investment and technological change

FDI is a controlling ownership in a business enterprise in one country by an entity, mostly multinational companies (MNCs) based in another country. FDI has a high economic impact on the MMS as the sector is highly capital intensive and has significant foreign investments. FDI will generate employment since new entrants/ investors will need to hire staff. FDI creates better mining infrastructure, which helps to support overall sector and economic growth. Increased economic activity brings with it more employment opportunities. The MMS strategies to be

adopted include ensuring that MNCs work within and are promoting IPAP 4, HRD-SA, the Skills Accord, the New Growth Path and New Development Plan. The skills planning implication is that there will be a shift towards skills biased technological change of job profiles (SBTC) and therefore a greater intensity of skills will be required in existing employees.

2.2.3. Small enterprise development

Enterprise development supports the notion that Small, Medium and Micro-sized Enterprises (SMMEs) should build sustainable business models given that the gestation period for success in the MMS is long. Enterprise development creates employment growth opportunities. Most workers employed by unorganised businesses do not receive healthcare, education opportunities and minimum wages. There is also increasing casualization of labour. The MQA Funding Policy for 2014-2015 calls for the grant allocations to take into account SMMEs (companies employing less than 50 employees). The SETA is in the process of developing suitable templates for the provision of information by small and micro enterprises on PIVOTAL training plans and reporting. The training and support to the SMMEs could be in the form of design learning programmes for SMMEs, voucher training schemes, toolkits, on-the-job training, industry clusters, mentoring and coaching. In addition, the MQA will assist SMMEs with research and development of appropriate technologies, and by providing training and support so that development is sustainable.

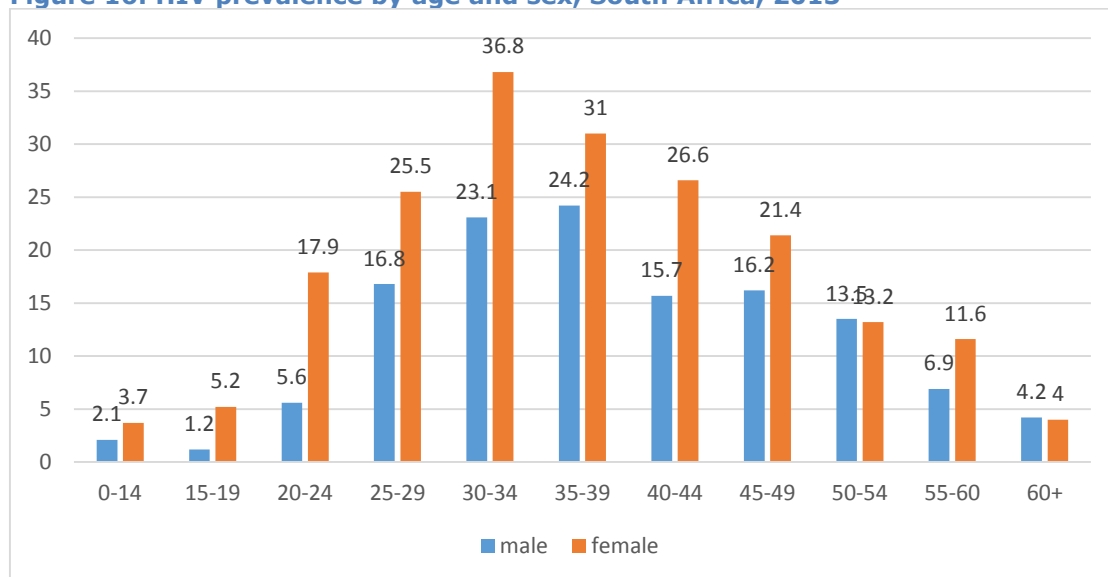
2.2.4. Employment Equity

Employment equity (women and people with disabilities) is another high priority change driver. The MMS is still faced with specific challenges that need more focused attention. As highlighted in the labour market profile, HDSAs and women in particular are underrepresented in the MMS management. The skills planning implication for the MQA as far as gender is concerned will be to focus on the development of women for senior positions. According to the Mining Charter targets, women should make up 10% of companies' workforce. Skills development must also include measures to address the representation of black people in senior management positions and the disabled in particular. The Mining Charter stipulates that there should be at least 40% participation in HDSAs in management positions. MQA support programmes such as Lecturer Development Programmes, Rural Development Projects (Maths and Science) and Management Development Programmes are aimed at addressing equity and transformational imperatives.

2.2.5. HIV and AIDS

The impact of HIV and AIDS in the workplace is usually in form of high labour turnover owing to either deaths or sicknesses. The diagrams below show a cross-sectional panel of HIV prevalence by age and gender in South Africa in 2012 and a time series graph showing new HIV infections in South Africa for the period 2001 to 2011.

The diagram below clearly shows that the economically active population are the most affected by the pandemic of HIV/AIDS posing a serious threat to the supply of labour in South Africa. It is important to increase awareness programs in order to minimise loss of key skills due to HIV and AIDS. New antenatal infections continue to be very high ranging between 25% and 33% for the previous decade which continues to threaten the long term supply of labour.

Figure 16: HIV prevalence by age and sex, South Africa, 2013

Source: Avert (2013)²⁴

A study by Evian et al. (2004)²⁵ found that mining and metal processing had the highest HIV infection rates; 18.0% and 17.3% respectively, compared to the total industry average of 12.7%. A recent study George et al. (2013)²⁶ showed that the estimated cost (MMS' loss) as a result of HIV and AIDS death rate was R2,8 million per annum and the total loss for all sectors was estimated to be almost R10 million.

2.2.6. Mining Charter

The Mining Charter stipulates that mining companies must be at least 26% black-owned by the end of 2014 to qualify for mining and prospecting rights. Companies are required to comply with social, labour and community objectives such as procurement spend with BEE entities: 40% for capital goods, 70% for services and 50% for consumable goods. Failure to comply with the charter could result in permits or mining rights being revoked by the government resulting in closure of non-compliant companies. If this happens, the opportunities for employment will be muted and this will impact on skills development and the career growth of those involved in the sector.

The MQA's response to this sector dynamic, which is to prioritise mentorship and entrepreneurship as a key skills requirement in the sector, is ongoing. Training interventions that aim to develop business start-ups and general business management skills could also assist in this broad transformational objective. These will support the initiatives on legislative compliance in the MMS.

2.2.7. Mineral beneficiation

Mineral beneficiation is premised on the proposition that opportunities exist along the mining value chain from extraction, processing to shipping and beneficiation of minerals such as diamonds, copper, lead, zinc and manganese are some of the potential investment areas in the sector. The government's Beneficiation Strategy (DMR, 2011) selected ten strategic mineral

²⁴ <http://www.avert.org/south-africa-hiv-aids-statistics.htm>

²⁵ EVIAN, C., FOX, M., MACLEOD, W., SLOTOW, S. & ROSEN, S. 2004. Prevalence of HIV in workforces in Southern Africa, 2000-2001. *South African Medical Journal*, 94(2):125-30.

²⁶ George, G., Surgey, G. & Gow, J. 2013. South Africa's private sector investment in training and its erosion as a result of HIV and AIDS. *SAJEMS* NS 17 (2014) No 2:109-123.

commodities from which five value chains were outlined. The five mineral value chains and corresponding minerals are: (i) energy commodities (coal and uranium and thorium), (ii) iron and steel, (iii) pigment and titanium metals production, (iv) autocatalytic converters and diesel particulate filters, and (v) jewellery fabrication (which includes gold, PGMs and diamond).

Mineral beneficiation is planned to transform the industry from being largely resource-based to knowledge-based²⁷. There is therefore need to train in new skills in line with this transformation. The MQA recently commissioned a study on the skills requirements for beneficiation in the jewellery manufacturing sub-sector. The critical skills identified in that study in line with mineral beneficiation includes jewellery designer and evaluator; diamond and gemstone cutter; gemologist; diamond and gemstone setter; goldsmith; jewellery processing and finishing machine operator.

2.2.8. Environmental Sustainability

The industry is becoming more conscious of protecting the environment to ensure its sustainability. Increased enforcement of legislation and consumer pressure are driving the demand for eco-compliance, so that the industry is able to show that it is environmentally friendly in business processes. Skilled workers are required in energy efficiency and sourcing of 'green' products and services and managing 'green' supply chains. There is therefore a business and ethical case for ensuring that an environmentally friendly MMS sector is realized. In addition mining companies also need to assess the impact of adverse weather patterns on their operations (excessive or below-average rain, heat, fog and dust impacting on operations) and then communities in which they operate.

The implications for the MQA include: developing greening skills programmes, learnerships and apprenticeships, toolkits for businesses to go 'green', code of conduct for sustainable practices; green projects promoting 'green' occupations and jobs awareness campaigns. There is great need for people to be skilled in energy efficiency.

2.2.9. Occupational Health and Safety

Mining is a hazardous activity and has generic risks that impact the health and safety of employees. Therefore, mining companies, government and unions should continue to place importance on employee safety since continued fatalities, injuries and occupational diseases jeopardise a company's licence to operate. However, there has been a decrease in mining injuries and fatalities. Overall, total fatalities decreased sharply from a peak of 744 per annum in 1989 to 84 in 2014. The MQA must continue its progress regarding Occupational Health and Safety (OHS) skills capacity in the industry by increasing human resources supply in scarce skills areas that are critical to OHS.

2.3. Policy Context for Skills Planning

Each SETA is required to develop an SSP Update within the framework of the National Skills Development Strategy (NSDS) as prescribed by the Skills Development Act of 1988, Section 10 as amended (2008). Sector skills planning in South Africa must take into account a wide range of policy imperatives that seek to support inclusive sector growth paths that advance economic growth and

²⁷

<http://www.southafrica.info/business/economy/sectors/mining.htm#.Vao1Dvmqqko#ixzz3gEzhCbkG>

the social development and transformation agenda. These policies include those relating directly to skills development, those focusing more directly on economic growth and social development, and those which focus on monitoring and evaluation.

Below is a table summarising some of National Policies that guide the operations of the MQA. It shows the alignment of the MQA Strategic Plan to the Government National Policies and Strategies.

Each SETA is required to develop an SSP Update within the framework of the National Skills Development Strategy (NSDS) as prescribed by the Skills Development Act of 1988, Section 10 as amended (2008). Sector skills planning in South Africa must take into account a wide range of policy imperatives that seek to support inclusive sector growth paths that advance economic growth and the social development and transformation agenda. These policies include those relating directly to skills development, those focusing more directly on economic growth and social development, and those which focus on monitoring and evaluation.

Below is a table summarising some of National Policies that guide the operations of the MQA. It shows the alignment of the MQA Strategic Plan to the Government National Policies and Strategies.

Table 6: Alignment of the MQA Strategic Plan to the Government National Policies and Strategies

Policy	Policy description	Policy alignment by the MQA
NSA	<p>Outlines the following 8 commitments:</p> <ul style="list-style-type: none"> Expand more fully the level of training using existing facilities Create internship and placement opportunities available in the workplace Set guidelines of ratios of trainees and artisans, as well as across the technical vocations, in order to improve level of training Improve the funding of training, the use of funds available for training and provide incentives for companies to train Set annual targets for training in state-owned enterprises Improve SETA governance and financial management, as well as stakeholder involvement Align training to the New Growth Path and improve SSPs Improve the role and performance of TVET colleges 	<ul style="list-style-type: none"> The MQA Strategic Plan has prioritised the internship and placement opportunities for the unemployed within workplaces, artisan development, focused attention to improve quality and credibility of the sector skills plan (SSP) and capacitation of TVET colleges to deliver MMS specific learning programmes. The MQA has identified RPL as a strategic initiative necessary to fast track artisan development within the MMS. MQA ETQA Committee has approved an RPL Implementation Framework for the MMS. The MMS SGB has approved the 7 Step Artisan Development Process which includes RPL for the training of artisans within the mining industry. The MQA Board has approved an Artisan Aides/RPL Project for employed engineering workers in the mining industry.
IPAP	<p>IPAP has identified several growth sectors which will address the high rate of unemployment in the country.</p>	<ul style="list-style-type: none"> The MQA has identified minerals beneficiation diamond processing and jewellery manufacturing as one of the MMS segments which will address the high rate of unemployment in the country. MQA is currently utilising all its funded learnerships, apprenticeships, workplace experience and work integrated learning programmes, bursaries and internships to assist the youth with placement with mining companies. Placement of learners with host employers is inextricably interwoven with all MQA programmes. The MQA's strategy with regards to supporting youth development to contribute towards reduced levels of unemployment focuses on unemployed learners for artisan learnerships, non-artisan learnerships, bursaries, internships and HET work placements for graduates will that will be supported through the MQAs discretionary funding mechanisms.
Policy	Policy description	Policy alignment by the MQA
NGP	<p>The New Growth Path identifies 5 job drivers:</p> <ul style="list-style-type: none"> Infrastructure for employment and development Improving job creation in employment and development Seizing the potential of new economies Investing in social capital Spatial development 	<ul style="list-style-type: none"> MQA focuses on skills for rural development to support government's prioritisation of rural development. The MQA supports the process for mine community development through sustenance for a customised mining community capacity building programme aligned with municipal Local Economic Development (LED) plans. MQA also supports learners in rural mining community schools with additional mathematics and science tuitions so that acceptable results are obtained in their matric year hence contributing to an acceptable pipeline for careers within the industry and the nation at large.

		<ul style="list-style-type: none"> The physical presence of the MQA in these mining provinces is also aligned to the strategy of government requiring SETAs to be located at Public TVET Colleges.
NDP 2030	<p>The National Development Plan 2030 has identified the following 9 key development areas for a sustainable and inclusive development approach:</p> <ul style="list-style-type: none"> Creating jobs and livelihoods Expanding infrastructure Transitioning to low carbon economy Transforming urban and rural spaces Improving education and training Providing quality healthcare Building a capable state Fighting corruption and enhancing accountability Transforming society and uniting the nation 	<p>The MQA has, in its strategic plan, incorporated the following top priorities:</p> <ul style="list-style-type: none"> Unemployment - the MQA will provide workplace placement for unemployed graduates as well as internships for students Rural Development – funding will be made available for programmes that are run in the rural areas Career guidance – the MQA will work with schools to increase the supply of learners with maths and science for grade 10, 11 and 12 learners and ensure career guidance interventions take place for participating learners Bursaries – The MQA will have bursaries aimed at creating a pool of HET graduates to pursue careers within the Mining and Mineral Sector Collaboration with TVETs and HETs – MQA has put in place initiatives to strengthen the capacity of TVET colleges to deliver MMS specific programmes Artisan development – the MQA has in place initiatives to develop artisans and other trades.
WPPSET	<ul style="list-style-type: none"> Sets out strategies to improve the capacity of post-school education and training system to meet SA's needs. It is a vision for an integrated system of post-school education and training with all institutions playing their roles. 	<ul style="list-style-type: none"> Career guidance – career guidance will be run in schools. Bursaries – The MQA will have bursaries aimed at creating a pool of HET graduates to pursue careers within the Mining and Mineral Sector. Collaboration with TVETs and HETs – MQA has partnered and put in place initiatives to strengthen the capacity of TVET colleges to deliver MMS sector specific programmes. Artisan development – the MQA has in place initiatives to develop artisans and other trades.
Policy	Policy description	Policy alignment by the MQA
NSDSIII	<ul style="list-style-type: none"> Its vision is a skilled and capable workforce that shares in, and contributes to, the benefits and opportunities of economic expansion and an inclusive growth path. Acts as strategic guide for skills development and provides direction to skills planning and implementation in the SETAs. Sets out the linkages with, and responsibilities of, other education and training stakeholders. 	<ul style="list-style-type: none"> The MQA supports various outcomes of the NSDS III Strategy such as quality provisioning of skills, addressing low levels of literacy and numeracy, promoting growth of the TVET sector and encouraging better use of workplace based skills development. The MQA has the following projects/programmes aligned to NSDS3: <ul style="list-style-type: none"> Standards Setting for HET and TVET programmes Career and Pathway Guidance Project Mathematics and Science Project AET Grant, Foundational Learning Competency Grant Incentive Skills programmes for Occupational Health and Safety Representatives Development TVET collaboration, Artisan development, Bursaries, Internships International Literacy Day Support
MTSF (2014-2019)	<p>The MTSF (2014-2019) focuses on the following priorities:</p> <ul style="list-style-type: none"> Radical economic transformation, rapid economic growth and job creation 	<ul style="list-style-type: none"> The MQA developed Occupational Qualifications, Standards and Programmes in accordance with the Mining and Minerals Qualifications Framework. MQA will:

	<ul style="list-style-type: none"> • Rural development, land and agrarian reform and food security • Ensuring access to adequate human settlements and quality basic services • Improving the quality of and expanding access to education and training • Ensuring quality health care and social security for all citizens • Fighting corruption and crime • Contributing to a better Africa and a better world • Social cohesion and nation building. 	<ul style="list-style-type: none"> ○ Train 40 000 Occupational Health Safety Representatives over five years as required by Mine Health & Safety Tripartite Leadership Summit Agreement signed 5 September 2008 ○ Facilitate the development of scarce artisan occupational skills in the MMS ○ Develop learning packs, learning materials for TVET and HET programmes to be used by industry providers ○ Support learners on core learnerships (Non-Artisan) for the MMS.
BBSEE	<p>The objectives of this charter are to:</p> <ul style="list-style-type: none"> • Promote equitable access to the nation's mineral resources to all the people of South Africa; • Substantially and meaningfully expand opportunities for HDSA's including women, to enter the mining and minerals industry and to benefit from the exploitation of the nation's mineral resources; • Utilise the existing skills base for the empowerment of HDSA's; • Expand the skills base of HDSA's in order to serve the community; • Promote employment and advance the social and economic welfare of mining communities and the major labour sending areas; and • Promote beneficiation of South Africa's mineral commodities. 	<p>The MQA has, in its strategic plan , incorporated the following top priorities:</p> <ul style="list-style-type: none"> • Unemployment - the MQA will provide workplace placement for unemployed graduates as well as internships for students • Rural Development – funding will be made available for programmes that are run in the rural areas • Career guidance – the MQA will work with schools to increase the supply of learners with maths and science for grade 10, 11 and 12 learners and ensure career guidance interventions take place for participating learners • Bursaries – The MQA will have bursaries aimed at creating a pool of HET graduates to pursue careers within the Mining and Mineral Sector • Collaboration with TVETs and HETs – MQA has put in place initiatives to strengthen the capacity of TVET colleges to deliver MMS specific programmes • Artisan development – the MQA has in place initiatives to develop artisans and other trade.
HRDSSA	<p>The HRDSSA sets out to, inter alia:</p> <ul style="list-style-type: none"> • To accelerate training output in the priority areas of design, engineering and artisanship that is critical to the manufacturing, construction and cultural industries • To accelerate the implementation of training programmes for the youth that are focused on employment creation • To leverage public and private sector programmes to create employment opportunities and work experience for new entrants into the labour market • To improve the coverage and efficacy of vocational guidance and labour market information in a manner that promotes the optimal uptake of training and employment opportunities available to the youth • To increase the supply of skilled personnel in areas of science, engineering and technology 	<ul style="list-style-type: none"> • The MQA has the following projects/programmes aligned to the HRDSSA: <ul style="list-style-type: none"> ○ Standards Setting for HET and TVET programmes ○ Career and Pathway Guidance Project ○ Mathematics and Science Project ○ AET Grant, Foundational Learning Competency Grant Incentive ○ Skills programmes for Occupational Health and Safety ○ Representatives Development ○ TVET collaboration, Artisan development, Bursaries, Internships • International Literacy Day Support

	<ul style="list-style-type: none"> To improve South Africa's performance in areas of teaching, research, innovation and the commercial application of high-level science, engineering and technology Knowledge To improve the credibility and impact of training in the public sector by improving service delivery To leverage the SETAs to contribute optimally to capacity development in the public sector. 	
MPRDA	To make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and to provide for matters connected therewith.	<ul style="list-style-type: none"> The development of management, scientific, engineering or other skills of historically disadvantaged persons The ownership of and participation in the beneficiation of the proceeds of the operations or other upstream or downstream value chains in such industries The socio-economic development of communities immediately hosting, affected by the of supplying labour to the operations The socio-economic development of all historically disadvantaged South Africans from the proceeds or activities of such operations
MHSA	<p>Outlines the following commitments to Health and Safety:</p> <ul style="list-style-type: none"> Provide for protection of the health and safety of employees and other persons at mines and, for that purpose Promote a culture of health and safety Provide for the enforcement of health and safety measures Provide for appropriate systems of employee, employer and State participation in health and safety matters Establish representative tripartite institutions to review legislation, promote health and enhance properly targeted research Provide for effective monitoring systems and inspections, investigations and inquiries to improve health and safety. 	<ul style="list-style-type: none"> Promote training and human resources development Provide funding for awareness of and training in health and safety

Source: MQA Strategic Plan 2015-2016

2.4. Conclusion

It was noted in this chapter that there are a number of factors that have significant impact on the operation of the MMS. These factors range from economic, governance, social and legal. Some of the factors such as the fluctuations in the exchange rate are beyond the ambit of the sector, but have a considerable impact on the current and future viability of the sector given its exports orientation. The skills implication of each change driver was highlighted. A matrix of these change drivers (captured in the MQA Strategic Plan) and their alignment to the National Strategies of Government was also provided. It can be concluded that the MQA has come up with programmes to cushion the industry from the negative impacts of these change drivers. Overall, a proper implementation matrix of the New Development Plan, New Growth Path, IPAP 4, Skills Accord, NSDSIII and HRD-SA by the MQA and other mining stakeholders will provide correct and relevant strategies in addressing these change drivers.

The main “key skills issues” identified in this chapter include:

- Change in technology and technological infusion through foreign direct investment.
- Environmental ‘green economy.’
- Mineral beneficiation.
- Occupational health and safety.
- HIV and AIDS.

3. EXTENT OF SKILLS MISMATCH

3.1. Introduction

Having profiled the sector, the people employed within it, and the key issues driving change, this chapter focuses primarily on understanding the demand for and supply of skills, as well as occupation-specific skills mismatches for employers in the sector. The issue of skills gaps in the sector will also be addressed.

3.2. Methodology

A quantitative analysis of the WSPs and ATRs was conducted to understand the needs of the companies in the sector. Regional workshops took place in June 2015, the findings from which were used together with skills demand data for the purposes of triangulation. Regional stakeholder workshops were conducted in the following regions:

- Eastern Cape (Port Elizabeth) – 9 attendees
- Free State (Welkom) – 52 attendees
- Gauteng (Johannesburg) – 41 attendees
- KwaZulu-Natal (Richards Bay) – 18 attendees
- Limpopo (Polokwane) – 64 attendees
- Mpumalanga (Witbank) – 46 attendees
- North West (Rustenburg) – 31 attendees
- Northern Cape (Kathu) – 52 attendees
- Western Cape (Cape Town) – 10 attendees

3.3. Extent and Nature of Demand

Demand for skills refers to the employers' needs for skills in the sector.

3.3.1. Current employment in the sector (by occupation)

As identified in Chapter 1, the weighted data obtained from the WSP/ATR submissions (2015) was used to determine which occupations dominate the sector. Table 7 shows the top 10 occupations as a percentage of total employed. Mining Support Workers, Mining Operators, Artisans and Operators of equipment and machinery are prevalent on the list.

Table 7: Employment in the sector (by occupation)

Occupation	OFO code	Alternative occupation title/s	Number employed as a percentage of total employed
Mining Support Worker	831101	Mineral Ore Processing Labourer, Shaft Assistant, Belt Attendant	17%
Mining Operator	711101	Mining Team Leader,	7.9%
Crane or Hoist Operator	734301	Winch Operator, Chairlift Operator, Crane Driver	6.6%

Occupation	OFO code	Alternative occupation title/s	Number employed as a percentage of total employed
Rock Drill Operator	711302	N/A	5.9%
Miner	312102	Hard Rock Miner, Team Leader (Mining), Shaft Timberman	4.1%
Driller	711301	Drill Rig Operator	3.9%
Train Driver	731101	Mine and Quarry Engine Driver, Locomotive Driver	3.5%
Production / Operations Supervisor (Mining)	312101	Quarry Foreman, Mine Operations Foreman	3.4%
Loader Operator	734206	Front-end Loader Operator, Front-end Loader Driver	2.2%
Metal Engineering Process Worker	832901	Boilermaker's Assistant/Aide, Fitter's Assistant	2.2%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

3.3.2. Occupational vacancies

Table 8 shows the vacancies by occupational category. Vacancy intensity (rate) refers to the number of vacancies as a percentage of the total employment within the occupational category. While the data indicates that there are no serious shortages, the categories that have among the highest number of vacancies are the Managers (2.99%), Professionals (1.57%) and the Artisan categories (2.56%).

Table 8: Occupational vacancies by category

Occupational category (OFO)		Number of vacancies	Number employed	Vacancy intensity (rate)
Group	Title			
1	Managers	420	14 165	2.99%
2	Professionals	417	26 601	1.57%
3	Technicians and Associate Professionals	709	61 145	1.16%
4	Clerical Support Workers	20	22 315	0.09%
5	Service and Sales Workers	7	6 419	0.11%
6	Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	1,015	39 677	2.56%
7	Plant and Machine Operators and Assemblers	1,770	213 412	0.83%
8	Elementary Occupations	65	131 172	0.05%

²⁸Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

²⁸ table 8 excludes number of learners reported in MQA WSP/ATR 2015 submission

3.3.3. Estimation of skills demand

A forecast of the labour demand by the MMS was conducted using the MQA Labour Demand Projection Model (LDPM). The LDPM was first used in the MQA SSP for the 2012 annual update. This SSP Update revises a few assumptions based on the identified key drivers and the results of the stakeholder consultations. The labour demand forecast acts as a bridge between past data and future expectations and is built at detailed occupational levels. At a high level, the LDPM is as follows:

- **Equation 1:** Replacement demand = No. of vacancies + (factor x labour utilisation factor) + (factor x labour turnover rate),
 - Less: labour turnover (retirement, mortality and people leaving the MMS).
- **Equation 2:** New demand = Existing employees + (labour utilisation factor x existing employees) + (summary of all factors affecting demand x existing employees) + probability of industry expansion x output: employment ratio).

The main assumptions (scenarios) used in this model can be summarised as follows:

- i. The National Development Plan (NDP) and New Growth Path (NGP) target of 140,000 additional direct jobs in MMS by 2020.
- ii. Overall employment growth in the MMS of 2.6% p.a.
- iii. The vacancy rates for each occupational group were assumed to be constant throughout the projection period.

Table 9 shows the demand projections from 2016, on the basis of the overall employment growth of 2.6%, using the MQA Labour Demand Projection Model and Table 8's vacancy rates.

Table 9: Estimation of demand (at a 2.6% growth rate)

Occupational category (OFO)		Demand forecasts				
Group	Title	2016	2017	2018	2019	2020
1	Managers	543	765	801	817	784
2	Professionals	1 031	1 453	1 521	1 551	1 489
3	Technicians and Associate Professionals	2 397	3 376	3 536	3 605	3 461
4	Clerical and Support Workers	872	1 228	1 286	1 311	1 259
5	Service and Sales Workers	261	368	385	393	377
6	Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	1 458	2 052	2 150	2 192	2 104
7	Plant and Machine Operators and Assemblers	8 573	12 071	12 648	12 891	12 376
8	Elementary Occupations	5 348	7 530	7 889	8 042	7 720
GRAND TOTAL		20 483	28 843	30 216	30 802	29 570

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

²⁹

²⁹ table 9 excludes number of learners reported in MQA WSP/ATR 2015 submission

In order to achieve the NDP and NGP target of 140 000 additional direct jobs in MMS by 2020, overall employment growth in the MMS must increase by 2.6% per annum. Where skills development is concerned, the training requirement needs to be apportioned according to occupational category in order to meet this target. Over the 5 year period, the greatest demand will be in the occupational categories 3 and 7 and 8. This model assumes that all factors and influences on the sector will remain constant.

3.3.4. Hard-to-fill occupations

Hard-to-fill occupations refer to occupations which employers struggle to find candidates for, for a sustained period of time, not because there is a scarcity in the country, but rather owing to the following reasons:

- Geographic location - many of the MMS's employers are situated in remote areas, which may not produce the talent required locally, and which employers may also struggle to attract from elsewhere.
- Employment equity – in some cases, vacancies are hard to fill because of a lack of skilled people meeting employment equity criteria. For example, a comment which came up at every regional meeting was that employers struggled to meet employment equity criteria of female artisans.
- Industry attractiveness – some employers believe that the MMS sector does not attract skills owing to a pervasive perception that other industries are more attractive to work in.

Table 10 shows the top 10 occupations which employers classify as hard-to-fill, owing to one or a combination of the above factors. This information is based on WSP data and corroborated by comments from stakeholders at the regional meetings.

Table 10: Hard-to-fill occupations

Hard-to-fill occupations	OFO code	Alternative titles (as found in WSPs)
Electrician	671101	Winder Electrical Technician
Production/Operations Supervisor (Mining)	312101	Mine Operations Foreman, Mine Overseer
Mineral Resources Manager	132202	Chief Surveyor, Mining Exploration Manager, Technical Services Manager (Mining)
Diesel Mechanic	653306	N/A
Engineering Manager	132104	N/A
Production/Operations Supervisor (Mining)	132201	Mine Manager, Quarry Manager
Mining Engineer	214601	Rock Engineer, Surface Mining Engineer
Surveyor	216502	Surveying Technologist, Mine Surveyor, Hydrographic Surveyor
Transportation Electrician	671208	Auto Electrician
Rigger	651501	Rigger Ropesman

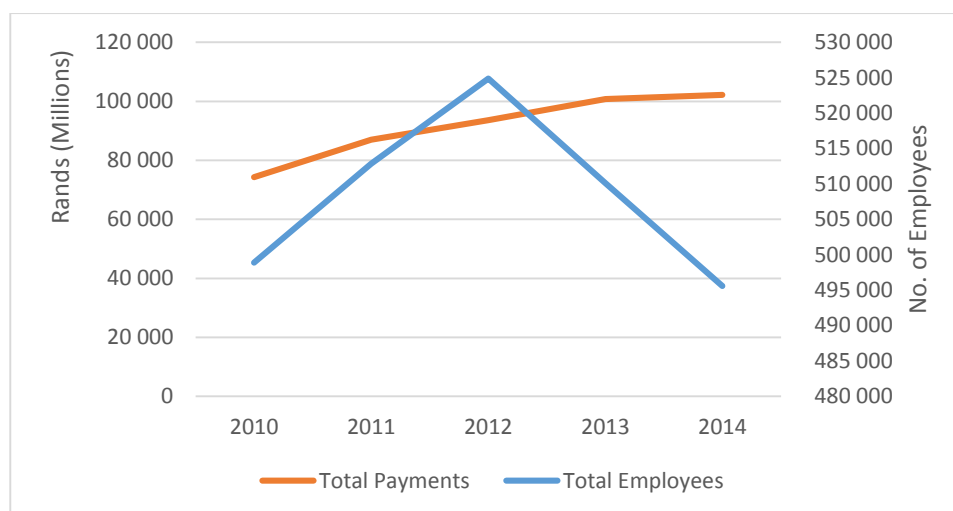
Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

3.3.5. Wage trends and conditions of employment

Figure 17 shows that before the year 2012, the number of employees in the mining industry was increasing at a faster rate than the increase in total wage payments. However, the trend was reversed in 2012 when total employment fell by 6% from a peak of 524 873 in 2012 to 495 592 in

2015. Overall, total wage bill has increased by 37% from 2010 to 2014 while total employment has fallen by 1% over the same period. The mining industry has lost 29 281 jobs between 2012 and 2014.

Figure 17: Number of Employees vs Total Wage Payments



Source: DMR (2015)

Further research over time is needed to fully understand these impacts, but also on the changing skills sets of those employed. There are indications in the market of other productivity changes that occur as a result of mechanisation and multi-skilling.

3.3.6. Employment trends

Table 11 shows the employment trends by occupational category since 2011. In 2014, there was a marked increase in employees across all categories, but 2015 then saw a significant decrease. In some cases, the numbers dropped to below 2012 numbers, especially in the lower-skilled categories.

Table 11: Employment trends by occupational category

Occupational category	2011	2012	2013	2014	2015
Managers	12 845	17 643	12 181	13 359	14 165
Professionals	19 922	26 852	21 853	25 749	26 601
Technicians and Associate Professionals	53 334	70 254	50 541	68 688	61 145
Clerical Support Workers	20 532	27 299	19 204	23 596	22 315
Service and Sales Workers	5 588	7 125	5 258	6 488	6 419
Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	24 471	34 315	30 726	38 238	39 677
Plant and Machine Operators and Assemblers	200 428	264 952	202 386	238 764	213 412
Elementary Occupations	130 367	172 699	124 722	150 201	131 172
Total	469 498	621 139	467 826	565 083	514 906

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

3.3.7. Foreign skills (migration)

The migration of foreigners could be an indication that the skills are not available locally. Table 12 shows the number of foreigners employed and reported through the MQA's WSP 2015 submissions.

Table 12: Foreign skills

Occupational category (OFO)		Total employed in the MMS	Number of foreigners	Number of locals	Percentage of foreigners to total employed
Group	Title				
1	Managers	11 398	437	10 961	4%
2	Professionals	21 647	765	20 882	4%
3	Technicians and Associate Professionals	50 311	5 608	44 703	11%
4	Clerical Support Workers	18 300	586	17 714	3%
5	Service and Sales Workers	5 481	285	5 196	5%
6	Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	30 591	972	2 9619	3%
7	Plant and Machine Operators and Assemblers	179 923	36 681	143 242	20%
8	Elementary Occupations	112 235	12 936	99 299	12%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

Table 12 reveals that the occupational categories with the highest number of foreigners are Plant and Machine Operators and Assemblers, Elementary Occupations, and Technicians and Associate Professionals (Miners fall into this category). The use of migrant workers means that the MMS is not only involved in the economic development and well-being of the provinces in which it is located but that it also has an effect on the labour-sending areas beyond South Africa's borders.

3.4. Extent and Nature of Supply

The future growth prospects of a sector are dependent on the availability of appropriate and affordable skills, therefore an analysis of the supply-side is necessary. Data received from the MQA, DMR and Chamber of Mines on training, as well as comments from stakeholders at the regional meetings held in June, were analysed for this section.

3.4.1. Extent of occupational skills supply

The skills available to the sector consist of people currently employed, as well as those that are unemployed but available for work. Chapter 1 gave an overview of the people currently employed in the MMS. Most of the workers have relatively low educational levels. The skills required for the

³⁰ table 11 excludes number of learners reported in MQA WSP/ATR 2015 submission

MMS are produced in TVET Colleges, private Training Providers, Universities of Technology and Universities.

3.4.1.1. MQA-accredited Training Providers

TVET Colleges form a critical component of the current training capacity of skills for the sector. As of February 2015, there are a total of 152 Training Providers offering MQA-accredited qualifications.

3.4.1.2. Chamber of Mines

Table 13 shows the number of certificates in MMS-related qualifications which the Chamber of Mines has issued since 2010. The numbers have declined significantly. Compared to 2010, in 2015 there was less than half the number of certificates issued.

Table 13: Certificates issued by Chamber of Mines

Name of Certificate	As at July 2010	As at July 2011	As at July 2012	As at July 2013	As at Dec 2014	As at July 2015
Certificate in Advanced Mine Surveying	29	57	70	58	91	57
Certificate in Advanced Mine Valuation	41	88	102	66	75	38
Certificate in Advanced Rock Engineering	3	1	11	3	4	4
Certificate in Basic Mine Sampling	272	125	141	63	164	80
Certificate in Basic Mine Surveying	163	134	130	142	156	77
Certificate in Elementary Mine Sampling	126	100	90	73	64	52
Certificate in Elementary Mine Surveying	150	114	130	88	141	95
Certificate in Mine Environmental Control	16	71	19	8	29	8
Certificate in Radiation Protection Monitoring Screening	260	70	125	109	181	61
Certificate in Rock Mechanics	11	10	27	25	25	16
Certificate in Strata Control	55	49	79	64	96	61
Intermediate Certificate in Mine Environmental Control	87	18	32	48	51	59
Certificate in Mine Survey Draughting	26	31	22	40	30	12

Practical Certificate in Mine / Environmental Control	3					
TOTAL	1242	868	978	787	1107	559

Source: Chamber of Mines (2015)

3.4.1.3. Industry-funded bursaries

Table 14 shows the number of bursaries funded by the sector's employers who also contribute to the development of employees in the sector. The numbers have declined significantly. It is not surprising that the programmes with the highest number of bursaries are those related to the core operations of the sector.

Table 14: Bursaries funded by employers in the sector

Programme Type	Number of Bursaries
Mining Engineering	791
Mechanical Engineering	698
Electrical Engineering (Heavy Current only)	342
Metallurgy	335
Other Engineering and Engineering Technology	328
Geology	266
Chemical Engineering	212
Fitter and Turner	120
Plater / Welder	120
Diesel Mechanic	80
Mine Survey	78
Mining Cadets	55
Industrial Engineering	54
Environmental Science	38
Management, e.g. Business, Commerce, Management Science, Economics, Computer Science, Data Processing	32
Extraction Metallurgy	32
Analytical Chemistry	21
Other Bursaries	19
Instrumentation Mechanic	14
Other health care & Health Sciences	10
Environmental Health and Management	6
Jewellery Design	4
Electrical Engineering	1
Elementary Survey	1
Other life Sciences and Physical Sciences	0
Total	3 657

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

3.4.1.4. The Department of Mineral Resources

Certain occupations within the MMS can only operate upon issuance of a DMR certificate, which confirms that the employee has the necessary skill-set required to perform the job. Table 15 shows the number of certificates which the DMR has issued between 2010 and 2013. With the exception of the Mine Surveyor Certificate of Competence and the Mine Engineer Certificate of Competence, the numbers have declined significantly. Of these, Winding Engine Driver and Mine Manager are of highest concern as these occupations are on the scarce skills list. Research is currently underway to unpack the reasons which will explain these decreasing numbers. Once understood, the MQA will accordingly appropriate resources to address this challenge.

Another concern is the small number of females, in comparison to males, qualifying for all of these certificates. The MQA continues to support females through its numerous programmes, to attract more women to the sector, and to develop them.

Table 15: Certificates issued by DMR

Type of certificate	2009 - 2010			2010 - 2011			2011 - 2012			2012 - 2013		
	Total	M	F	Total	M	F	Total	M	F	Total	M	F
Winding Engine Driver Certificate of Competence	51	42	9	22	14	8	31	24	7	18	14	4
Mine Surveyor Certificate of Competence	13	9	4	10	10	0	8	8	0	14	14	0
Mine Overseer Certificate of Competence	217	210	7	154	147	7	187	176	11	158	152	6
Mine Engineer Certificate of Competence	51	50	1	141	133	8	61	56	5	71	70	1
Mine Manager Certificate of Competence	96	93	3	104	87	17	100	85	15	62	49	13

Source: DMR (2013)

3.4.1.5. Universities

With regards to Universities, some of the fields of study relevant to this sector are Mining Engineering, Mine Surveying, Metallurgy, Chemical Engineering, Geology, Electrical Engineering, Mechanical Engineering, Jewellery Design and Manufacturing. Mining Engineering is offered at the University of the Witwatersrand, the University of Pretoria, the University of Johannesburg, and UNISA, while Mine Surveying is offered at the University of Johannesburg. Jewellery Design and Manufacturing is offered at Stellenbosch University and at 4 Universities of Technology. The other fields of study are each offered at a number of institutions.

Table 16 shows that the number of graduates in MMS-related qualifications at HET level has generally been increasing, with the exception of Geology in 2012. The MMS competes with other sectors in the country where all the graduates are concerned, with the exception of Mining Engineering and Mine Surveying.

Table 16: Graduate numbers in MMS-related qualifications

Qualification	Output 1999	Output 2011	Output 2012
Chemical Engineering	305	1 169	1 352
Electrical Engineering	1 225	2 567	2 579
Geology	97	906	45
Mechanical Engineering	531	1 892	2 064
Metallurgical Engineering	79	367	335
Mining Engineering	148	418	431

Source: DHET, HEMIS Data (2012)

Table 17 shows the breakdown of the MMS-related qualifications by gender and race, for the year 2012. The number of females enrolled in Electrical Engineering, Mechanical Engineering and Mining Engineering are significantly lower than males. However, the number of females enrolled in Chemical Engineering and Geology are much higher, as a percentage of the number of males in those qualifications.

Table 17: Graduate numbers in MMS-related qualifications, by gender and race

	Chemical Engineering		Electrical Engineering		Geology		Mechanical Engineering		Metallurgical Engineering		Mining Engineering	
	M	F	M	F	M	F	M	F	M	F	M	F
White	175	80	512	37	9	2	778	68	36	12	61	6
Indian	74	91	161	28	1	0	138	24	5	3	4	2
Coloured	40	26	95	10	0	0	99	8	2	0	3	1
Black	469	373	1265	433	16	18	748	182	168	109	242	113
Gender Total	758	570	2033	508	26	20	1763	282	211	124	310	122
Total	1328		2541		46		2045		335		432	

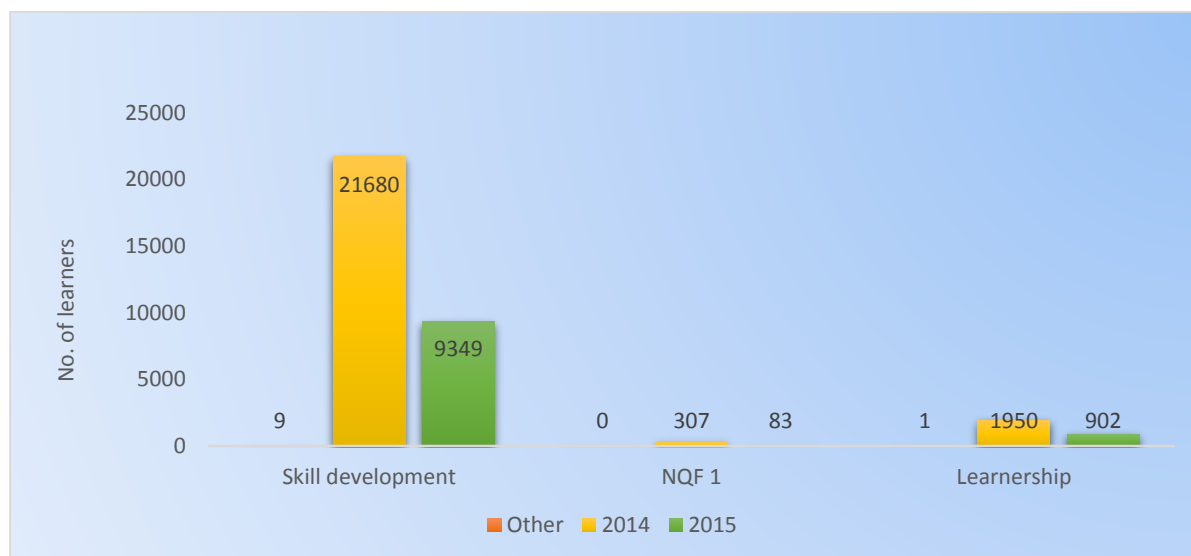
Source: DHET, HEMIS Data (2012)

3.4.2. MQA interventions to address challenges and alleviate skills shortages

The MQA, in consultation with the MMS, has been developing skills interventions over the years to meet the scarce and critical skills needs in the sector. Below is a summary of the SETA's skills development supply programmes.

3.4.2.1. Learnerships and skills programmes

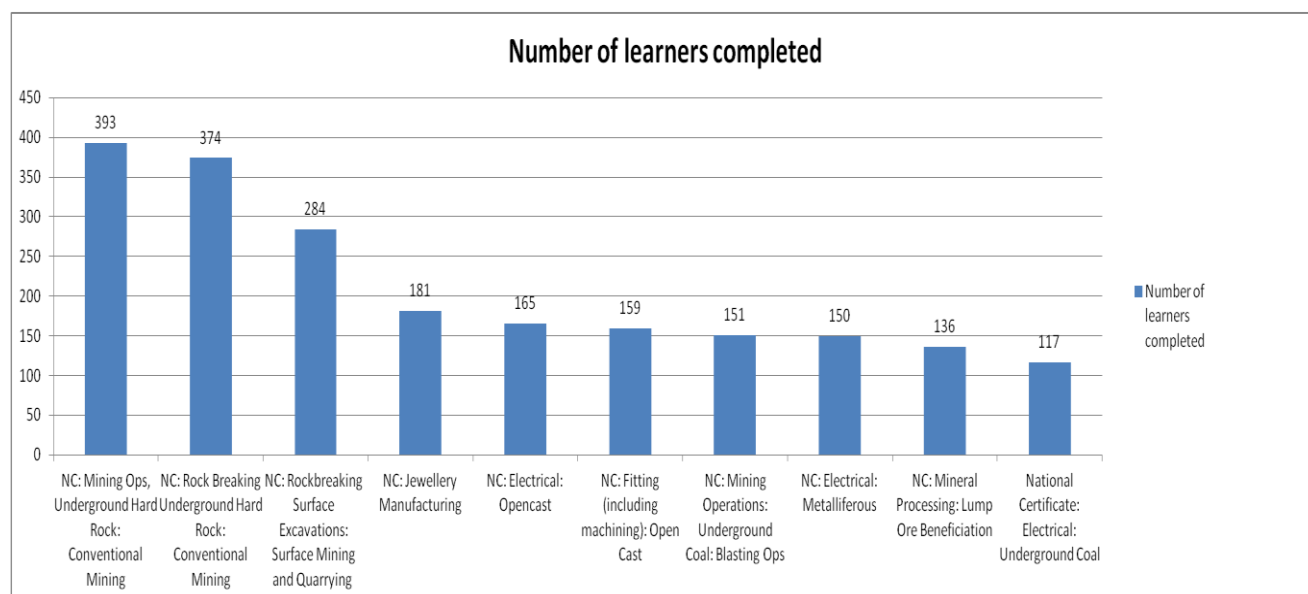
Figure 18 shows that MQA has certified a total of 34 281 learners under skills development programmes NQF 1 and learnerships. 90% of these completed the skills development programmes.

Figure 18: MQA Certification of Learnerships and Skills Programmes

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

91% of those who completed skills development programmes were employed compared to 50% for NQF 1 and 74% learnerships. Of those who were unemployed, the majority indicated that they were looking for work while others were full time students, not looking for work and/or retired. 5% of the learners in the learnership programmes indicated that they were not working owing to disability.

Figure 19 shows the top 10 MMS-related learning programmes completed in 2015. Mining operations and rock-breaking have the highest number of learners, which corresponds to the highest number of people currently employed in the sector – as seen in the WSPs (shown in Table 10 earlier in the chapter).

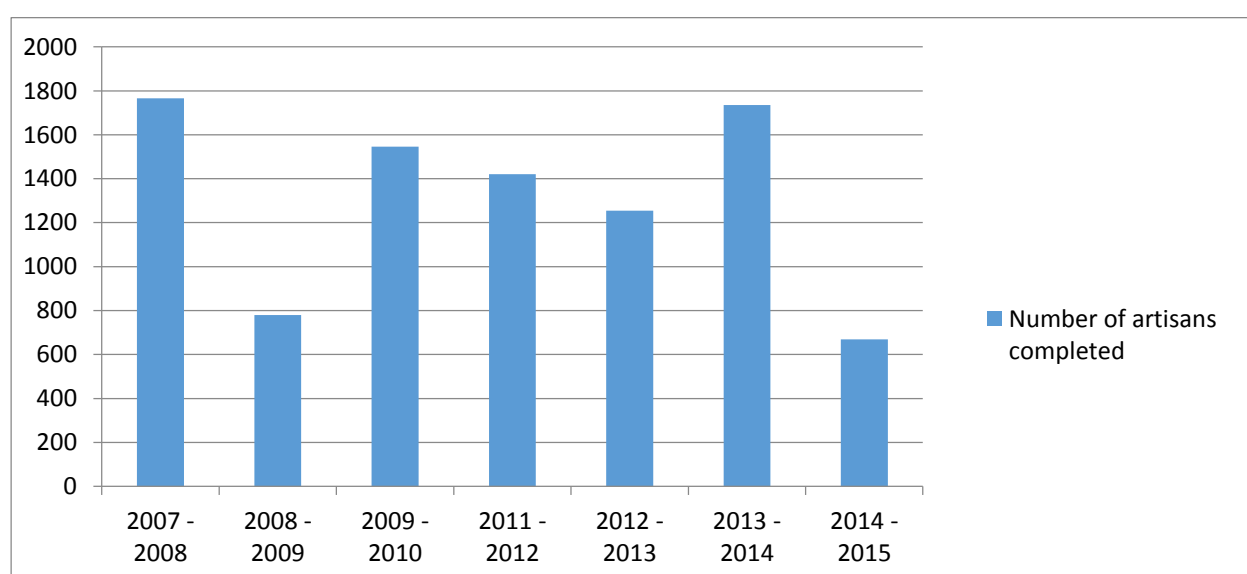
Figure 19: MMS-related Learning Programmes Completed in 2015

Source: MQA Database (2015)

3.4.2.2. Artisan development

The entire artisan database is composed of 85% black Africans, 10% white and 5% coloured people. In terms of gender, 73% are male and 27% female. 4% of total artisans and learners in the database are living with a type of disability. In terms of socio-economic status, only 52% were employed. Figure 20 shows the numbers of artisans who have completed qualifications, by year, since 2007-8. From 2009 the numbers remained over 1,000, but in 2014-15 there is a significant drop to below 700. Upon analysis of previous enrolments figures, it was found that a significant drop in enrolments occurred in 2011, and then recovered to over 2 000 enrolments for subsequent years. This decrease 3 years ago may help to explain the reason for the low completion numbers in 2014-15, therefore it is anticipated that the numbers will increase in 2015-16 again. It is suggested that the MQA conducts a Tracer Study to determine how many of the artisans it supports find employment in the MMS after completing their qualifications.

Figure 20: Artisan qualifications completed



Source: MQA Database (2015)

Table 18 shows the top 10 artisan qualifications being completed in 2015, in terms of programme numbers.

Table 18: Artisan programmes

OFO Description	Number of learners
Electrician	217
Jeweller	178
Diesel Mechanic	103
Boilermaker	74
Millwright	72
Welder	54
Instrument Mechanician	46
Fitter and Turner	34
Mineral Processing	25
Rigger	24

Source: MQA Database (2015)

3.4.2.3. Practical training and workplace exposure

According to the National Skills Accord between industry and government, SETAs need to facilitate the placement of TVET College and university students into industry. In 2014/15 the MQA had a target to place 250 learners with host employers, however only 89 were successfully placed. The MQA commits to leading greater engagement and collaboration between itself, the TVET Colleges and industry in order to meet their targets. However, their targets for P1 and P2 training for the University of Technikon students (target of 600 was exceeded by 222), as well as internships for University graduates (target of 400 was exceeded by 267), were both exceeded in 2014-15.

To help alleviate the burden on employers to mentor learners, the MQA has introduced an initiative to place coaches within workplaces to support employers with on-the-job mentoring and coaching activities. The target for 2014/15 is to place 50 coaches in companies for this purpose.

Suggestions from stakeholders included that the focus on TVET Colleges should be on the quality of students, meaning therefore that lecturers need to be developed in a professional capacity. These suggestions are currently being addressed by MQA, which has a programme to place lecturers in companies for workplace exposure. In 2014/15 the MQA's target of placing 20 lecturers was successfully achieved.

3.4.2.4. Bursaries

The MQA has a bursary scheme for tertiary studies. It applies to:

- Students entering their first year of study who possess a South African Matriculation Certificate (or an evaluated equivalent qualification) in the subjects and with subject grades that are required by the academic institution (or such equivalent qualification as that the institution may determine), for undergraduate studies;
- Bursars entering their second or third year of study who meet the requirements as specified under the "Bursary Continuation, Suspension and Reinstatement" principles contained in this policy;
- Students studying towards a University or University of Technology (Degree, Diploma and B Tech).

In 2014/15, the MQA's Annual Performance Plan (APP) required that 500 bursaries during the year be provided to undergraduates enrolled in MMS-related qualifications. This target was achieved and exceeded by 35.

Another target in MQA's APP for 2014/15 was to facilitate access to internships for 400 graduates in MMS core and related skills during the year. This was achieved and exceeded by 267, owing to an increase in the number of employers requesting to host Graduate Development Programme (GDP) learners.

3.4.2.5. Maths and Science programmes

The MQA has developed an intervention which aims to address the poor quality of Maths and Science at basic education level. It supports Grades 10, 11 and 12 learners to complete Maths and Science subjects. In 2014/15 the MQA committed in their APP to support 1,000 learners, which was successfully achieved with a total of 1,037 learners supported in this programme. The reason for the target being exceeded was owing to a high demand for the programme in rural areas.

3.4.2.6. Career awareness

The MMS is not perceived to be an attractive industry to work in. There is a lack of adequate career awareness drives which would help a person understand the variety of career options and career progression opportunities that are available in the MMS. The MQA's APP for 2014/15 required that a target of 1,000 delegates attend career guidance workshops, the aim of which is to provide comprehensive information on careers and pathways in the sector. This target was exceeded by a substantial amount – a total of 6,041 delegates attended, the reason being an increased effort to ensure participation in rural career guidance activities in order to encourage learners to pursue artisan trades and to improve their Maths and Science levels.

3.4.3. Current state of education and training provision

3.4.3.1. General basic education

Stakeholders at every regional meeting expressed concern at the quality of basic education in the country. Many occupations within the MMS require a foundation of good quality Maths and Science, which for the majority of the population is lacking. South Africa has one of the highest rates of public investment in education in the world. At about 7% of gross domestic product (GDP) and 20% of total state expenditure, the government spends more on education than on any other sector. School infrastructure has been a persistent challenge for many rural provinces and a fair portion of the DBE allocation will be channeled to rural school infrastructure. The NDP calls for 450,000 grade 12 learners to achieve university entrance passes with mathematics and physical science in 2030. But the intake for these subjects at high school has been slow. Although the national grade 12 pass rate has improved somewhat in recent years, questions remain about the quality of the grade 12 certificate, especially considering that learners need to score only 30% to pass some subjects. Regional stakeholders believe that many learners struggle with the National Certificate Vocational (NCV) subjects at TVET Colleges because their basic education has been poor. It is believed that when this has been resolved, much of the current training requirements which employers have to fund will become unnecessary.

3.4.3.2. TVET college sector

Stakeholders at the regional meetings stated that many learners are not adequately work-ready upon graduating, particularly artisans. While employers appreciate the need to carry a measure of responsibility for the training of graduates to develop company-specific skills, indications are that many colleges' workshops are not equipped enough to provide adequate practical training required for the completion of qualifications.

3.4.3.3. Higher education and training

Higher education and training (HET), or tertiary education, includes education for undergraduate and postgraduate degrees, certificates and diplomas, up to the level of the doctoral degree. In recent years more school-leavers have been getting marks that enable them to enrol for studies at university – however, owing to the poor Maths and Science pass marks in the country, which is a requirement for the majority of MMS-related qualifications, the uptake for the sector remains relatively low.

3.4.4. Supply issues faced by employers

The supply issues faced by employers relate to the critical skills which are core to an organisation's operations and are often found to be important skills in a number of occupations, rather than just one. They can also refer to "top-up" skills which are required within an occupation. Table 19

highlights the supply issues which employers at the regional stakeholder meetings held in June believed needed to be highlighted to the MQA as needing attention.

Table 19: Supply issues in providing critical skills to the sector

Supply issues	Reason for skills gap
Management skills	Managers of mines need to understand and have a lot of experience in the technicalities of mining operations. It therefore follows logically that employees with engineering and technical backgrounds will be advanced to managerial positions. However, Middle and Senior Management sometimes lack the skills required to motivate, encourage and grow their team. These skills have not normally been developed during the person's early education, and it becomes more challenging to develop them later in a person's career. They are skills which prove to be as important as technical abilities. It is therefore believed that management development should be included at the earliest education levels possible, such as high school, but at the very least during undergraduate and college levels.
Practical training	Learners are often not perceived to be work-ready upon graduating, owing in part to a lack of practical training during their studies. Many TVET College workshops have been deemed to be inadequately equipped for the purposes of providing high quality practical training to learners. This is particularly true for artisan qualifications.
Female artisans	Employers struggle to find suitably qualified and able females to fill the artisan roles, in particular Boilermaker, Diesel Mechanic, Welder, Rigger and Fitter and Turner. This affects their Employment Equity numbers. They believe that the onus should be on TVET Colleges to adequately screen and develop them into these occupations.
Maths and Science	The poor quality of basic education results in poor levels of Maths and Science, subjects which are critical to the MMS.

3.5. Identification of Scarce Skills and Skills Gaps

3.5.1. Scarce skills

Scarce occupations, otherwise known as hard-to-fill vacancies, are defined as occupations which take 3 months or more to find a candidate with suitable work experience, qualifications and attributes at current wage levels. Scarce skills are usually caused by one of two factors:

1. Absolute scarcity – this relates to suitably skilled people but who are not available in the labour market. Reasons could include industry attractiveness.
2. Relative scarcity – this relates to suitably skilled people but who do not meet other employment criteria. Reasons could include lack of sector-specific knowledge.

The top 10 scarce occupations extracted from the 2015-16 WSPs as of 31st May 2015 are shown in the table below (Table 20). Total scarcity refers to the sum of all vacancies identified in the WSP submissions, Total employed refers to the number that is currently employed by the sector, and Scarce intensity refers to the number of vacancies as a percentage of the total employment within the occupation - therefore, the higher the percentage the higher the scarcity.

Table 20: Scarce skills

Scarce occupations	OFO code	Alternative title/s	Total scarcity	Total employed	Scarce intensity
Electrical Engineer	215101	Electrical Design Engineer, Control Engineer	23	161	14.3%
Auto Electrician	671208	N/A	25	518	4.9%
Engineering Manager	132104	Engineering Maintenance Manager, Engineering Manager (Mining)	31	694	4.5%
Mechanical Engineer (Mines)	214401	Maintenance Management Engineer	27	621	4.3%
Mining Engineer	214601	Rock Engineer, Surface Mining (including quarrying) Engineer	30	714	4.2%
Rigger	651501	Rigger Ropesman	37	1 029	3.6%
Mine Planner	132202	Mining Exploration Manager, Technical Services Manager (Mining), Chief Surveyor (Mining)	20	774	2.6%
Geologist	211401	N/A	18	800	2.3%
Instrument Mechanician	672105	N/A	25	863	2.3%
Surveyor	216502	Surveying Technologist, Mine Surveyor	22	1 039	2.1%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

A summary of the reasons for the scarcity of the skills provided in Table 20, as given in both the WSPs and the regional stakeholder meetings, is as follows:

- Lack of work-readiness, particularly among the artisan occupations
- Poor management skills, particularly for the technical occupations which are promoted to managerial positions
- Lack of people with sector-specific experience/knowledge
- Lack of people with experience in specific machinery
- Industry attractiveness
- Employment equity compliance
- Poor Maths and Science levels

3.5.2. Mineral beneficiation skills

Table 21 shows the occupations related to mineral beneficiation considered to be scarce by employers completing the WSPs. These were corroborated by jewellery manufacturers who attended the regional meetings, specifically in the Eastern Cape, KwaZulu-Natal and Western Cape. The majority of the manufacturers who attended the meetings were small businesses, therefore it is important to note that the WSP data in the table below under-represents the extent of scarcity

in the jewellery manufacturing sector. Further research needs to be undertaken to fully quantify the extent of demand.

Table 21: Scarce skills for minerals beneficiation

Scarce occupations	OFO code	Total scarcity	Total employed	Scarce intensity
Jewellery Mouldmaker	661301	12	4	300%
Jewellery Wax Carver	661301	6	4	150%
Jewellery Die Stamper	711202	6	10	60%
Jewellery Industrial Designer	216303	5	19	26%
Diamond and Gemstone Setter	661302	7	29	24%
Diamond Grader	711203	7	44	16%
Goldsmith	661301	29	198	15%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

Other scarce occupations provided during the regional meetings included Gemologist, Diamond Polisher, Diamond Cutter and Jewellery Designer.

The main reasons provided for the scarcity were a combination of the following factors:

- Lack of learners with inherent talent in innovative design.
- Lack of learners who have a natural interest in and passion for the industry.
- Learners are not employable when they graduate owing to a lack of practical experience. It is very expensive for small manufacturers to train graduates, especially as there is much metals wastage when they practice while gaining sector experience.
- Lack of high quality training providers with well-equipped workshops.

The “Skills Requirements for Mineral Beneficiation through Jewellery Manufacturing” report revealed a scarcity in skills related to “Afro-centric” design elements as well as stronger technical skills. Although study has not yet been finalized, it listed the main critical skills in line with mineral beneficiation: Jewellery Designer and Evaluator; Diamond and Gemstone Cutter; Gemologist; Diamond and Gemstone Setter; Goldsmith; Jewellery Processing and Finishing Machine Operator. For the most part, these are the scarce skills found in the WSPs and indicated by regional stakeholders.

3.5.3. PIVOTAL skills

The MQAs' OFO Code Pivotal Skills List in Table 22 was determined by considering both the scarce and critical skills in the sector. The below table is a summarised version of the PIVOTAL table provided separately to DHET, and includes the reason for the scarcity. It is important to note that sometimes the occupation itself is not necessarily scarce, rather a skill within the occupation is.

Table 22: MQAs' OFO Code Pivotal Skills List (2015-2016)

Occupation	OFO code	Reasons for scarcity
Electrical Engineer	215101	Employment equity, lack of skilled people, industry attractiveness
Auto Electrician	671208	Geographic location, lack of skilled people, industry attractiveness
Engineering Manager	132104	Geographic location, employment equity, lack of skilled people, industry attractiveness
Mechanical Engineer (Mines)	214401	Absolute lack of skilled people in the country
Mining Engineer	214601	Absolute lack of skilled people in the country, lack of GCC, geographic location, industry attractiveness
Rigger	651501	Geographic location, lack of skilled people, industry attractiveness, lack of skills within occupation (for example, roping skills)
Mine Planner	132202	Lack of planning skills within the occupation, geographic location
Geologist	211401	Geographic location, industry attractiveness, employment equity
Instrument Mechanician	672105	Geographic location
Surveyor	216502	Employment equity, lack of MMCC, lack of skilled people, lack of management skills within the occupation, industry attractiveness, geographic location

Source: Calculated from Weighted MQA WSP/ATR Submission, 2015

3.5.4. Skills gaps in the sector that need improving

The primary skills gaps which have emerged through WSP data and regional meeting analysis are generally those skills which are core to an organisation's operations. Some skills are often found to be important skills in a number of occupations, rather than just one, and can sometimes be referred to as "top-up" skills. Below is a list of these skills gaps, and how the MQA is intervening with development programmes.

3.5.4.1. Engineers

With the exception of Mining Engineers, the MMS competes with other sectors for Engineers. In 2015/16, the MQA's APP requires that 500 bursaries be provided to undergraduates enrolled in MMS-related qualifications.

3.5.4.2. Artisan development

Empirical evidence indicates that artisans are not scarce in the MMS. Anecdotal evidence, however, suggests that artisans with sector-specific skills are for the most part quite scarce, and, in particular, suitable female candidates. Currently, the MQA is supporting 2,654 learners on artisan programmes.

3.5.4.3. Practical training and workplace experience

Learners are often not perceived to be work-ready upon graduating, owing in part to a lack of adequate practical training during their studies, and inadequate workplace learning. The MQA has

a number of interventions in place to address these challenges. Their targets for 2015/16 are as follows:

- To place 650 undergraduates at UoTs in companies for workplace experience.
- To place 450 university graduates into internships.
- To support 500 NVC learners in companies for workplace experience.

3.5.4.4. Certificates of Competence

Certain occupations within the MMS can only operate upon issuance of a DMR certificate, which confirms the employee has the criteria required to perform the job. Table 19 showed that the number of Certificates of Competence for Winding Engine Drivers and Mine Managers being issued by the DMR have decreased significantly in recent years. This is of concern as these occupations are on the scarce skills lists. Stakeholders at regional meetings confirmed the challenge in finding candidates in these fields with the required certificates. Research is currently underway to unpack the reasons which will explain these decreasing numbers. Once understood, the MQA will accordingly appropriate resources to address this challenge.

It was also revealed that there is a significantly small number of females, in comparison to males, qualifying for all of these Government-issued certificates. The MQA continues to support females through its numerous programmes, to attract more women to the sector, and accordingly to develop them.

3.5.4.5. Management skills

Technical people, often Engineers, are promoted to managerial positions as there is a need for Managers to have a strong technical understanding of the operations they are managing. However, these skills are often lacking as they are not developed during the person's early education and career. The MQA has a Management Development Programme in place which aims to address this challenge. They have a target to expose 150 historically-disadvantaged employees to this programme in 2015/16.

3.5.5. Impact of skills shortages on employers

Employers at the regional meetings stated that the impact of skills shortages on their businesses included:

- Employers located in rural areas need to incentivise skilled people to relocate from other parts of the country, with additional incentives to retain them, which is a high cost to company.
- When skills in the country are absolutely scarce, the cost of importing skills is very high, and involves a lengthy procedure to prove scarcity.
- The lack of management skills can cause tension between employees within companies, and a lack of planning ability within the management skill can disrupt operations and jeopardise productivity.
- The lack of high quality Maths and Science levels in learners make training more challenging to employers, as many of the MMS-related occupations require these subjects as a foundation to do the jobs well.
- Employers struggle to find suitably qualified and able females to fill some of the artisan roles, in particular Boilermaker, Diesel Mechanic, Welder, Rigger and Fitter and Turner. This affects their Employment Equity numbers.

- Companies located in the Eastern Cape and Western Cape need to send their employees to other provinces for their college theory and practical training components of their qualifications, which is costly.

3.5.6. Employability of graduates

- Graduates who complete with artisan qualifications are perceived to be not work-ready as they lack sector- and machine-specific knowledge and skills, which can be caused by inadequate practical training at college, as well as workplace experience which is too generic in nature. The responsibility then becomes the employers' to undertake further training for them, which is an increased cost to company. MQA's work-integrated learning programmes aims to address this issue.
- Graduates of non-mining related engineering qualifications usually lack MMS-related experience. Companies generally prefer to recruit Engineers with some sector-related experience. MQA's internship programmes for Engineering graduates aims to address this issue.

3.6. Conclusion

Analysis of MQA WSP submissions and comments from stakeholders at regional meetings indicates that supply is meeting current demand, owing to the low numbers of vacancies per occupation (as a percentage of the total number employed for each occupation). The primary reasons underlying the challenges in filling occupational vacancies were found to be related to geographic location, employment equity and industry attractiveness.

The MQA assists the industry in addressing these challenges through interventions which include: Partnerships with colleges; Local community development projects which include learnerships, skills programmes, Maths and Science programmes, and adult education and training; Targeting HDSAs to address transformation issues; Career awareness programmes. Ongoing research to monitor and evaluate these interventions is being, and will continue to be, undertaken.

4. SECTOR PARTNERSHIPS

4.1. Introduction

The MQA partners with and has relationships with numerous key role-players in the industry, such as DHET, the DMR, labour unions, the Chamber of Mines, employers and training providers.

The purpose of this chapter is to assess the effectiveness of the existing MQA partnerships in the sector – specifically, those where official collaboration is in place through a Memorandum of Understanding (MOU), and where objectives and outcomes of the MOU are monitored and evaluated. There will be particular reference to partnerships with TVET Colleges owing to the DHET's focus on and prioritisation of TVET College capacitation as outlined in the White Paper for Post-School Education and Training. The chapter identifies problems to maintaining and creating partnerships and proposes measures for deepening them. The Chapter will also indicate new partnerships that the MQA has identified that will be addressed and considered during the cycle of this SSP Update.

4.2. Existing Partnerships

4.2.1. TVET College partnerships

The MQA has established official partnerships, through Memoranda of Understanding (MOUs), with the following colleges:

- Goldfields TVET College in the Free State province
- King Hintsa TVET College in the Eastern Cape province
- Nkangala TVET College in Mpumalanga province
- Northern Cape Rural TVET College in the Northern Cape province
- Orbit TVET College in the North West province
- Sekhukhune TVET College in the Limpopo province

The above colleges were chosen owing to MQA's regional presence in these provinces, and because qualifications related to the MMS are offered there. The qualifications are not yet accredited by the MQA, however one of the primary aims of these partnerships is to support and develop the colleges so that accreditation becomes a natural outcome in the medium to long term.

The objectives of the partnerships with these 6 TVET Colleges include to facilitate the offering of learnerships, trades and other industry qualifications, as well as lecturer development, workplace learning and learner placements. In order to achieve these goals, the MQA's commitments to the TVET Colleges include, to:

- Assist with the placement of learners at workplaces. This was highlighted by stakeholders at the regional meetings as being critical to ensure that learners are equipped with some work experience upon graduating which makes them more employable. MQA's 2014/15 APP required that the MQA facilitates the placement of 250 TVET graduates with host employers. Only 89 were successfully placed. The reason for the shortfall was that better collaboration is needed between the MQA, TVET Colleges and industry.
- Assist with the placement of lecturers at workplaces to gain work experience. The 2014/15 APP required that the MQA facilitates and funds the placement of 20 lecturers in companies in order to gain workplace experience, for a period of 3 months. A pilot project is being

undertaken at Goldfields TVET College and the target was successfully met. However, initial findings suggest that the 3 months is too short to gain adequate experience. It is the MQA's intention to lengthen this period to 18 months. Stakeholders at regional meetings emphasised the need for better quality teaching, so it is recommended that development programmes in lecturing be provided to a larger number of lecturers of MMS-related qualifications at these colleges.

- Assist with programme approval of identified qualifications and skills programmes. The qualifications at the above-mentioned colleges are not yet accredited by the MQA, however one of the primary aims of these partnerships is to support and develop the colleges in order that accreditation becomes a natural outcome.
- Assist with the compliance of these colleges' workshops to meet the standards for programme approval. Both MQA staff and stakeholders at the regional meetings indicated that one of the major reasons learners are not work-ready at the end of their qualifications is because of poor quality workshops at colleges which serve to provide the practical training element.
- Train college facilitators in line with ETD unit standards registered on the NQF. This is a planned special programme which is not a requirement in MQA's APP but will be provided to colleges which request the support and will be funded as per the request in the proposal. This will be piloted at Goldfields TVET College and, if successful, will be rolled out to other colleges.

4.2.2. University partnerships

The MQA has established official partnerships, through Memoranda of Understanding (MOUs), with the following Universities:

- Rhodes University
- University of Cape Town
- University of Fort Hare
- University of Johannesburg
- University of Limpopo
- University of Pretoria
- University of South Africa
- University of Venda
- University of the Witwatersrand

The objective of the partnerships with the Universities identified above is for these institutions to employ historically disadvantaged lecturers to lecture on mining-related disciplines. They begin as junior lecturers and are mentored by senior lecturers, and are encouraged to complete PhDs. The MQA funds the salaries of these lecturers. The aim is that they are eventually absorbed by the universities as permanent employees.

The MQA's current target is to support 27 HDSA lecturers has been successfully achieved. Since the partnerships' commencement in 2011, 3 lecturers have been successfully absorbed by the university, while 6 have been absorbed by industry. All of these were replaced so that the target of 27 is an ongoing commitment by the MQA.

One of the challenges in this partnership is that there is a very low turnover of lecturers at the universities, so it will likely be a lengthy period of time that MQA needs to support the same pool of HDSA lecturers before they are considered for permanent employment. The MQA has intentions of

providing the lecturers with 3 years of international exposure during their tenures at the universities, so that they gain valuable experience and are therefore more employable on their return to South Africa.

4.2.3. Department of Mineral Resources partnership

The MQA entered into an MOA with the DMR which aims to facilitate increased access to occupationally-directed programmes that respond to PIVOTAL programmes in order to address the skills needs for the MMS. The partnership aims to strengthen and sustain the building of a developmental state through skills development.

Additionally, the MOA supported the DMR in the following interventions:

4.2.3.1. Bursary Support

The project benefited 33 learners on bursaries. Research should be undertaken to determine successes, failures, challenges and impact of this project.

4.2.3.2. Internship Project

The MQA supported 50 DMR Inspectors on an internship project. The project started in the 2014/15 financial year, and will be completed in 2015/16. The learners are currently placed with Anglo Gold and Sibanye Gold Mines to get work integrated learning. If successful, this project may be rolled out on a broader scale.

4.2.4. Chamber of Mines partnership

The Chamber of Mines is one of the strategic tripartite partners with the MQA, and the MQA responded to the Chamber's call for greater collaboration on high quality development for mining-related qualifications. The objective was to develop learning material for sector qualifications that are fit for purpose and relevant to the industry.

4.3. Proposed New Partnerships

4.3.1. Minerals beneficiation partnerships

The “Skills Requirements for Mineral Beneficiation through Jewellery Manufacturing” report compiled by Odiscan and released in October 2014 found that the Minerals Beneficiation Strategy is not working as well as expected. The industry has seen job losses, firm closures, people are being trained but are not being absorbed into employment, or sustaining the new businesses as expected. The argument made in this report is that these interventions are more likely to work if the activities are better coordinated, and that this will have significant implications for the skills development system. Stakeholders that can be engaged and partnered to address these challenges are suggested below:

4.3.1.1. Industry partnerships

Greater collaboration between the MQA, industry councils and jewellery manufacturers needs to be put in place and official partnerships formed with mutual firm commitments to brainstorm and strategise the way forward to revive the industry. The “Skills Requirements for Mineral Beneficiation through Jewellery Manufacturing” report suggests that qualifications will need to be more carefully scoped against industry requirements, with a long-range workforce in mind. It further recommends that it should entail strong and predominantly “Afro-centric” design elements

as well as stronger technical skills. Jewellery manufacturers who attended the regional meetings concurred that the only way to compete, both nationally and internationally, is to focus on bespoke, innovative and unique design work.

The current grants by the MQA which aim to develop graduates and provide them with valuable workplace experience were highlighted in the meetings as not being sufficient to cover the high costs of adequate mentorship and metals wastage. This presents an opportunity for partnership formation for the MQA and could be explored to harness the Minerals Beneficiation Strategy to a greater degree.

4.3.1.2. Training provider partnerships

The “Skills Requirements for Mineral Beneficiation through Jewellery Manufacturing” report recommends that Training Provider capacity may need to be improved, to provide stronger practical skills. The regional stakeholder engagements also revealed a need to capacitate colleges where economies of scale are a concern (minimum class numbers required) as well as develop students who have an avid interest and talent in innovative design work, rather than just being trained on technical design software. Therefore, the MQA will need to facilitate more collaborative partnerships between workplaces and Training Providers, although the afore-mentioned partnership between the MQA and industry will need to precede this.

4.3.2. Green skills partnerships

Rhodes University’s report, “Green Skills for the Mining Sector” conducted on behalf of the MQA and released in May 2015, as well as stakeholder comments made during the regional meetings in June 2015, were used to inform the recommendations in this section. While Rhodes University’s report was an initial study with limited scope and focused only on the coal sub-sector, the findings are believed to be transversal to the MMS and can therefore be extended to other sub-sectors.

4.3.2.1. Department of Water and Sanitation partnership

The Green Skills for the Mining Sector report recommended that the MQA supports the Department of Water and Sanitation in strengthening the capacity of its regulatory function with regards to mining, with a range of skills from demand determination and catchment management to regulatory roles in the approval and enforcement of water use licences. Support would need to include short (top-up) courses and the establishment of networks/communities of practice.

Stakeholders at the regional meetings also emphasised the amount of water used by the sector, which for the most part does not get recycled. Concern was expressed at the significantly reducing water levels in the country and that not enough efforts were being made to manage this imminent problem, which could have significant and far-reaching consequences if not addressed soon. Official and proactive efforts to mitigate this challenge should be undertaken by the MQA, but in partnership with the Department of Water and Sanitation, to combine strengths and avoid any duplication of work.

4.3.2.2. Research institutions

The Green Skills for the Mining Sector report also recommended that partnerships be formed with industry including Eskom, the Fossil Fuel Foundation, Mintek, SANEDI, DST and the NRF to complement their funding for cleaner production research in clean technology and processes, and in the effective remediation of the impacts of mining on air, soil and water quality.

4.3.3. Inter-SETA partnerships

In alignment with the Minister of Higher Education and Training's call for increased inter-SETA collaboration, partnerships should be considered with SETAs whose occupations are required in the MMS, in particular those which are considered scarce, as the development of components of qualifications could be a shared initiative.

4.4. Conclusion

The chapter identified challenges and successes with existing partnerships, proposes measures for deepening them and recommends possible new partnerships. The MQA currently has formal partnerships with 6 TVET Colleges, in the provinces where MQA has a regional presence. It was highlighted that better collaboration is needed between the MQA, TVET Colleges and industry, for the purposes of improving access to workplace experience. Other recommendations include development programmes for lecturers of MMS-related subjects, in order to improve quality of lecturing; continuation of TVET College support to ensure eventual accreditation of qualifications; and funding to be proportionately and expediently allocated to colleges in order to upgrade colleges' workshop facilities and equipment.

With regards to minerals beneficiation, greater collaboration between the MQA, industry councils and jewellery manufacturers needs to be put in place and official partnerships formed with mutual firm commitments to strategise the way forward to revive the industry, and , in particular to understand what the skills demand from industry will be.

With regards to green skills, a partnership with the Department of Water and Sanitation is recommended to mitigate the challenge of significantly reducing water levels, to combine strengths and avoid any duplication of work. It is also recommended that partnerships be formed with companies with R&D departments that focus on cleaner production research in clean technology and processes, and in the effective remediation of the impacts of mining on air, soil and water quality.

5. SKILLS PRIORITY ACTIONS

5.1. Introduction

The purpose of this chapter is to identify the top 5 key priority actions for the sector based on a consolidation of the analysis from previous chapters. This chapter will indicate the skills priority actions that the MQA will prioritise for the cycle of this SSP (2015-2016), which will reflect the operational priorities that the MQA expects to promote in its quest to implement its various learning interventions for the MMS sector as it aligns with national priorities.

5.2. Priority 1: Support transformation of the sector through skills development

Employment Equity plays a key role in South Africa's transformation agenda. In order for the MQA to support this national priority, it will continue to prioritise skills development to enable an increase in the number of Historically-Disadvantaged South Africans (HDSAs). These include, and are not limited to, undertaking skills development interventions to capacitate more men and women to occupy management and supervisory roles, with emphasis on enabling women to occupy position in core mining occupations. The MQA will also prioritise skills development interventions to respond to the disabled, i.e. those individuals already employed, and those seeking employment in the sector with a view to increasing their representation.

The Mining Charter stipulates that there should be at least 40% participation in HDSAs in management positions. HDSAs and women in particular are underrepresented in the MMS management. In addition, management skills were highlighted at every regional meeting as being a critical skill, the MQA intends to continue supporting black individuals in and for management roles. This includes support to individuals in its Management Development Programmes. MQA will also continue to support programmes such as lecturer development programmes and Rural Development Projects (Maths and Science) and Management Development Programmes aimed at addressing equity and transformational imperatives within the sector. Furthermore, it is recommended that management programmes for engineering students be targeted for support, to pre-empt their advancement to managers of mining operations at later stages of their careers.

To promote gender equality, the MQA intends to continue providing incentives for women to enter the MMS. More bursaries will be introduced in an attempt to attract young women to mining. Employers have pointed out that they cannot find suitably qualified females to fill some of the artisanal functions, in particular Boilermakers, Diesel Mechanics, Welders, Riggers and Fitter and Turners. This affects ability to meet employment equity targets. Another major challenge is developing black women into senior management. The MQA will continue supporting women in its Management Development Programme.

People with disabilities represent less than 1% of the labour force of the total MMS sector in terms of data in the 2015 WSP-ATR submissions for the MQA. It is proposed that the MQA plays a more active role in supporting people with disabilities to acquire skills to take up employment in the sector, and increase skills development interventions for those already employed.

5.3. Priority 2: Core Mining Skills Must Continue to Be Developed through Skills Programmes

In order to ensure a sufficient pool of skills for the sector in the long-term, it is important that the MQA continues to support and fund programmes which are core to the sector. These should include skills programmes and learnerships. This will also involve improved monitoring and evaluation of training delivery and quality. Capacity-building of TVET College lecturers will also continue to be supported to ensure that this improves public sector training delivery.

Interventions to ensure employability of graduates will also be prioritised through various workplace training mechanisms. There will continue to be collaboration with industry to provide valuable workplace experience, via work-integrated learning for TVET College learners, P1 and P2 training for University of Technology students, and internships for university undergraduates.

The MQA will also undertake further research on understanding artisan demand in the medium- to long-term in the sector. The project will seek to determine whether the number of artisans currently entering the sector, if held constant, will be adequate to supply skills to the MMS in the longer term.

The impact of new, more sophisticated technologies and innovations will transform the mining and metals processes and operations in the core mining skills in the long term. In addition, the type, level and mix of skills need to be considered in respect of technological changes. The implications to MQA in terms of skills is that learnerships must engage new mining technologies and, as a result, new operations and processes. It is anticipated that the MQA will undertake a comprehensive research study to determine the impact of changing technology and its skills development implications. It is necessary to understand which occupations will be affected, which existing skills can be developed to incorporate the new technologies, and most importantly which new skills will be required. This will inform the kinds of qualifications that may need to be developed, or adapted, to ensure timely supply to the sector.

5.4. Priority 3: Monitor and Develop the Skills Required for Minerals Beneficiation

South Africa's Minerals Beneficiation Strategy is planning to transform the industry from being largely resource-based to knowledge-based. In order for this to succeed, greater collaboration between the MQA, industry councils and jewellery manufacturers needs to be put in place and official partnerships are formed and sustained with mutual firm commitments to chart the way forward to revive the industry. In particular, the MQA will seek to ensure an adequate and relevant supply of skills to the sector. Qualifications will need to be carefully scoped against industry requirements, with a longer term view of the kinds of workforce in mind. There is agreement that the best way to compete, both nationally and internationally, is to focus on technical skills that take account of bespoke, innovative and unique design work which takes account of "Afro-centric" design elements.

There is therefore a need to train new skills in line with this transformational imperative. The MQA recently commissioned a study on the skills requirements for beneficiation in the jewellery manufacturing sub-sector. Tentative findings from that study (still to be finalised) indicate that the

main critical skills in mineral beneficiation include: Jewellery Designer and Evaluator; Diamond and Gemstone Cutter; Gemologist; Diamond and Gemstone Setter; Goldsmith; Jewellery Processing and Finishing Machine Operator. Further research will need to be undertaken to fully understand the skill implications of the potential growth of the sector.

5.5. Priority 4: Continue to Improve Health and Safety Standards

Mining is a hazardous activity and has generic risks that impact on the health and safety of employees. Additionally, a company's licence to operate is jeopardised when there are fatalities, injuries and occupational injuries. The government has put in place legislation and associated processes to ensure the safety of workers is paramount as a key feature of the sustainability of the mining sector. Indeed, in this respect, one of the MQA's legislative mandates is to improve the health and safety standards and it must continue to be a priority. The results of this has been already been realised notwithstanding other interventions by those in the sector. There has been a notable decrease in mining injuries and fatalities, with total fatalities decreasing sharply from a peak of 744 per year in 1989 to 84 in 2014.

The MQA will, therefore, continue its progress regarding OHS skills capacity and training in the industry, through the following measures:

- Support skills development in OHS Skills programmes.
- Train OHS Representatives over 5 years as required by the Mine Health and Safety Tripartite Leadership Summit Agreement signed on 5th September 2008.

There were indications at the regional meetings that there was a shortage of SHEQ Practitioners in remote areas of the country. While this occupation did not make the top 10 'hard-to-fill' list, it represents a key skill for the sector. It is proposed that MQA should explore reasons which contribute to a possible supply shortfall and if necessary determine the solutions which will mitigate them.

5.6. Priority 5: Develop Skills for Sustainability

5.6.1. Sustainability of Livelihoods

A challenge for the MMS is job losses as a result of retrenchment. The MQA, through skills planning initiatives, has to put in place measures to ameliorate the impact of downscaling and retrenchments in partnership with all role-players in the MMS sector.

Social Labour Plans (SLPs) represent a unique model of agreement between labour, capital and the state in dealing with the social consequences of mining activities. Through SLPs a focus is placed on portable skills training which targets both employees and communities for empowerment and self-sustainability after the life of a mine. In addition, SLPs critically addresses local economic development and skills training to improve livelihoods by re-engaging workers into the labour market and opening up re-employment opportunities or further study pathways for retrenched workers.

As part of a case study research project being championed by the MQA, it was identified that a model needs to be crafted which looks at best practice principles for implementing the skills

development component of the retrenched mine workers. The proposed research will delve deeper into the entire structure and models used in training of retrenched mine workers in the sector. The implications of this research will be a valuable complement to current thinking about the way in which the skills development dimension of the retrenched mine workers is understood and how it is being implemented. The outcomes of this research report will also assist the MQA in identifying the support and interventions that need to be provided from the skills planning imperative in support of retrenched workers.

5.6.2. Environmental Sustainability

A concern in the MMS is the potential damage being done to the environment by mining operations. Reducing water levels, together with inadequate recycling initiatives will have significant and far-reaching consequences if not addressed soon. Proactive efforts to mitigate this challenge should be undertaken by the MQA in partnership with other government departments. There is need to understand the seriousness of the issue, and in particular whether there are adequate skills to address it. A range of skills from demand determination and catchment management to regulatory roles in the approval and enforcement of water use licences will likely be required. It is anticipated that support would include short (top-up) courses and the establishment of networks/communities of practice.

It is also recommended that partnerships be formed with industry including Eskom, the Fossil Fuel Foundation, Mintek, SANEDI, DST and the NRF to complement their funding for cleaner production research (i.e. in clean technology and processes), and in the effective remediation of the impacts of mining on air, soil and water quality.

Research is underway to explore what the 'green skills' needs are within the entire mining value chain. The research is a case study that will focus on the following priority arrears;

What are the essential 'green skills' within the mining value chain?

What 'green skills' are considered scarce within the mining value chain?

How does this knowledge influence career-pathing within the mining value chain?

What are 'green skills' supply pipelines and challenges?

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ANNEXURE A: METHODOLOGY USED IN THE DEVELOPMENT OF SECTOR PROFILES

There is no single database that provides a complete and comprehensive profile of the MMS as it has been defined for the purposes of the Skills Development Act. In order to develop such a profile a variety of data sources were used. For each of the subsectors and for each of the variables needed in the profile, the sources that provided the best data were selected.

1. Mining Sector

For five of the mining subsectors (Coal Mining, Gold Mining, PGM Mining, Diamond Mining and Other Mining) the DMR's database of mines (employment in the first quarter of 2015) was used to establish total employment in each subsector. This database is maintained and updated every quarter when all mining operations are required to submit information to the DMR. The employment and earnings figures provided on this database are used by Statistics South Africa in their quarterly Survey of Employment and Earnings (SEE) and are regarded as the official statistics on employment in the mining industry. Information on population group, gender, occupational distribution and educational levels was not available from the DMR database. However, the MQA has a relatively high return of WSPs-ATRs every year and the WSPs contain comprehensive information on the workforce of the sector. The WSPs-ATRs submitted for the financial year 2014/15 represented approximately 70% of the workers in the sector. Thus, for the purpose of establishing a sector profile the individual records in the source data were weighted using the following formula:

$$W_a = E_a (\text{DMR}) / E_a (\text{Source data})$$

where

W_a = the weight applied to records belonging to a particular subsector

$E_a (\text{DMR})$ = total employment in that subsector as reported by the DMR

$E_a (\text{Source data})$ = total employment in that subsector in the WSP-ATR submissions in 2014/15

2. Services Incidental to Mining, CLAS, Diamond Processing and Jewellery Manufacturing

The CLAS subsector includes cement manufacturing which is not included in the DMR data. For this reason the WSP-ATR data of the CLAS subsector were weighted, using SDL payment information. Similarly, to arrive at an estimate of total employment in the Services Incidental to Mining, Diamond Processing and Jewellery Manufacturing subsectors SDL payments were used in weighting the source data. It was assumed that there is a direct relationship between the amount of levies paid by an organisation and the number of people employed. It was also assumed that organisations in a particular subsector would have similar wage structures and that the employment-levy relationship of companies that submitted WSPs-ATRs would be the same as for those in the same subsector that did not submit WSPs-ATRs. Thus the weights applied to individual employee records in these four subsectors were calculated using the following formula:

$$W_a = L_a / L_{aw}$$

where

W_a = the weight applied to records belonging to a particular subsector

L_a – Total levies paid by organisations in the subsector in 2014/15

L_{aw} – Total levies paid by organisations in the subsector in 2014/15 that submitted WSPs

The weights calculated were also applied to the individual records in the source data.

ANNEXURE B: MQA SUBSECTOR AND SIC CODES

Subsector	SIC code	Description of activity
Coal mining	21000	Mining of coal and lignite
	22100	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction except surveying
Gold Mining	23000	Mining of gold and uranium ore
	23001	Thin tabular operations
	23002	Thick tabular operations
	23003	Massive mining operations
PGM Mining	24240	Platinum group metals
Diamond Mining	25200	Mining of diamonds (including alluvial diamonds)
	25201	Marine mining operations
	25202	Coastal mining operations
Other Mining	24000	Mining of metal ores, except gold and uranium
	24100	Mining of iron ore
	24200	Mining of non-ferrous metal ores, except gold and uranium
	24210	Chrome
	24220	Copper
	24230	Manganese
	24290	Other metal ore mining, except gold and uranium
	25000	Other mining and quarrying
	25102	Open cast/strip mining operations
	25103	Open pit operations
	25300	Mining and quarrying n.e.c.
	25310	Mining of chemical and fertilizer minerals
	25311	Phosphates
	25319	Other chemical and fertilizer mineral mining
	25320	Extraction and evaporation of salt
	25390	Other mining and quarrying n.e.c.
	25391	Mining of precious and semi-precious stones, except diamonds
	25392	Asbestos
	25399	Other minerals and materials n.e.c.
Cement, Lime, Aggregates and Sand (CLAS)	34240	Manufacture of cement, lime and plaster
	25100	Stone quarrying, clay and sandpits
	25110	Dimension stone (granite, marble, slate, and wonderstone)
	25101	Quarrying/dimension stone operations
	25120	Limestone and lime works
	25190	Other stone quarrying, including stone crushing and clay and sandpits
Services Incidental to Mining	92004	Education by technical colleges and technical institutions
	87000	Research and development
	29000	Service activities incidental to mining of minerals
	85291	Supply of mining equipment
Diamond Processing	39212	Diamond cutting and polishing
	39219	Other precious and semi-precious stone cutting and polishing

Jewellery Manufacturing	39210	Manufacture of jewellery and related articles
	39211	Jewellery and related articles composed of precious metals, precious and semi-precious stones and pearls
	37601	Manufacture of watches, clocks and related articles

ANNEXURE C: RESEARCH AGENDA FOR 2015-2016

NSDS III requires a new approach and set of skills to identify, foster and develop strategic opportunities, partnerships and ensure specialised technical support for new initiatives that focus on quality, throughput and scale. To address this requirement; the MQA has adopted a strategic approach that seeks to put research at the centre of planning and inform decision making. The role of research thus is to:

- Monitor external trends in education and training, nationally and internationally, and promote a learning and development culture in order to support continuous learning and improvement in the MMS
- Develop a robust and reliable sector Labour Market Intelligence (LMI) framework and institutional capacity in order to make informed planning decisions.
- Build capacity in the sector to support increased participation by ensuring dissemination of best practices, models, and research findings;
- Identify and leverage Research and Skills Planning partnerships.
- Provide a central point for the Development, interpretation, and communication of the Sector Skills Plan (SSP) and support implementation of the SSP through relevant projects and programmes;

The MQA Research agenda is informed by the MQA strategic outcome oriented goal 2 of the annual performance plan and strategic plan documents. The outcome clearly states that research is to continually inform and support objective decision making for skills development planning in the sector. To ensure the continual objective decision making and skills development planning; the below research project are proposed for 2015/16 financial year.

SSP 2016 UPDATE-Functional Legislative imperative

Section 5 of the Skills Development Amendment Act (2008):

(a) Develop a sector skills plan

(b) Implement its sector skills plan by—

- Establishing [learnerships] learning programmes;
- Approving workplace skills plans and annual training reports;
- Allocating grants
- Monitoring education and [training] skills development provision in the sector

WSP/ATR Analysis- Functional imperative

The objective of this project is to develop a profile of the MMS in terms of the geographic location, size, and composition of organisations that submitted WSP/ATR to MQA for the 2015/16 Financial year. The report shall profile MMS workforce as well as the training priorities identified in the WSP/ATR submissions in 2015/16.

Trends Analysis- Functional imperatives

The objective of the study is use the information contained in the WSP/ATR submissions to provide an updated trends and analysis of the sector in terms of geographic location, size and composition of MMS

companies. This is to also capture the trends in training offered over a determined period of WSP/ATR submissions.

Tracer study of MQA Bursars – Functional Imperative

The purpose of this research study is to provide as much information as possible regarding the activities of MQA bursars after obtaining a qualification, including the employment status and expectations of bursars who have qualified through the MQA bursary programme. Tracer studies are designed to determine whether or not a programme is achieving its mission and help demonstrate its impact and this is best seen by the achievements of the qualified MQA funded graduates (herein referred to as bursars).

Support to Retrenched workers through skills development

The research aims to look at the efficacy of the skills development and training of retrenched workers.

Green Skills within MMS- Functional and Intrinsic Imperative

The research aims to explore what are the 'green skills' needs within the entire mining value chain. The research is a case study that will focus on the following priority areas;

- What are the essential 'green skills' within the mining value chain?
- What 'green skills' are considered scarce within the mining value chain?
- How does this knowledge influence career- pathing within the mining value chain?
- What are 'green skills' supply pipelines and challenges?

Regional SSP- Functional imperative

This project aims to develop a Regional Sector Skills Plan (RSSP) for the each region/provinces or cluster thereof, which will serve to identify and map key features, trends forecasts and legislative initiatives at the regional level vis-à-vis skills development. It should engage MQA sectors in the identification of sectoral demands and provide an ongoing insight into regional and local developments in the sector and links to skills development planning. The regional SSP should provide the following information:

- A review of regional economic landscape, based broadly on the guidelines of the requirements of the national economic analysis as per chapter 1 of the Sector Skills Plans. Emphasis to be placed on liaison with regional Growth and Development Strategies and special associated projects
- An outline of key supply and demand-side considerations (Chapters 2 and 3 of the national Sector Skills Plan). This must linked to the shifts towards green production technologies and subsequent for green skills.
- A review of the regional MQA Company profile using latest MQA WSP and ATR data. This must incorporate an analysis of the impact of the economic cycle on the MMS.
- An analysis of public and private Further Education and Training (FET) training provider capacity, strengths, weaknesses and opportunities; mapped against requirements outlined above
- An intensive negotiation and discussion platform for strategic shifts at provincial level
- Feedback to report-back workshop. Either at MQA national level and/ or regional stakeholder forums.

ANNEXURE D: WEIGHTING FORMULA FOR ESTIMATION OF DEMAND

The MQA Labour Demand Projection Model (LDPM) was used in Chapter 3 to estimate demand for occupations (by occupational category) for the next 5 years (2016-2020). This SSP Update revises a few assumptions based on the identified key drivers and the results of the stakeholder consultations. The labour demand forecast acts as a bridge between past data and future expectations and is built at detailed occupational levels. At a high level, the LDPM is as follows:

- **Equation 1:** Replacement demand = No. of vacancies + (factor x labour utilisation factor) + (factor x labour turnover rate),
 - Less: labour turnover (retirement, mortality and people leaving the MMS).
- **Equation 2:** New demand = Existing employees + (labour utilisation factor x existing employees) + (summary of all factors affecting demand x existing employees) + probability of industry expansion x output: employment ratio).

The main assumptions (scenarios) used in this model can be summarised as follows:

- iv. The National Development Plan (NDP) and New Growth Path (NGP) target of 140,000 additional direct jobs in MMS by 2020.
- v. Overall employment growth in the MMS of 2.6% p.a.
- vi. The vacancy rates for each occupational group were assumed to be constant throughout the projection period.

ANNEXURE E: PIVOTAL SKILLS LIST

MQAs' OFO Code Pivotal Skills List														
SETA NAME	SHORT/MEDIUM /LONG TERM	PERIOD	OCCUPATION CODE	OCCUPATION	SPECIALISATION/ ALTERNATIVE TITLE	INTERVENTION PLANNED BY THE SETA	NQF LEVEL	NQF ALIGNED Y/N	QUANTITY NEEDED	Quantity to be supported by SETA	0-100	101-1000	1001 & ABOVE	COMMENTS
MQA	Long term	2015-16	215101	Electrical Engineer	Electrical Design Engineer, Control Engineer	Bursary, work experience, internship		Y	23		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	671208	Auto Electrician	Auto Electrician	Artisan development	4	Y	25		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	132104	Engineering Manager	Engineering Maintenance Manager, Engineering Manager (Mining)	Management Development Programme		Y	31		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	214401	Mechanical Engineer (Mines)	Maintenance Management Engineer	Bursary, work experience	4	Y	27		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	214601	Mining Engineer	Rock Engineer, Surface Mining (including quarrying) Engineer	Bursary, work experience, internship		Y	30		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	651501	Rigger	Rigger Ropesman	Artisan development	4	Y	37		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	132202	Mine Planner	Mining Exploration Manager, Technical Services Manager (Mining), Chief Surveyor	Work experience, Management Development		Y	20		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	211401	Geologist	Geologist	Bursary, work experience, internship		Y	18		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	672105	Instrument Mechanician	Instrument Mechanician	Artisan development	4	Y	25		X			MQA targets are set at programme level, not at occupational level.
MQA	Long term	2015-16	132201	Mine Manager	Production/Operations Manager (Mining), Quarry Manager	Management Development Programme		Y	22		X			MQA targets are set at programme level, not at occupational level.