MINING QUALIFICATIONS AUTHORITY

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 2018-2019

FINAL SUBMISSION

01 AUGUST 2017

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 Sector Skills Plan (SSP) update for the MMS for the period 2018-19.

The SSP has been prepared in accordance with the National Skills Development Strategy (NSDS) III, in accordance with the expectations of the DHET. This SSP has been presented to the Skills Research and Planning Committee and the MQA Board. 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 conducted regional stakeholder consultation between June 2015 and May 2016, which culminated in the development of 9 regional sector skills plans (RSSPs). Further consultations were made with key MMS stakeholders in June and July 2017 and the qualitative information from stakeholders was combined with quantitative analysis of the MQA WSP data as at 31 May 2017.

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.

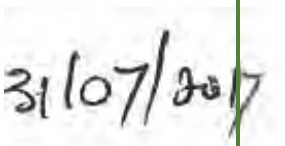
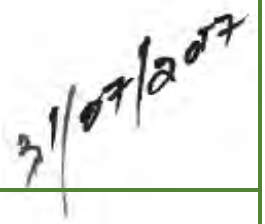
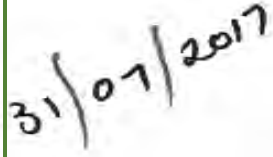
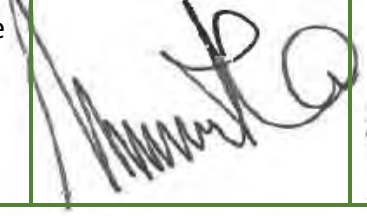
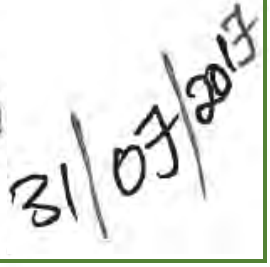
…… 31/07/2017

Mr Mthokozisi Zondi
Chairperson: MQA Board

Date

STAKEHOLDER ENDORSEMENT

This is the Sector Skills Plan update prepared by the Mining Qualifications Authority (MQA) for the Mining and Minerals Sector (2018/19). 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 organisations and organised labour in this national economic sector.

Endorsed by	For	Title	Signature	Date
Mr Mthokozisi Zondi	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 Regional Operations Coal - DMR		
Mr Amon Teteme	Organised Labour: National Union of Mineworkers (NUM) 7 Rissik Street Johannesburg. P O Box 2424 Johannesburg 2000	MQA Board: Convener – Organised Labour		
Mr Mustak Ally	Employers: Chamber of Mines (COM) 5 Hollard Street, Marshalltown. P O Box 61809 Marshalltown 2107	MQA Board: Convener – Employers		
Mr Tebogo Mmotla	MQA: 7 Anerley Road Parktown Johannesburg Private Bag X118 Marshalltown, 2017	Acting Chief Executive Officer of the MQA		

ACRONYMS

Acronym	Description	Acronym	Description	Acronym	Description
AET	Adult Education and Training	HR	Human Resources	NW	North West
AIDS	Acquired Immune Deficiency Syndrome	HRDS-SA	Human Resources Development Strategy for South Africa	OFO	Organising Framework for Occupations
APP	Annual Performance Plan	IMF	International Monetary Fund	OHS	Occupational Health and Safety
ATR	Annual Training Report	INSETA	Insurance Sector Education and Training Authority	PDP	Provincial Development Plan
ABET	Adult Basic Education and Training	IPAP	Industrial Policy Action Plan	PGMs	Platinum Group Metals
BEE	Black Economic Empowerment	IRM	Industrial Raw Materials	PGDP	Provincial Gross Domestic Product
BER	Bureau of Economic Research	KZN	KwaZulu-Natal	PICC	Presidential Infrastructure Coordinating Commission
Bn	Billion	LDEDAT	Limpopo Department for Economic Development and Tourism	PIVOTAL	Professional, Vocational, Technical and Academic Learning
CAD	Computer-Aided Design	LMI	Labour Market Intelligence	R&D	Research and Development
CETA	Construction Education and Training Authority	LP	Limpopo Province	RSSP	Regional Sector Skills Plan
CHIETA	Chemical Industries Education and Training Authority	M&E	Monitoring and Evaluation	SA	South Africa
CLAS	Cement, Lime, Aggregates and Sand	MBAP	Mineral Beneficiation Action Plan	SAMDA	South African Mining Development
Ct	Carat	Mct	Metric carat	SARB	South Africa Reserve Bank
DHET	Department of Higher Education and Training	MDP	Management Development Programme	SDA	Skills Development Act
DMR	Department of Mineral Resources	merSETA	Manufacturing, Engineering and Related Services SETA	SDL	Skills Development Levy
DoE	Department of Energy	MHS	Mine Health and Safety	SERO	Socio-Economic Review and Outlook
DST	Department of Science and Technology	MMS	Mining and Minerals Sector	SETA	Sector Education and Training Authority
EC	Eastern Cape	MP	Mpumalanga Province	SEZ	Special Economic Zone
ECSA	Engineering Council of South Africa	MPRDA	Minerals and Petroleum Resources Development Act	SIC	Standard Industrial Classification
ESETA	Energy Sector Education and Training Authority	MQA	Mining Qualifications Authority	SIP	Strategic Infrastructure Project
FASSET	Financial & Accounting Sector Education and Training Authority	Mt	Metric ton	SMME	Small, Medium and Micro Enterprise
FDI	Foreign Direct Investment	MTSF	Mid Term Strategic Framework	SOE	State Owned Enterprise
FET	Further Education and Training	NC	Northern Cape	SSP	Sector Skills Plan
FS	Free State	NCV	National Certificate Vocational	Stats SA	Statistics South Africa
GCC	Government Certificate of Competency	NDP	National Development Plan	TETA	Transport Education and Training Authority
GDP	Gross Domestic Product	NGP	National Growth Path	TVET	Technical and Vocational Education and Training
GET	General Education and Training	NMBLP	Nelson Mandela Bay Logistics Park	UCS	Underhill Corporate Solutions
GP	Gauteng Province	NQF	National Qualifications Framework	UoT	University of Technology
GVA	Gross Value Added	NRF	National Research Fund	WC	Western Cape
GWM&E	Government- Wide Monitoring and Evaluation	NSA	National Skills Accord	WP-PSET	White Paper - Post School Education and Training
HDSA	Historically Disadvantaged South African	NSSP	National Sector Skills Plan	WSP	Workplace Skills Plan
HET	Higher Education and Training	NSDS	National Skills Development Strategy	YEA	Youth Employment Accord
HIV	Human Immunodeficiency Virus	NUM	National Union of Mine Workers		

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EXECUTIVE SUMMARY

1. Introduction and Background

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

2. Research methodology

The research methodology used included both quantitative and qualitative research methods. Secondary research was conducted on economic, social and development status and strategies. MQA Workplace Skills Plans (WSPs) and Annual Training Reports (ATRs) as at 31 May 2017, complemented these sources and allowed for an analysis of the size and nature of the sector. Key stakeholder workshops and consultations were undertaken between May and July 2017. The insight gained provided deeper insight into change drivers, skills demand and supply, and skills gaps. Stakeholders included employers, labour unions and training providers, as well as representatives from the Department of Mineral Resources (DMR), the Chamber of Mines, and the National Union of Mineworkers (NUM).

3. Sector Profile

The MMS is an important sector to South Africa but it is currently facing challenges:

- Its contribution to the GDP has been decreasing gradually, from 8.5% in 2009 to 7.3% in 2016, though the 2017 Stats SA quarterly data show a slight increase to 7.5%.
- Declining global demand for mining commodities and retrenchments have led to a 12.4% decrease in the number of people employed, from a peak of 628 750 in 2012 to 550 905 in 2017.
- However, the outlook of the MMS would be improved if the sector monitors the developments of Mining Phakisa and prepares existing and potential employees accordingly; as well as takes advantage of the implementation of the Mineral Beneficiation Action Plan (MBAP) and the Strategic Infrastructure Projects (SIPs), which are expected to increase economic activity and create new jobs.

Additionally, analysis of the MMS revealed the following:

- Gauteng has the highest proportion of the number of companies by province (45.80%), followed by Mpumalanga (15%) and Western Cape (10.8%). However, this doesn't show the concentration of mining activities, but where company head offices are located.
- MMS employment is mainly concentrated in North West (40.9%), Gauteng (15.8%), Limpopo (13.7%) and Mpumalanga (12.8%); and together constitutes 83.2% of total employment in the MMS.
- In terms of subsector employment, most subsectors experienced significant declines in employment numbers between 2012 and 2017 save for 'Other Mining' which registered a significant increase of 61.4%. The sub-sectors which lost significant employees are CLAS with a 69.8% drop followed by Jewellery Manufacturing, Services Incidental to Mining and Diamond Processing which registered 59.1%, 57% and 54.8% respectively during the same period.
- A review of employment trends by occupational categories shows that, since 2012, there has been a decrease in employment numbers across most occupational categories, with the most significant in the Managers category, with a 32.7% decrease, followed by the Elementary occupations with a 18.6% decrease. The Artisan category is the only one to have shown growth in numbers, with an 8.6% increase since 2012.

- The MMS remains a male dominated sector. However, the proportion of females has been increasing gradually, from 11% in 2012, to 13.9% in 2017.
- Equity composition of employees shows that Africans comprise 86% of the total number employed in the MMS. The number of Whites employed in the sector has been on the decline from 12.9% in 2012 to 10% in 2017 while Coloureds and Indians have increased marginally, currently comprising 3% and 1% of the sector respectively.
- During the period 2012-2017 the proportion of Whites in management roles has declined by 8.2% while the proportion of African, Indian and Coloured increased by 6.7%, 1.1% and 0.4% respectively.
- The number of employed people with disabilities has consistently been less than 1% of the MMS labour force. This shows no change in the period 2012-2017.

4. Key Skills Issues

The key change drivers currently impacting the MMS are: changing technology, together with Mining Phakisa; retrenchments, as the widespread downscaling of operations across the sector owing to decreased investor confidence and global demand for mined commodities has led to large-scale retrenchment drives, resulting in the need to prioritise portable skills training; and transformation, as targets contained in the new Mining Charter are designed to redress historical imbalances.

5. Occupational Shortages and Skills Gaps

Analysis of 31 May 2017 MQA WSP-ATR submissions and comments from key stakeholders revealed the following:

- There are recruitment challenges where a few of the core mining occupations are concerned. The 10 most hard-to-fill occupations which need to be addressed were found to be Mine Planning Manager, Industrial Engineering Technologist, Mechanical Engineering Technologist, Mining Engineer, Rock Engineer, Electrical Engineer, Environmental Health Officer, Technical Trainer, Ventilation Officer, Strata Control Officer, and Quarry Master (Magazine Master).
- The primary reasons for skills gaps are a lack of specialised knowledge and experience in updated and new technology, insufficient experience, low levels of maths and science, insufficient access to high quality career awareness, employment equity, lack of GCC holders, lack of management skills, lack of project management skills, lack of work-readiness, lack of skills pipeline, and transitionary delays in the QCTO process.
- Main supply-side concerns were found to be as follows:
  - Basic education: Low levels of maths and science; and poor access to career awareness.
  - TVET college sector: Lack of practical training and outdated curricula at colleges.
  - HET sector: Lack of career awareness for Rock Engineering.
  - Other (not specific to a level of education): QCTO transitionary delays, lack of specialised knowledge and experience on updated and new technology, lack of work experience, and declining GCC achievement numbers for core MMS-related occupations.
- Industry is assisted in addressing these challenges through interventions which include: partnerships with colleges; local community projects such as learnerships, skills programmes, Maths and Science programmes, and adult education and training; targeting HDSAs to address transformation issues; and career awareness events. The targets for most of these interventions were successfully achieved.
- Given the importance of maths and science as building blocks for the majority of occupations in the sector, stakeholders suggested that efforts should be focused on the development of

teachers, in order to reach more learners and ensure impact through high quality teaching. Learners who have successfully passed these Maths and Science programmes could be prioritised for MQA bursaries.

- Career awareness events should provide greater detail so that a person is empowered to make an informed decision regarding whether or not a particular career might be suited to them or not, thus potentially avoiding career changes and unnecessary training expenditure at a later stage. It is important to continue to partner effectively to increase access to high school learners, and to emphasise the positive effects on future job prospects of pursuing maths and science until Grade 12. Career awareness efforts should include a focus on the Rock Engineering specialisation, as it is believed that this is partly responsible for the shortage of rock engineers in the sector.

6. Sector Partnerships

Formal partnerships have been established with 22 TVET colleges around the country, where qualifications related to the MMS are offered. It is difficult to report on the partnerships as most of them are in early stages. One of the key challenges is in facilitating workplace experience for lecturer development. TVET colleges do not have financial capacity to replace lecturers who are on leave for workplace experience. This is a significant issue which is currently being resolved.

The MQA has established official partnerships with nine community colleges, one in each of the nine provinces, a project which is in line with DHET's mandate to capacitate community colleges. These partnerships are in early stages and due to be completed in 2018, therefore no reviews have been conducted yet.

The MQA has a very strong partnership with its three tripartite partners: the DMR, the Chamber of Mines and organised Labour, who convene regularly to discuss challenges facing skills development. The MQA is becoming increasingly involved in inter-SETA meetings, which involve the sharing of skills development progress and a focus on areas of collaboration.

It is important to partner formally with the Mining Phakisa, as their technology developments may require reskilling training drives for some occupations in the sector. Their R&D efforts also include a focus on the conservation of natural resources, preservation and restoration of the environment, which is an important focus area.

7. Skills Priority Actions

As a result of the findings in this SSP, the following skills priorities are recommended:

- Priority 1: Support transformation of the sector through skills development
- Priority 2: Continue to improve health and safety standards
- Priority 3: Monitor and respond to technology changes
- Priority 4: Develop portable skills
- Priority 5: Monitor and develop the skills required for minerals beneficiation.

RESEARCH PROCESS AND METHODS

1. Introduction

SETAs are expected to facilitate the delivery of sector-specific skills interventions that help to achieve the goals of the NSDS III. It is therefore a core mandate for the SETA to develop National Sector Skills Plans (SSPs). The SSP must outline current and projected needs of the sector and sector employers, as well as the current and future training and qualification needs of the sector that are agreed with stakeholders and can improve the match between education and training supply and demand. The SSP must also highlight suitable interventions that will address the skills needs of the sector.

There is aim to support objective and informed decision making for skills development through research in the MMS and to contribute to the body of skills development both nationally and within the provinces through collaboration with relevant bodies within the MMS and to then disseminate the research reports and findings.

The purpose of this section is to provide details regarding the research process and methodology employed by the research team in order to complete an SSP which is both factual and analytical, and therefore informative, useful and actionable for the SETA.

2. Research Process and Methods

2.1. Research Topic

The SSP research process pursued an answer to the following primary question: “What are the key issues influencing the Mining and Minerals Sector (MMS) which are either currently or have the potential to impact skills supply and demand, as well as skills development?”

2.2. Nature of the Study

The research study used both quantitative and qualitative research methodologies. It was important to include qualitative methods owing to the limitations of quantitative methods in providing insight to data and statistics. Inclusion of qualitative data and stakeholder insight was important as the sector is complex and subject to significant internal and external pressures whose implications for skills development must be understood.

2.3. Objectives of the Study

The objectives of the research study were to:

- Determine the key change drivers impacting the sector where skills development is concerned.
- Highlight any skills mismatches between demand and supply in the sector.
- Investigate the primary reasons for the skills mismatches.
- Understand stakeholders’ experiences of, and beliefs regarding the effectiveness and impact of MQA’s skills development interventions for the sector.
- Determine whether there is any potential for growth and the creation of much-needed jobs in the sector, which would influence skills development initiatives for the MQA.

2.4. Data Collection Tools

Much of the qualitative research that was completed was in the form of two workshops as well as personal interviews with a small sample of employers, labour, training providers, industry representatives and government in Gauteng during June and July 2017. The workshops were

effective in delving deeply into the topic of the research in order to understand the key challenges facing the sector, with a strong focus on their implications on skills development. Discussion guides and interview packs were prepared and sent to all stakeholders involved in advance of the meetings, and were used as the basis for discussions to ensure that attention was maintained on the important areas of the research. The insight and key findings obtained from the MQA's Regional Sector Skills Plan project in 2015-16 as well as the NSSP project in 2016-17 helped to inform most of the discussion guide for the first workshop, and was thus used to kick-start discussions on how the sector had changed, if at all, in the intervening year. These updates were then used to inform the discussion guides and interview packs for subsequent meetings.

The main sources of quantitative data are MQA WSP as at 31 May 2017, DMR, Stats SA and Quantec Research Services.

2.5. Sample Size and Scope

The first workshop was attended by six employers, a training provider and an industry representative. The second workshop was attended by two members of the National Union of Mineworkers, one industry representative, and a representative from the Department of Mineral Resources.

With regard to personal interviews, two representatives of the Mining Phakisa initiative were consulted for an update on their research and development efforts that will impact the mining sector.

The MQA Board, MQA's EXCO as well as MQA's SRP Committee were all engaged during June and July 2016 for their expertise on and assessment of the research findings. All outstanding matters needing clarity were discussed fully and resolved during these high-level engagements.

With regard to the WSP/ATR database, it is widely accepted that the WSP/ATRs submitted by employers in the MMS provide an employment coverage of as much as 95% of the sector, therefore the sample size of this particular quantitative data type is statistically very high.

The scope of the project involved covering the following areas:

- Reviewing the economic landscape and performance of the sector, the employer and labour profiles, as well as outlook of the sector.
- Outlining key change drivers influencing the sector, with particular attention to those which impact skills development.
- Analysing WSP data submitted by 31 May 2017, to understand the emerging trends in the sector as well as possible limitations of the data.
- Analysing the state of education institutions providing the skills needed by the sector.
- Identifying the key skills mismatches in the sector, and the primary reasons thereof.
- Seeking assessment of the findings, by both key national and regional stakeholders.
- Analysing MQA's partnerships at a national level as well as around the country.
- Determining the key research findings.
- Recommending five key priority areas for the MQA.

2.6. Data Sources and Data Sets

The quantitative data used was sourced mainly from MQA's weighted WSP/ATR submissions and MQA's programme interventions databases, as well as through literature and document review of relevant policies and previous SSPs. Other substantial information sources included DMR, DHET, Stats SA, Quantec and Chamber of Mines reports. 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. For example, 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, which is not usually included in other data sources, for example DMR.

Furthermore, qualitative data was sourced in the form of regional workshops and one-on-one consultations with expert stakeholders in the sector, including representatives from DMR, the Chamber of Mines, the National Union of Mineworkers (NUM) and the Department of Higher Education and Training (DHET). This information provided rich insight into the quantitative data and statistics, and facilitated understanding of the change drivers impacting the sector, skills demand and supply, the current and emerging skills gaps and potential solutions to the complexities and challenges in providing skills development for the sector.

2.7. Time-frame of the Study

The research study was conducted over three months. It began in May 2017 and ended in July 2017.

3. Key Findings

The key findings of this report which are aligned to the objectives of the research are as follows:

- The main change drivers currently impacting the MMS are: technology, together with Mining Phakisa; retrenchments, as the widespread downscaling of operations across the sector owing to decreased investor confidence and global demand for mined commodities has led to large-scale retrenchment drives, resulting in the need to prioritise portable skills training; and transformation, as targets contained in the new Mining Charter are designed to redress historical imbalances.
- The new Mining Charter, which was gazetted in June 2017[1], stipulates that there should be at least 60% participation from black persons in senior management positions (of which 30% must be female black persons), 75% middle management (of which 38% must be female black persons), and 88% junior management (of which 44% must be female black persons). Chapter 1's labour profile shows that representation is currently not at the required levels.
- The most hard-to-fill occupations are mine planning manager, industrial engineering technologist, mechanical engineering technologist, mining engineer, rock engineer, electrical engineer, environmental health officer, technical trainer, ventilation officer, strata control officer and quarry master (magazine master).
- The primary reasons for skills gaps are a lack of specialised knowledge and experience in updated and new technology, insufficient experience, low levels of maths and science, insufficient access to high quality career awareness, employment equity, lack of GCC holders, lack of management skills, lack of project management skills, lack of work-readiness, lack of skills pipeline, and transitionary delays in the QCTO process.

[1] Please note that the new Mining Charter was suspended by the Minister (DMR) pending the court decision.

- The main supply-side concerns were found to be as follows:
  - Basic education: low levels of maths & science; and insufficient access to career awareness.
  - TVET college sector: lack of practical training at colleges; and outdated curricula at colleges.
  - HET sector: lack of career awareness for rock engineering, a specialisation of Mining Engineering.
  - Other (not specific to a level of education): QCTO transitionary delays; lack of specialised knowledge and experience on updated and new technology; lack of work experience; and declining GCC achievement numbers for core MMS-related occupations.
- The MQA's targets for Maths & Science and career awareness events were exceeded in 2016-17. Stakeholders believe, however, that there is room for improvement and that the initiatives should be monitored for impact, given the importance of maths and science as building blocks for the majority of occupations in the sector, and with career awareness' potential to disseminate accurate information as well as draw the right skills and potential to the sector.
- The outlook of the MMS would be improved if the sector monitors the developments of Mining Phakisa and prepares existing and potential employees accordingly; and takes advantage of the implementation of the Mineral Beneficiation Action Plan (MBAP) and the SIPs projects, which are expected to increase economic activity and create new jobs.
- Mining operations come with inherent risks that can impact the health and safety of employees. Mining companies, government and unions need to continue to place importance on employee safety since continued fatalities, injuries and occupational diseases jeopardise a company's licence to operate.
- With regard to green skills, the industry is becoming more conscious of the growing need to protect the environment by mining in an environmentally sustainable way. Energy and water efficiency, as well as the reduction of air pollution, are increasing imperatives resulting in the need for skilled workers to source 'green' products and services and manage 'green' supply chains. R&D efforts in the Mining Phakisa initiative include a focus on conservation of natural resources, preservation and restoration of the environment.

1 SECTOR PROFILE

1.1. Introduction

The purpose of this chapter is to provide an overview of the Mining and Minerals Sector (MMS) in South Africa. The section covers the: 1) Scope of coverage; 2) Key role players; 3) Sector contribution to the broader South African economy; 4) Employer profile; and 5) Labour profile of the MMS.

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 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).

The MMS is categorised into the following subsectors: 1) Coal Mining; 2) Gold Mining; 3) Platinum Group Metals (PGM) Mining; 4) Diamond Mining; 5) Other Mining, which includes the mining of iron ore, chrome, manganese, copper, phosphates and salt; 6) Cement, Lime, Aggregates and Sand (CLAS); 7) Services Incidental to Mining; 8) Diamond Processing; and 9) Jewellery Manufacturing.

1.3. Key Role Players

The MMS is a highly regulated industry with key role players inclusive of government and state-owned enterprises, employer representatives and labour unions. The following tables set out the broad contributions that each of the above-mentioned stakeholders make to the MMS.

1.3.1. National Government Departments

Table 1.1 shows the government departments which are interlinked with the MMS.

Table 1.1: National Government Departments

Department	Role	Function in relation to MMS and skills development
Department of Mineral Resources (DMR)	Mineral policy and regulation	• 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	• 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	• Planning for higher education provision to the mining sector • Setting up national skills development agenda via the regulation of SETAs, including MQA • Career awareness

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

Table 1.2 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 1.2: 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	• Improving and promoting occupational health and safety in the mining industry • Liaise with MQA about MHS and skills development
Mintek	Mineral processing and Metallurgy	• R & D expertise; intellectual capital-engineers, scientists and technologists • Provide 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	• Accreditation of engineering programmes • Registration of persons as professionals • Regulation of the practice of registered persons
South African Diamond and Precious Metals Regulator	Diamond and Precious metals regulation	• Regulation of diamond, gold and PGMs • Skills transfer • Business development support • Local beneficiation
State Diamond Trader	Buying and selling of rough diamonds	• Promote equitable access to beneficiation of diamonds • Develop South Africa's diamond cutting and polishing skills
CSIR	Mining Phakisa	• Research and Development in mining • Supporting increased exploration activities • Improving upstream linkages between mines and equipment manufacturers

1.3.3. MMS key industry stakeholders

Table 1.3 shows some of the key industry stakeholders which are involved in advocacy, promotion and other industry development initiatives.

Table 1.3: 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	• Establish conducive policy, legislative and operating environment
Copper Development Association (Pty) Ltd	Copper industry representation	• Promote and expand the use of copper and copper alloys • Marketing and promoting skills which can be adopted in MQA learning materials
Federation of SA Gem & Mineralogical Societies	Earth science clubs	• 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	• Junior mining[2] initiative by SA junior mining investor • Create enabling environment for raising finance • Develop technical and other skills • Practice responsible environmental management

1.3.4. MMS Worker Representatives

The mining sector is highly unionised with a great number of employees represented or affiliated to a union. Unions in the mines are amongst the most active in South Africa. Their activities have a significant bearing on the productivity in the MMS. Labour relations has changed in recent years with the emergence of new unions in the MMS. The National Union of Mineworkers (NUM) and United Association of South Africa (UASA) are the recognised union within the MQA and forms part of its governance structure.

1.4. Economic Performance

This section provides an overview of the economic performance and contribution of the sector to the country.

[2] 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'.

1.4.1. Overview of the MMS

South Africa accounts for 96%[3] of known global reserves of the platinum group metals (PGMs), 74% of chrome, 26% manganese and 11% of gold reserves[4]. As a leading producer and supplier of a range of minerals, the country is in a position to offer a highly competitive investment destination which ensures that it meets specific trade and investment requirements of prospective investors and business people as well as the developmental needs of its populace.

South Africa remains one of the largest net exporters of minerals and metals. The economy earns about 40% of export earnings from mining. South Africa is an important global mining industry hub with deep 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 industrialised country in Africa. The MMS employs about 3% of 16.2 million employees[6] in the country whose annual earnings is R116.7 billion. These employees support about 4.5 million dependents. The sector paid R3.7 billion royalties and R12.5 billion taxes to the government during 2015/16 financial year.[7] 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 recognise the critical role that mining contributes to growing investments, exports, GDP and job creation.

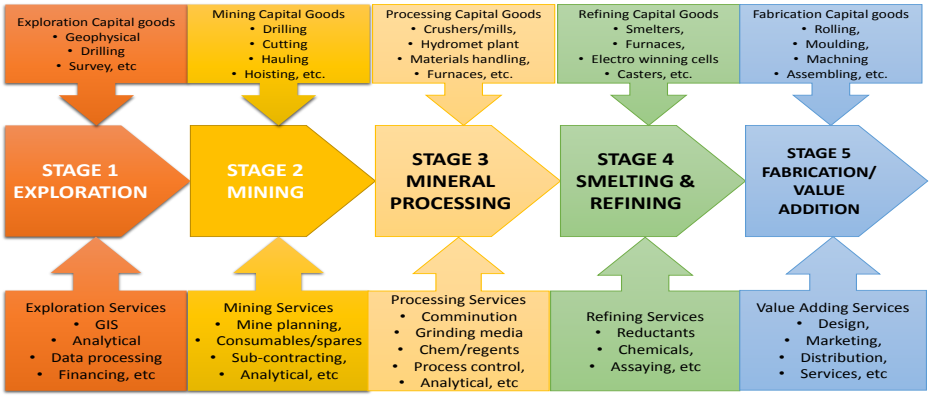
Mining production increased by 15.5%[8] year-on-year in March 2017 and has added 26 000 jobs[9]during the same period. The growth was driven by production in PGMs which grew by 30.0% and iron ore and coal which grew by 24.4% and 8.1% respectively and diamonds by 53.8% though its contribution to the overall growth was minimal. On the other hand, Gold weighed down the growth as its production went down by 8.8%. Seasonally adjusted mining production increased by 3.7% in March 2017 compared with February 2017. This followed month-on-month changes of 2.3% in February 2017 and 2.2% in January 2017[10].

1.4.2. Value Chain of the MMS

Figure 1.1 below shows the MMS value chain system of the industry from primary activities of exploration to minerals value addition and the support activities in each stage of the value chain. A value chain is a set of activities that companies operating in a specific industry perform in order to deliver a valuable product or service for the market[11].

[3] http://www.gov.za/about-sa/minerals
[4]http://www.gcis.gov.za/sites/www.gcis.gov.za/files/docs/resourcecentre/pocketguide/2012/15%20Mineral%20Resources.pdf
[5] African Economic Outlook, 2014.
[6] http://www.statssa.gov.za/publications/P0211/P02111stQuarter2017.pdf
[7] Chamber of Mines South Africa, Facts and Findings (2016)
[8] Quarterly Labour Force Survey
[9] Quarterly Labour Force Survey Quarter 1, 2017 http://www.statssa.gov.za/publications/P0211/P02111stQuarter2017.pdf
[10] http://www.statssa.gov.za/publications/P2041/P2041March2017.pdf
[11] Porter, Michael E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Simon and Schuster. Retrieved 13 May 2016.

Figure 1.1: Mining and Minerals Sector Value Chain



Source: Underhill Corporate Solutions illustration based on Ecopartners[12]

As illustrated in the Figure above, the majority of the companies in Stage 2 are involved in primary production while Stages 3-5 depict secondary production, with increasing degrees of processing, beneficiation and value addition.

1.4.3. Overview of the MMS Subsectors

1.4.3.1. PGM mining

PGMs (Platinum Group Metals) includes; platinum, palladium, rhodium, ruthenium, iridium and osmium mining commodities. South Africa's reserves constitute 87% of the global reserve base and the country contributes around 58.7% to global production, ranking 1st in both categories. PGM Mining produced 275.5 tonnes of platinum during 2016 with 88% of it being exported. The country realised R94.14 billion from the sales.

1.4.3.2. Gold mining

The South African gold mining industry is ranked 1st in the world in terms of gold reserves and 7th in production[13], contributing 5.6% to global production[14].Gauteng dominates in gold mining accounting for 51.6% of South Africa's production followed by Free State at (21.6%); North West (20.6%); Mpumalanga (4.6%) and then Limpopo (1.6%). Approximately 5% of South Africa's gold production is beneficiated locally to coins and jewellery.[15] 141.4 tonnes of gold was produced in 2016; 88% of it was exported. The country realised R62.7billion in sales.

1.4.3.3. Coal mining

The South African coal mining industry is ranked 6th in the world in terms of production and 6th in terms of reserves, contributing 3.5% to global output.[16] Coal reserves, and coal mining activity, are predominant in Mpumalanga and Limpopo[17] and production is largely concentrated by five largest mining groups who produce about 80%. In 2016, South Africa produced 293Mt of coal with 54.8 % sold locally (amounting to a sales value of R65.54 billion) with the remaining 45.2% exported (amounting R50.6billion).

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12 http://www.ecopartners.co.za/docs/Wits%20University%20Mineral%20Economics%20Value%20Chain%20Analysis%20February%202011.pdf

13 http://www.mineweb.com/regions/

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

15 http://www.dmr.gov.za/publications/south-africas-mineral-industry-sami.html

16 http://www.chamberofmines.org.za/sa-mining/coal

17 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.

1.4.3.4. Diamond mining

In 2015; South Africa was ranked 7th in the world on diamond production[18]. These deposits are concentrated in Northern Cape, Free State and Limpopo provinces. During 2016 South Africa produced 8.12Mct of diamonds realising total sales value of R14.4 billion and 40.3% of diamonds were exported. Local diamond sales totalled R8.6 billion while foreign export sales amounted to R5.8 billion[19].

1.4.3.5. 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%)[20] also fall into this group of industrial commodities. In October 2015 CLAS group minerals had recorded a decrease of -4,8% year on year for non-metallic mineral production, and continued to decline to -11.4% as of March 2016[21]. Large firms in this subsector include cement manufacturers, phosphates, vermiculate and dimension stone producers. Dimension stone is also exported in bulk.

1.4.3.6. Other mining

Other mining sub sector includes producers of uranium, copper, chrome, iron ore, manganese and salt. South Africa's copper deposits lie mainly in Limpopo. In terms of production, 16.3 million tons of chrome were produced in 2016. The production of iron and manganese was 73.2 million tons and 15 million tons respectively. South African iron ore 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. Iron ore and manganese deposits are concentrated in Northern Cape.[22]

1.4.3.7. Services incidental to mining

The Services Incidental to Mining category consists of companies providing services incidental and closely related to the MMS. These includes research and development in the mining and mineral extraction, training, catering, payroll services, manufacturing, distribution, hiring and maintenance of machinery and equipment, consulting services, shaft sinking, transportation and logistics.

1.4.3.8. Diamond processing and jewellery manufacturing

The South African diamond processing industry consists of 221 licenced diamond manufacturers. De Beers is the major supplier of rough diamonds South Africa. The Master Diamond Cutters' Association has 80 registered members employing 95% of the employees in this subsector.[23] South Africa's State Diamond Trader was launched in February 2008 and is mandated to purchase 10% of South Africa's rough diamond production to sell to local beneficiates.

Companies in the jewellery manufacturing subsector beneficiate mining outputs such as gold, platinum and silver and diamonds to manufacture jewellery for both the domestic and export markets. The majority of companies in this subsector are small and located in Gauteng, Western Cape and KwaZulu-Natal.

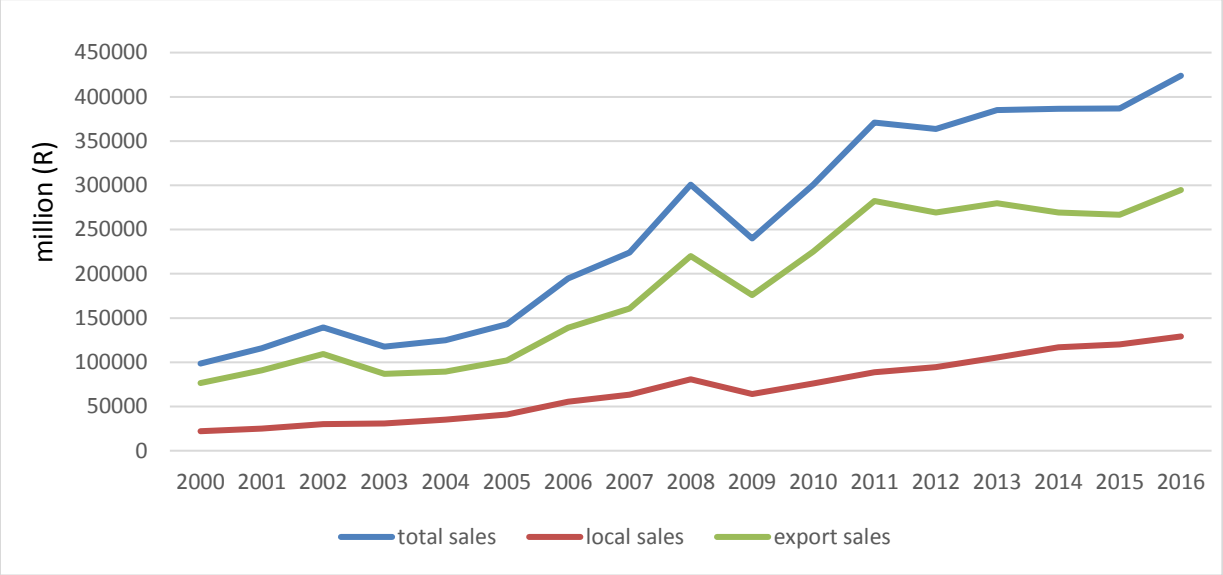
1.4.4. Mineral Sales and Exports

The trends for the demand of South African minerals is shown in Figure 1.2 below for the period 2000-2016. The figure shows an upward trend of both local and export of minerals. However, the

[18] http://www.gov.za/about-sa/minerals
[19] Chamber of Mines, Facts and Figures, 2016
[20] http://www.statssa.gov.za/publications/P2041/P2041March2015.pdf
[21] http://www.statssa.gov.za/publications/P2041/P2041March2016.pdf
[22] Chamber of Mines, Facts and Figures
[23] http://www.essentialsjewelry.com/southafrica-gem-jewelry/south-africa-rough-diamond.html

proportion of local sales has been increasing slowly hence the call for beneficiation of minerals rather than exporting them in their unprocessed state. Revenue increased by only 0.1% in 2015 from 2014 total sales. Total sales and exports peaked from 2009 to 2011 after the global financial crisis and thereafter have been on a sluggish trend because of the global economic slowdown particularly from China which is the major consumer of most of minerals which are exported. The decrease is attributed to the decrease in exports, since local sales have been increasing steadily.

Figure 1.2: Value of sales of total minerals



Source: Quantec/DMR (2017)

1.4.5. MMS contribution to GDP and comparison with other economic sectors

Table 1.4 below shows the economic sector contributions to the national GDP for the past 6 years (2010-2016)[24]. As shown in the table, the MMS' contribution to South Africa's GDP has decreased from 8.4% in 2011 to 7.3% in 2016. The decline in global commodity demand, downscaling and closing down of mines compounded the decline in 2016. In comparison Finance, real estate and business services was the highest individual contributor to the national GDP, with 20.1%, General Government Services coming up 2nd with 15.4%. The MMS[25] was the 6th highest contributor to GDP in 2015.

Table 1.4: Sector contribution to national GDP

Economic Sector	2011	2012	2013	2014	2015	2016	2017*
Agriculture, forestry and fishing	2.4	2.3	2.3	2.3	2.4	2.1	2.2
Mining and quarrying	***8.4***	***8.1***	***7.7***	***7.8***	***7.6***	***7.3***	***7.5***
Manufacturing	13.1	13.0	13.0	12.8	12.6	12.5	12.3
Electricity, gas and water	2.5	2.4	2.4	2.3	2.3	2.1	2.1
Construction	3.5	3.4	3.4	3.4	3.4	3.6	3.5
Wholesale, retail and motor trade; catering and accommodation	13.5	13.6	13.7	13.7	13.7	13.9	13.7
Transport, storage and communication	8.4	8.3	8.4	8.3	8.4	8.5	8.6

[24]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.

[25] 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.

Economic Sector	2011	2012	2013	2014	2015	2016	2017*
Finance, real estate and business services	19.1	19.2	19.4	19.6	19.6	20.1	20.1
General government services	14.7	14.9	15.1	15.2	15.4	15.4	15.5
Personal services	5.4	5.4	5.4	5.3	5.3	5.4	5.4
Total value added	**90.8**	**90.6**	**90.6**	**90.7**	**90.7**	**91**	**91**
Taxes less subsidies on products	9.2	9.4	9.4	9.3	9.3	9	7.5
GDP at market prices	**100**	**100**	**100**	**100**	**100**	**100**	**100**

*Source: Stats SA, 2016, *2017 is quarterly data*

1.5. MMS Future Outlook

1.5.1. Mining Charter

On the 15th of June 2017, the government gazetted a Mining Charter[26] which seeks to address many of the inequalities in the MMS and enhance the participation of historically disadvantaged South Africans in the sector. The Charter seeks to achieve this by setting out specific targets which existing and prospecting investors in the MMS are required to honour within specified timeframes in ownership, employment equity and procurement of goods and services. The Charter aims to ensure that black representation at the various levels of employment is representative of the demographics of the country, whilst ensuring harmonisation with other industry Charters. It is set to have huge implications on the MMS in terms of old and new investment, skills development and community development.

1.5.2. Technical Recession and Down Grading of Credit Ratings

Statistics South Africa released statistics showing that South Africa has entered into a technical recession after the economy contracted by 0.7% during the first quarter of 2017 following another contraction by 0.3% during the last quarter of 2016 resulting in two consecutive quarters of contraction. The recession has largely been attributed to loss of confidence by both investors and consumers resulting in delayed spending and expansion projects which ultimately affects production in the MMS. On the other hand, the down credit rating of South Africa by three credit rating companies is set to impact negatively on the profitability of MMS as the cost of borrowing is likely to go up. However, some set offs will be recorded as the depreciation of the rand will make exports competitive and at the same time making imports costly.

1.5.3. Mining Phakisa

The Mining Phakisa, an initiative of the Presidency, is aiming to develop systems and technologies for the sector which are holistic and people-centric; which are safer and healthier to use; which facilitate the mining of low-grade reefs that are currently not economical to mine; which facilitate access to resources that are currently too deep to mine, thereby extending the lifespan of some of the existing and established mines; as well as technologies which reinforce pillars underground. It is believed that the innovations will result in job retention and growth in the sector, up to the year 2046. It is important for the MQA to partner formally with the Mining Phakisa, as these developments may require reskilling training drives for some occupations in the sector, including managers and supervisors. Collaboration will allow the MQA to plan accordingly and ahead.

[26] Please note that the new Mining Charter was suspended by the Minister (DMR) pending the court decision.

1.5.4. 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)[27]. The mining industry value chain has been prioritised as an economic growth node in the New Growth Path. The Minerals Beneficiation Strategy (DMR, 2011) is aimed at encouraging the country to move from the sale of commodities from mining stage to fabrication and value adding stage of the MMS. Mineral beneficiation is a key priority of Industrial Policy Action Plan (IPAP) 2016/17-2018/19 and vital for economic linkages between the primary agriculture, mining and manufacturing sectors of the economy in order to secure much greater downstream beneficiation and maximise upstream linkages.[28]

1.5.5. Strategic Infrastructure Projects

There are 3 of 18 strategic infrastructure projects (SIPs) which have a direct bearing on the MMS:

- SIP 1: Unlocking the northern mineral belt with Waterberg as the catalyst. According to Presidential Infrastructure Coordinating Commission (PICC, 2012)[29] SIP 1 is the largest of the 18 SIPs 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. Primary minerals on SIP 1 include coal (18 billion tons), chromite (5.5bn tons), platinum (6.3bn tons) and palladium (3.6bn tons).
- SIP (SIP 4) is linked to mineral beneficiation as it involves the facilitation of development of the MMS by opening up beneficiation opportunities in the North West (PICC, 2012).
- SIP 5: this entails the expansion of the rail and port infrastructure in the Saldanha area, construction of industrial capacity at the back of these ports (including a possible industrial development zone), strengthening maritime support for the gas and oil activities along the West Coast, and expansion of iron ore mining production.

1.6. Employer Profile

The employer profile is obtained primarily from the weighted[30] MQA WSP/ATR dataset, as well as the DHET. An assessment of the proportion of companies submitting WSPs is illustrated in Table 1.5 below. The table shows a steady increase in the number of mining entities submitting WSPs from 585 in 2012/13 to 719 in 2016/17 reflecting an increase of 22.9%.

Table 1.5 also shows the number of MQA/SDL-registered companies in comparison with WSPs submissions over the last 5 years. The table indicates that out of 1 863 companies registered with MQA/SDL 719 companies submitted their WSPs to MQA.

[27] http://www.merseta.org.za/Portals/0/merSETA%20Regional%20Sector%20Skills%20Plan_%20Free%20State%20%20Northern%20Cape%2004092013.pdf
[28] The Department of Industry (20160. *Industrial Policy Action Plan (IPAP) 2016/17-2018/19*
[29] PICC (2012) A Summary of the South African National Infrastructure Plan. http://www.gov.za/sites/www.gov.za/files/PICC_Final.pdf
[30] The detailed explanation of the weighted data formula is contained in Annexure A.

Table 1.5: Number of companies submitting WSPs

	MQA/SDL-registered companies (incl. small companies)	WSPs Submitted	WSP employment
2012-13	1 539	585	572 498
2013-14	1 564	573	579 038
2014-15	1 682	609	525 248
2015-16	1 775	634	520 003
2016-17	1 863	719	550 905

Source: DHET (2016) and Weighted MQA WSP/ATR Submission (as at 31 May 2017)

1.6.1. Size and number of companies represented in the MMS

Table 1.6 shows the number of companies registered to pay levies in the MQA by sub-sector and size.

Table 1.6: Profile of MQA registered companies (SETA 16) by subsector

Sector	Size of Mining firms			Total per subsector		
	Small	Medium	Large	Total number of companies	% of companies to Total	% of Employees
CLAS	92	14	15	121	6.5%	2.6%
Coal Mining	136	5	19	160	8.6%	11.8%
Diamond Mining	20		10	30	1.6%	2.9%
Diamond Processing	38	5	3	46	2.5%	0.4%
Gold Mining	80	7	21	108	5.8%	18.2%
Jewellery Manufacturing	144	6		150	8.1%	0.5%
Other Mining	846	69	73	988	53.0%	18.2%
PGM Mining	2	3	11	16	0.9%	35.8%
Services Incidental to Mining	214	18	12	244	13.1%	7.3%
Total	**1 572**	**127**	**164**	**1 863**	**100%**	**100%**
Percentages (%)	**84.4%**	**6.8%**	**8.8%**	**100%**		

Source: DHET (2016) and Weighted MQA WSP/ATR Submission (as at 31 May 2017)

* Other Mining also refers to all mining entities which did not have SIC code or subsector specified

The table shows that the greatest proportion (84.4%) of SETA 16 registered companies are small employers (less than 50 employees), followed by large companies constituting 8.8%. The highest number of large companies are involved in “Other mining” (53%), followed by Services Incidental to Mining (13.1%). PGM Mining companies are the largest employer employing 35.8% followed by “Other Mining” and Gold Mining companies with 18.2% apiece and Coal mining employing 11.8%. Diamond Processing and Jewellery Manufacturing are the sub-sectors employing the least number of employees in the MMS sector, constituting 0.4% and 0.5% respectively.

1.6.2. Geographical location of companies in the MMS

Table 1.7 shows the geographic location of companies in the sector indicating that Gauteng has the majority of mining companies (45.8%) followed by Mpumalanga and Western Cape with 15% and 10.8% respectively. Eastern Cape has the least number of mining companies with only 2.1%. While the number of companies for some of the provinces is very high, for example Western Cape, employment coverage is very low, with only 1% of total employment as a result of the presence of a high number of small companies which are mainly in the jewellery manufacturing and design

sub-sector. Conversely, Limpopo has a relatively low number of companies (3.9%) but with the majority of large companies employing is third highest number of people in the country's MMS (13.7%), after North West and Mpumalanga which employs 40.9% and 12.8%.

Table 1.7: Geographical location of MMS companies

Province	Total 2017	% of MMS employers	% of MMS employment
Eastern Cape	39	2,1%	0,4%
Free state	49	2,6%	7,2%
Gauteng	853	45,8%	15,8%
KwaZulu-Natal	84	4,5%	2,2%
Limpopo	73	3,9%	13,7%
Mpumalanga	280	15,0%	12,8%
North West	162	8,7%	40,9%
Northern Cape	122	6,5%	6,1%
Western Cape	201	10,8%	1.0%
Total	**1863**	**100%**	**100%**

Source: DHET (2016) and Weighted MQA WSP/ATR Submission (as at 31 May 2017)

1.7. Labour Market Profile

This section is based on weighted WSP/ATR submissions submitted by 31 May 2017. A total of 719 companies submitted their WSPs to MQA. The section highlights the profile of the MMS labour market in terms of total employment, provincial distribution, gender and other equity indicators.

1.7.1. Gender and Race

The MMS is a male dominated sector. The below Table 1.8 shows that 13.9% of the sector's employees are female. The majority of females employed in MMS are in the Clerical Support Workers category (49%), Professionals (33%) and Service and Sales Workers (34%) categories.

Table 1.8: Composition of MMS employees by gender and race

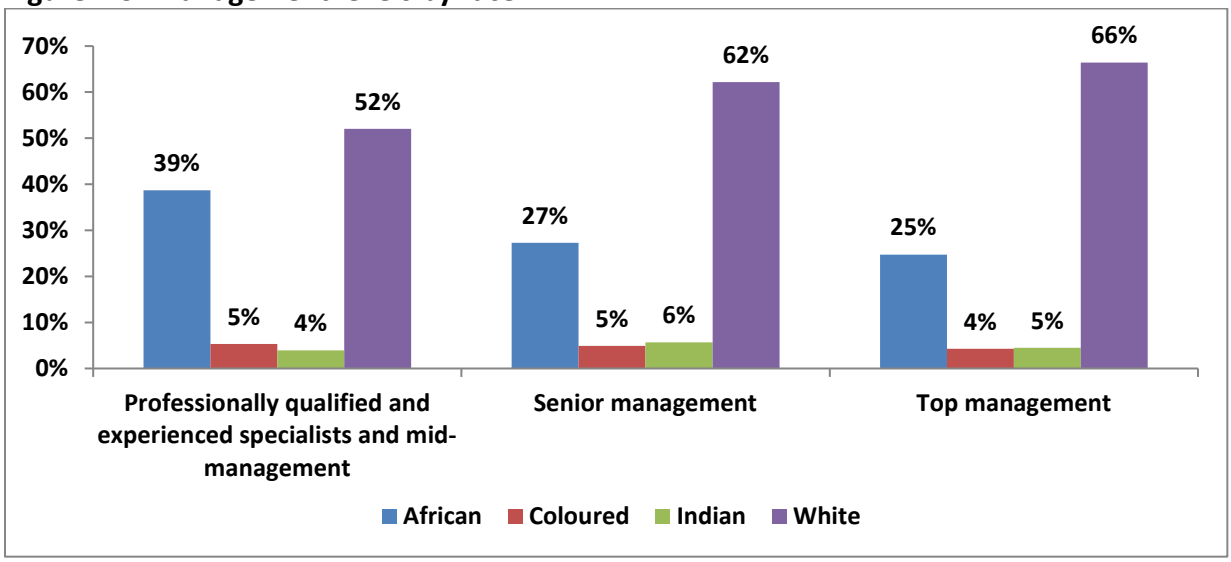
Occupational Categories	Gender		Race				
	Female	Male	African	Coloured	Indian	White	Total
Managers	2180	9692	4344	563	532	6433	**11871**
	18%	82%	37%	5%	4%	54%	**100%**
Professionals	7523	15436	13396	1170	701	7692	**22960**
	33%	67%	58%	5%	3%	34%	**100%**
Technicians and Associate Professionals	8312	54674	43289	2615	511	16571	**62986**
	13%	87%	69%	4%	1%	26%	**100%**
Clerical Support Workers	10930	11505	14993	1599	332	5511	**22435**
	49%	51%	67%	7%	1%	25%	100%
Service and Sales Workers	2409	4691	6150	187	42	720	**7100**
	34%	66%	87%	3%	1%	10%	100%
Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	2780	34541	21441	2728	252	12899	**37320**
	7%	93%	57%	7%	1%	35%	100%
Plant and Machine Operators and Assemblers	16247	220155	226265	5890	206	4041	**236402**
	7%	93%	96%	2%	0%	2%	100%
Elementary Occupations	22960	117672	136081	2298	70	2183	**140632**
	16%	84%	97%	2%	0%	2%	100%
Learners	3325	5797	8215	243	56	609	**9122**
	36%	64%	90%	3%	1%	7%	100%
Total	**76665**	**474163**	**474174**	**17294**	**2701**	**56659**	**550828**
	13.9%	86%	86%	3%	1%	10%	**100%**

Source: Weighted MQA WSP/ATR Submission (as at 31 May 2017)

Table 1.8 also shows that race composition in the sector is dominated by Africans constituting 86% of the sector's employees followed by Whites (10%), Coloureds (3%) and Indians (1%). Africans dominate in all of the occupational categories within the sector with the exception of Managers across all management categories, where they comprise 37% which is the second highest after White employees.

A closer analysis of the different management levels in Figure 1.3 reveals that Whites comprise 66% of top management, 62% of senior management, (52%) of mid management. Africans comprise the second highest in all 3 categories, the highest proportion (39%) being in mid management.

Figure 1.3: Management levels by race



Source: Calculated from Weighted MQA WSP/ATR Submission (as at 31 May 2017)

Table 1.9 shows that all the three management levels are dominated by white males who constitute 59.2% in top management, 53.4% in senior management and 41.7% in lower management. This is followed by African males with 18.5 %, 21.6% and 29.6% in top management, senior management and lower management respectively. The table also shows that female representation in management levels is low across all races. The representation of African females who are in management is a relatively higher proportion in lower management where they constitute 9.1%.

Table 1.9: Management Levels by race and gender

Management Level	Gender	Race	Number of employees per race	Percentages
Professionally qualified and experienced specialists and mid-management	**Female**	African	1769	9,1%
		Coloured	241	1,2%
		Indian	246	1,3%
		White	2000	10,3%
	Male	African	5736	29,6%
		Coloured	798	4,1%
		Indian	518	2,7%
		White	8100	41,7%
Senior management	**Female**	African	262	5,7%
		Coloured	50	1,1%

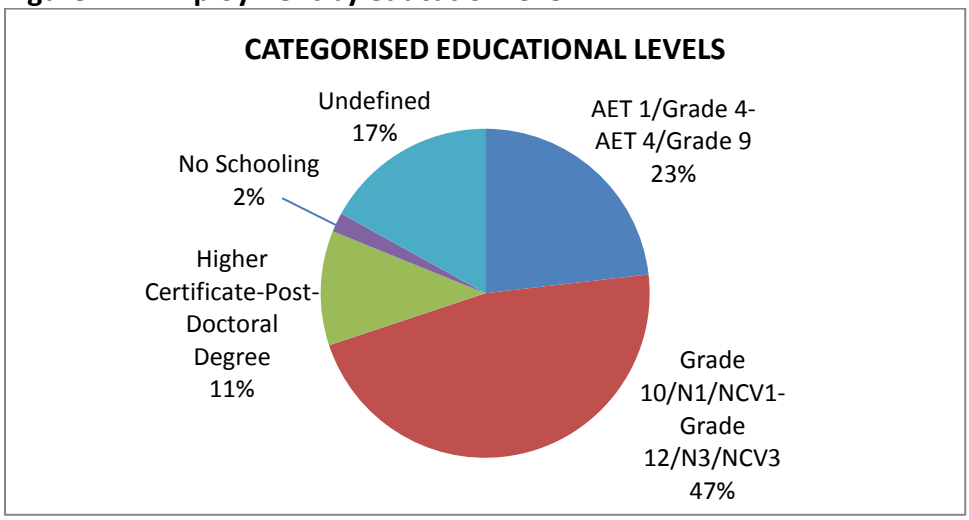
Management Level	Gender	Race	Number of employees per race	Percentages
		Indian	75	1,6%
		White	404	8,8%
	Male	African	998	21,6%
		Coloured	178	3,8%
		Indian	185	4,0%
		White	2468	53,4%
Top management	**Female**	African	64	6,2%
		Coloured	14	1,3%
		Indian	8	0,8%
		White	74	7,2%
	Male	African	191	18,5%
		Coloured	31	3,0%
		Indian	38	3,7%
		White	610	59,2%

Source: Calculated from Weighted MQA WSP/ATR Submission (as at 31 May 2017)

1.7.2. Education and skills levels

Analysis of qualifications reported in the WSP-ATR submissions reveals that the highest proportion of employees (47%) in the sector have achieved between Grade 10 (including N1 and NCV) and Grade 12 (including N3 and NCV 3). This is followed by those employees who have achieved between Grade 4 (including AET1) and Grade 9 (including AET 4) who constitute 23% and those who have attained a Higher Certificate and Post-Doctoral degree who account for 11%. Approximately 2% of the sector's employees have no schooling at all. Of these, 70% are South African citizens and 90.5% fall into the categories Plant and Machine Operators and Assemblers and Elementary Occupations. The "Undefined" category represents the employees whose education levels were not specified in the WSP-ATR submissions.

Figure 1.4: Employment by education level



Source: Calculated from Weighted MQA WSP/ATR Submission (as at 31 May 2017)

1.7.3. The status and trends of employment in the MMS

Table 1.10 provides a 6-year trend analysis of employment in the MMS for the period 2012-2017.

Table 1.10: Employment trends in the MMS

Total employment in MMS		2012	2013	2014	2015	2016	2017	Percentage change from 2012 to 2017
Total Employment		628750	572 518	575 768	525 247	520 003	550 905	12.4%
Provincial Distribution	Province	2012	2013	2014	2015	2016	2017	2012 - 2017
	Eastern Cape	1160	2023	2 647	2 170	1 889	2 204	90,0%
			74%	31%	-18%	-13%	17%	
	Free State	42485	46037	44316	40545	36378	39 665	-6.6%
			8%	-4%	-9%	-10%	9%	
	Gauteng	119330	145456	123795	96802	84559	87 043	-27.1%
			22%	-15%	-22%	-13%	3%	
	KwaZulu-Natal	12771	10382	11079	11616	10669	12 120	-5.1%
			-19%	7%	5%	-8%	14%	
	Limpopo	91648	77121	90425	82373	86680	75 474	17.6%
			-16%	17%	-9%	5%	-13%	
	Mpumalanga	103234	70535	74309	90289	63219	70 516	-31.7%
			-32%	5%	22%	-30%	-12%	
	North West	220527	190601	195840	165213	185352	225 320	2.2%
			-14%	3%	-16%	12%	22%	
	Northern Cape	31555	24672	27698	31126	44329	33 605	6.5%
			-22%	12%	12%	42%	-24.0%	
	Western Cape	6040	5581	5658	5114	6928	5 509	-8,8
			-8%	1%	-10%	35%	-20.0%	
	Totals	628750	572 498	575 768	525 248	520 003	550 905	
Sub-sector Distribution	CLAS	45780	17256	14298	13449	13162	14424	-68,5%
			-62,30%	-17,10%	-5,90%	-2,10%	10%	
	Coal mining	76912	62864	62913	87389	56930	26610	-65,4%
			-18,30%	0,10%	38,90%	-34,90%	-53%	
	Diamond mining	11963	11216	9900	16286	8974	8743	-26,9%
			-6,20%	-11,70%	64,50%	-44,90%	-3%	
	Diamond Processing	1965	1372	6557	989	1849	1758	-10,5%
			-30,20%	377,90%	-84,90%	87,00%	-5%	
	Gold mining	151382	156771	138237	118235	91357	238245	57,4%
			3,60%	-11,80%	-14,50%	-22,70%	161%	
	Jewellery Manufacturing	2589	1104	902	1074	2802	1631	-37,0%
			-57,40%	-18,30%	19,10%	160,90%	-42%	
	Other mining	68225	101871	108277	107969	129829	153057	124,3%
			49,30%	6,30%	-0,30%	20,20%	18%	
	PGM mining	189437	175579	185339	144690	173529	87404	-53,9%
			-7,30%	5,60%	-21,90%	19,90%	-50%	
	Services incidental to mining	80497	44485	36571	35117	41509	19034	-76,4%
			-44,70%	-17,80%	-4,00%	18,20%	-54%	
	Totals	628 750	572 518	562 994	525 248	520 003	550905	
Gender Distribution	Gender	2012	2013	2014	2015	2016	2017	
	Male	559470	503974	506676	454663	444553	474217	-2,92%
		89%	88%	88%	86.6%	85.5%	86,1%	
	Female	69280	68544	89092	70585	75450	76688	2,92%
		11%	12%	12%	13.4%	14.5%	13,9%	
	Totals	628 750	572 518	575 768	525 248	520 003	550 905	

Total employment in MMS		2012	2013	2014	2015	2016	2017	Percentage change from 2012 to 2017
Equity Distribution	**Equity**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	
	African	529635	485210	486524	441699	435100	474189	1.9%
		84.2%	84.8%	84.5%	84.1%	83.1%	86,1%	
	Coloured	14997	13763	11515	15352	19582	17349	0.7%
		2.4%	2.4%	2.0%	2.9%	3.8%	3,1%	
	Indian	3167	2855	2879	2832	3907	2701	0.0%
		0.5%	0.5%	0.5%	0.5%	0.8%	0,5%	
	White	80951	70690	69092	65365	61414	56666	-2.6%
		12.9%	12.3%	12.0%	12.4%	11.8%	10,3%	
	Totals	**628 750**	**572 518**	**575 768**	**525 248**	**520 003**	**550 905**	
Occupational Group Distribution	**Managers**	17643	14677	13359	14165	13397	11871	-32,7%
			-16,80%	-9,00%	6,00%	-5,40%	-11%	
	Professionals	26852	26379	25749	26601	25591	22960	-14,5%
			-1,80%	-2,40%	3,30%	-3,80%	-10%	
	Technicians & Associate Professionals	70254	60864	68688	61145	57877	62986	-10,3%
			-13,40%	12,90%	-11,00%	-5,30%	9%	
	Clerical Support Workers	27299	23152	23596	22315	21582	22435	-17,8%
			-15,20%	1,90%	-5,40%	-3,30%	4%	
	Service & Sales Workers	7125	6322	6488	6419	6885	7100	-0,4%
			-11,30%	2,60%	-1,10%	7,30%	3%	
	Trades category	34315	36985	38238	39678	39949	37320	8,8%
			7,80%	3,40%	3,80%	0,70%	-7%	
	Plant & Machine Operators & Assemblers	264952	244335	238765	213412	216245	236402	-10,8%
			-7,80%	-2,30%	-10,60%	1,30%	9%	
	Elementary occupations	172669	150614	150201	131172	127534	140632	-18,6%
			-12,80%	-0,30%	-12,70%	-2,80%	10%	
	Learners	7611	9191	10684	10341	10841	9122	19,9%
			20,70%	16,20%	-3,20%	4,80%	-16%	
	Total	**628 750**	**572 518**	**575 768**	**525 248**	**520 003**	**550 905**	
Disability Distribution		4843	4450	4924	3815	4864	4575	-5,53%
			-8%	11%	-23%	27%	-6%	
Management by Equity%	**Race**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	
	African	5377	4005	3913	4315	4340	9018	5.5%
		30.5%	37.0%	29.4%	30.5%	32.4%	36,0%	
	Coloured	692	299	490	586	649	1311	1.3%
		3.9%	2.8%	3.7%	4.1%	4.8%	5,2%	
	Indian	595	288	591	649	704	1071	0.9%
		3.4%	2.7%	4.4%	4.6%	5.3%	4,3%	
	White	10979	6235	8315	8614	7704	13656	-7.7%

Total employment in MMS		2012	2013	2014	2015	2016	2017	Percentage change from 2012 to 2017
		62.2%	57.6%	62.5%	60.8%	57.5%	54,5%	
	Total in management	**17643**	**10827**	**13306**	**14164**	**13397**	**25057**	
	Percentage of Management to total employment	**2.8%**	**1.9%**	**2.3%**	**2.7%**	**2.6%**	**4,5%**	**1.7%**

Source: Calculated from Weighted MQA WSP/ATR Submission (2012-2017)

Table 1.10 shows that the most significant changes and trends over the past 5 years occurred in the following categories:

- Total employment in the MMS has been declining from a peak of 628750 in 2012 to 550 905 in 2017, a 12.4% decline with the exception of 2016 -2017, where the sector recorded a 5.9% increase.
- Employment levels have been declining steadily in Mpumalanga, Gauteng and Limpopo, Western Cape, Free State and North West 31.7%, 17.1%, 8.8% and 6.6% respectively between 2012 and 2017. Growth in employment has been seen in Eastern Cape with 90% and Northern Cape and North West recording an increase of 6.5% and 2.2% over the same period respectively.
- A review of employment by occupational categories shows that, since 2012, there has been a decrease in employment numbers across most occupational categories, with the most significant in the Managers category, with a 32.7% decrease, followed by the Elementary occupations with a 18.6% decrease. The artisan category is the only one to have shown growth in numbers, with an 8.6% increase since 2012.
- The MMS remains a male dominated sector. The proportion of females has been increasing gradually, from 11% in 2012, to 13.9% in 2017.
- Equity composition of employees shows that Africans continue to be the dominant racial group in the MMS. In 2017 the composition of Africans has increased by 1.9% from 2012-2017 while that of Coloured has only increased by 0.7%. Indians have remained stagnant at 0.5% of the total employments. On the other hand, the composition of Whites has been on a downward trend decreasing by 2.6% over the same period.
- During the period of 2012-2017 data shows that there has been some changes in the composition of races at management levels. The composition of Africans at management level has increased by 5.5% from 2012-2017 followed by Coloured and Indians with 1.3% and 0.9% respectively. On the other hand, the composition of Whites has decreased by 8.2% over the same period.
- The number of employed people with disabilities has consistently been less than 1% of the MMS labour force. This shows no change in the period 2012-2017.

1.7.4. Implications of Findings for Skills Development

The main implications for skills development in the sector are summarised below:

- The sector has seen a decrease in employment figures over the last few years, with an exception of 2017 where there was an increase of 30 902. Though there is an increase in employment over the one-year period; retrenchments remain a foreseeable reality. Key role players in the sector need to prioritise the reskilling, up skilling and training of potable skills so that employees can be absorbed into other sectors of the formal labour market.
- There is an urgent need to monitor and implement Mining Phakisa, the 3 SIPs projects related to the MMS as well as mineral beneficiation as they present potential to create

employement. Initiatives such as these require the development of the relevant and required skills.

- Racial and gender disparities remain within the demographic composition of the industry signalling the need to continue addressing workforce imbalances.
- To increase racial and gender transformation in the MMS; the implementation of the allocation of the discretionary grants to support industry, require an increase uptake and throughput of historically disadvantaged individuals with a focus on women and HDSAs in top and senior management levels.

1.8. Summary and Conclusion

This chapter revealed that South Africa remains a key role player in the global mining economy. However, the sector is currently facing critical challenges which include:

- The sector's contribution to GDP has been decreasing over the last few years, from 8.5% in 2009 to 7.3% in 2016 with quarterly data for 2017 indicating a marginal increase to 7.5%.
- There has been a decrease in the number of people employed from a peak of 628 750 in 2012 to 550 905 in 2017.
- The short to long term outlook of the sector could be improved should the sector monitor and forge partnerships in the developments of Mining Phakisa and the preparation of existing and potential employees to assume employment that may be created by such initiatives.
- Implementation of the Industrial Policy Action Plan (IPAP) 2016/17-2018/19 which places mineral beneficiation as one of its key priority areas as well as the SIPs projects, which are expected to lead to an increased economic activity and create employment in South Africa.
- Reskilling of retrenched workers is an area that requires attention from a skills development perspective to facilitate absorption of the retrenched into other sectors of the formal labour market and entrepreneurship.
- Demographic disparities in the gender and management by equity compositions of the industry signals the need for MMS to continue addressing workforce imbalances and skills development which feeds the management pipeline.

2 KEY SKILLS ISSUES

2.1. Introduction

This chapter is concerned with identifying factors that are driving change in the MMS and which impact on skills demand and supply. It offers an analysis of their implications for skills development. Secondly, the chapter provides an analysis of the alignment of MQA's SSP to national strategies and plans such as the National Skills Development Strategy as well as those specific to the MMS such as the Minerals and Petroleum Resources Development Act.

2.2. Change Drivers

There are numerous factors that impact on skills development in the MMS, including economic, social, technological, environmental and legislative. The influence of the drivers on the sector is important, particularly their impact on skills development. 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. All change drivers discussed have direct implications for skills development in the MMS, and are listed in no particular order.

2.2.1. Technology

Technological change remains at the forefront of the sector's ability to become as safe, efficient and sustainable as possible. New technologies are transforming the sector's operations. As a result, the type, level and mix of skills required is starting to change. Reskilling programmes are needed so that employees are trained in new mining processes, and in operating and maintaining new equipment. The use of new technology in training, particularly workplace experience, should receive attention. A focus on AET programmes will be important to prepare existing and potential employees to operate new machinery and coordinate new processes.

Changes in technology could have an impact on organisational structure, which may lead to the responsibility for training shifting to supervisors and/or employees. Continuous learning and knowledge management will become an aspect of work. "Soft skills" and the Critical Cross Field Outcomes may become a feature of a successful worker. More research could be conducted on the way in which technology could impact these roles, which in turn needs to inform legislation.

As mentioned in Chapter 1, the Mining Phakisa initiative is aiming to develop systems and technologies for the sector which are holistic and people-centric; which are safer and healthier to use; which facilitate the mining of low-grade reefs that are currently not economical to mine; which facilitate access to resources that are currently too deep to mine, thereby extending the lifespan of some of the existing and established mines; as well as technologies which reinforce pillars underground. It is believed that the innovations will result in job retention and growth in the sector, up to the year 2046. There is formal partnering with the Mining Phakisa, as these developments may require reskilling training drives for some occupations in the sector, including managers and supervisors. Collaboration will allow forward planning accordingly. Research could be proactively conducted on Mining Phakisa's current R&D efforts and what the likely training requirements will be.

2.2.2. Global influence

Many subsectors in the MMS are experiencing significant decline in growth owing to decreased global demand for their commodities (in particular, platinum, iron ore, chrome and manganese), with many operations downscaling or closing down as a result. Retrenchments are an ongoing

reality requiring retrenchees' skills to be absorbed into an already constrained job market. Reskilling, upskilling and portable skills training are some of the ways to assist retrenchees to gain access to the job market.

2.2.3. Occupational health and safety

Mining operations come with inherent risks that can impact the health and safety of employees. Mining companies, government and unions need to continue to place importance on employee safety since continued fatalities, injuries and occupational diseases jeopardise a company's licence to operate. Besides the MQA supporting the training of OHS representatives, other initiatives to incorporate safety into learning programmes could be investigated.

2.2.4. Mining Charter and employment equity

In June 2017, a new Mining Charter was gazetted by the DMR. It stipulates that there should be at least 60% participation from black persons in senior management positions (of which 30% must be female black persons), 75% middle management (of which 38% must be female black persons), and 88% junior management (of which 44% must be female black persons). Chapter 1's labour profile shows that representation is currently not at the required levels: categorisation of management levels in the WSPs is slightly different to the Mining Charter's, which reveals that representation of black persons in the sector is currently 25% in top management positions, 27% in senior management, and 39% in middle management. The MQA intends to continue supporting HDSAs in and for management roles, which includes support to individuals in its Management Development Programmes.

With regard to the required targets for black female representation in management positions as stated in parentheses in the preceding paragraph, Chapter 1's labour profile shows that representation is currently not at the required levels: representation of female black persons in the sector is currently 6.2% in top management positions, 5.7% in senior management, and 9.1% in middle management. Owing to the nature of the sector, both national and regional stakeholders have emphasised the difficulties which mining companies face where the recruitment of females is concerned. The MQA will need to support industry through its skills development programmes aimed at females.

The Mining Charter's target for persons with disabilities is 3% of total employment. Labour profiles have consistently showed that representation of persons with disabilities is below 1%. The MQA will need to support industry through its skills development programmes aimed at disable persons.

Companies are required to comply with social, labour and community objectives such as procurement spend with BEE entities. Failure to comply with the Charter could result in permits or mining rights being revoked. Companies situated in remote areas find it difficult to comply owing to a lack of access to suitable small black-owned businesses that can meet the mine's needs. The stakeholder engagements revealed the need for training and support to small businesses in remote areas which can service the mines. The MQA's response is to continue to provide mentorship and entrepreneurship development.

2.2.5. Mineral beneficiation

The mining industry value chain has been prioritised as an economic growth node in the New Growth Path, which highlights a path for the MMS out of its depression until 2020. The Minerals Beneficiation Strategy is aimed at encouraging the country to move from the sale of commodities to value-added products. The government is currently drafting the Mineral Beneficiation Action

Plan, which seeks to advance "local value-addition across five mineral value-chains, namely; iron-ore and steel, platinum-group metals, polymers, titanium and mining inputs". The implementation of the strategy is expected to create and retain much needed jobs in the MMS. The MQA needs to maintain strong relationships with government departments involved in this, to understand its role in responding to any resulting skills needs. Research could also be conducted to understand the R&D currently taking place in the area of mineral beneficiation, to determine whether any skills training may be required in the future.

2.2.6. Environmental sustainability

The industry is becoming more conscious of the growing need to protect the environment, by mining in an environmentally sustainable way. Energy and water efficiency, as well as the reduction of air pollution, are increasing imperatives resulting in the need for skilled workers to source 'green' products and services and manage 'green' supply chains. R&D efforts in the Mining Phakisa initiative include a focus on conservation of natural resources, preservation and restoration of the environment, therefore the MQA should keep abreast of developments which may require employee capacitation.

2.2.7. Community and youth development

Community unrest in mining communities is becoming more prevalent with unemployment and service delivery often being causes of the unrest. Ideally, mines should be recruiting unemployed youth from the shadow of the headgear. Most mines require prospective employees to have a Grade 12 certificate and in some instances, with Mathematics and Science. This is becoming more so with mechanisation becoming a reality. Many schools in Limpopo, Mpumalanga, Free State and the Eastern Cape have dismal Grade 12 results and are not able to supply the required number and standard of matriculants for the mining industry. The MQA has a Mine Community Project in place, which includes partnering with TVET colleges in mining areas who will train unemployed youth in mine communities. It includes a focus on Maths and Science as well as various skills programmes.

2.2.8. Small enterprise development

Many mining companies that are SMMEs require skills. Start up and small training companies that operate in the MMS, are provided with assistance and support by the MQA, through partnerships with government and training providers. In order for mining companies to comply with BBBEE and Charter requirements, small enterprises that can supply and meet the requirements of the mining industry with products and services could be developed and assisted, possibly by the MQA.

2.3. Alignment of National Strategies and Plans

Each SETA is required to develop an SSP Update within the framework of the National Skills Development Strategy (NSDS) III 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 national policy imperatives that seek to support inclusive sector growth paths which advance economic growth and the social development and transformation agenda. Table 2.1 summarises the national policies which guide the strategy and operations of the MQA.

Table 2.1: Alignment of the MQA Strategic Plan to Government National Policies and Strategies

POLICY / ACT	Policy alignment to the MMS	
	Policy input Relevant to the MMS	**Policy implications on Skills Planning**
National Skills Development Strategy III (NSDS) 2011-2016 Published in (2011)	• Establish a credible institutional mechanism for skills planning • Increase access to occupationally-directed programmes. • Address the low-level youth and adult numeracy skills to enable additional training. • Encourage better use of workplace based skills development. • Promote the growth of a public TVET college system that is responsive to sectoral, local, regional and national skills needs and priorities • Encourage and support small enterprises, worker initiatives, NGO and community training initiatives • Build career guidance and vocational guidance	The MQA: • Uses SSPs and other research projects to inform skills planning and decision-making. • Increases access to workplace experience for learners. • Increases access to internships in the MMS for university graduates. • Has conducted research into the training of small mining enterprises. • Has partnerships in place with 6 TVET Colleges for capacitation and accreditation purposes. • Facilitates workplace experience for TVET College lecturers. • Facilitates and funds HDSA Lecturer development. • Provides mentorship programmes for small businesses. • Provides career guidance by convening events at regional career expos and high schools. • Funds Maths and Science interventions for grade 10, 11 and 12 learners.
National Development Plan (NDP) 2014 (Published 2014)	• Improve education and training • Expand skills base through better education and vocational training.	• The MQA funds learnerships, workplace placement and internships, rural Development, bursaries – aimed at creating a pool of HET graduates to pursue careers in the MMS, and collaborates with TVET colleges.
Human Resources Development Strategy for South Africa (HRDS-SA) (Published 2010)	• Accelerate training in the priority areas including artisanship. • To leverage public and private sector programmes to create employment opportunities and work experience for new entrants into the labour market. • Improve coverage and efficacy of vocational guidance	The MQA has the following projects/programmes aligned to the HRDSSA: ○ TVET collaboration, Artisan development, Bursaries, Internships ○ Career and Pathway Guidance Project ○ Mathematics and Science Project ○ AET Grant, Foundational Learning Competency Grant Incentive
Industrial Policy Action Plan. (IPAP) 2013-2016 (Published 2013)	• IPAP has identified several growth sectors which will address the high rate of unemployment in the country.	• Mineral beneficiation, diamond processing and jewellery manufacturing as one of the MMS segments which will address the high rate of unemployment in the country. Funding for learnerships made available in this regard.
National Growth Path (NGP) 2010 (Published 2010) &National Skills Accord (Published 2010)	• Improve job creation. Key targets set at the NGP launch 140 000 additional direct jobs in mining only, by 2020 • Increase funding for and quality of training • Align training to the New Growth Path and improve SSPs • Improve the role and performance of TVET colleges	• Rural development programmes • Partnerships in place with 6 TVET Colleges for capacitation and accreditation purposes. • Workplace experience for TVET College lecturers. • Workplace experience funded for learners.
White Paper-Post School Education Training (WP-PSET) (Published 2013)	• Improve the capacity of post-school education and training system to meet SA's needs.	• Partnerships in place with 6 TVET Colleges for capacitation and accreditation purposes. • Workplace experience for TVET College lecturers. • Workplace experience funded for learners
Youth Employment Accord (YEA) 2013 (Published 2013) & National Youth Policy (NYP) 2015-2020 (Published 2015)	• Improve education and training opportunities for the gap between school-leaving and first employment. • Connect young people with employment opportunities, through job placement schemes and work readiness promotion programmes for young school leavers.	• Rural development projects • Support learners on core learnerships (non-Artisan) for the MMS. • MQA partners with the private sector to increase access to workplace experience • The career guidance initiatives by the MQA in schools and colleges will provide leverage for an informed youth prepared to enter the workforce.

POLICY / ACT	Policy alignment to the MMS	
	Policy input Relevant to the MMS	**Policy implications on Skills Planning**
Mid-Term Strategic Framework (MTSF) 2014-2019 (Published 2014)	• Improve the quality of and access to education and training • Ensure quality healthcare and social security for all citizens. • Encourage and support cooperatives, small enterprises, workers initiated, NGO and community training initiatives.	• Train 40 000 Occupational Health Safety Representatives over five years starting in 2008 (recent data unavailable) • Facilitate the development of scarce artisan occupational skills in the MMS. • Develop learning packs, learning materials for TVET and HET programmes • Support learners on core learnerships (non-Artisan) for the MMS.
Skills Development Act (SDA) (Published 1998)	• Increase the quality and quantity of artisans	• Facilitates the development of scarce or hard-to-fill artisan occupational skills in the MMS.
Mineral and Petroleum Resources Development Act (MPRDA) (Published 2002)	• Promote employment and advance the social and economic welfare of all South Africans and production operations; • Ensure holders of mining and production rights contribute to the socio-economic development of their areas	• The MQA provides learnerships and workplace placement for unemployed youth. • Rural Development • Bursaries –aimed at creating a pool of HET graduates to pursue careers in the MMS. • Collaboration with TVETs and HETs.
Mining Health & Safety Act (MHSA) (Published 1996)	• To promote training in mine health and safety	• MQA funds and supports training programmes for mine Health and Safety • MQA regulates and accredits curricula on Mining Health and Safety programmes. • Supports the MHS' objectives through transformative skills development initiatives.
Mining Charter (Published 2010)	• Meaningfully expand opportunities for HDSAs. • Utilise and expand the skills base of HDSAs. • Promote employment and advance the social and economic welfare of mining communities and labour-sending areas • Promote beneficiation of South Africa's mineral commodities.	• The MQA provides learnerships and workplace placement for unemployed youth. • Rural Development –including Maths & Science and literacy programmes • Career guidance • Bursaries –aimed at creating a pool of HET graduates to pursue careers in the MMS. • Artisan development – the MQA has in place initiatives to develop artisans and other trades

Source: MQA Strategic Plan 2015-2016

2.4. Conclusion

Change drivers that are likely to have an impact on skills development are changing technology, occupational health and safety, and environmental sustainability. Meeting the Mining Charter targets will also require attention as well as employing youth and community development.

3 OCCUPATIONAL SHORTAGES AND SKILLS GAPS

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 occupational shortages and skills gaps in the sector, the supply of skills, as well as implications of shortages for employers in the sector.

3.2. Occupational shortages and skills gaps

3.2.1. Hard-to-fill occupations

Hard-to-fill occupations refer to occupations which employers struggle to find candidates for, for a sustained period of time, usually at least twelve months. They are informed by key stakeholder consultations held during June and July 2017, with representatives from industry, labour and government, as well as scarce skills information in the WSPs. Table 3.1 shows the top occupations which stakeholders classify as hard-to-fill, with the accompanying reasons.

Table 3.1: Hard-to-fill occupations

Hard-to-fill occupation	OFO code	Reason/s for challenge
Mine Planning Manager	132202	Lack of project management skills, lack of HDSAs, lack of management skills, absolute scarcity
Industrial Engineering Technologist	214102	Lack of experience
Mechanical Engineering Technologist	214402	No skills pipeline
Mining Engineer	214601	Lack of experience, high turnover, lack of GCC holders
Rock Engineer	214601	Lack of career awareness at university, not enough students pursuing the specialisation
Electrical Engineer	215101	Lack of experience, lack of HDSAs, lack of GCC holders, high turnover
Environmental Health Officer	226301	Transitionary delays in QCTO process
Technical Trainer	242402	Lack of a combination of technical knowledge and teaching skills, salaries for professional positions more attractive than for training positions
Ventilation Officer	311705	Transitionary delays in QCTO process
Strata Control Officer	311707	Transitionary delays in QCTO process
Quarry Master (Magazine Master)	312101	Absolute scarcity

Source: Key stakeholder consultations, June and July 2017

3.2.2. Occupational shortages

Occupational shortages are different to the hard-to-fill occupations in the previous subsection (Table 3.1), as they have been informed by the scarce skills vacancy information as found in the WSP data only, ie. No stakeholder input. Scarce skills are defined to employers as occupations which take three 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 occupational shortages have been extracted from the scarce skills vacancy information in the 2016-17 WSPs as of 31st May 2017 and are shown in Table 3.2. The table includes all occupations with a vacancy intensity rate of 5% or higher, as this is the generally-accepted level at which

concern regarding possible scarcity is raised. Vacancy intensity rate refers to the number of vacancies as a percentage of the total employment within the occupational category. The two columns highlighted in green put the vacancy intensity rates in perspective by referring to the number of companies who employ these skills and their corresponding number of vacancies.

Table 3.2: Occupational shortages by vacancy intensity rate

OCCUPATION	OFO CODE	Alternative title/s	Total vacancies	Number of companies specifying vacancies	Total Employed	Number of companies who employ these skills	Vacancy intensity rate
Agricultural Technician	314201	Agricultural Lab Technician, Field Production Officer	10	1	3	2	333%
Mining Diver	684101	Diver	31	6	10	2	310%
Miller	313909	Stock Feed Miller	8	2	3	1	267%
Diversional Therapist	226904	Activities Coordinator, Activities Officer	10	1	4	3	250%
Jewellery Assembler	721901	Metal Products (except Mechanical), Product Assembler	81	5	39	10	208%
Diamond and Gemstone Setter (T)	661302	Jewellery Setter	68	8	58	11	117%
Goldsmith (T)	661301	Jeweller, Platinumsmith, Jewellery Chainmaker	368	10	468	23	79%
HIV / Aids Counsellor	263501	Social Counselling Worker	8	1	12	8	67%
Jewellery Metal Plater	711202	Jewellery Processing and Finishing Machine Operator	50	5	85	11	59%
General Medical Practitioner	221101	Doctor, Medical Practitioner	15	7	37	16	41%
Water Process Controller	313201		2	2	5	17	40%
Air-Conditioning and Refrigeration Mechanic	642701	Air Conditioning Equipment Mechanic	7	3	18	10	39%
Engine Assembler	721101		12	2	37	4	32%
Mine Planning Manager	132202	Geology Manager (Mining), Mining Exploration Manager, Mineral Resources Manager	22	18	94	51	23%
Research and Development Manager	122301	Research Manager	3	1	13	13	23%
Deck Hand	735101	Able Seaman, Boatswain	4	2	21	1	19%
Concrete Products Machine Operator	711401	Kiln Operator (Cement Production)	5	1	27	5	19%
Industrial Engineering Technologist	214102	Process Technologist	4	2	27	16	15%
Senior Government Official	111204	Chief Operating Officer (Government Department)	1	1	7	6	14%
Compensation and Benefits Manager	121203	Benefits Manager	1	1	7	5	14%
Quality Control Manager	132106	Quality Assurance Manager	6	2	45	22	13%
Ships Mate / Officer	315202	Deck Officer	1	1	10	1	10%
Geophysicist (G)	211402	Seismologist	2	2	24	10	8%
Mechanical Engineering Technologist	214402	Thermodynamics Technologist	8	3	99	19	8%
Electrical Engineer	215101	Electrical Engineer (Mines), Electromechanical Engineer	15	12	209	49	7%
Mining Engineer (G)	214601		43	32	637	120	7%
Diamond Polisher	711203	Diamond Polisher (T)	25	1	386	9	6%
Sales Representative / Salesman (Industrial Products)	243301		6	2	95	24	6%

OCCUPATION	OFO CODE	Alternative title/s	Total vacancies	Number of companies specifying vacancies	Total Employed	Number of companies who employ these skills	Vacancy intensity rate
Rubber Production Machine Operator	714101	Rubber Belt Splicer	4	2	65	11	6%
Mining / Quarrying Blaster	684202	Blaster	9	4	151	36	6%
Ship's Engineer	315101		1	1	17	1	6%
Technical Solutions Manager	133104		1	1	19	5	5%
Auto Electrician, Automotive Electrician	671208		22	12	450	95	5%
Business Training Manager	121202	Technical Training Manager, HR Development Manager, Training & Development Manager	8	3	164	96	5%
Credit or Loans Officer	331201	Finance Clerk / Officer	13	1	280	54	5%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2017

Some of the occupations listed in Table 3.2 are not core to the MMS. Some of them, particularly the occupations in the jewellery manufacturing sector such as diamond & gemstone setter, goldsmith and jewellery metal plater, have disproportionate vacancies compared to the total employed. Stakeholders explained that shortages in this sub-sector do not exist (with the exception of a gemologist), therefore it is believed that errors may have been made in the capturing of information in the WSPs. This can be investigated further.

However, there is a possible cause for concern where the position for mine planning manager is concerned, since as many as 18 companies are experiencing vacancies. Key stakeholders consulted on this list agreed that a shortage in the sector is being experienced where mine planning manager, mining engineer, industrial engineering technologist, mechanical engineering technologist and electrical engineer are concerned (highlighted in yellow). These five occupations have been included on the hard-to-fill list. It is believed by key stakeholders that more emphasis should be placed on the hard-to-fill occupations (Table 3.1) rather than the scarce skills, as the hard-to-fill occupations were determined by an extensive consultation process with key stakeholders, with consensus reached by industry, labour, government and training providers, while the scarce skills list is based on the number of vacancies in the WSPs only and does always provide adequate insight.

3.2.3. Employment and vacancies by occupational category

Table 3.3 shows the vacancies by occupational category, which were also determined by the scarce skills vacancy information in the WSP submissions. Considering the industry-accepted norm of a 5% vacancy intensity rate triggering cause for concern, the data indicates that there are no serious shortages. The categories that have among the highest number of vacancies are the artisans (2.16%), professionals (1.2%) and managers (0.8%).

Table 3.3: Occupational vacancies by category

Occupational category (OFO)		Number of vacancies	Number employed	Vacancy intensity rate
Group	Title			
1	Managers	95	11 871	0.8%
2	Professionals	276	22 960	1.2%
3	Technicians and Associate Professionals	389	62 986	0.62%

4	Clerical Support Workers	11	22 435	0.05%
5	Service and Sales Workers	0	7 100	0%
6	Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers **(Artisan category)**	807	37 320	2.16%
7	Plant and Machine Operators and Assemblers	388	236 402	0.16%
8	Elementary Occupations	19	140 632	0.01%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2017

3.2.4. Critical skills gaps

Stakeholders at the workshops advised that certain critical skills are lacking in the MMS:

- Artisans with specialised knowledge and experience in updated and new technology;
- The following occupations are not scarce, but have been advised by stakeholders as having a lack of HDSAs and of GCC/MMCC holders: mining manager, mine planner, mining engineer and surveyor;
- Project management skills;
- Problem-solving and critical thinking skills; and
- Work-readiness.

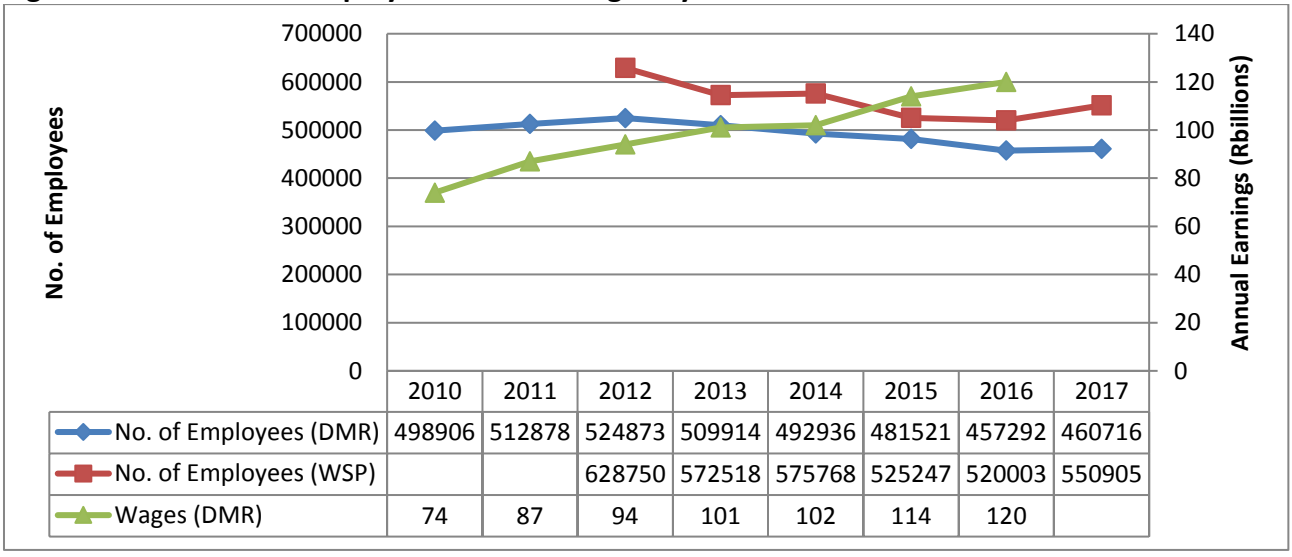
3.2.5. Mineral beneficiation skills

The only occupation currently in shortage, as advised by the South African Diamond and Precious Metals Regulator, is gemologist. This is owing to a lack of curriculum in South Africa and with demand from both industry and learners increasing. Further research on this may be considered to fully quantify the extent of demand.

3.2.6. Wage trends

Figure 3.1 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. Using WSP data, total employment has fallen by 12.4% from a peak of 628 750 in 2012 to 550 905 in 2017. Using DMR's annual figures shows an almost identical picture, with total employment having fallen by 12.2% since 2012, from 524 873 to 460 716 employees in 2017. Overall, total wage bill has increased by 62% from 2010 to 2016.

Figure 3.1: Number of Employees vs Total Wage Payments



	2010	2011	2012	2013	2014	2015	2016	2017
No. of Employees (DMR)	498906	512878	524873	509914	492936	481521	457292	460716
No. of Employees (WSP)			628750	572518	575768	525247	520003	550905
Wages (DMR)	74	87	94	101	102	114	120	

Source: DMR & MQA WSP (2010-2017)

Further research over time is needed to fully understand these impacts, but also on the changing skills sets of those employed. As mentioned in chapter two, there are indications in the market of other productivity changes that occur as a result of technology and reskilling.

3.2.7. Employment trends

Table 3.4 shows a six-year employment trend by occupational category for the period 2012-2017. Since 2012, there has been a decrease in employment numbers across most occupational categories, with the most significant in the Managers category, with a 32.7% decrease, followed by the Elementary occupations category with an 18.6% decrease. The artisan category is the only one to have shown growth in numbers, with an 8.6% increase since 2012.

Table 3.4: Employment trends by occupational category (6-year trend)

Occupational category	2012	2013	2014	2015	2016	2017
Managers	17 643	12 181	13 359	14 165	13 397	11 871
Professionals	26 852	21 853	25 749	26 601	25 691	22 960
Technicians and Associate Professionals	70 254	50 541	68 688	61 145	57 877	62 986
Clerical Support Workers	27 299	19 204	23 596	22 315	21 582	22 435
Service and Sales Workers	7 125	5 258	6 488	6 419	6 885	7 100
Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	34 315	30 726	38 238	39 677	39 949	37 320
Plant and Machine Operators and Assemblers	264 952	202 386	238 764	213 412	216 245	236 402
Elementary Occupations	172 699	124 722	150 201	131 172	127 534	140 632
Total	**621 139**	**467 826**	**565 083**	**514 906**	**509 160 (excludes the 10 841 learners)**	541 706 **(excludes the 9 122 learners)**

Source: Calculated from Weighted MQA WSP/ATR Submission, 2013-2017

3.2.8. Conditions of employment

Conditions of employment in the MMS can be described in a number of ways:

- Physical conditions – the type of conditions within the sector vary greatly. For some mining occupations such as miners, rock drill operators and mining managers' safety is an important element which must be continuously monitored and, if necessary, addressed. Other occupations such as HR practitioners and administrators tend to be office-based with fewer safety concerns.
- Relationships between employer and employee – relations can become stressed prior and during protest action.
- Job security – the MMS is still facing retrenchment drives across the country and across subsectors. Many jobs, particularly those at the lower skilled levels, are not secure.

3.2.9. Migration

Bilateral labour agreements between South Africa and numerous countries in Southern Africa allow for mining companies to employ workers with Southern African Development Community origin, thus allowing for diversity of skills in the sector. Table 3.5 shows the number of foreigners employed in each occupational category.

Table 3.5: Foreign skills

Occupational category (OFO)		Total employed in the MMS	Number of foreigners employed in occupation group	Percentage of foreigners to total employed in occupation group
Group	Title			
1	Managers	11 871	408	3.43%
2	Professionals	22 960	898	3.91%
3	Technicians and Associate Professionals	62 986	7 806	12.39%
4	Clerical Support Workers	22 435	864	3.85%
5	Service and Sales Workers	7 100	370	5.21%
6	Skilled Agricultural, Forestry, Fishery, Craft and Related Trades Workers (Artisan category)	37 320	1 433	3.83%
7	Plant and Machine Operators and Assemblers	236 402	51 401	21.74%
8	Elementary Occupations	140 632	19 378	13.77%

Source: Calculated from Weighted MQA WSP/ATR Submission, 2017

Table 3.5 reveals that the occupational categories with the highest number of foreigners are plant and machine operators and assemblers (21.74%), elementary occupations (13.77%), and technicians and associate professionals (miners fall into this category) at 12.39%. The use of migrant workers (highest in the two lowest-skilled categories where Table 3.4 showed that some of the biggest drops in employment numbers have occurred since 2012) is a possible area requiring further discussion and research.

3.3. 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, DHET and Chamber of Mines on education and training, as well as comments from stakeholders at numerous meetings held between May and July 2016 (during the development of regional SSPs) and June and July 2017, was analysed for this section.

3.3.1. Current state of education and training provision

The skills required for the MMS are produced at school, TVET colleges, private Training Providers, Universities of Technology, Universities as well as workplaces themselves.

3.3.1.1. Basic education

3.3.1.1.1. Overview of the basic education

The skills available to the sector consist of people currently employed, as well as those that are unemployed but available for work. Chapter one's labour market profile showed that the biggest proportion of workers (49%) have achieved the equivalent of Grades 10 - 12 as their highest level of education. However, stakeholders 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, even when Grade 12 has been completed. 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 Department of Basic Education's budget will be channeled to rural school infrastructure. The NDP calls for 450 000 Grade 12 learners to achieve university

entrance passes with maths 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. National and 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 and the MQA have to fund will become unnecessary.

Employees whose highest level of education is between Grades 4 and 9 constitute 21% of the sector, which is equal to the numbers in 2015-16. This range includes AET levels 1 – 4. As discussed in chapter two, given that changing technology will lead to a need for reskilling of some current and future employees in the areas of machine operations and maintenance, it will be important for stakeholders in the sector to prioritise the funding of AET training, up to and including level 4. This will help to develop adequate literacy and numeracy levels for industry's emerging new skills requirements. MQA's WSP/ATR submissions show that employers in the sector do offer training on AET 1 – 4 for their employees. In 2016-17 a total of 3 606 employees received one or more levels of AET training, although it is a 17% decrease from 2015-16.

3.3.1.1.2. MQA interventions to address challenges at basic education level

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, at various levels of education.

3.3.1.1.3. MQA interventions in basic education: 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 successfully complete maths and science. In 2016-17 the MQA committed to support 1 200 learners, which was successfully achieved. Stakeholders suggested that these programmes be monitored for impact, and that the learnings be incorporated into the programmes to ensure effectiveness. A popular suggestion from national and regional stakeholders was to focus efforts on the development of teachers, as well as focus on fewer beneficiaries, to ensure impact. It was widely suggested that considerable funding be directed at those who are applying for bursaries, as a condition before commencement of studies.

3.3.1.1.4. MQA interventions in basic education: Career awareness

Stakeholders in the sector widely believe that career guidance initiatives should be taking place before Grade 10, when learners need to decide their subjects, including whether or not to drop maths and replace it with maths literacy. There is a lack of informative career guidance for the majority of the population which would help a person understand the variety of career options and career progression opportunities that are available. In 2016-17 the commitment was made to create awareness of occupations within the MMS at 50 career awareness events, the aim of which is to provide comprehensive information on careers and pathways in the sector and to correct any misperceptions about mining occupations, as the MMS is not perceived to be an attractive industry to work in. This target was exceeded– a total of 68 events were attended. Stakeholders have emphasised the role of career guidance in creating awareness and knowledge around the diverse mining career options available, as well as in providing information on the importance of pursuing maths and science until Grade 12 (including the consequences on future career prospects if not done). Career awareness events should provide sufficient detail so that a person is empowered to make an informed decision regarding whether or not the career might be suited to them or not,

and whether or not the mining industry is attractive to them, thus potentially avoiding career changes and unnecessary training expenditure at a later stage. Stakeholders suggested that this initiative should be monitored for impact, and that an increase in events at high schools be undertaken if possible.

3.3.1.2. TVET college sector

TVET colleges form a critical component of the current training capacity of skills for the sector. Programmes include NCV, Nated (mainly for artisan development), skills programmes, learnerships and short courses. Many MMS-related skills are developed at this level of education, covering a variety of mining operations including blasting, excavations, metallurgy and engineering. Practical training at college workshops and on-the-job workplace experience are an important component of this level.

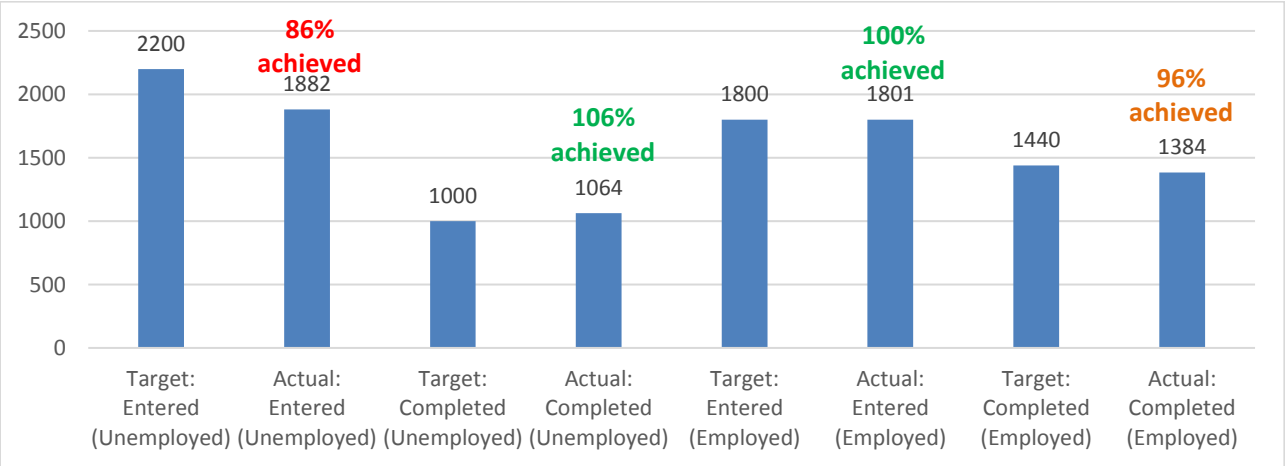
The main concern at this level was stated by stakeholders as being that many learners are not adequately work-ready upon graduating, particularly artisans. While employers appreciate the need to carry a measure of responsibility for the training of graduates to develop company-specific skills, indications are that many colleges' workshops are not equipped enough to provide adequate practical training required for the completion of qualifications; and curricula are for the most part not believed to be updated with latest technologies being used in the sector.

Below is a summary of the MQA's skills development interventions at the TVET college sector level to assist industry in meeting its skills requirements.

3.3.1.2.1. MQA interventions at TVET College: Learnerships (non-artisan)

Figure 3.2 shows the annual targets versus actual achievements for 2016-17 where learnerships are concerned, excluding artisans. A total of 3 683 learners registered for MQA-funded non-artisan learnerships (both unemployed and employed), which is 92% of MQA's target; with 1 064 unemployed learners completing non-artisan learnerships during the year, thus achieving the target; and 1 384 employed learners also completing the learnership, thereby almost meeting the target at 96%.

Figure 3.2: MQA Learnerships (excluding artisan): Target vs Actual 2016-17

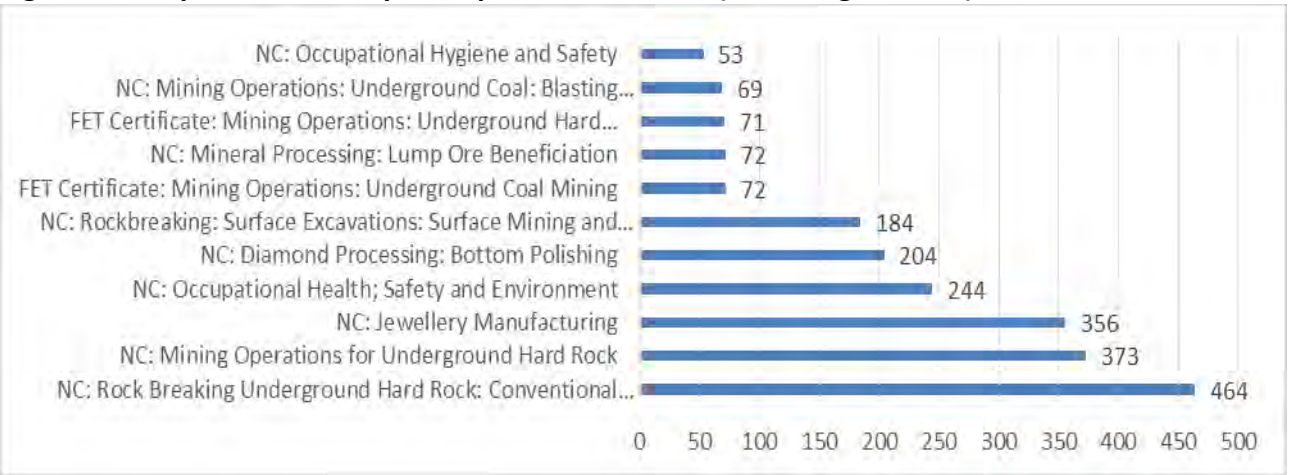


Source: MQA database (2017)

Figure 3.3 shows the top ten learnerships (excluding artisans) completed by unemployed and employed learners in 2016-17. The top two concern core mining skills at stage one of mining activities, with the third highest being jewellery manufacturing. With many subsectors in the MMS

undergoing retrenchment drives, there is currently very little indication of a shortage in the skills supplied in the TVET college sector, with the exception of a lack of practical experience and knowledge in new technologies.

Figure 3.3: Top 10 Learnerships completed in 2016-17 (excluding artisans)

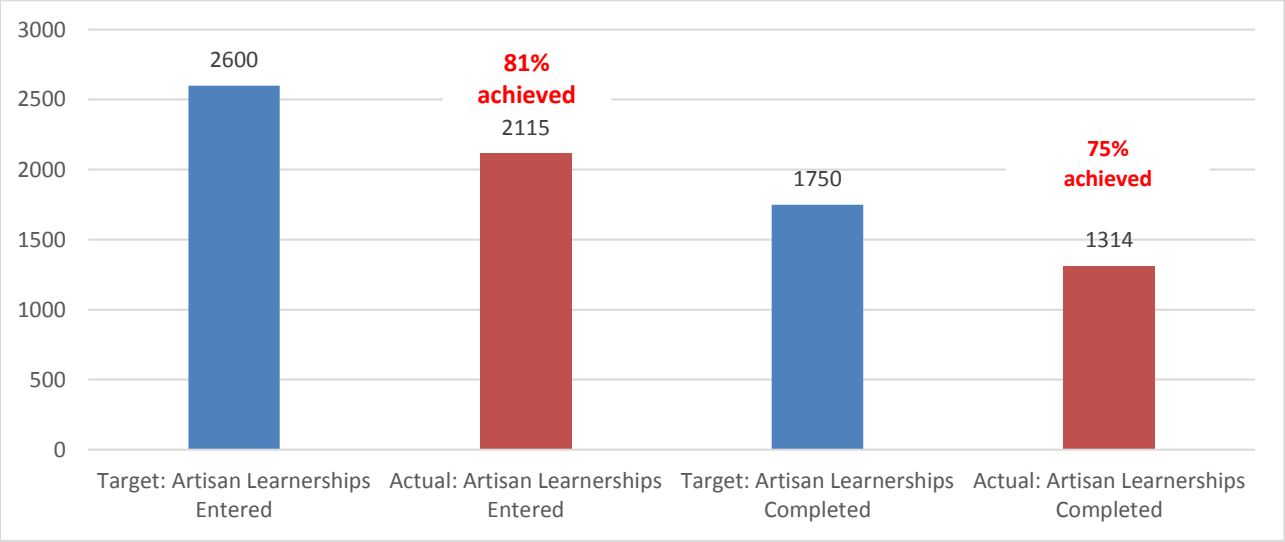


Source: MQA Database (2017)

3.3.1.2.2. MQA interventions at TVET College: Artisan development

Figure 3.4 shows the annual targets versus actual achievements for 2016-17 where artisan learnerships are concerned. A total of 2 115 learners entered MQA-funded artisan learnerships, which is 81% of MQA's target. The shortfall was owing to the mining sector not performing well thus a number of employers had to return allocations as they could not be utilised. A total of 1 314 learners completed artisan learnerships during the same year, which is 75% of MQA's target. The shortfall was believed to be an insufficient pipeline created in previous years.

Figure 3.4: MQA Learnerships (artisan): Target vs Actual 2016-17

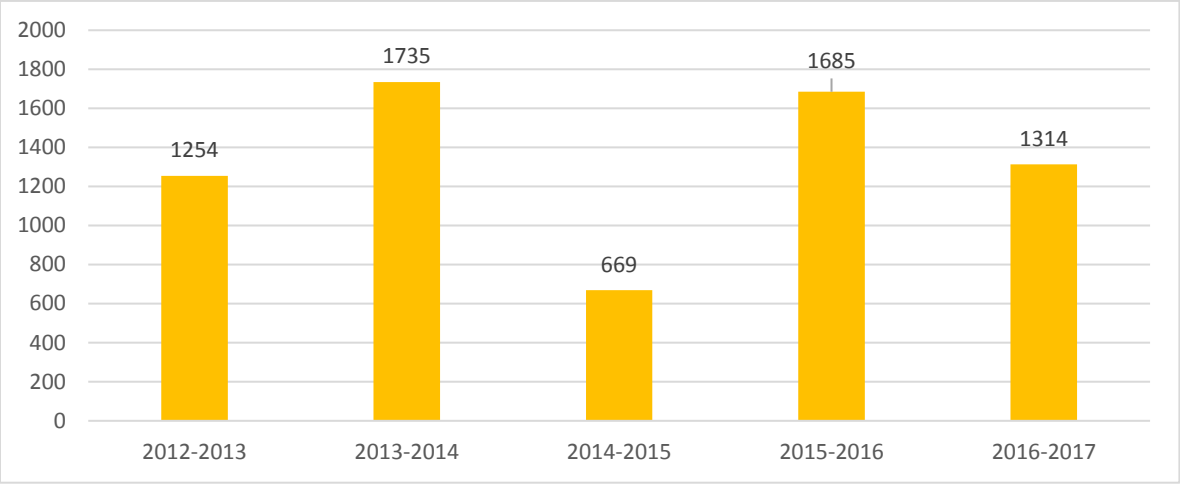


Source: MQA Database (2017)

Figure 3.5 shows a five-year analysis of the number of learners who completed artisan learnerships. In 2012-13 and 2013-14 the numbers remained over 1 000, but in 2014-15 there was a significant drop to below 700. Upon analysis of previous enrolment figures, it was found that a significant drop in enrolment occurred in 2011, and then recovered to over 2 000 enrolments for subsequent years. This decrease five years ago may help to explain the reason for the low

completion numbers in 2014-15. As expected, completions in the most recent two years returned to pre-2014-15 levels.

Figure 3.5: Artisan qualifications completed (5-year trend)



Source: MQA Database (2017)

Table 3.6 shows a breakdown of the artisan learnerships entered and completed in 2016-17 (blue and white columns), and compares these figures to the total number employed in the sector and their vacancy intensity rates (green columns).

Table 3.6: Artisan learnerships entered and completed

OFO Description	Number of learners entered 2016-17	Number of learners completed 2016-17 (Associated*)	Number of learners completed 2016-17 (Not associated*)	Total employed (current) in the sector	Number of vacancies	Vacancy intensity rate
Electrician	565	370	73	6 992	45	0.64%
Fitter	342	320	61	4 114	39	0.95%
Diesel Mechanic	337	251	70	3 736	76	2.03%
Welder	166	99	34	553	8	1.45%
Millwright	94	70	11	2 345	36	0.04%
Boilermaker	173	120	23	5 333	41	0.77%
Instrument Mechanician	58	72	19	1 143	28	2.45%
Fitter and Turner	64	51	18	4 081	17	0.42%
Rigger Ropesman	69	67	10	427	37	8.67%
Diamond and Gemstone Setter	3	0	0	57	78**	137%**

Source: MQA Database (2017)

** Associated refers to MQA-funded learners, while Not Associated refers to industry-funded or self-funded learners.*

*** It is believed that errors were made in the WSPs where this occupation is concerned – refer to Table 3.7's narrative.*

Table 3.6 shows that MQA funding towards artisan development may have decreased in some cases, owing to the number completed being higher in some cases to the number entered. However, given that the majority have very low vacancy intensity rates, this is not likely a cause for concern. Rigger ropesman has a vacancy rate of above 5% (8.67%). In 2015-16 there was a concern from stakeholders regarding throughput numbers of the rigger ropesman being low. In 2015-16, only 49 learners graduated as rigger ropesmen, however in 2016-17 an encouraging

finding was that graduate numbers increased to 77. Where diamond and gemstone setter is concerned, it is believed that errors may have occurred in the capturing of information in the WSPs, since seven of the eight companies which listed very high vacancies either do not currently employ any diamond and gemstone setters at all, or employ just one or two. The relevant employers may be contacted to resolve this seeming anomaly.

Stakeholders advised that there is a shortage of artisans with specialised knowledge and experience in updated and new technology, therefore learnerships need to incorporate changes in technology within the occupations and include work experience at suppliers of new technology to the mines as much as possible.

Since the number of those who completed is higher than the number of vacancies in the sector, it would appear that enough artisans are being developed in the system. However, there is competition with other sectors for artisans; as well, an uncertainty with the completed numbers is that the number of graduates who do seek and find employment in the MMS after studying is unknown.

3.3.1.2.3. MQA interventions at TVET College: 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 2016-17 the target was to place 200 TVET NCV learners with host employers (a decrease from 500 in 2015-16), with 241 being successfully placed. The target for completed workplace programmes was 100, but only 46 completed – this is said to be owing to an insufficient pipeline created in previous years. The targets for undergraduate students were also successfully achieved, with the target of 500 for those who entered workplace experience exceeded by 137, while the target of 335 for those who completed workplace experience was exceeded by 43. Furthermore, the targets for graduates were also achieved, with the target of 465 for those who entered internships exceeded by 5, while the target of 235 for those who completed internships was exceeded by one.

To help alleviate the burden on employers to mentor learners, an initiative has been introduced to place coaches within workplaces to support employers with on-the-job mentoring and coaching activities. The target for 2016-17 was to place 50 coaches in companies for this purpose, which was successfully achieved. An impact assessment has not yet been done on the programme, however it is set to continue in 2017-18 with another 50 coaches being targeted for placement in companies.

Suggestions from stakeholders included that the focus on TVET colleges should be on lecturer development. These suggestions are currently being addressed, there is a programme to place lecturers in companies for workplace exposure. In 2016-17 the target was to place 30 lecturers. Work placement for the lecturers was not attained owing to challenges such as the release and replacement of lecturers by TVET colleges. However, it was possible to support 30 lecturers on other required skills development interventions, thus the target of 30 was deemed to have been achieved. The same target has been reinstated in 2017-18.

3.3.1.3. MQA-accredited Training Providers

As of July 2017, there were a total of 168 accredited training providers which were fully accredited, meaning that they focus on MMS-related qualifications. This is an increase of 18 since 2016-17. Another 27 offer a few MQA-approved programmes. Training providers at regional workshops

expressed that the process of gaining accreditation is sometimes very lengthy which impedes the speed at which skills can be developed in the MMS.

3.3.1.4. Employer training reported on WSP-ATR

Companies in the sector contribute much to the development of skills for employees. Over one million training programmes were completed by employees in 2016-17. They varied greatly in type, from job-specific development programmes to learnerships, with the three most common being short courses (a total of 377 010 completed), induction training (255 675) and refresher/ex-leave training (180 607).

Upon deeper analysis of the different types of short courses completed, it was found that while many of them were not specified in the WSPs, among the highest were engineering core, mining core, safety and supervisory and management skills, and soft skills.

Given the ongoing retrenchment drives prevailing in the sector, it is noteworthy that a total of 4 563 short courses were completed on portable skills. Specifically, they were:

- Licences: 1 155 courses
- Engineering: 850 courses
- Construction: 581 courses
- Business: 252 courses
- Agriculture: 4 courses
- Other (not specified): 1 721 courses.

3.3.1.5. Chamber of Mines certificates

Table 3.7 shows the number of certificates in MMS-related qualifications which the Chamber of Mines has issued since 2012. The numbers have declined significantly for most certificates, with the exception of elementary mine surveying, mine environmental control and radiation protection monitoring screening which overall showed growth. While the numbers in July and December 2016 show a marginal increase overall when compared to 2015, they are still approximately a quarter of the 2014 numbers. A particular concern to key role-players could be the low numbers of learners studying advanced rock engineering, considering it is on the hard-to-fill list.

Table 3.7: Certificates issued by Chamber of Mines

Certificate	As at July 2012	As at July 2013	As at Dec 2014	As at July 2015	As at Dec 2015	As at July 2016	As at Dec 2016
Certificate in Advanced Mine Surveying	70	58	91	57	6	54	19
Certificate in Advanced Mine Valuation	102	66	75	38	16	38	10
Certificate in Advanced Rock Engineering	11	3	4	4	3	5	1
Certificate in Basic Mine Sampling	141	63	164	80	43	73	26
Certificate in Basic Mine Surveying	130	142	156	77	66	120	14
Certificate in Elementary Mine Sampling	90	73	64	52	35	31	26
Certificate in Elementary Mine Surveying	130	88	141	95	25	46	46
Certificate in Mine Environmental Control	19	8	29	8	4	15	6

Certificate	As at July 2012	As at July 2013	As at Dec 2014	As at July 2015	As at Dec 2015	As at July 2016	As at Dec 2016
Certificate in Radiation Protection Monitoring Screening	125	109	181	61	41	108	37
Certificate in Rock Mechanics	27	25	25	16	2	12	14
Certificate in Strata Control	79	64	96	61	10	50	49
Intermediate Certificate in Mine Environmental Control	32	48	51	59	1	51	13
Certificate in Mine Survey Draughting	22	40	30	12	1	15	11
TOTAL	**978**	**787**	**1 107**	**559**	**253**	**618**	**272**

Source: Chamber of Mines (2017)

3.3.1.6. 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 itself remains relatively low.

3.3.1.6.1. Universities

With regard 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, and 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 four Universities of Technology. The other fields of study are each offered at a number of institutions.

Table 3.8 shows that the number of graduates in most MMS-related qualifications at HET level has generally been increasing. However, there may be a concern regarding mining engineering, as it is an occupation on both the hard-to-fill and occupational shortages lists, but the number of mining engineering graduates is generally consistent. Stakeholders advised that there is a lack of career awareness at university level for rock engineering, a specialisation of mining engineering, which has resulted in a shortage in the provinces of North West and Limpopo.

Table 3.8: Graduate numbers in MMS-related qualifications

Qualification	Output 2011	Output 2012	Output 2013	Output 2014	Output 2015*
Chemical Engineering	1 170	1 352	1 468	1 619	1 658
Electrical Engineering	2 567	2 579	2 888	3 269	3 269
Geology	906	993	890	978	1 070
Mechanical Engineering	1 893	2 064	2 259	2 469	2 609
Metallurgical Engineering	376	335	509	477	504
Mining Engineering	418	431	474	441	430

Source: DHET, HEMIS Data (2017)
** Most recent data from DHET available. The 2016 figures are not released yet.*

Table 3.9 shows the breakdown of the MMS-related qualifications by gender and race, for 2015. The number of females enrolled in electrical engineering, mechanical engineering and mining

engineering have historically been, and continue to be lower than that of males. However, the gap is not as large for chemical engineering, and only marginal for geology. For all disciplines, Africans constitute a substantially higher proportion of graduates than other race groups.

Table 3.9: Graduate numbers in MMS-related qualifications, by gender and race, 2015

	Chemical Engineering		Electrical Engineering		Geology		Mechanical Engineering		Metallurgical Engineering		Mining Engineering	
	M	F	M	F	M	F	M	F	M	F	M	F
White	71	43	163	30	159	86	183	44	19	10	21	10
Indian	33	36	66	25	14	23	59	19	1	4	5	1
Coloured	30	20	55	11	33	36	50	13	1	2	4	3
African	226	164	339	151	335	376	252	82	80	58	66	34
Not specified	10	11	24	7	4	4	16	3	N/A	N/A	N/A	N/A
Gender Total	370	274	647	224	545	525	560	161	101	74	96	48
Total*	644		871		1 070		721		175		144	

Source: DHET, HEMIS Data (2017)

** 2015 is the most recent data from DHET available. The 2016 figures are not released yet.*

3.3.1.6.2. Industry-funded bursaries (non-employee and employee)

Table 3.10 shows the number of bursaries for non-employees funded by the sector's employers who also contribute to skills development. There are four bursary types found on this list which are linked to occupations on the hard-to-fill list: mining engineering, electrical engineering, industrial engineering and mechanical engineering.

Table 3.10: Non-employee bursaries funded by employers

Programme Type	Number of bursaries (as of 31st May 2017)
Mining Engineering	63
Electrical Engineering (Heavy Current Only)	56
Geology	41
Chemical Engineering	28
Metallurgy	22
Environmental Health and Management	19
Electro Mechanical Engineering	19
Mechanical Engineering	17
Industrial Engineering	16
Mine Surveying	15
Extraction Metallurgy	8
Analytical Chemistry	7
Metallurgical Engineering (extractive only)	2
Other	206
Total	**519**

Source: Calculated from Weighted MQA WSP/ATR Submission, 2016-17

Table 3.11 shows the number of study-assistance programmes funded by the sector's employers for their employees. These programmes are usually employee-driven, with the three occupations in highest demand by employees in the MMS involving engineering. All three are on the hard-to-fill list. While mechanical and electrical engineering are occupations which can be used in other sectors, mining engineering is contained to the MMS only, therefore these employees would very likely not exit the sector upon graduation.

Table 3.11: Employee study-assistance programmes funded by employers

Programme Type	Number of study-assistance programmes
Mechanical Engineering	173
Electrical Engineering (Heavy Current Only)	102
Mining Engineering	86
Metallurgy	70
Environmental Health and Management	51
Mine Surveying	27
Geology	24
Chemical Engineering	21
Analytical Chemistry	20
Industrial Engineering	19
Electro Mechanical Engineering	13
Metallurgical Engineering	9
Jewellery Design Manufacturing	5
Metallurgy (extraction)	4
Other (unspecified)	1 487
TOTAL	**2 111**

Source: Calculated from Weighted MQA WSP/ATR Submission, 2017

3.3.1.6.3. MQA interventions at HET level

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 2016-17, the MQA had a target to provide 700 bursaries to unemployed learners for MMS-related qualifications. This target was achieved and exceeded by 229, owing to a number of allocations that were made to TVET colleges whose fees made it possible to accommodate more learners. The annual target of 300 for completed programmes was also exceeded, with 308 learners completing their studies. The MQA benchmarks its target throughput rate against educational institutions, which is said to be between 15% and 20%.

Table 3.12 shows the total number MQA-funded bursars currently in the system.

Table 3.12: MQA-funded bursars

Row Labels	1st year	2nd year	3rd year	4th year	5th year	Totals
Electrical Engineering	77	233	59	22	2	**393**
Mechanical Engineering	103	86	52	28	2	**271**
Mining Engineering	58	48	54	43		**203**
Environmental Health and Management	38	37	37	36		**148**

Row Labels	1st year	2nd year	3rd year	4th year	5th year	Totals
Metallurgical Engineering	51	20	27	36		**134**
Chemical Engineering	34	37	36	23		**130**
Geology	13	26	45	28		**112**
Industrial Engineering	23	23	17	24		**87**
Analytical Chemistry	5	13	19	37		**74**
Jewellery Design and Manufacturing	7	11	8			**26**
Mine Surveying	3	1	9	1		**14**
Other	16	5	2	3		**26**
Grand Total	**428**	**540**	**365**	**281**	**4**	**1618**

Source: MQA database (2017)

Table 3.12 shows that five of the occupations on the hard-to-fill list have bursars currently in the system: electrical engineering, mechanical engineering, mining engineering, environmental health and management and industrial engineering. With regard to mining engineering, which includes rock engineering and is considered the most hard-to-fill of the occupations, it is encouraging that 21% of the learners pursuing these disciplines are in their final year. Awareness will be created about the specialisation of rock engineering among those pursuing the mining engineering qualification, as a lack of career awareness is widely held by stakeholders to be the main reason for a shortage of rock engineers in the sector.

3.3.2. Other supply-side considerations in the MMS

The following two sections provide detail on other supply-side concerns, which do not fall neatly into any of the afore-mentioned education levels, namely Government Certificates of Competency and management skills.

3.3.2.1. Government Certificates of Competency

Certain core occupations within the MMS, such as mine engineer and mine manager, can only operate upon issuance of a Government Certificate of Competency (GCC) by the DMR, which confirms that the employee has the necessary skill-set required to perform the job. There are stringent qualification criteria, which include years of experience and passing of examinations in order to qualify for a GCC. Table 3.13 shows the number of certificates which the DMR has issued in the past five years. The decreasing numbers of GCCs issued for mine engineers may be a concern as it is on the hard-to-fill list. Generally, sector stakeholders have expressed concern over the decreasing numbers and the standards required to achieve a GCC. Research will be conducted to determine the demand from industry for GCC holders in order to compare the numbers to the GCC certificates being issued.

With the exception of winding engine driver, there are significantly fewer females qualifying for all of these certificates. The MQA continues to support females through numerous programmes, in order to attract more to the sector and develop them if necessary.

Table 3.13: Certificates of Competency issued by DMR (5-year analysis)

Year	Mine Engineer (Elec & Mech)			Mine Manager (Coal & Metal)			Mine Overseer (Coal & Metal)			Mine Surveyor			Winding Engine Driver		
	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F
2012-2013	72	71	1	62	49	13	165	157	8	12	12	0	18	14	4
2013-2014	115	100	15	73	57	16	177	168	9	10	10	0	58	34	24
2014-2015	121	102	19	15	12	3	103	93	10	10	8	2	33	15	18
2015-2016	98	80	18	29	22	7	105	99	6	9	8	1	35	19	16
2016-2017	70	57	13	29	24	5	77	67	10	15	9	6	28	12	16

Source: DMR (2017)

3.3.2.2. Management skills

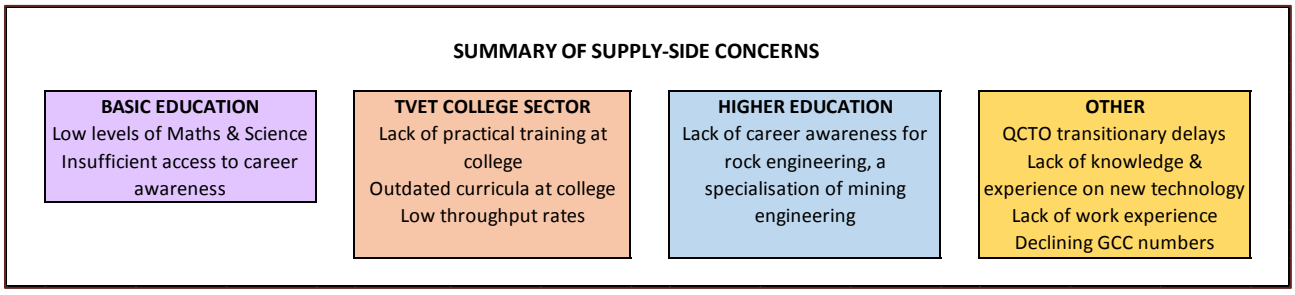
Technical people, often Engineers, are promoted to managerial positions as there is a need for managers of mines to have a strong technical understanding of the operations they are managing. The sector lacks people with a combination of senior technical knowledge and strong management skills which can negatively affect productivity and internal relations. National experts believe that the best place to develop these skills is experientially at the workplace, which takes at least eight years. Numerous stakeholders suggested that opportunities need to be created at early career stages, for example managing small tasks, as well as attending management development courses.

The MQA has a management development programme in place which aims to address this challenge. The target of 150 HDSA employees who entered this programme was achieved and exceeded by five owing to greater awareness of the programme, while the target of 150 for those who completed the programme was successfully met.

3.3.3. Summary of Skills Supply

Figure 3.6 shows a summary of the supply-side issues discussed above which are currently faced by the sector's employers.

Figure 3.6: Summary of supply-side concerns



Source: UCS 2017

3.4. Summary of skills gaps

3.4.1. Skills areas in the sector that need improving

Table 3.14 lists the main skills issues which emerged through analysis of stakeholder engagements.

Table 3.14: Primary skills concerns in the MMS

Skills issue	Reason for concern
Maths and Science	The poor quality of basic education results in poor levels of maths and science, subjects which are critical to the MMS. Currently this is a concern in mine communities, as unemployed youth seek to find employment at the mines.
Career awareness	It is believed by all stakeholders that a lack of career awareness at university level is responsible for the shortage in rock engineers. Furthermore, career awareness events are currently perceived as

Skills issue	Reason for concern
	not being accessible and informative enough for learners at the majority of high schools. Career awareness should provide sufficient detail that a person is empowered to make an informed decision regarding whether or not the career might be suited to them or not, thus potentially avoiding career changes and unnecessary training expenditure at a later stage.
Employment equity	Employers struggle to find suitably qualified HDSAs to fill certain roles, in particular senior managers and engineers.
Technology	Learners are often not perceived to be work-ready upon graduating, increasingly owing to changing technology.
Work experience	Among the reasons provided by employers and stakeholders for the hard-to-fill occupations is a lack of high-level experience needed in senior positions.
Government Certificates of Competency	Sector stakeholders have expressed concern over the decreasing number of people achieving a GCC. Research has been underway to unpack the reasons. Once understood, the MQA will appropriate resources accordingly to address them.
QCTO transition	Stakeholders expressed concern at the transitionary delays being experienced in the QCTO process, resulting in a shortage of the following occupations in the sector: ventilation officer, environmental health officer and strata control officer.
Management skills	Technical people, often engineers, are promoted to managerial positions as there is a need for managers of mines to have a strong technical understanding of the operations they are managing. The sector lacks people with a combination of senior technical knowledge and strong management skills which can negatively affect productivity and internal relations. National experts believe that the best place to develop these skills is experientially at the workplace, which takes at least 8 years. Stakeholders suggested that opportunities need to be created at early career stages, for example managing small tasks, as well as attending management development courses.
Industry attractiveness	High-level individuals in non-core occupations, especially medical such as occupational health nurse and doctor are generally not attracted to working in the MMS.

Source: Expert stakeholder engagements, 2015-2017

3.4.2. Impact of skills shortages on employers

Employers at regional meetings advised that the impact of these skills gaps include:

- 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 qualified HDSAs to fill some of the engineering and management roles, which affects employment equity numbers.
- Changing technology in the MMS has affected the skills required within certain occupations, particularly artisans. Colleges for the most part have not adapted accordingly, which is an increased training cost to employers.
- 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.
- 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.
- Employers sometimes struggle to find suitably qualified skills from local communities, which can result in community protests and unrest. This can lead to a decline in productivity and profitability while the unrest is ongoing, or in the case of new mines, operational start up delays.
- Individuals in non-core occupations such as occupational health nurses are generally not attracted to working in the MMS, thus companies need to incentivise with high salaries. This is an increased cost to company.

3.4.3. Employability of graduates

- Graduates who complete artisan qualifications are not perceived to be work-ready as they lack knowledge of and experience in new technology, 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 employer's to undertake further training for them. MQA's work-integrated learning programmes aims to address this issue.
- Graduates of non-mining 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.
- An impact assessments of bursary, internship, work placement and artisan qualifications is being undertaken as well as a tracer study of bursars.

3.5. PIVOTAL list

The MQAs' OFO Code PIVOTAL Skills List in Table 3.15 was determined by considering the hard-to-fill occupations, as well as the critical skills within occupations which are lacking, as advised by key stakeholders. Additionally, the occupations on the scarce skills list were considered, with particular focus on those which are on the hard-to-fill list as well. It is important to note that sometimes the occupation itself is not necessarily scarce, rather a skill or competence within the occupation is. In this case, this is especially true for mine planning manager and rigger ropesman.

It is important to note that since the PIVOTAL list is OFO code-based, it is not possible to reflect other critical priorities in it. For example, AET, MDP, OHS, as well as skills related to mineral beneficiation and sustainability are blanket priorities in the sector and required to be developed within many occupations and at different NQF levels. Therefore, highlighting some of these occupations in the PIVOTAL list would be excluding many others which are as applicable. Considering this, as well as that PIVOTAL skills is also required to address scarce and critical skills, the research team chose to focus its PIVOTAL list on those occupations which are hard-to-fill only.

The interventions listed in the PIVOTAL list were informed by understanding the unique reasons for the challenges faced by employers where each of the occupations are concerned. For example, the primary reason facing employers where rock engineer is concerned is a lack of career awareness regarding this specialisation at university level. The quantities were informed by the number of vacancies for each occupation as at 31st May 2017.

The envisaged outcomes from the identified interventions are an increase in these occupations in the sector, in the number of HDSAs in these occupations, of technical people with management and training skills as well as knowledge of and experience in changing technology, and in career awareness. The PIVOTAL list is ranked in order of priority according to advice by key stakeholders in the sector, including representatives of industry, labour and government.

The list was approved by the MQA Board on 31st July 2017.

Table 3.15 MQAs' OFO Code Pivotal List (2018-19)

MQA's 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 the	0-100	101 - 1000	1001 & ABOVE	COMMENTS
MQA	Short-Medium term	2017-18	2015-214601	Mining Engineer	Rock Engineer	Bursary, work experience, career awareness	7	Y	43	43	X			
MQA	Short-Medium term	2017-18	2015-132202	Mine Planning Manager	Mineral Resouces Manager, Mining Exploration Manager	Management development programme, bursary & work experience	7	Y	22	22	X			
MQA	Short-Medium term	2017-18	2015-214102	Industrial Engineering Technologist	Process Technologist	Bursary, work experience	7	Y	4	4	X			Quantity needed based on number of vacancies as at 31st May 2017
MQA	Short-Medium term	2017-18	2015-214402	Mechanical Engineering Technologist	Thermodynamics Technologist	Bursary, work experience	7	Y	8	8	X			
MQA	Short-Medium term	2017-18	2015-215101	Electrical Engineer	Electromechanical Engineer	Bursary, work experience	7	Y	15	15	X			
MQA	Short-Medium term	2017-18	2015-242402	Technical Trainer	Trainer	Work experience, skills programme	7	Y	8	8	X			
MQA	Short-Medium term	2017-18	2015-311705	Ventilation Officer	N/A	Bursary, work experience	6	Y	4	4	X			
MQA	Short-Medium term	2017-18	2015-311707	Strata Control Officer	Strata Control Practitioner	Bursary, work experience	6	Y	7	7	X			
MQA	Short-Medium term	2017-18	2015-312101	Quarry Master	Magazine Master, Quarry Foreman	Bursary, work experience	6	Y	9	9	X			
MQA	Short-Medium term	2017-18	2015-651501	Rigger Ropesman	N/A	Bursary, work experience	6	Y	37	37	X			

Source: Stakeholder engagements (2017) and MQA WSP ATR (2017)

3.6. Conclusion

Analysis of MQA's WSP submissions and comments from key stakeholders indicates that the hard-to-fill occupations are as follows: mine planning manager, industrial engineering technologist, mechanical engineering technologist, mining engineer, rock engineer, electrical engineer, environmental health officer, technical trainer, ventilation officer, strata control officer and quarry master (magazine master). Mine planning manager has a high vacancy intensity rate, at 23%. The primary reasons underlying the challenges were found to be related to a lack of specialised knowledge and experience in changing technology; insufficient experience; low levels of maths and science; insufficient access to high quality career awareness; employment equity; lack of GCC holders; lack of management skills; lack of project management skills; lack of work-readiness; lack of skills pipeline; and transitionary delays in the QCTO process.

Main supply-side concerns were found to be as follows:

- Basic education: low maths and science levels; and insufficient access to career awareness.
- TVET college sector: lack of practical training at colleges; outdated curricula at colleges; and low throughput rates.
- HET sector: Lack of career awareness for rock engineering.
- Other (not specific to a level of education): QCTO transitionary delays; lack of specialised knowledge and experience on updated and new technology; lack of work experience; lack of management and project management skills; and declining GCC achievement numbers for core MMS-related occupations.

The MQA assists the industry in addressing these challenges through interventions which include: partnerships with colleges; local community projects such as learnerships, skills programmes, Maths and Science programmes, and adult education and training; targeting HDSAs to address transformation issues; career awareness programmes. Stakeholders strongly suggested that some of these programmes, in particular Maths and Science and career awareness events, be thoroughly researched and adjusted to increase effectiveness, as well as monitored for impact.

4 SECTOR PARTNERSHIPS

4.1. Introduction

The MQA partners with, and has relationships with numerous key role-players in the industry, such as government departments, labour unions, industry representatives and training providers. The purpose of this chapter is to assess the effectiveness of the existing partnerships in the sector. 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. State of Existing Partnerships

4.2.1. TVET college partnerships

The MQA has established official partnerships, through Memoranda of Understanding (MOUs), with 22 TVET colleges around the country, where qualifications related to the MMS are offered. Since the majority of the qualifications at the TVET colleges are not yet accredited, 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 22 TVET colleges include to facilitate the offering of learnerships, trades and other industry qualifications, as well as lecturer development, workplace learning, provision of bursaries, learner placements and to assist with the compliance of these colleges' workshops to meet the standards for programme approval. These are due to be completed in 2018, and no reviews have been conducted yet.

Assessor and moderator training for lecturers was another objective for the partnerships, and this is the only objective which has been completed so far, and successfully. All targeted lecturers have received the training.

The following partnerships are in place for the provision of internship programmes, bursaries and lecturer training in governance programmes:

- Eastern Cape: Ingwe TVET college and KSD TVET college;
- Free State: Flavius TVET college, Goldfields TVET college, Maluti TVET college and Motheo TVET college;
- Gauteng: Ekurhuleni East TVET college and Central Johannesburg TVET college;
- KwaZulu-Natal: Mthashana TVET college;
- Limpopo: Capricorn TVET college, Lephalale TVET college, Mopani TVET college, Sekhukhune TVET college and Vhembe TVET college;
- Mpumalanga: Ehlanzeni TVET college, Gert Sibande TVET college, Nkangala TVET college and Umfolozi TVET college;
- North West: Taletso TVET college and Vuselela TVET college;
- Northern Cape: Northern Cape Rural TVET college; and
- Western Cape: West Coast TVET College.

It is difficult to report on the partnerships as most of them are in early stages. However, one of the key challenges which has arisen in the early stages with these TVET colleges is in facilitating workplace experience for lecturer development. TVET colleges do not have financial capacity to replace lecturers who are on leave for workplace experience. This is a significant issue which MQA head office and its regional managers are currently trying to resolve in order to ensure that the project is enabled and the targets can be achieved for the next financial year.

A pilot project for the placement of lecturers at workplaces to gain work experience was undertaken at Goldfields TVET College with the target of 20 lecturers being successfully met. However, the intention is to lengthen the work experience period to 18 months as the pilot showed that three months was too short for sufficient experience to be gained. With regard to assistance with the compliance of colleges' workshops to meet the standards for programme approval, an assessment of the workshop at Goldfields College is currently being undertaken and a findings report is expected to be released imminently. This partnership stands out for its initiative-taking focus and willingness to learn from experience and adapt quickly. It was noted by stakeholders that more stakeholder collaboration is needed, and must be facilitated in order for the college to respond quickly and relevantly to industry needs.

With regard to the Northern Cape partnerships, collaborative efforts between numerous stakeholders resulted in the workshop of one of the five campuses of Northern Cape Rural College, Okiep Campus, being deemed compliant in 2015, and their trade test centre becoming accredited by NAMB. The other two engineering workshops which are part of Northern Cape Rural College are still undergoing assessments.

While there are still many challenges to overcome in this partnership, the process followed with regard to workshop compliance presents a model example of what can be achieved through multi-stakeholder collaboration and commitment. It will now be important for this partnership to be monitored for its impact on skills priorities in the province.

4.2.2. Community college partnerships

Official partnerships have been established through Memoranda of Understanding (MOUs), with nine community colleges, one in each of the nine provinces, a project which is in line with DHET's mandate to capacitate community colleges. Regional offices will assist the colleges in policies and legislation training, marketing and advocacy, corporate governance, financial management, student leadership, organisational development, curriculum training, subject specialist training, assessor training, and the methodology required when teaching adults. These partnerships are in early stages and due to be completed in 2018, therefore no reviews have been conducted yet.

The following partnerships are in place with community colleges:

- Eastern Cape: Eastern Cape Community Education Training;
- Free State: Free State Community Education Training;
- Gauteng: Gauteng Community Education Training;
- Limpopo: Limpopo Education Training;
- Mpumalanga: Mpumalanga Community Education Training;
- North West: North West Community Education Training;
- Northern Cape: Northern Cape Community Education Training; and
- Western Cape: Western Cape Community Education Training.

4.2.3. University partnerships

Official partnerships have been established through Memoranda of Understanding (MOUs), with the following universities: Rhodes University, the University of Cape Town, the University of Fort Hare, the University of Johannesburg, the University of Limpopo, the University of Pretoria, the University of South Africa, the University of Venda and the 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 current target to support 30 HDSA lecturers has been successfully achieved. Since the partnerships' commencement in 2011, three lecturers have been successfully absorbed by the university, while six have been absorbed by industry. All of these were replaced so that the target of 30 is an ongoing commitment.

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 the same lecturers need support before they are considered for permanent employment. There are intentions of providing the lecturers with three years of international exposure during their tenures, for them to gain valuable experience and therefore become more employable on their return to South Africa.

4.2.4. Partnerships with the DMR, Chamber of Mines and Organised Labour

There is an ongoing and close relationship with the three strategic tripartite partners: the DMR, the Chamber of Mines and organised labour. All parties involved in this partnership convene regularly to discuss challenges facing skills development in the MMS. It is considered a successful partnership by the individual parties as it enables the appropriate response to skills gaps with support from its key stakeholders.

4.2.5. Inter-SETA partnerships

In alignment with the Minister of Higher Education and Training's call for increased inter-SETA collaboration, involvement in inter-SETA meetings has increased, with meetings often being chaired in Limpopo and Mpumalanga and North West. These meetings involve sharing skills development progress reports and focus on possible areas of collaboration. The SETAs also share costs and platforms for career awareness. However, obtaining formal agreements that were proposed is an ongoing challenge. Furthermore, stakeholders advised that not enough Memoranda of Understandings are in place for qualifications needed in the MMS but which are accredited by other SETAs.

4.2.6. Premier's Office partnerships

There are working relationships with the Premier's Offices in Limpopo, Free State, Mpumalanga, Northern Cape, KZN and Eastern Cape. While most partnerships have not been formalised, there is agreement that this needs to take place. In Eastern Cape, there is a proposal with the premier's office under discussion involving the training of ex mine workers in short courses. All skills development efforts by the SETAs are reported to the Provincial Skills Development Forum chaired by the Premiers, who in turn are engaged for assistance in the removal of blockages to implement them. A challenge is that turnaround time to the implementation of agreements is sometimes long. In the North West, the regional office is currently collaborating with the Premier's Office to establish a Provincial Skills Development Forum.

4.3. Proposed New Partnerships

4.3.1. Minerals beneficiation partnerships

Owing to the size of South Africa's untapped minerals the country has significant potential to increase mineral beneficiation. Stakeholders in every province expressed the importance of implementing efforts to beneficiate the country's minerals and metals, especially during an economic downturn and significantly reduced global demand. The DTI completed a research project in 2013 that analysed backward and forward beneficiation potential in four key value-chains (ferrous metals; polymers; titanium, PGMs) and developed strategies to increase the localisation of mining inputs. The next phase was to unpack the high-level analysis and identify key projects in the selected value chains that can be taken forward. Collaboration with the DTI and DMR needs to be created and formalised to ensure adequate timeous response of skills development requirements.

4.3.2. Mining Phakisa partnership

As mentioned in Chapter 2, the Mining Phakisa initiative is aiming to develop systems and technologies for the sector which are holistic and people-centric; which are safer and healthier to use; which facilitate the mining of low-grade reefs that are currently not economical to mine; which facilitate access to resources that are currently too deep to mine, thereby extending the lifespan of some of the existing and established mines; as well as technologies which reinforce pillars underground. It is believed that the innovations will result in job retention and growth in the sector, up to the year 2046. It is important to partner formally with the Mining Phakisa, as these developments may require reskilling training drives for some occupations in the sector, including managers and supervisors. Collaboration will allow forward planning accordingly.

4.3.3. Green skills partnerships

Chapter 2 highlighted the growing need to protect the environment by mining in an environmentally sustainable way. Two types of partnerships are proposed to this end:

4.3.3.1. Government partnerships

Rhodes University's report Green Skills for the Mining Sector report recommended the support of the Department of Water and Sanitation in strengthening the capacity of its regulatory function with regard to mining, with a range of skills from demand determination to regulatory roles in the approval and enforcement of water use licences. It is also proposed that a partnership with the Department of Environmental Affairs be formalised, for the research projects being undertaken on ways to develop cleaner production and processes.

4.3.3.2. 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. R&D efforts in the Mining Phakisa initiative include a focus on the conservation of natural resources, preservation and restoration of the environment.

4.4. Conclusion

Formal partnerships exist with 22 TVET colleges. It was highlighted that an increase in more effective collaboration is needed between the MQA, TVET colleges and industry, for the purposes of responding relevantly to industry's needs and preparing learners accordingly. One of the key challenges which has arisen in the early stages of the partnerships with the TVET colleges is in facilitating workplace experience for lecturer development. TVET colleges do not have financial capacity to replace lecturers who are on leave for workplace experience. This is a significant issue which head office and its regional managers are currently trying to resolve in order to ensure that the project is enabled and the targets can be achieved for the next financial year.

Official partnerships have been established with nine community colleges, one in each of the nine provinces, a project which is in line with DHET's mandate to capacitate community colleges. These partnerships are in the early stages and are due to be completed in 2018, therefore no reviews have been conducted yet.

It is important to partner formally with the Mining Phakisa, as their developments may require reskilling training drives for some occupations in the sector.

With regard to mineral beneficiation, collaboration with the DTI and DMR needs to be created and formalised to ensure adequate timeous response of skills development requirements.

Regarding green skills, a partnership with the Department of Water and Sanitation and the Department of Environmental Affairs is recommended to mitigate the challenge of significantly reducing water levels, to combine strengths and avoid duplication of work. It is also recommended that partnerships be formed with companies' 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. Research findings

The purpose of this chapter is to identify the top five key priority actions for the sector based on a consolidation of the analysis from previous chapters. This chapter will indicate the recommended skills priority actions that the MQA will prioritise for the cycle 2018-19, which will reflect the operational priorities inherent in the MQA's Strategic Plan in its quest to implement its various learning interventions for the MMS as it aligns with national priorities.

The key findings of this report are as follows:

- As found in Chapter 2, the main change drivers currently impacting the MMS are: changing technology, together with Mining Phakisa; retrenchments, as the widespread downscaling of operations across the sector owing to decreased investor confidence and global demand for mined commodities has led to large-scale retrenchment drives, resulting in the need to prioritise portable skills training; and transformation, as targets contained in the new Mining Charter are designed to redress historical imbalances.
- Chapter 2 also explained that the new Mining Charter, gazetted in June 2017, stipulates that there should be at least 60% participation from black persons in senior management positions (of which 30% must be female black persons), 75% middle management (of which 38% must be female black persons), and 88% junior management (of which 44% must be female black persons). Chapter 1's labour profile shows that representation is currently not at the required levels.
- Chapter 3 found that the most hard-to-fill occupations are mine planning manager, industrial engineering technologist, mechanical engineering technologist, mining engineer, rock engineer, electrical engineer, environmental health officer, technical trainer, ventilation officer, strata control officer and quarry master (magazine master).
- The primary reasons for skills gaps are a lack of specialised knowledge and experience in updated and new technology; insufficient experience; low levels of maths and science; insufficient access to high quality career awareness; employment equity; lack of GCC holders; lack of management skills; lack of project management skills; lack of work-readiness; lack of skills pipeline; and transitionary delays in the QCTO process.
- The main supply-side concerns, as outlined in Chapter 3, were found to be as follows:
  - Basic education: low levels of maths & science; and insufficient access to career awareness.
  - TVET college sector: lack of practical training at colleges; and outdated curricula at colleges.
  - HET sector: lack of career awareness for rock engineering, a specialisation of Mining Engineering.
  - Other (not specific to a level of education): QCTO transitionary delays; lack of specialised knowledge and experience on updated and new technology; lack of work experience; and declining GCC achievement numbers for core MMS-related occupations.
- It was revealed in chapter 3 that the MQA's targets for Maths and Science and career awareness events were exceeded in 2016-17. Given the importance of maths and science as building blocks for the majority of occupations in the sector, stakeholders suggested that efforts should be focused on the development of teachers, in order to reach more learners and ensure impact through high quality teaching. Learners who have successfully passed these Maths and Science programmes could be prioritised for MQA bursaries. Career

awareness should have a focus on the rock engineering specialisation, as it is believed that this is partly responsible for the shortage of rock engineers in the sector.

- Chapter 1 explained that the outlook of the MMS would be improved if the sector monitors the developments of Mining Phakisa and prepares existing and potential employees accordingly; and takes advantage of the implementation of the Mineral Beneficiation Action Plan (MBAP) and the SIPs projects, which are expected to increase economic activity and create new jobs.
- Chapter 1 further outlined that mining operations come with inherent risks that can impact the health and safety of employees. Therefore, mining companies, government and unions need to continue to place importance on employee safety since continued fatalities, injuries and occupational diseases jeopardise a company's licence to operate.
- With regard to green skills, the industry is becoming more conscious of the growing need to protect the environment by mining in an environmentally sustainable way. Energy and water efficiency, as well as the reduction of air pollution, are increasing imperatives resulting in the need for skilled workers to source 'green' products and services and manage 'green' supply chains. R&D efforts in the Mining Phakisa initiative include a focus on conservation of natural resources, preservation and restoration of the environment. Chapter 4 emphasised the importance of partnerships with key stakeholders who are working in these areas.

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

Employment Equity plays a key role in South Africa's transformation agenda. In order to support this national priority, skills development will continue to be prioritised 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 positions in core mining occupations.

In June 2017, a new Mining Charter was gazetted by the DMR. It stipulates that there should be at least 60% participation from black persons in senior management positions (of which 30% must be female black persons), 75% middle management (of which 38% must be female black persons), and 88% junior management (of which 44% must be female black persons). Chapter 1's labour profile shows that representation is currently not at the required levels: categorisation of management levels in the WSPs is slightly different to the Mining Charter's, which reveals that representation of black persons in the sector is currently 25% in top management positions, 28% in senior management, and 40% in middle management. The MQA intends to continue supporting HDSAs in and for management roles, which includes support to individuals in its Management Development Programmes. It is also 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.

With regard to the required targets for black female representation in management positions as stated in parentheses in the preceding paragraph, Chapter 1's labour profile shows that representation is currently not at the required levels: representation of female black persons in the sector is currently 6.5% in top management positions, 5.7% in senior management, and 10% in middle management. Owing to the nature of the sector, both national and regional stakeholders have emphasised the difficulties which mining companies face where the recruitment of females is concerned. Industry skills development programmes aimed at females will need to be supported.

The Mining Charter's target for persons with disabilities is 3% of total employment. Labour profiles have consistently showed that representation of persons with disabilities is below 1%. A more active role in supporting people with disabilities to acquire skills to take up employment in the sector will be employed, as well as increased skills development interventions for those already employed.

As discussed in Chapter 3's section on supply of skills, there is an increasing output of graduates emerging from universities with qualifications related to the MMS. Stakeholders have emphasised that many graduates are not ready for the workplace upon graduating and lack skills relating to the application of theory. One of the reasons given for hard-to-fill-vacancies include lack of experience. Some graduates therefore do not find placement in the MMS which leads to a loss of much needed skills and training. Priority should be given to the facilitation of workplace experience and the placement of graduates into the MMS. The SETA should also consider conducting an impact study on the effectiveness of its programmes to address graduate development and the lack of workplace experience.

Programmes such as lecturer development and Rural Development Projects aimed at addressing equity and transformational imperatives within the sector will receive continued support. With regard to maths and science, a strong suggestion from national and regional stakeholders is to focus efforts on the development of teachers, in order to reach more learners and ensure impact through high quality teaching. Learners who have successfully passed these Maths and Science programmes could be prioritised for MQA bursaries.

With regard to career awareness, stakeholders believed that events should provide sufficient detail that a person is empowered to make an informed decision regarding whether or not a particular career might be suited to them or not, thus potentially avoiding career changes and unnecessary training expenditure at a later stage. It is also important to continue to emphasise the positive effects on future job prospects of pursuing maths and science until Grade 12, and partner effectively to increase access to career awareness to high school learners.

5.3. Recommended Priority 2: Continue to Improve Health and Safety Standards

Mining is an activity with inherent risks that can 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 legislative mandates is to improve the health and safety standards and this must continue to be a priority. The results of this have been already realised notwithstanding other interventions by those in the sector. There 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 73 in 2016.

Progress will therefore continue 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 is a challenge in finding Mine Environmental Hygienists and OHS Practitioners, particularly in remote areas of the country. While

these occupations did not make the top 10 'hard-to-fill' list or the scarce skills list, they represent key skills for the sector. It is proposed that more reasons should be explored which contribute to a possible supply shortfall and if necessary determine the solutions which will mitigate them.
The Mining Phakisa initiative is aiming to develop systems and technologies for the sector which are safer and healthier to use. It is important to partner formally with this initiative in order to respond accordingly to any resulting requirement for employee capacitation in health and safety.

5.4. Recommended Priority 3: Monitor and respond to technology changes

Technological change remains at the forefront of the sector's ability to become as safe, efficient and sustainable as possible. New technologies are transforming the sector's operations. As a result, the type, level and mix of skills required is starting to change, resulting in a need for reskilling programmes so that employees are trained in new mining processes and in operating and maintaining new equipment. The use of new technology in training, particularly during workplace experience, should receive attention. A focus on AET programmes will be important to prepare existing and potential employees to operate new machinery and coordinate new processes.

The Mining Phakisa initiative aims to develop systems and technologies for the sector which are holistic and people-centric; which are safer and healthier to use; which facilitate the mining of low-grade reefs that are currently not economical to mine; which facilitate access to resources that are currently too deep to mine, thereby extending the lifespan of some of the existing and established mines; as well as technologies which reinforce pillars underground. It is believed that the innovations will result in job retention and growth in the sector, up to the year 2046. It is important to partner formally with the Mining Phakisa, as these developments may require reskilling training drives for some occupations in the sector, including managers and supervisors. Collaboration will allow forward planning accordingly. Research could be proactively conducted on Mining Phakisa's current R&D efforts and what the likely training requirements will be.

5.5. Recommended Priority 4: Develop portable skills

The widespread downscaling of operations across the sector has led to large-scale retrenchment drives, resulting in the ongoing need to prioritise portable skills training and support industry in this where possible. Owing to the cyclical nature of the industry, it is believed that these initiatives need to take place as a pre-emptive measure, before retrenchments are a consideration, since retrenchment is a very stressful event and the person is therefore not likely to be thoroughly engaged, or even interested, in a training programme.

Research should be undertaken with employers and employees to determine what the most relevant and useful training programmes for employees would be. Additionally, detailed studies are required to determine the type and nature of portable skills that would benefit both retrenchees and their communities.

5.6. Recommended Priority 5: 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 with industry councils and jewellery manufacturers needs to be put in place and official partnerships formed and sustained with mutual firm commitments to chart the way forward to revive the industry. An adequate and relevant supply of skills to the sector will be ensured. Qualifications will

need to be carefully scoped against industry requirements, with a longer-term view of the type of workforce in mind.

With regard to minerals beneficiation, greater collaboration is needed with the government departments working on implementing the Mineral Beneficiation Implementation Plan, to understand in advance what the skills requirements will be, in order to respond accordingly and timeously. Where the jewellery manufacturing sector is concerned, a consideration would be to conduct research into possible ways to revive the sector and to facilitate engagement on the possible removal of red tape which would open up doors for local skills development. Two such examples are diamond cutting and polishing which are mostly conducted abroad owing to enforced legislation in South Africa. Furthermore, the low number of jewellery manufacturing graduates which successfully find employment may necessitate an increase in support to develop entrepreneurship skills including business management and how to access markets.

5.7. Measures to support National Strategies and Plans

Efforts to support National strategies and plans are being formulated and guided by priority areas identified in the SSP and these are being implemented in the following manner:

- To support transformation of the sector, there is need to make use of SSPs and other research projects to inform skills planning and decision-making which increases access to workplace experience for learners; access to internships in the MMS for university graduates. Research has also been conducted into the training of small mining enterprises; career guidance has been provided by convening events at regional career expos and high schools as well as funding Maths and Science interventions for grade 10, 11 and 12 learners which ensures disadvantaged students also have equal chances to access training in highly technical areas.
- Training programmes for mine Health and Safety are being funded and supported; curricula on Mining Health and Safety programmes is being regulated and accredited as well as supporting the MHS' objectives through transformative skills development initiatives.
- To support minerals beneficiation which will address the high rate of unemployment in the country, funding for learnerships is being provided to ensure that the required skills are made available in this regard.

5.8. Conclusion

As a result of the findings in this SSP, the following skills priorities are recommended:

- Priority 1: Support transformation of the sector through skills development
- Priority 2: Continue to improve health and safety standards
- Priority 3: Monitor and respond to technology changes
- Priority 4: Develop portable skills
- Priority 5: Monitor and develop the skills required for minerals beneficiation.

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