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

2020-2025

FINAL SUBMISSION

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MINING QUALIFICATIONS AUTHORITY

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, the MQA Board submits to the Department of Higher Education and Training (DHET) the 5 year Sector Skills Plan (SSP) for the MMS for the period 2020-2025.

The SSP has been prepared in such a way that its responds to the National Skills Development Plan 2030 and policies for driving the skills transformation agenda, aligned to the expectations of the DHET. This SSP has been presented and endorsed by the Skills Research and Planning Committee and the MQA Board. The improvement of the skills of the MMS workforce is imperative for the economic development of our sector, improvement of our health and safety records and for the growth and wellbeing of all employees.

The main purpose of this SSP is to determine sectoral skills development priorities through an analysis of the skills demand and supply, the influence of key change drivers and legislative tools. This is done with the aim of developing strategies that will inform interventions addressing skills development in the MMS taking into account competencies that are fit for purpose, industry specific and aligned to broader national development priorities. The SSP is informed by a rigorous research process entailing a mixed methods of research design, using both quantitative and qualitative research paradigms. The usage of a mixed methods research design is aimed at ensuring credible research findings that are realisable, specific and generalizable, leading to manageable recommendations that will address skills development in the sector.

.....

Mr David Msiza

Chairperson: MQA Board

31 March 19

Date

STAKEHOLDER ENDORSEMENT

This is the Sector Skills Plan update prepared by the Mining Qualifications Authority (MQA) for the Mining and Minerals Sector (2020-25). 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.

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ACRONYMS

Acronym	Description	Acronym	Description
AET	Adult Education and Training	MMS	Mining and Minerals Sector
AgriSETA	Agriculture Sector Education Training Authority	MoAs	Memorandum of Agreements
AI	Artificial Intelligence	MPRDA	Minerals and Petroleum Resources Development Act
APP	Annual Performance Plan	MQA	Mining Qualifications Authority
APR	Annual Performance Report	MYPD	Multi Year Price Determination
ATR	Annual Training Report	NCV	National Certificate Vocational
Bn	Billion	NDP	National Development Plan
BRICS	Brazil, Russia, India, China, South Africa	NEMA	National Environmental Management Act
CAGR	Compound Annual Growth Rate	NERSA	National Energy Regulator of South Africa
CET	Community Education And Training	NGP	National Growth Path
CLAS	Cement, Lime, Aggregates and Sand	NGP	New Growth Path
CoCs	Certificates of Competency	NQF	National Qualifications Framework
CSIR	Council for Scientific & Industrial Research	NSDP	National Skills Development Plan
DBE	Department of Basic Education	NYP	National Youth Policy
DEA	Department of Environmental Affairs	OFO	Organising Framework for Occupations
DHET	Department of Higher Education and Training	PESTEL	Political, Economic, Social, Technological, Environmental and Legal
DMR	Department of Mineral Resources	PGMs	Platinum Group Metals
DoL	Department of Labour	PIVOTAL	Professional, Vocational, Technical and Academic Learning
DSBD	Department of Small Business Development	PSET	Post School Education and Training
DST	Department of Science and Technology	QCTO	Quality Council for Trades and Occupations
DTI	Department of Trade and Industry	RCA	Regulatory Clearing Account
EMIS	Education Management Information System	RPL	Recognition of Prior Learning
EU	European Union	R&D	Research & Development
FET	Further Education and Training	SADC	Southern African Development Community
GCC	Government Certificate of Competency	SAQA	South African Qualifications Authority
GCIS	Government Communication Information System	SATCAP	Successful Application of Technology Centred Around People

Acronym	Description	Acronym	Description
GDP	Gross Domestic Product	SETA	Sector Education and Training Authority
HDI	Historically Disadvantaged Individual	SETMIS	Sector Education and Training Management Information System
HDP	Historically Disadvantaged Persons	SIC	Standard Industrial Classification
HDSA	Historically Disadvantaged South African	SLA	Service Level Agreement
HEMIS	Higher Education Management Information System	SLP	Social and Labour Plan
HET	Higher Education and Training	SMME	Small, Medium and Micro-sized Enterprises
HRD	Human Resource Development	SP	Strategic Plan
IDP	Integrated Development Plan	SSP	Sector Skills Plan
IPAP	Industrial Policy Action Plan	Stats SA	Statistics South Africa
KPIs	Key Performance Indictors	STEM	Science Technology Engineering & Maths
M&E	Monitoring & Evaluation	TVET	Technical and Vocational Education and Training
MCSA	Mineral Council South Africa	UCT	University of Cape Town
MDP	Management Development Programme	UNISA	University of South Africa
MerSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority	WBL	Work Based Learning
MHSA	Mine Health and Safety Act	WSP	Workplace Skills Plan
MHSC	Mine Health and Safety Council	4IR	4th Industrial Revolution
MMP	Mandela Mining Precinct		

Departmental Name Changes	
DMR	Department of Mineral Resources and Energy (DMRE)
DTI	Department of Trade, Industry and Competition (DTIC)
DHET	Department of Higher Education and Training Science and Innovation (DHETSI)
DEA	Department of Environment, Forestry and Fisheries (DEFF)

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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 5 year Sector Skills Plan (SSP) in accordance with 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

A mixed methods research design, encompassing desk research, quantitative and qualitative methods were used to develop the SSP. The study focused on the nine subsectors within the MMS to gather both primary and secondary data.

The study was initiated by desk research where secondary data was collected using different data sources. These data sources comprised of but not limited to, data sets such as the MQA's WSP/ATR and Annual Performance Report (APR), the Department of Mineral Resources' (DMR) employer statistics, public labour report, report on fatalities and injuries as well as government certificates of competence report, the DHET's Higher Education Management Information System (HEMIS) and Occupations in high demand, the Department of Basic Education's (DBE) Education Management Information System (EMIS) and certificates issued by the Minerals Council South Africa.

Quantitative research entailed the analysis of secondary data mentioned above to highlight the sector's economic performance, the MMS contribution to the economy, employer profile by province and subsector as well as employment trends by subsector and province. Findings related to occupational shortages and skills gaps in the sector are informed by quantitative and qualitative data analysis.

Furthermore, to gain a nuanced understanding of the nature of demand and supply in the sector as well as to illuminate on the quantitative research findings, a qualitative method was used to reflect on the macro and micro factors affecting skills development in the MMS. In this context, views were elicited through key informant interviews with the sector's key role players. The nature of this data enabled delving deeper into factors affecting skills development in the sector.

The focus in all nine subsectors of the MMS, the chosen research methodology, the usage of different data collection techniques were all intended to meet triangulation requirements to increase validity, reliability and generalisability of the research findings and conclusions. The mixed methods research design was able to minimise research biasness and enhance validity by capturing a more comprehensive, holistic and contextual portrayal of the sector that revealed various dimensions of the subsectors in the MMS.

Below are the key findings of the research.

3. Sector Profile

The MMS employs about 3% of 16.2 million employees in the country whose annual earnings is R116.7 billion (DMR, 2016). Those employed in the sector support about 4.5 million dependents. In the past few years, the South African mining industry experienced a decline in financial performance. This was due to the impact of slump in commodity prices, increased costs pressures. Local cost pressures, labour actions, and continuing downswing in commodity prices have also resulted in shrinking margins and impairment provisions (DMR, 2019). It is important to note that; Mining companies are inescapably influenced by global developments, with macro-economic growth and international markets strongly influencing both the demand and supply for resources as well as profitability (Lane, et al., 2015).

A five year analysis of the sector reveals a decline in the number of employees from a peak of 525 248 in 2015 to 498551 in 2019, except for 2016 -2017, where the sector recorded a 5.9% increase. As a result, on average over this period there has also been a decrease in the reported number of employees by occupational categories, with the most significant comprising Professional and Manager Occupations with a -2.9% and -3.3% concurrently. The Learners and Trades categories are the only occupations to have shown growth in average employee numbers over the period, with a 3.7% and 2.7% increase respectively. The MMS remains a male dominated sector employing 84% of males. It is important to note that the average growth rate of females employed within the sector over the 5 year period is 2.6%

4. Key Skills Change Drivers

Historically, there was a strong correlation between the performance of commodity markets and mining stocks; however, this relationship appears to have broken down. Mining stocks (including those of global diversified mining role players continue to underperform broad commodity price benchmarks. Despite these challenges, according to President Cyril Ramaphosa's African Mining Indaba speech in February 2019, the government views the MMS as one of the key sectors in the future growth and development of the country's economy, with a notion held that it has huge potential for exploration, production and beneficiation. It is for this reason that that significant work has been done to remove the policy uncertainty that held back the development of the industry through the finalisation of the Mining Charter 2018 and clarifying the Mineral and Petroleum Resources Development Amendment Bill.

Technological transformations remains at the forefront of the sector's ability to become as safe, healthy, efficient and sustainable as possible. The MMS presents a unique opportunity for a new industrialisation drive and advancement in the economy as a whole. This applies across the value chain: from mining equipment and services, to extraction, infrastructure development, beneficiation, skills development as well as research and development. Along with this, there are opportunities for more profound empowerment of the previously disadvantaged including unskilled and semi-skilled employees, females, communities and entrepreneurs. This however, can only be achieved if the sector fully embraces technology and address energy and water issues that are affecting mining operations.

With the developments brought on by the change drivers in the MMS, it will be prudent for the sector to consider how the demand profile of employees will change. While the education and training system may not be able to respond with perfect timing, understanding the different sets of skill that will be in demand in years to come provides a good starting point for planning. This is also accompanied with the need to consider interdisciplinary training that

will allow students to develop skills and knowledge in a range of subjects but also produce a flexible workforce that can adjust to rapid shifts in changing skills demands within and outside MMS.

5. Occupational Shortages and Skills Gaps

Analysis of 31 May 2019 MQA WSP-ATR submissions revealed the following hard-to-fill occupations: Mine Manager, Production Manager, Engineering Manager, Mechanical engineer (Mines), Mining Engineer, Occupational Hygienist, Mine Overseer (Production), Diesel Mechanic, Fitter and Turner, and Auto Electrician. It is crucial to also note the skills gaps identified as these influence the skills demand for the sector. This information has been corroborated with the findings from the expert interviews. The reasons accounting for these vacancies ranged from individual, organisational and supply side levels.

The main supply-side concerns were found to be as follows:

- Basic education: low Maths and Science levels; and lack of early access to career awareness.
- TVET college sector: lack of practical training and workplace experience at colleges and low throughput rates.
- HET sector: sector still lagging behind in attracting females to critical mining qualifications.
- Other (not specific to a level of education): lack of specialised knowledge and experience in updated and new technology; lack of work experience; lack of interest from youth; lack of management for core MMS-related occupations.

Efforts to address the challenges should not be isolated but well-coordinated and integrated to develop a holistic approach that involves a wide range of social partners.

Industry is assisted in addressing these challenges through interventions which include: partnerships with colleges; local community projects such as learnerships, skills 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. Career awareness efforts should include a focus on the occupations in high demand, as it is believed that this is partly responsible for the skills shortage in the sector.

6. Sector Partnerships

Between 2017 and 2019, the MQA entered into partnership with various TVET and Community colleges to provide training interventions for TVET employees or council members on corporate management and governance as well as assessor and moderator training. This partnership is aimed at improving the TVET college management and governance systems as well as the quality of teaching and learning. Continuous concerns have been raised by the industry that TVET college graduates have limited knowledge of industry specifics. Research conducted has shown a discrepancy between what is taught at colleges and what the industry requires from graduates. One of the reasons relating to this is that lecturers at TVET colleges often possess theoretical knowledge and lack the relevant practical experience such as the use of updated and new technology. To address this challenge, during 2017-18 financial year, the MQA entered into a tripartite partnership to facilitate access to industry for lectures to gain relevant workplace exposure and offered training interventions such as assessor and moderator training.

In a bid to augment its research capacity, the MQA entered into partnership with 3 institutions with an aim to undertake research and share knowledge and skills in a collaborative manner to achieve specified outcomes directed towards addressing mutually inclusive skills priorities within a specified time frame.

Various challenges were experienced in the roll-out of the above mentioned partnerships, ranging from availability of time for lectures to be trained, constraints that come with lack of understanding of required compliance measures in the partnerships and the co-funding concept in research partnerships. Strategies to address current challenges with the partnerships and strengthen them are outlined in chapter 5 of this document. A model for sector partnership is hereby proposed to approach partnerships in a strategic manner and thus, ensuring that skills development efforts are well integrated and coordinated with a holistic approach to maximise the value of partnerships.

7. Monitoring and Evaluation

The MQA has developed a Monitoring and Evaluation Framework used to provide assurance by tracking all the projects that are implemented in line with its mandate. M&E is an integral part of the MQA's value chain and its contribution towards, amongst others, organisational strategy, planning, monitoring, impact assessment and evaluation, and risk management enables the organisation to track the impact on skills development in the sector.

The M&E Unit provides various impact study reports that influence the strategic planning process which are used to inform the decisions taken such as; Interventions to be considered for the target setting of APP KPIs, resources to be invested on the various interventions, advise on current and emerging risks associated with the various programmes, advising on which programmes have the most impact in the sector, lessons learnt during the implementation of current and past projects and recommendations for more effective implementation methods and efficient use of existing resources and capacity. Monitoring of projects is an on-going process that focuses on the assessment of projects, programmes, their day to-day activities and deliverables required for achievement and performance.

8. Skills Priority Actions

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

- Priority 1: Facilitate transformation and SMME development of the sector through skills development
- Priority 2: Continue to support interventions to improve mine health and safety through skills development
- Priority 3: Continue to monitor and provide support to interventions responding to technological changes through skills development
- Priority 4: Monitor and support interventions aimed at developing the skills required for minerals beneficiation
- Priority 5: Focus on increasing support to core mining skills and the hard-to-fill occupations in terms of skills development in the MMS
- Priority 6: Develop skills for environmental sustainability
- Priority 7: Support National Strategies and Plans through skills development

RESEARCH PROCESS AND METHODS

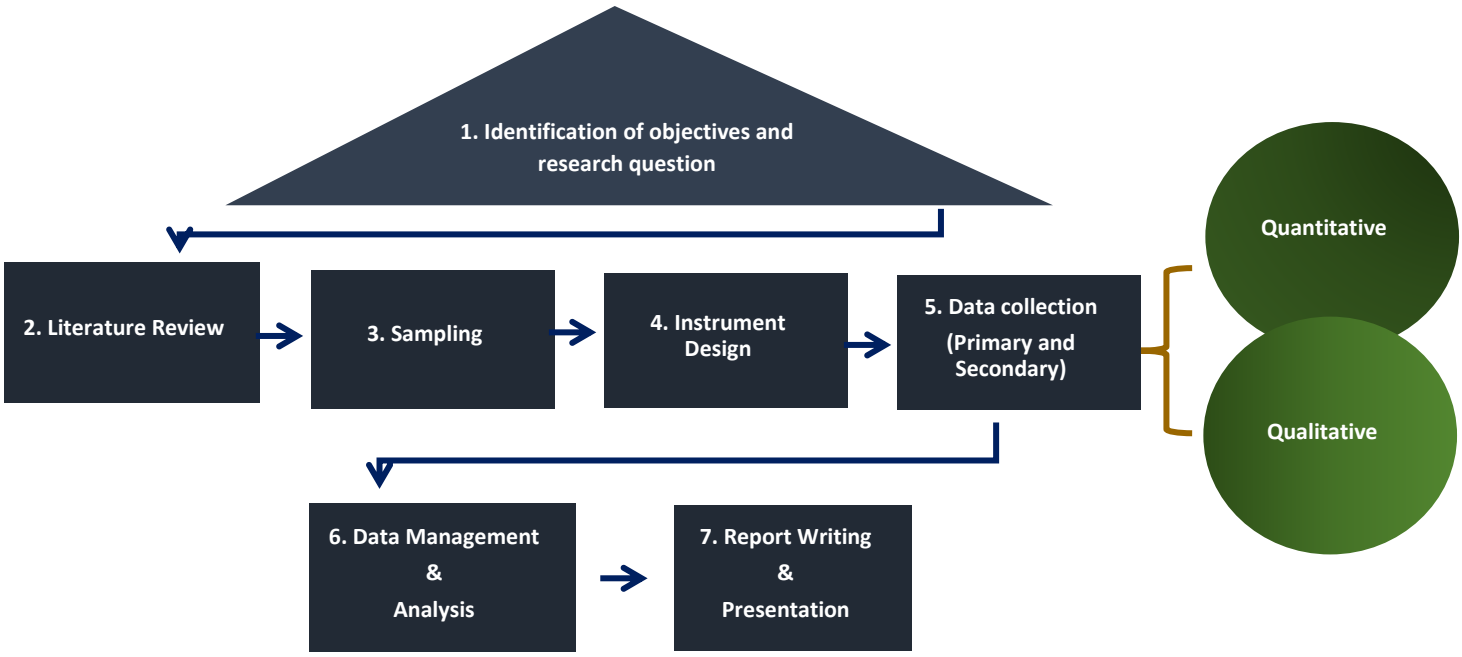
I. Introduction

The purpose of this section is to outline the research methods and their rationale, research tools, sampling, data collection techniques as well as data analysis techniques used in this report. The research design was guided by the 2019 updated Sector Skills Plan framework and guidelines.

II. Research Process Overview

The diagram below illustrates a step by step process undertaken to conduct the research, commencing with the identification of the objectives and research question, how the research question informed the research paradigm, data collection process and subsequently, the analysis and report writing.

Figure 1: Research Process



III. Research Paradigm - Mixed Methods Research Design

Table 1: Research Paradigm

Research type	Topics	Sample Size	Data Sources
Desktop Research	Literature Reviews	N/A	Stats SA, Quantec, MCSA and resources mentioned in the list of references
Quantitative Research	Labour Market Profile	498 551	WSP ATR, DMR and DHET levy file
Qualitative Research	Expert Interviews (DHET requirement)	7	Stakeholders, in the form of employers, from the different subsectors within the MMS.
	Key Informant Interviews (To enhance triangulation of data)	6	National government and state owned enterprises that are Key Role Players within the MMS.

IV. Research Paradigm - Mixed Methods Research Design

A concurrent mixed methods research design, encompassing desk research, quantitative and qualitative methods were used to develop this SSP. The usage of both quantitative and qualitative research enabled the researchers to acquire extensive and depth understanding of the MMS, while offsetting the weaknesses inherent to using each approach solely. An additional advantage of using mixed methods was its possibility of triangulation (the use of several means of methods and data sources to examine the same phenomenon). Through the triangulation of data, findings are intended to ensure that conclusions meet the methodological and procedural requirements of reliability and thus, ensuring that the same conclusions can be made by using the same methods (validity). This then ensures that decision making with regards to skills planning is well informed by empirical evidence that incorporates skills development matters that are relevant, significant and could be generalisable to have cross contextual application and information for future research (Yin, 2010).

V. Objectives of the SSP

The SSP aims to cover the following objectives:

- Provide an overview of the profile of the MMS.
- Identifying factors influencing and driving change in the MMS from a skills perspective.
- Highlight the extent and nature of skills demand and supply for the MMS.
- Identify any skills mismatches between demand and supply in the sector and its related reasons.
- Propose a revision of existing and new career pathways and qualifications.
- Identify strategic partnerships to promote industry training clusters aimed at improving skills, productivity and competitiveness within MMS.

- Identify and align skills development priorities responding to government's national priorities.
- Outline the MQA's achievements of strategic priorities outlined in 2018's SSP.
- Signal to education, training and skills development providers' priority occupations and occupations for the sector.
- Inform the MQA Strategic Plans that outline key strategic interventions and funding for the MMS.

VI. Research Question

It was from the above objectives that the SSP pursued an answer to the following research question: "What are the key issues influencing the MMS which are either currently or have the potential to impact skills supply and demand, as well as skills development in the next 5 year period?"

Research was initiated by desk research (literature review) which entailed the collection of secondary data to inform or add value to other research methods used in the SSP.

VII. Desk Research (Literature Review)

A thorough search of literature was an imperative element of this research. Desk research consists of critically reading, evaluating and organising literature related to the research topic and assessing the state of knowledge in the area (Schirmer and McGough, 2005). Desk research involved gathering and analysing data from sources within the MQA such as the APR and external reports from various institutions such as the DMR, DHET, DBE, and Minerals Council South Africa (MCSA).

VIII. Sampling

For quantitative research, no sampling was applied as the entire population (companies that submitted WSP-ATRs) formed part of the study. In contrast, considering the need to obtain in-depth views of factors affecting skills development in the sector, qualitative research required capturing knowledge that is rooted in a particular form of expertise, and thus, a purposive expert and convenient sampling technique were used to develop a sample of industry experts that were interviewed. Purposive expert sampling is a non-probability sample that is selected based on characteristics of a population and the objectives of the study (Crossman, 2018). Convenience sampling involves selecting participants based on how readily and easily available they are to participate in the study (Taherdoost, 2016). The main objective of a purposive and convenient sample is to produce a sample that can be representative of the population by applying expert knowledge of the population to select in a non-random manner, a sample of elements that represents a cross-section of the population that will best enable the researcher to answer specific research questions (Lavrakas, 2008 & Palinkas et al., 2013).

IX. Research Instruments

To achieve the objectives of the research, data collection was guided by research instruments. Two interview guides were used to collect qualitative data, one designed by the MQA for the key role players' interviews and another by the DHET for the expert interviews. Both participants, i.e. key role players and experts are referred as stakeholders in the report. In addition, the WSP-ATR template on the other hand, was used to collect the quantitative data.

X. Reliability, Validity and Ethical Consideration

The reliability of measuring research instruments demonstrates the consistency of the measurements (Eiselen, Uys & Potgieter, 2005). A measuring instrument is consistent if it produces equivalent results for repeated measurements (Eiselen, Uys & Potgieter, 2005). Additionally, the quality of a measuring instrument is also determined by looking at its validity. According to Eiselen, Uys & Potgieter (2005) validity refers to the degree to which the measuring instrument measures what is supposed to measure. Therefore, to ensure validity and reliability of data, a standardised screening tool was adopted to select key role players and industry experts according to their subsectors and expertise of the sector. This ensured that the relevant profile of respondents were chosen. Prior to participation in the research, permission was obtained from respondents after they were thoroughly informed about the purpose of the research. With that, respondents were assured that their participation in the study was completely voluntary. In addition, all interviews were recorded during all interview sessions.

XI. Data Collection

a) Quantitative Data Collection

Quantitative data included data obtained from the WSP-ATR, HEMIS, EMIS, DMR GCC results and Minerals Council South Africa's certificates as well as facts and figures. Data utilised highlighted the sector's economic performance, the MMS contribution to the economy, employer profile by province and subsector, employment trends by subsector and by province and employer profile with particular focus on the demographic composition of the MMS workforce, occupational shortages and gaps in the sector as well as the supply of higher education qualifications.

b) Qualitative Data Collection

Qualitative data was collected through key informant interviews with industry experts in the sector in April-July 2019. Key Informant Interviews are a form of in-depth interviews that involve interviewing people that are experts and thus, have particularly informed perspectives on aspects of the research being conducted. The key informant interviews were aimed at reflecting on the macro and micro issues within the MMS to gain nuanced insightful understanding of matters pertaining to the demand and supply of skills in the sector. This was done to enhance triangulation of data to determine factors such as hard-to-fill vacancies, skills gaps, change drivers and skills priority actions to be considered for the sustainability and growth of the sector.

XII. Research Limitations

In terms of analysis of data, the focus was on companies that submitted WSP/ATRs as required by the Skills Development Act 97 of 1998 as well as Skills Development Levies Act 9 of 1999. For the current financial year (As of 30 April 2019), 757 companies submitted WSP-ATRs, of these 654 were analysed for the SSP, whilst 103 were eliminated due to data errors. Additionally, the findings presented in the report do not include the views of companies that did not submit a WSP/ATR. This was done to ensure reliability of data and the scope of analysis.

Furthermore, the key informant interviews conducted did not have representation of all subsectors in the MMS. Therefore, key findings might not include the views of subsectors that could not participate in the research.

To address issues pertaining to data limitation, quantitative data was weighted using the MQA WSP/ATR dataset, DHET's levy file and DMR's Public Labour data to provide a representative outlook of the sector (*See annexure for details on the weighting formula*).

XIII. Data Management and Analysis

The first step of data management for quantitative data involved outlining all variables of interest that were going to be used for the analysis, e.g. variables pertaining to employer and labour profile, training interventions (planned and achieved), hard-to-fill vacancies etc. Upon identifying all variables, the data was transferred into Excel files where the researchers cleaned it through addressing missing data (identifying and labelling them) and recoding some variables. The data was then weighted to make it more representative of the MMS.

The analysis used for quantitative data consisted mostly of descriptive statistics (frequency tables and cross-tabulations) which described the features of the data in the study. Mean comparisons were also applied to identify the number of training interventions and the sections related to hard-to-fill occupations.

The MQA's Board sub-committee (Skills Planning and Research Committee) provided input, guidance and oversight throughout the SSP development. In addition, interview notes and audio recordings were also used to check the accuracy of qualitative data and assisted with interpretations. Content analysis was used to analyse qualitative data. This entailed reading over interview notes and listening to recordings to identify sub-themes and key themes that emerged from the different participants. The purpose of the content analysis was to organise and elicit meaning from the data collected and draw realistic conclusions from it (Bengtsson, 2016). From that, the researchers were able to decide on which themes made meaningful contributions to understanding the data (Braun & Clarke, 2013).

XIV. Report Writing and Presentation

Report writing entailed the incorporation of evidence supported by the analysis of literature reviewed, quantitative and qualitative data. The report is stratified into different chapters as guided by the 2019 updated SSP framework and guideline. The report covers all the 9 subsectors of the MMS.

Upon completion of report writing, the report was disseminated and presented to the MQA's sub-Board Committee which comprise representatives from Employers, Labour and the State for inputs.

Chapter 1 : Sector Profile

This chapter provides an overview of the MMS in South Africa. The section details the MMS' scope of coverage, key role-players, economic performance, employer profile and labour market profile.

1.1. Scope of Coverage

The MMS is categorised into the following 9 subsectors which will be analysed throughout the SSP and a breakdown of their relevant Standard Industrial Classification (SIC) codes are indicated in the table below:

Table 1-1: Scope of coverage

Subsector	SIC Codes
Coal Mining	21000, 22100
Gold Mining	23000, 23001, 23002, 23003
Platinum Group Metals (PGM)	24240
Diamond Mining	25200, 25201, 25202
Other Mining*	24000, 24100, 24200, 24210, 24220, 24230, 24290, 25000, 25102, 25103, 25300, 25310, 25311, 25319, 25320, 25390, 25391, 25392, 25399
Cement, Lime, Aggregates and Sand (CLAS)	34240, 25100, 25110, 25101, 25120, 25190
Services Incidental to Mining	92004, 87000, 29000, 85291
Diamond Processing	39212, 39219
Jewellery Manufacturing	39210, 39211, 37601

* Other Mining includes the mining of iron ore, chrome, manganese, copper, phosphates and salt.

1.2. Key Role Players

The National Skills Accord of 2011 encourages partnerships and collaboration with sectors across the board to facilitate linkages and efforts to sufficiently address skills issues. While there are many role players within the MMS, the list provided is not exhaustive, but identifies a broader portrayal of the nature and type of role players that impact skills development in the MMS. It should be noted that each key role player's contribution depends on their specific role context or mandate to influence the achievement of the NSDP outcomes and the broader national socio-economic imperatives.

1.2.1 National Government Departments

Table 1-2 below illustrates the government departments that are interlinked with the MMS and play a crucial role towards achieving skills development and national outcomes.

Table 1-2: National government departments key role players

Department	Role	Function in relation to the MMS and skills development	Relevant NSDP Outcome/s
Department of Mineral Resources (DMR)	To implement legislation (MPRDA) by developing policies and strategies that drive transformation by redressing historical, socio-economic inequalities within the MMS	• To drive strategies such as the 2018 Mining Charter which highlights factors that promote transformation. The Charter is a key driver to skills development and stipulates that mining right holders must invest a minimum 5% of leviable amount on essential skills development activities including the support for SA based academic institutions and research initiatives	• Improve skills levels in the South African workforce, focussing on skills matters in relation to targets set by the Mining Charter
Department of Higher Education and Training (DHET)	Implement legislation by developing and implementing policies and strategies to transform post school education by achieving the outcomes outlined in the NSDP	• Conduct research and implement relevant initiatives to address skills priorities within the MMS • Provides support to the MQA to fulfil its skills development mandate through research capacity building, development of SSP framework, (as well as CIP, OFO codes) and also the provision of relevant information for skills planning (SETMIS, HEMIS, integration of sectoral and national data) • Develops and implements appropriate legislation and policies for a sustained quality and accessible post-school education and training system	• Improves the skills levels of the South African workforce by identifying occupations in high demand • Increase production of occupations in high demand by developing appropriate curriculum or learning interventions • Support the growth of the public college institutional systems by providing more funding to scale up provision of TVET and CET programmes • Link education and the workplace

1.2.2 State Owned Enterprises

The table below specifies state-owned entities, their role as well function (advocacy, promotion and other industry development initiatives) appropriate for addressing skills development within the MMS envisaged in the NSDP.

Table 1-3: State owned enterprise key role players

State-Owned Enterprises	Role	Function in relation to MMS and Skills Development	Relevant NSDP outcome/s
Mine Health and Safety Council (MHSC)	Promotes the transformation of occupational health and safety in the MMS in efforts to attain zero harm of mine workers and mine communities	• Promotes the culture of health and safety in the workplace through awareness, research and training interventions (occupational health and safety programmes) to reduce injuries, occupational diseases and fatalities	• Improves the levels of skills with regard to health and safety training • Supporting skills development programmes aimed at occupational, health and safety in the MMS
Council for Geoscience (DMR, DST)	Governs the onshore and offshore geology of South Africa	• Undertakes research to guide methods of developing modern technology to facilitates minerals and energy development- especially those regarding complicated mineralisation, groundwater controls and natural hazards • Through its mine project, identify and promote the development of skills related remediation or rehabilitation	• Identify and increase the production of skills in high demand through the support growth of the public college institutional types as a key provider required for socio-economic development and also recommend learning programmes falling within its scope of work
CSIR	Fosters global and national partnerships in narrow reef, hard rock mining equipment systems through R&D and the development of competitive local manufacturing capabilities	• Improves the technological base of the mining sector by achieving health and safety as well productivity outcomes through integrating the critical component of skills development required for mining-related technologies and the application of the 4IR • Advocates for local purchasing of mining equipment to create more employment	• Increase the level of skills in the South African workforce • Identify and increase production of occupations in high demand • Skills development support for entrepreneurship and cooperative development • Support career development initiatives
Mining Qualifications Authority	Support sector skills transformation through various interventions	• Assist in the transformation of the MMS through skills development	• Facilitate access to industrial exposure through workplace experience programmes • Provide funding through bursaries, learnerships, internships to increase the level of skills in the South African workforce • Conduct research to identify occupation that are on high demand

1.2.3 Industry Key Role Players

Table 1.4 below shows the role, functions and outcomes that industry key role players can achieve in addressing skills development within the MMS.

Industry Stakeholder	Role	Specific Function in relation to Skills Development	Relevant NSDP Outcome/s
Mineral Council South Africa	Promotes interests of organisations in the MMS by forming partnerships with key stakeholders and advising them on legislative, policy and operative environment conducive for investment, growth and sustainability	• Promote skills development initiatives in mining organisations and conduct research regarding skills development within the MMS • Plays an active role in lobbying for skills development in various structures such as the MQA, Quality Council For Trades & Occupations (QCTO), Umalusi and SAQA	• Increase level of skills in the workforce by engaging in training interventions to enhance the skills profile of the labour force • Identify and increase occupations in high demand through the offering of certificate programmes focussing in mine surveying, mine sampling, strata control, rock mechanics etc. • Link education and the workplace by engaging with the sector in order to facilitate the establishment of workplace experience opportunities
Organised Labour	Advances the rights of employees in the labour market and in society as a whole	Promotes the interests of workers including making inputs into WSP/ATRs	Increase the level of skills development in the South African workforce by advocating for skills development offerings and submission of WSP/ATRs

Table 1-4: Industry key role players

1.3. Economic Performance

This section provides an overview of the economic performance and contribution of the MMS to the country as a whole.

1.3.1 Overview of the MMS

South Africa ranks among the top ten countries with respect to production of manganese ore, chrome, ferrochrome, iron ore, gold, platinum, piped medical gases, coal, nickel (DMR, 2018). The country accounts 91% of precious platinum metals (PGMs), 75.2% of chrome, 29% of manganese, 18.8% of zirconium, 17.5% of vanadium and 11.1% of gold in terms of global reserves (DMR, 2019). 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, business owners as well as the developmental needs of its populace (DMR, 2016).

Moreover, South Africa remains one of the largest net exporters of minerals and metals. The economy earns about 40% of export earnings from mining (DMR, 2016). 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 (DMR, 2016). The MMS has played a key role in the country's economic development, which has transformed South Africa into one of the most industrialised countries in Africa. In addition, the MMS employs about 3% of 16.2 million employees in the country whose annual earnings is R116.7 billion (ibid). Those employed in the sector support about 4.5 million dependents. In 2017/18, the sector paid

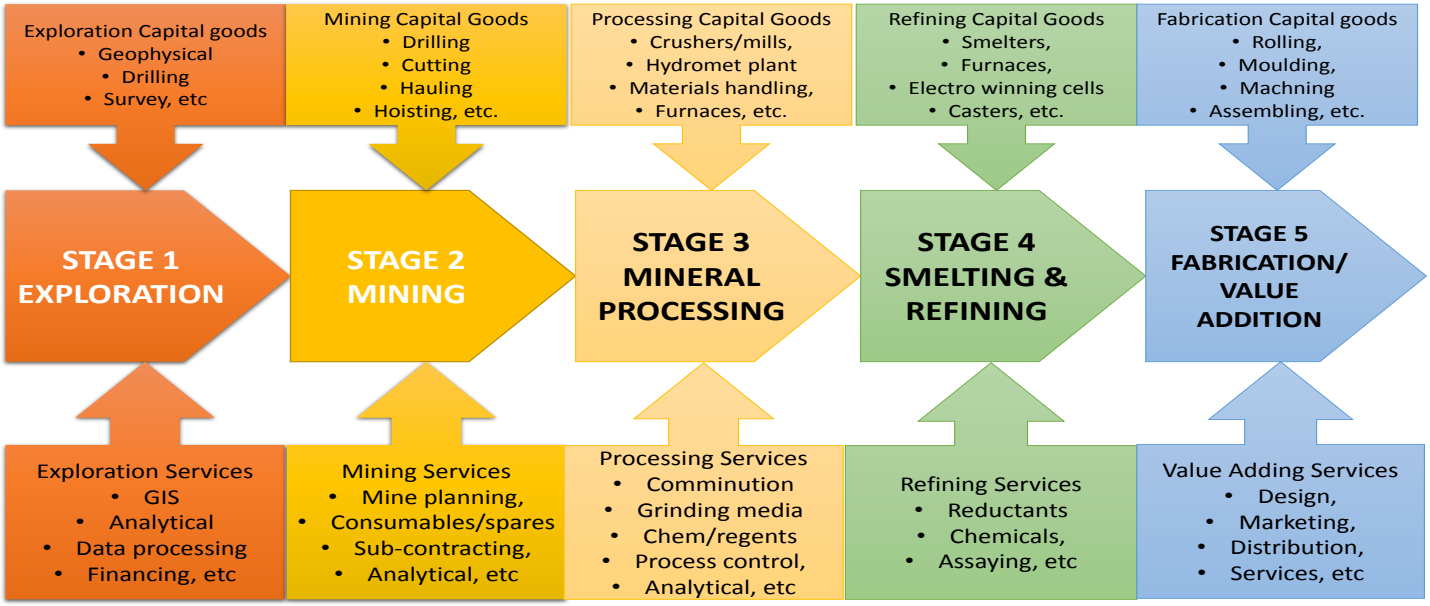
R5.8 billion royalties up from R3.7 billion giving a 56.7% increase whilst taxes paid to the government increased by 28% to R16 billion from R12.5 billion.

Although the sector has had positive contributions to the South African economy and population, the MMS has not been immune to challenges. In the past few years, the South African mining industry experienced a decline in financial performance. This was due to the impact of slump in commodity prices, increased costs pressures. Local cost pressures, labour actions, and continuing downswing in commodity prices have also resulted in shrinking margins and impairment provisions (DMR, 2019).

1.3.2 Value Chain of the MMS

Figure 1-1 below shows the MMS' value chain from the exploration of primary activities to the minerals value addition as well as 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.

Figure 1-1: MMS Value Chain



Source: MQA, 2016

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. This implies that there are green skills that can be prioritised across the values within all stages of the life cycle of mining in all subsectors within the MMS (MQA, 2018).

1.3.3 Overview of the MMS subsectors

1.3.3.1 PGM Mining

PGM 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.

Although the subsector has been hit hard by declining demand, economists believe that the subsector has the potential to grow sales to US$35 billion by 2050 depending on the

undertaking of various initiatives. These include promotion of the significant demand of platinum, increasing investment in stimulating global demand for platinum jewellery, playing a leading role in adopting and rolling out platinum based hydrogen economy, increasing vehicle emission standards within BRICs economies, and continual research to guide new uses of platinum (Mineral Council South Africa: 2018).

1.3.3.2 Gold Mining

Globally, gold remains one of the most sought-after metals used for jewellery and many industrial applications. However, from 2008 and 2018, the industry has been experiencing a decline in terms of production, sales and employment. Other challenges include limited investments due to challenging policy, regulatory, operating environment and a constrained pipeline because of minimal exploration (Minerals Council South Africa, 2018). Limited investments is also attributed to the gradual rate of implementing innovation and technology recorded between 1992 and 2016. An additional challenge is that of rapidly increasing input costs such as electricity and steel that have risen much quicker than inflation. Potential solutions include among others, unlocking potential through R&D, the introduction of modern techniques (technological applications in rock drilling) and stabilising Eskom (Mineral Council South Africa, 2018).

1.3.3.3 Coal Mining

In South Africa, coal is the largest component of mining sales and it is an important primary sources of energy (electricity and energy fuels) and remains a driving force of the economy. 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 (Minerals Council South Africa, n.d.). Coal reserves and coal mining activities are predominant in Mpumalanga.

Coal has an export potential of 110 million tons versus the current 75mt which could employ 11 600 people and increase investment by more than 10% from gross fixed capital; formation of R18 billion (in 2017) to an estimated R20 billion per annum (Mineral Council South Africa: 2018).

1.3.3.4 Diamond Mining

In 2015, South Africa was ranked 7th in the world on diamond production. These deposits are concentrated in Northern Cape, Free State and Limpopo provinces. Industry specific challenges included the gazetted 2018 Mining Charter which now also applies to the diamond subsector (certain stipulated threshold may negatively affect the industry), rising illegal mining activities, safety, environmental and social concerns. Potential solutions include, but are not limited to a clear regulatory framework in which illegal miners are formalised into artisanal miners (Mineral Council South Africa, 2018).

1.3.3.5 Diamond processing and jewellery manufacturing

The South African diamond processing subsector consists of 221 licenced diamond manufacturers. The Master Diamond Cutters' Association has 80 registered members employing 95% of the employees in this subsector. 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, silver and diamonds to manufacture jewellery for both domestic and export markets. The majority of companies in this subsector are small and located in Gauteng, Western Cape and KwaZulu-Natal.

1.3.3.6 Cement, lime, aggregates and sand (CLAS)

The CLAS subsector is dominated by small and medium-sized mining companies. The vast majority of small-scale mining applications (90%) also fall into this group of industrial commodities. Large firms in this subsector include cement manufacturers, phosphates, vermiculate and dimension stone producers.

1.3.3.7 Other mining

The Other mining subsector includes producers of uranium, phosphates, copper, chrome, iron ore, manganese and salt. South Africa's copper deposits lie mainly in Limpopo. 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.

1.3.3.8 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. The contribution of this sector to the GDP is indirect since the mining sector depends to essential services.

1.3.4 Mineral Sales and Exports

The trends for the demand of South African minerals is shown in Figure 1-2 below for the period 2007-2017. The figure shows an upward trend of both local and export of minerals. However, the proportion of local sales has been increasing slowly, hence the call for beneficiation of minerals rather than exporting them in their unprocessed state. Local sales increased by 14.4%, whilst export sales increased by 6.3% between 2016 and 2017. Total sales and exports increased from 2009 to 2011 after the global financial crisis and thereafter have been on a sluggish trend because of the global economic slow-down particularly from China which is the major consumer of most of minerals that are exported. The year 2017 was the most challenging, linked to alleged policy uncertainty and weak economic growth. The economy went into technical recession during the first half of the year and later rebounded to record a growth rate.

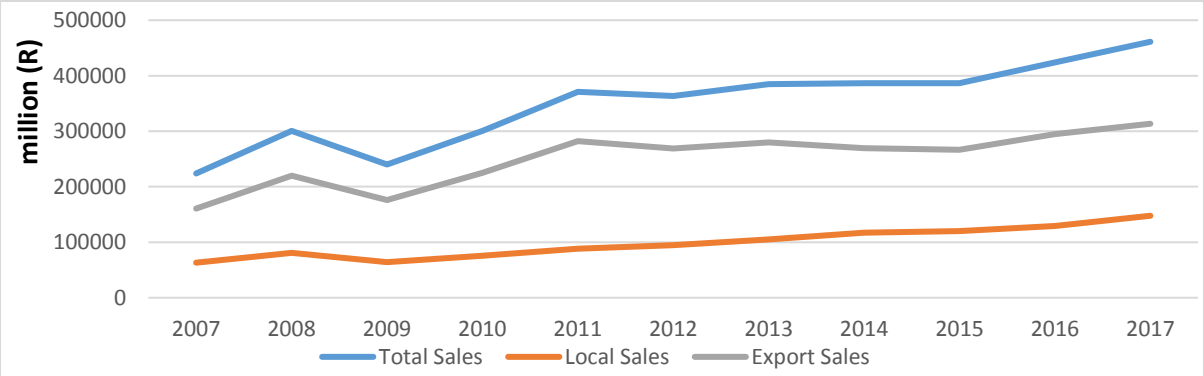


Figure 1-2: value of sales of minerals

Source: Quantec, 2018

Favourable commodity prices supported mining output in 2017 and this recovery could be temporary. For example, coal prices rebounded as China cut its coal production due to the

need to diverge from using coal to greener economy. China's continued transition from an investment to a consumption driven economy also results in stagnant iron ore prices. Demand for coal is expected to go down due to the movement towards greener technologies for environmental reasons.

Gold prices are projected to weaken over time whereas platinum is on the rise as global demand continue to gain strength. The impact of the European ban on diesel vehicles (of which platinum is used as catalytic converter in diesel engines) could nonetheless weaken such positive prospects. Though it is not without risks the global outlook remains positive. Global financial conditions and commodity prices are expected to stabilize going forward. Global growth is projected to rise by 4.7% in 2019 as activities recover further in commodity exporting countries and remains robust in commodity importers (World Bank: 2018).

1.3.5 MMS contribution to GDP and comparison with other economic sectors

Table 1-5 below shows the economic sector contributions to the national GDP for the past 8 years (2011-2018). As shown in the table, the MMS' contribution to South Africa's GDP decreased from 8.1% in 2011 to 6.8% in 2017. The Finance, real estate and business services has always been the highest individual contributor to the national GDP and maintained its position in 2018, with manufacturing as the second contributor, whilst the mining and quarrying was the 7th contributor to GDP at 7,3%. This is a slight improvement from mining and quarrying as it implies that the growth rate increased in nominal terms by 1. 2%, slightly faster than the overall economy. In monetary terms, the sectoral contribution to GDP moved from R335 in 2017 to R356 billion in 2018 (Minerals Council South Africa, 2018).

Table 1-5: sector contribution to national GDP

Economic Sector	2011	2012	2013	2014	2015	2016	2017	2018
Finance, real estate and business services	19.1	19.2	19.4	19.6	19.6	20.1	20.3	20.6
General government services	14.7	14.9	15.1	15.2	15.4	15.4	15.3	14.7
Wholesale, retail and motor trade; catering and accommodation	13.5	13.6	13.7	13.7	13.7	13.9	13.7	13.0
Manufacturing	13.1	13.0	13.0	12.8	12.6	12.5	12.3	16.8
Transport, storage and communication	8.4	8.3	8.4	8.3	8.4	8.5	8.6	16.3
Mining and quarrying	***8.1***	***7.7***	***7.8***	***7.5***	***7.7***	***7.3***	***6.8***	***7.3***
Personal services	5.4	5.4	5.4	5.3	5.3	5.4	5.4	7.1
Construction	3.5	3.4	3.4	3.4	3.4	3.6	3.5	2.8
Agriculture, forestry and fishing	2.4	2.3	2.3	2.3	2.4	2.1	2.4	10.3
Electricity, gas and water	2.5	2.4	2.4	2.3	2.3	2.1	2.1	2.3
Total value added	**90,7**	**90,2**	**90,9**	**90,4**	**90,8**	**90,9**	**90,4**	**111.2**
Taxes less subsidies on products	9,3	9,8	9,1	9,6	9,2	9,1	9,6	11.2
GDP at market prices	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: *Stats SA in Minerals Council South Africa 2016, SARB, StatsSA & DMR (2019)*

1.4. MMS Future Outlook

1.4.1 Mining Charter, 2018

The 2018 Mining Charter was published in September 2018 and aims at addressing past inequalities by dealing with specifics below:

- In terms of employment equity at board, top, senior, middle and junior management level, emphasis is on the placement of HDSAs and women with set percentage targets for each of these demographics.
- Employees with disabilities should represent 1, 5% of the employee population.
- Training in scarce and critical skills should prioritise HDSAs at a target of 60%.
- Mining companies are required to invest 5% of their total annual leviable amount on essential skills development.
- Mining organisations are expected to develop mine communities through SLPs and IDPs in line with the requirements of mine licence regulations.
- Mines are also expected to improve the living and housing conditions of their employees under the principles of decent, home ownership, proper health services as well as social and economically integrated human settlement.

1.4.2 Global Demand for Commodities

Mining companies are inescapably influenced by global developments, with macro-economic growth and international markets strongly influencing both the demand and supply for resources as well as profitability (Lane, et al., 2015).

With limited post-recession growth prospects in the USA and Europe, companies have looked to Asia to drive global demand. For example, Chinese demand has had profound effects on South Africa's extractive sector (Reboredo, 2018). Chinese investors have developed specific interest in South Africa's chrome and platinum deposits as these are of strategic importance to China's economic growth (ibid).

It should be noted however, although the sector has shown good relations with Chinese investors, there are additional internal challenges that need to be addressed. For example, the sector is compounded by flat global growth outlook for the country's main commodities, more specifically Gold and PGMs.

Among other advanced economies is the demand to shift towards cleaner and efficient use of energy such as natural gas. As a result, coal prices are expected to decline as countries especially economic giants such as China will be switching to alternative sources of energy. Per capita demand for metals has also started to decline as it is driven by to some extent the outsourcing of manufacturing to emerging markets and developing economies such as China. This transition from an investment which is metals intensive to a consumption driven economy has also caused a stagnation of iron ore prices.

It is prudent to note that PGM is a basket of the platinum group metals and attention should be paid to commodities such as Palladium and Rodium when analysing the commodity prices and global demand. An example that is cited from the MCSA facts and figures September document shows that the South African global supply share for Palladium and Rodium increased from 2017 to 2018 by 2.1% for each commodity whilst the Platinum had experiences only a one percentage point increase over this period. Anecdotal evidence suggest that the shift from diesel and internal combustion engines moving towards electric

vehicles may be a possible driving force for the increased demand of other commodities within the PGM basket. Such trends need to be managed proactively as they could pose as opportunities in the form of addressing priorities such as unemployment, beneficiation and new skills development.

1.4.3 Improved economic growth prospects

A number of important events have improved South Africa's economic outlook. The transition of the new leadership in 2018 and the Budget Review reaffirmed the government's commitment to fiscal consolidation to generate more private investment (World Bank, 2018). The finalisation of the 2018 Mining Charter and the withdrawal of MPRDA amendment Bill provided policy certainty and increased investment into the country. Against this background, there is optimism in that the country will attract more investment into the MMS.

These new events indicate a positive outlook for investment with an anticipated capital expenditure of projects estimated at R127 billion and 35 000 new job opportunities in the next four years (DMR, 2018).

1.4.4 Mandela Mining Precinct

The Mandela Mining Precinct (MMP) initiative of the Presidency is aimed at developing a holistic and people-centric systems as well as technologies for the MMS. Through this initiative, research into safer systems and technology is undertaken to facilitate efficient measures of mining. The people-centric systems and technology are intended to facilitate the mining of low-grade reefs that are currently not economical to mine.

There are notions that the innovations developed by the MMP will result in job retention and growth in the sector up to the year 2046. The MQA has a formal partnership with the MMP to conduct research aimed at gauging technology and its implications on skills development in the sector, as these developments may require reskilling training drives for MMS related occupations such as technicians, artisans, supervisors and managers.

1.4.5 Mineral beneficiation

South Africa's endowment to mineral resources gives the country a "competitive edge" for developing a downstream beneficiation. "The cost competiveness is poor for South Africa, the challenge is that South Africa has to pay the same international rates for commodities dictated by the London Metal Exchange"(Dti, 2019). Beneficiation or value addition 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 (DMR, 2011). With mining and mineral products contributing substantially to exports and employment, the potential of local beneficiation in terms of job creation has been acknowledged. This could be much higher if raw materials were processed into intermediate and finished products before exporting (White Paper on Reconstruction and Development Programme, 1994).

1.4.6 MMS Worker Representatives

Trade unionism is one of the essential components of the current workplace dispensation. The MMS is highly unionised with a great number of employees represented or affiliated to a union. Their inclusiveness in decision making has a significant bearing on the productivity of the MMS. With a move towards the fourth industrial revolution which may change the nature and type of skills required in the sector, labour representation is critical in gaining buy-in for skilling the workforce.

1.5. Employer Profile

The analysis of employers within the MMS is based predominantly on the DHET levy registration file. The data limitations in this regard pertained to certain employers not disclosing their location, size or number of employees. To best accommodate this, the MQA has captured these organisations as an unknown field.

1.5.1 Geographical location of employers in the MMS

Province	No. of Employers	% of Employers
Eastern Cape	40	1,8%
Free state	50	2,2%
Gauteng	882	39,1%
KwaZulu-Natal	81	3,6%
Limpopo	110	4,9%
Mpumalanga	257	11,3%
North West	240	10,6%
Northern Cape	149	6,6%
Western Cape	199	8,8%
Unknown	249	11,2%
Total	**2257**	**100,0%**

Table 1-6: Employers' geographical location

Source: DHET levy registration file (May 2019)

The table above shows the geographic location of companies in the sector- indicating that Gauteng hosts the majority of mining companies (39, 1%). The Eastern Cape (1, 8%) and Free State (2, 2%) on the other hand, contribute the least towards the provincial allocation of employers within the MMS. There is no relevant information on start-ups and closures to be published at this period.

1.5.2 Subsector, Size and Number of companies represented in the MMS

Subsector	Size of Employers				Total per subsector	
	Small	Medium	Large	Unknown	No. of Employers	% of Employers
CLAS	85	25	20	8	138	6,1%
Coal Mining	124	36	45	36	241	10,7%
Diamond Mining	28	11	13	3	55	2,4%
Diamond Processing	49	1	4	2	56	2,5%
Gold Mining	66	12	26	8	112	5,0%
Jewellery Manufacturing	151	7	-	13	171	7,6%
Other Mining	624	107	92	133	956	42,4%
PGM Mining	3	5	19	-	27	1,2%
Services Incidental to Mining	340	55	41	65	501	22,2%
Total	1470	259	260	268	2257	100,0%
Percentages (%)	65,1%	11,5%	11,5%	11,9%	100%	100%

Table 1-7: Subsector, Size and Number of companies represented in the MMS

Source: DHET levy registration file (May 2019)

The table above details the number of employers based on the subsector and company size category they fall within the MMS. The majority of employers are small (65, 1%), with medium (11, 5%) and large (11, 5%) employers sharing the balance equally. The largest number of employers can be found within the Other Mining subsector (42, 4%), followed by Services

Incidental to Mining (22, 2%), whilst the least number of employers fall within PGM Mining (1, 2%).

1.6. Labour Market Profile

The labour market profile is obtained primarily from the MQA WSP and ATR dataset, the DHET levy registration file and DMR's Public Labour data. Weighting of the data was applied to provide a close to a realistic outlook of the sector. The formula for weighting the data and other relevant formulae can be found in the Annexure to the SSP. For the current financial year (As of 30 April 2019), 757 companies submitted WSP/ATRs. Of these companies, 654 were used for the analysis of this SSP, whilst 103 were eliminated due to data errors.

1.6.1 Major Occupational Groups by Gender and Race

Occupational Categories	Gender		Race				
	Female	Male	African	Coloured	Indian	White	Total
Managers	2366	9586	4523	521	540	6368	11952
	20%	80%	38%	4%	5%	53%	2%
Professionals	8072	14927	13630	1130	651	7588	22999
	35%	65%	59%	5%	3%	33%	5%
Technicians and Associate Professionals	9318	46181	37911	2255	519	14815	55499
	17%	83%	68%	4%	1%	27%	11%
Clerical Support Workers	11586	10654	15393	1701	322	4823	22240
	52%	48%	69%	8%	1%	22%	4%
Service and Sales Workers	1937	4613	5603	225	31	691	6550
	30%	70%	86%	3%	0%	11%	1%
Skilled Agricultural and Related Trades Workers (Artisan category)	4388	40917	30356	2420	200	12329	45305
	10%	90%	67%	5%	0,4%	27%	9%
Plant and Machine Operators and Assemblers	17186	187354	196345	4816	161	3219	204540
	8%	92%	96%	2%	0,1%	2%	41%
Elementary Occupations	20512	96567	112698	2207	43	2130	117078
	18%	82%	96%	2%	0%	2%	23%
Learners	4969	7419	10957	778	72	582	12388
	40%	60%	88%	6%	1%	5%	2%
Total	**80333**	**418218**	**427415**	**16052**	**2538**	**52546**	**498551**
	16%	84%	86%	3%	1%	11%	**100%**

Table 1-8: Major occupational groups by gender and race

Source: Weighted MQA WSP and ATR (31 May 2019)

The table above shows that the race composition in the sector is dominated by Africans constituting 86% of the sector's employees followed by Whites (11%), Colored's (3%) and Indians (1%). This however is concerning as the dominant race group within the Managerial Occupations is Whites (53%) followed by African (38%), Indian (5%) and Colored (4%).

The MMS remains a male dominated sector employing 84% males throughout the major occupational categories, with the exception of Clerical Support Workers. The Occupational categories with the lowest representation of women are Trade workers (10%), Plant and Machine Operators and Assemblers (8%) and Elementary Occupations (18%).

1.6.2 Management levels by race trend 2018 - 2019

A more granular look within the different management levels depicted in the figure below reveals that Whites (63%) dominate the Top Management category followed by Africans (28%), Indians (5%) and lastly Coloureds (4%). In Senior Management, a similar trend of white dominance is noticed with the majority being Whites (60%), followed by African (30%), Indian

(6%) and Coloureds (4%). The Professionally qualified and experienced specialists and mid-management comprise mostly of African (56%) followed by White (37%), Colored (5%) and Indian (3%).

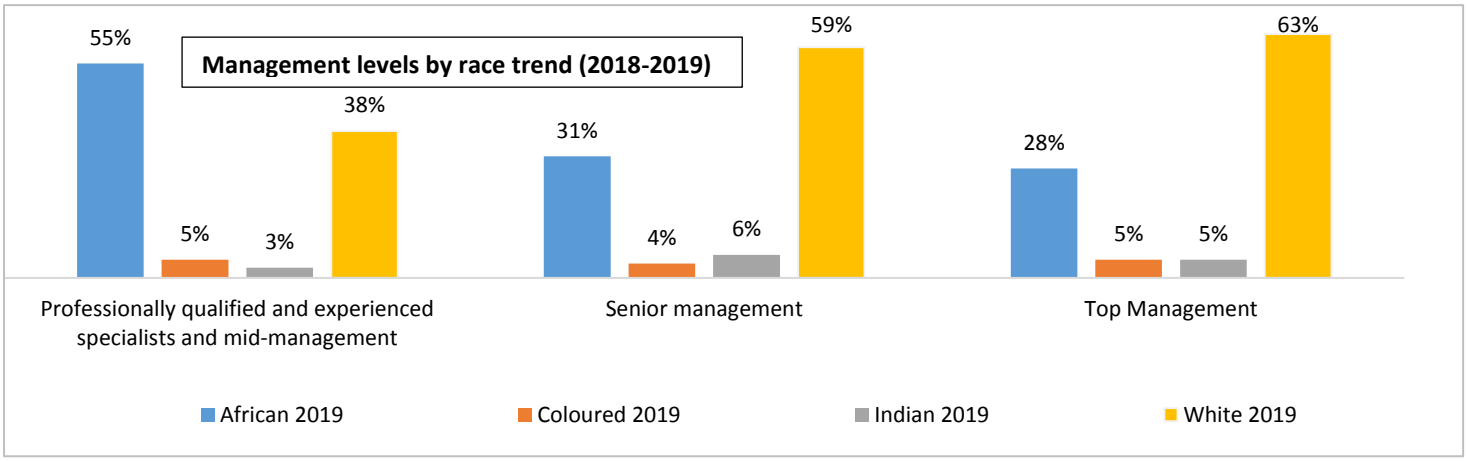


Figure 1-3: Management levels by race trend (2018-2019)

Source: MQA Weighted WSP and ATR (31 May 2019)

1.6.3 Management Levels by race and gender

Management Level	Gender	Race	No. of employees	% of employees
Top management	**Female**	African	108	44%
		Coloured	14	6%
		Indian	18	8%
		White	104	43%
	Male	African	238	24%
		Coloured	44	4%
		Indian	40	4%
		White	669	68%
Senior management	**Female**	African	361	8%
		Coloured	53	1%
		Indian	85	2%
		White	411	9%
	Male	African	1101	29%
		Coloured	122	3%
		Indian	190	5%
		White	2362	63%
Professionally qualified and experienced specialists and mid-management	**Female**	African	3986	57%
		Coloured	342	5%
		Indian	309	4%
		White	2353	34%
	Male	African	12121	54%
		Coloured	1034	5%
		Indian	463	2%
		White	8688	39%

Table 1-9: Management Levels by race and gender *Source: MQA Weighted WSP and ATR (31 May) 2019)*

The table above shows that at top management level, White and African females account for 43% and 44% respectively within the gender group, whereas Africans males account for 24%, whilst White males are at 68%. It is concerning to note that 19% of total employees in top management and senior management are females. Professionally qualified and experienced specialists and mid-management consists of only 24% females.

1.6.4 Highest Education Obtained

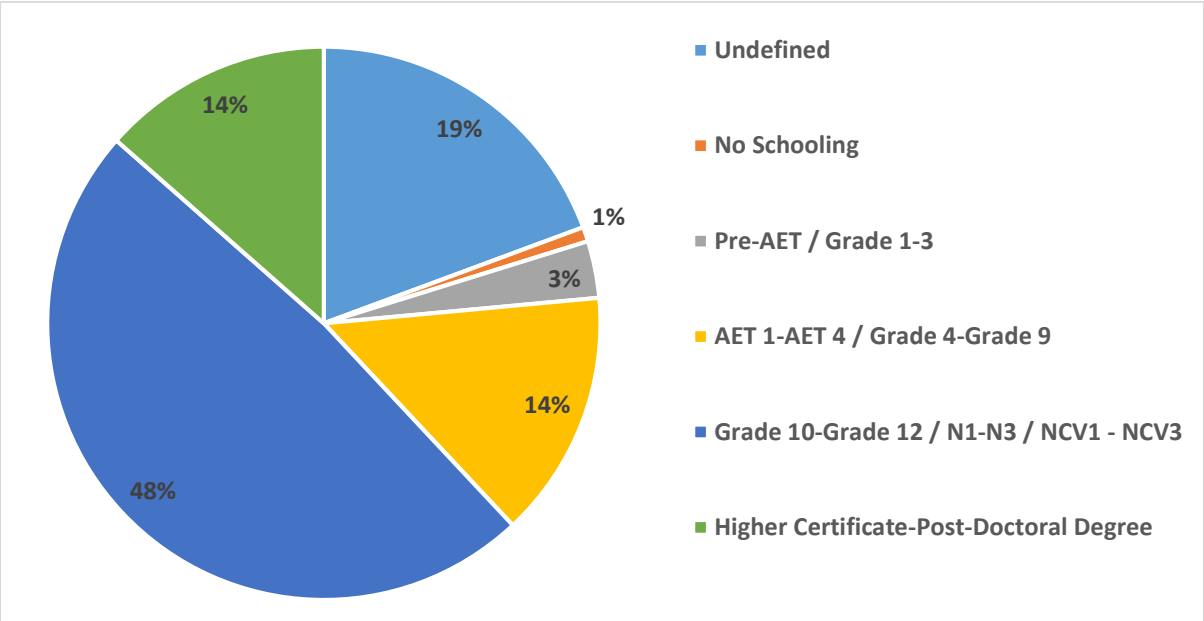


Figure 1-4: Highest education obtained *Source: MQA Weighted WSP and ATR (31 May 2019)*

Analysis of qualifications reveals that the highest proportion of employees (48%) in the sector have achieved between Grade 10 (including N1 and NCV1) and Grade 12 (including up to N3 and NCV3). This is followed by employees who have achieved between Grade 4 (including AET1) and Grade 9 (including up to AET 4) who constitute 14%. On the other hand, 14% of employees have between a Higher Certificate and Post-Doctoral degree. Approximately 1% of the sector's employees are reported to have no schooling. The "Undefined" category represents the employees whose education levels were not specified, equating to 19%.

1.6.5 The status and trends of employment in the MMS

The table below provides a 5-year trend analysis of employment in the MMS for the period 2015-2019. The column labelled "CAGR" represents the 'Compound Annual Growth Rate' over this period and makes adjustments for the spikes and drops in employment over the 5 year period, thereby depicting an annual average delineation of the rise or decline in employment figures.

Table 1-10: Provincial employment trends in the MMS (2015-2019)

Province	2015	2016	2017	2018	2019	CAGR
Eastern Cape	2 170	1 889	2 204	647	533	**-24,5%**
	0,4%	0,4%	0,4%	0,1%	0,1%	
Free State	40545	36378	39 665	15684	14823	**-18,2%**
	7,7%	7,0%	7,2%	3,2%	3,0%	
Gauteng	96802	84559	87 043	157275	154995	**9,9%**

Province	2015	2016	2017	2018	2019	CAGR
	18,4%	16,3%	15,8%	31,9%	31,1%	
KwaZulu-Natal	11616	10669	12 120	7718	8792	**-5,4%**
	2,2%	2,1%	2,2%	1,6%	1,8%	
Limpopo	82373	86680	75 474	74790	77598	**-1,2%**
	15,7%	16,7%	13,7%	15,2%	15,6%	
Mpumalanga	90289	63219	70 516	78801	79353	**-2,5%**
	17,2%	12,2%	12,8%	16,0%	15,9%	
North West	165213	185352	225 320	132660	132801	**-4,3%**
	31,5%	35,6%	40,9%	26,9%	26,6%	
Northern Cape	31126	44329	33 605	20015	22128	**-6,6%**
	5,9%	8,5%	6,1%	4,1%	4,4%	
*Western Cape	5114	6928	5 509	5882	7529	**8,0%**
	1,0%	1,3%	1,0%	1,2%	1,5%	
Totals	**525 248**	**520 003**	**550 905**	**493471**	**498551**	**-1,0%**

Source: MQA Weighted WSP and ATR (31 May 2019)

**Although percentage is high, one needs to take into account the actual numbers of employees i.e. the province represents 1, 5% of the sector.*

With regards to changes in the provincial distribution of employees, the Eastern Cape (-24,5%) followed by the Free State (-18,2%) have seen the largest decline in employees on a compounded average analysis over the 5 years, whilst Gauteng (9,9%) and the Western Cape (8%) have increased in employment over the same period.

Table 1-11: Sub sectoral employment trends in the MMS (2015-2019)

Subsector	2015	2016	2017	2018	2019	CAGR
CLAS	13449	13162	14424	15637	10746	**-4,4%**
	2,6%	2,5%	2,6%	3,2%	2,2%	
Coal mining	87389	56930	26610	86235	89775	**0,5%**
	16,6%	10,9%	4,8%	17,5%	18,0%	
Diamond mining	16286	8974	8743	16714	15888	**-0,5%**
	3,1%	1,7%	1,6%	3,4%	3,2%	
Diamond Processing	989	1849	1758	1790	1461	**8,1%**
	0,2%	0,4%	0,3%	0,4%	0,3%	
Gold mining	118235	91357	238245	98965	94152	**-4,5%**
	22,5%	17,6%	43,2%	20,1%	18,9%	
Jewellery Manufacturing	1074	2802	1631	1902	1853	**11,5%**
	0,2%	0,5%	0,3%	0,4%	0,4%	
Other mining	107969	129829	153057	68580	83103	**-5,1%**
	20,6%	25,0%	27,8%	13,9%	16,7%	
PGM mining	144690	173529	87404	167794	166367	**2,8%**
	27,5%	33,4%	15,9%	34,0%	33,4%	
Services incidental to mining	35117	41509	19034	35854	35206	**0,1%**
	6,7%	8,0%	3,5%	7,3%	7,1%	
Totals	**525 248**	**520 003**	**550 905**	**493471**	**498551**	**-1,0%**

Source: MQA Weighted WSP and ATR (31 May 2019)

Other Mining (-5, 1%), Gold Mining (-4, 5%), CLAS (-4, 4%) and Diamond Mining (-0, 5%) have shown a decline in employment over the 5 year period. The subsectors showing the most

improvement in employment is Jewellery Manufacturing (11, 5%) and Diamond Processing (8, 1%) over the 5 years.

Table 1-12: Gender distribution trends in the MMS (2015-2019)

Gender distribution	2015	2016	2017	2018	2019	CAGR
Male	454663	444553	474217	418449	418218	**-1,7%**
	86,6%	85,5%	86,1%	84,8%	83,9%	
Female	70585	75450	76688	75023	80333	**2,6%**
	13,4%	14,5%	13,9%	15,2%	16,1%	
Totals	**525 248**	**520 003**	**550 905**	**493471**	**498551**	**-1,0%**

Source: MQA Weighted WSP and ATR (31 May 2019)

The MMS remains a male dominated sector. However, the proportion of females have been increasing gradually from 2015 to 2019 with a compounded annual average over the 5 years at 2, 6%. Concerns are still raised on the appropriate growth rate in terms of the progress of female representation in the sector with the alignment of the transformational objectives of the Mining Charter.

Table 1-13: Racial distribution trends in the MMS (2015-2019)

Racial distribution	2015	2016	2017	2018	2019	CAGR
African	441699	435100	474189	424537	427415	**-0,7%**
	84,1%	83,7%	86,1%	86,0%	85,7%	
Coloured	15352	19582	17349	13070	16052	**0,9%**
	2,9%	3,8%	3,1%	2,6%	3,2%	
Indian	2832	3907	2701	2629	2538	**-2,2%**
	0,5%	0,8%	0,5%	0,5%	0,5%	
White	65365	61414	56666	53235	52546	**-4,3%**
	12,4%	11,8%	10,3%	10,8%	10,5%	
Totals	525 248	520 003	550 905	493471	**498551**	**-1,0%**

Source: MQA Weighted WSP and ATR (31 May 2019)

Equity composition of employees shows all race groups aside from coloureds have been diminishing on average over the 5 years. The greatest decline is depicted by Whites (-4, 3%) followed by Indians (-2, 2%) and Africans (-0, 9%).

Table 1-14: Employment by major occupational group trends in the MMS (2015-2019)

Major Occupational Groups	2015	2016	2017	2018	2019	CAGR
Managers	14165	13397	11871	13455	11952	**-3,3%**
	2,7%	2,6%	2,2%	2,7%	2,4%	
Professionals	26601	25591	22960	23387	22999	**-2,9%**
	5,1%	4,9%	4,2%	4,7%	4,6%	
Technicians & Associate Professionals	61145	57877	62986	53128	55499	**-1,9%**
	11,6%	11,1%	11,4%	10,8%	11,1%	
Clerical Support Workers	22315	21582	22435	21290	22240	**-0,1%**
	4,2%	4,2%	4,1%	4,3%	4,5%	
Service & Sales Workers	6419	6885	7100	6205	6550	**0,4%**
	1,2%	1,3%	1,3%	1,3%	1,3%	
Trades category	39678	39949	37320	40489	45305	**2,7%**

Major Occupational Groups	2015	2016	2017	2018	2019	CAGR
	7,6%	7,7%	6,8%	8,2%	9,1%	
Plant & Machine Operators & Assemblers	213412	216245	236402	206481	204540	**-0,8%**
	40,6%	41,6%	42,9%	41,8%	41,0%	
Elementary occupations	131172	127534	140632	118436	117078	**-2,2%**
	25,0%	24,5%	25,5%	24,0%	23,5%	
Learners	10341	10841	9122	10600	12388	**3,7%**
	2,0%	2,1%	1,7%	2,2%	2,5%	
Total	**525248**	**520003**	**550905**	**493471**	**498551**	**-1,0%**

Source: MQA Weighted WSP and ATR (31 May 2019)

A review of employment by occupational categories on a compounded average annual basis over 5 years shows that the MMS is bleeding Managers (-3, 3%), Professionals (-2, 9%), Elementary Occupations (-2, 2%), Technicians & Associate Professionals (-1, 9%), Plant& Machine Operators & Assemblers (-0, 8%) and Clerical Support Workers (-0, 1%) over the 5 year period

The MMS is however absorbing Learners (3, 7%), Trades (2, 7%) and Services and Sales Workers (0, 4%) over the 5 year period.

Table 1-15: Employment trends by disabled employees (2015-2019)

Disability distribution	2015	2016	2017	2018	2019	CAGR
Disabled Employees	3815	4864	4575	4639	3948	**0,7%**
	0,7%	0,9%	0,8%	0,9%	0,8%	

Source: MQA Weighted WSP and ATR (31 May 2019)

The disability figures in the sector remain a concern, there has been minimal change in percentages employed over the 5 year period however there has been a compounded average annual increase of 0,7% in disabled employees.

Table 1-16: Management by Equity trend (2015-2019

Total employment in MMS	2015	2016	2017	2018	2019	CAGR
African	4315	4340	9018	5453	4523	**0,9%**
	30,5%	32,4%	36,0%	40,5%	37,8%	
Coloured	586	649	1311	518	521	**-2,3%**
	4,1%	4,8%	5,2%	3,9%	4,4%	
Indian	649	704	1071	550	540	**-3,6%**
	4,6%	5,3%	4,3%	4,1%	4,5%	
White	8614	7704	13656	6933	6368	**-5,9%**
	60,8%	57,5%	54,5%	51,5%	53,3%	
Total in management	**14164**	**13397**	**25057**	**13455**	**11952**	**-3,3%**

Source: MQA Weighted WSP and ATR (31 May 2019)

The equity profile of Managers depicts that Africans (0,9%) have been the only group to have increased on average over the 5 year period with the biggest decline coming from Whites (-5,9%) followed by Indians (-3,6%) and Coloured (-2,3%) over the same period.

1.7. Conclusions

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 8.1% in 2011 to 6.8% in 2017. However, there was a slight increase of GDP contribution in 2018 (7, 3%), thereby representing a growth rate slightly faster than in the overall economy. The employment rate has also been affected as it has been decreasing from a peak of 628 750 in 2012 to 498 551 in 2019.
- The short to long term outlook of the sector could be improved should the sector monitor and forge partnerships in the developments of the Mandela Mining Precinct and mineral beneficiation strategies.
- Demographic disparities in gender and management by equity compositions signals the need for the MMS to continue addressing workforce imbalances. The sector should increase the intake and absorption of females in core occupations and management.
- It is imperative that transformational objective of the Mining Charter be aligned to relevant skills development programmes in the MMS with the aim of increasing participation of HDPs within management levels.
- Individuals with disabilities need to be given an equal chance in employment opportunities. More efforts needs to be placed in increasing the representation of individuals with disabilities.

Chapter 2 : Key Skills Issues

This chapter identifies factors that drive change and impact on skills demand and supply within the MMS. Literature and document review as well as key informant interviews informed the findings of the chapter. The chapter identifies macro and micro, internal and external factors that continue to shape the skills development landscape of the MMS. This was done through the use of PESTEL analysis that assists in systematically identifying and evaluating political, economic, social, technological, legal and environmental factors that play a role in influencing the sector (Viljoen, 2018).

2.1 Change Drivers

Change drivers are factors which bring change in the industry. These changes compel the industry to modify their actions due to various factors that may affect them, be it positive or negative. In the MMS, numerous factors that impact skills development have political, economic, social, technological, environmental and legislative implications. Understanding how these drivers intersect with skills development is imperative to navigate through the concomitant challenges. 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.

2.1.1 Political Context

2.1.1.1 Government's role in the MMS

As seen in Chapter 1, in 2017, South Africa experienced most of its challenges linked to alleged policy uncertainty and weak economic growth. In 2018, the economy went into technical recession during the first half of the year and later rebounded to record a growth rate. Despite these challenges, according to President Cyril Ramaphosa's African Mining Indaba speech in February 2019, the government views the MMS as one of the key sectors in the future growth and development of the country's economy, with a notion held that it has huge potential for exploration, production and beneficiation. It is for this reason that that significant work has been done to remove the policy uncertainty that held back the development of the industry through the finalisation of the Mining Charter 2018 and clarifying the Mineral and Petroleum Resources Development Amendment Bill. As a result, the government anticipates that they will make a valuable contribution to accelerate economic growth and greater job creation (Ramaphosa, 2019). This was further stressed in the Minister of Mineral Resources and Energy's Budget speech which emphasised investments, totalling R45 billion and the creation of an estimated four thousand permanent jobs, established into the sector in the past year. Among them; R21,8 billion by Vedanta Resources in the Northern Cape, Sasol's R14bn mine replacement programme at Shondoni and Impumelelo in Mpumalanga, and Exxaro's R3,3 billion mine investment in Belfast, Mpumalanga. These were reported as endorsements to South Africa being an attractive destination for mining investment (Mantashe, 2019). In addition, the President's priority of education has also prioritised skills development and training amounting to R800 million amongst others in the form of bursaries, apprenticeships and internships in the fields of geology, electrical, mechanical, mining and rock engineering, as well as artisanal training (Mantashe, 2019). These interventions are mostly driven by the MQA.

2.1.1.2 Industrial Relations

Labour costs are said to have exceeded inflation. The annual strike season is characterised by the increasing demands for salary increases and other operational related demands by unions and mineworkers. This is despite the challenging environment that mining companies face as a result of a myriad factors (low commodity demand, rising operational costs, unfavourable global economic outlook) in sustaining and growing the sector. For the year 2019, the impact of secondary strikes on the mining industry is forecasted to cost the sector around R789 million in revenue per day (MCSA, 2019). Employees stand to lose R300 million in earnings per day, losses in terms of royalties would amount to around R8 million per day and losses in terms of taxes would amount to R14 million per day. In the gold subsector, revenue losses are estimated at around R201 million per day, whilst the platinum subsector is estimated at R555 million revenue losses per day. These loses are anticipated to not recover and will have a negative impact on the lives of employees, their families and communities at large (MCSA, 2019).

Given the introduction of new technology in the sector, there is a shift in the profile of employees with respect to skills sets needed in the sector. Mines have since focused their recruitment patterns on attracting people in possession of higher degree qualifications to meet their labour demands of absorbing a labour force with high ecological capabilities. Strikes ordinarily and acutely affect unskilled and semi-skilled employees, thus leading to retrenchments. With that, the sector should aim to improve the general level of education and skills of employees who are most likely to be affected by retrenchments to create long-term people-centric sustainable growth that will enable higher wages and a higher probability of employment, and accordingly, minimise strikes.

2.1.2 Macro/Micro Economic factors

2.1.2.1 Global Influence and Market Performance

Local mining companies manage unique South African operational challenges while still operating in the context of global pressures (Guzek & van Antwerpen, 2015). Mining companies are inescapably influenced by global developments, with macro-economic growth and international markets strongly influencing both the demand and supply for resources as well as profitability (Lane, et al., 2015). Historically, there was a strong correlation between the performance of commodity markets and mining stocks; however, this relationship appears to have broken down. Mining stocks (including those of global diversified mining role players continue to underperform broad commodity price benchmarks. Important global economies such as the USA, Europe, and China, are reported to be slowly recovering from recession; however, there are mixed signals for future growth.
In South Africa for example, the sector grew by 1.2% in 2018 representing a growth rate slightly faster than in the overall economy (MCSA, 2018). The sector is estimated to have contributed R356 billion to GDP in 2018 (2017: R335 billion) in nominal terms (MCSA 2018). However, this did not translate to investment as there has been virtually no growth in fixed investment in the sector during 2018 (ibid).

With limited post-recession growth prospects in the USA and Europe, companies have looked to Asia to drive global demand. For example, Chinese demand has had profound effects on South Africa's extractive sector (Reboredo, 2018). Chinese investors have developed specific

interest in South Africa's chrome and platinum deposits as these are of strategic importance to China's economic growth (ibid). Stakeholders believe that as China continues to expand its presence and interests in the South African mining sector will undoubtedly increase.

It should be noted however, although the sector has shown good relations with Chinese investors, there are additional internal challenges that need to be addressed. For example, the sector is compounded by flat global growth outlook for the country's main commodities, more specifically gold and PGMs. For the period 2030, the revenue pool outlook is flat for commodities that make up more than 60% of South Africa's mining revenue (Goodman, 2019). This therefore, has an impact on employment in the sector. Mining companies need to invest in employees' advanced technical and vocational skills, but also produce a flexible workforce that can adjust to rapid shifts in changing sectoral demands

2.1.2.2 The availability of mineral resources

Over the last decade the South African mining industry has gone through a consistent decline in terms of production output as well as stability within the sector. This is due to a number of intertwined factors including the unstable supply of electricity that has plagued the country since the rolling blackout crises of 2008 and 2014 and the global financial crisis which plunged developed markets into a recession thus decreasing demand.

There is a major opportunity for businesses and government to work together to unlock South Africa's high potential mining assets in the next five-ten years. This includes untapped reserves of iron ore, manganese and zinc (IOA, 2018). An example of the potential to unlock mining assets is in the Northern Cape which has high quality iron ore and large manganese and zinc deposits. South Africa has an estimated 80% of manganese of high grade resources and no similar substitute exists. This will put South Africa in a strong position to strengthen its reputation as a major mining region of the world and will also result in employment creation, greater profitability and enhanced contribution to the economy (Goodman & Rajagopaul, 2019).

Moreover, stakeholders are positive about future of mining. They hold the notion that the future of mining is bright if the sector would fully embrace modernisation and localise resources with stability created through policy certainty within the country.

2.1.2.3 Minerals beneficiation

In 2018, the mining sector exported 66% of its production to international buyers or commodity markets. These dollar earnings are equal to half of the country's foreign reserves (+/- $ 50 billion) (MCSA, 2018).

Opportunities exist for downstream processing and adding value locally to iron, carbon steel, stainless steel, aluminium, PGMs and gold. A wide range of materials is available for jewellery, other than gold, platinum and diamonds; there is also tiger's eye, and many other semiprecious stones (BrandSA, 2017). Arguments were held in that the sector needs to develop local capacity by investing in infrastructure to enable local beneficiation first instead of exporting.

Through partnerships with entities such as the DTI, the country has the potential to develop unique capabilities and the necessary human resources with adequate skills and equipment to apply interventions beyond the mining sector. With that, stakeholders expressed that there

are opportunities for the mining sector to integrate with other sectors of the economy through mineral beneficiation. These opportunities could be embedded in the manufacturing sector (e.g. steel and iron ore, nickel, copper and zinc); energy sector (e.g. coal, uranium and gas); and agriculture sector (e.g. phosphates, potassium and sulphur). These in turn can be added jewellery for precious metals such as gold, diamonds and PGMs (Netshitenzhe, n: d).

It will be prudent for the sector to form partnerships with SADC (Southern African Development Community) regions. Some of these countries are said to not have enough skilled employees. Therefore, there are opportunities for South Africa to export its skilled workforce, especially in the diamond and jewellery manufacturing subsectors. Key informants expressed that the relationship between SADC regions and South African beneficiation can only be achieved through revising the country's trading policies. The trading policy was criticised for being rigid, sequestered and does not explore inter-regional benefits, which consequently, does not promote regional value chains. Purchasing from South African suppliers is believed to be significantly cheaper than buying from an American or European based markets. It is therefore, recommended that the government should assist local companies by providing manufacturing subsidies just as it is done in EU countries where they subsidise their equipment manufacturers. This then allows them to sell their equipment to other countries at a lower price and as a result knocks local suppliers down. Therefore, there is an opportunity for government to step up to help support local businesses and help prevent the dominance from foreign suppliers. This will also result in increased employment opportunities and upskilling employees, not only for the benefit of the country, but the continent as well.

2.1.2.4 Increasing Energy tariffs

The MMS currently faces increased risk on the energy front as electricity has in recent years become a scarce commodity subject to supply interruptions and rising prices (SBPR, 2019). According to MCSA (2019) rising electricity prices continue to affect consumers and will intensify further in 2019 as the National Energy Regulator of South Africa (NERSA) recently ruled that Eskom can recuperate R32.7billion of the MYPD3 (Multi-Year Price Determination) allowable costs sustained in the 2014 to 2017 financial years through the regulatory clearing account (RCA). This would mean that Eskom could raise electricity tariffs by at least 4.4% (excluding MYPD4) starting April 2018 to recuperate back the allowable revenue through the RCA. This, together with the additional tariff increase (15% applied for by Eskom within the awaited MYPD4) could see electricity prices rising much higher than inflation, and 10 percentage points higher than in recent years, over the next 3 years. With that, the MMS as one of the largest consumer of energy continues to be plagued by electricity supply constraints, rising administered prices and declining productivity rates, impeding its effective operational performance (Arnoldi, 2019).

The sector requires a reliable supply of competitively priced electricity to not only enable the functioning of deep level and technologically complex mines, but also to support the continued beneficiation of South Africa's mineral resources. The sector is both a significant supplier of primary energy for electricity generation (>90%) but is also a large consumer of electricity (15% of total, >30% if smelters and refineries are included) (MCSA, 2019).

The collapse of the commodity prices in the sector is attributed to the increase of electricity tariffs which commenced to upsurge in 2007. During this period tariffs also increased by 15%

and the mining sector lost 53 500 jobs of which electricity tariff increases specifically accounted for 11 800, and a cumulative loss in fixed investment of R103.2 billion (MCSA, 2019). The sector has not recovered since 2007/2010 and a repeat of steep tariff increases over the last 10 years will exacerbate the situation; leading to severe consequences of the sustainability and growth of the sector.

Commodities that are projected to be particularly vulnerable to the large adjustments in electricity tariffs include gold and platinum mining; ferrochrome and manganese smelting; basic chemicals; iron and steel; basic non-ferrous metals; glass and glass products; rubber products; paper and paper products; sawmilling; textiles; as well as segments of food processing (e.g. grain milling) (IDC, 2019). The MYPD4 application would accelerate the demise of the gold industry (adding 41 027 job losses, on top of 57 482 currently under threat), and platinum group metals mining (adding 37 660 on top of the 90 000 already under threat). The total job loss impact from the MYPD4 when other commodities are included could make this number as high as 150 000, that is; gold; 41 027 + PGM; 37 660 + other commodities; 71 313 = 150 000.

In addition, given the increase in electricity tariffs will affect local beneficiation, thus making it impossible to render local beneficiation of minerals as a feasible option. The loss of jobs poses are a threat to addressing the country's triple challenges as it would result in loss of financial security, unemployment and thus, cause further community unrests. These are not only affecting economic activity on a wide scale, but also investment decisions.

Furthermore, the current challenge also forces mining companies to consider alternative green measures as a source of energy. However, that too will have an impact in the coal subsector in terms of production and employment. In addition, there are indirect jobs created by the coal mining industry through its multiplier effect on the economy, and these cohorts will also be affected.

2.1.3 Social influences

2.1.3.1 Local Influence (Influences Related to National, Provincial and Local Economic Output)

Despite its decreasing GDP contribution to the national output, mining accounts for the largest proportion output for the majority of South African provinces. With that, South African mining companies must also account for uniquely local issues with profound operational implications. Over the past years, there has been an increase in community unrests within mining communities. These disruptions are a threat to production, profits and result in job losses and are estimated to cost the industry about R20 million each time they occur. According to the stakeholders in the sector, mining companies time and again experience pressure from mining community members to recruit within communities which often do not possess adequate qualifications and experience to fill in vacant positions in mines.

There are estimates that about 35 protests take place in mining communities every month (James, 2018). Community-based protests against mining companies are rooted in socioeconomic issues, such as job creation, and infrastructure development which are attributed to South Africa's triple challenges of inequality, poverty and unemployment. These translate into higher levels of community

discontent in mining communities and does not augur well with the mining operations in the areas of concern.

Mining companies can invest in upskilling local communities, leveraging technology-based learning solutions. There are also opportunities for mining companies to localise their value chains around specific mines, thus making broader socio-economic development integral to their operations. Key steps include elevating local suppliers to reduce imports and develop alternative industries such as agriculture to reduce communities' heavy reliance on mining for community development.

The MQA supports various mine communities and labour sending areas with skills development initiatives. These initiatives are not only restricted to mining skills but included training in portable skills such as carpentry, bricklaying, agricultural skills and road construction. These intervention should continue to be supported and strengthened for the benefit of community members. Supporting mining communities contributes to the country's fulfilment of the socio-economic transformational mandate and enhances skills development.

2.1.4 Changing technological landscape

2.1.4.1 Fourth Industrial revolution

The fourth industrial revolution is described as a world where individuals move between digital domains and offline reality with the use of connected technology to enable and manage their lives (Miller, 2015). It integrates cyber-physical systems and the "Internet of Things", big data and cloud computing, robotics, artificial intelligence-based systems and additive manufacturing (MCSA, 2019). This digital revolution does not only impact the mining sector, but its effects are evident across all sectors globally and nationally.

In the MMS, key informants reported that South Africa's mining industry are slower adopters of technology compared to other global countries such as Australia and Canada. South Africa lags behind in terms of the fourth industrial revolution as mines are said to be less digitised than those in many other regions as a higher proportion of its operations are underground, and thus, technology ramp-up will be more challenging to be undertaken.

According to the Deloitte 2018 Tracking the Trends Global Mining Study, the mining industry's success will be determined by the border of analytics and artificial intelligence (AI) which will be used to leverage data generated to sharpen planning and decision-making across the mining value chain. This will also be accompanied by the digitalisation of mining supply chains and, driving sustainable shared social outcomes where mining organisations will become interdependent of other sectors and judged based on their relationships with their employees, investors, regulators as well as their impact on society at large.

Furthermore, the implementation of sophisticated technologies are transforming the sector's operations in terms of the type, level and mix of skills required, thus starting to transform occupations such as rock drill operator, blaster, drill rig operator as well as most of the artisan trades. Upskilling and reskilling programmes are needed so that employees are trained in new mining processes that will extend the lifespans of mines and to also ensure the smooth transition to embracing the fourth industrial revolution and to meet new digital demands (Moodley, 2019). As mining becomes more automated, physical strength and stamina will

become less important than fine motor skills, dexterity and problem solving – all of which are more easily acquired by new entrants to the workforce will generate opportunities to attract more females and therefore, redress gender inequalities in the sector.

Key informants also emphasised the need to place focus on integrating technology in AET (adult education and training) programmes up to level 4. This is more particularly imperative for uneducated employees as a way of improving literacy, technological and numeracy levels to prepare them to operate new machinery and coordinate new processes that emerge with the introduction of the fourth industrial revolution. At a supply level, the integration of technology can be incorporated in the curriculum of Higher Education and Training (HET) institutions as a delivery mechanism, as a complement to instruction, and as an instructional tool for training novice employees in the sector.

The diagram below indicates how automation and new technologies will impact skills demand and supply in the MMS:

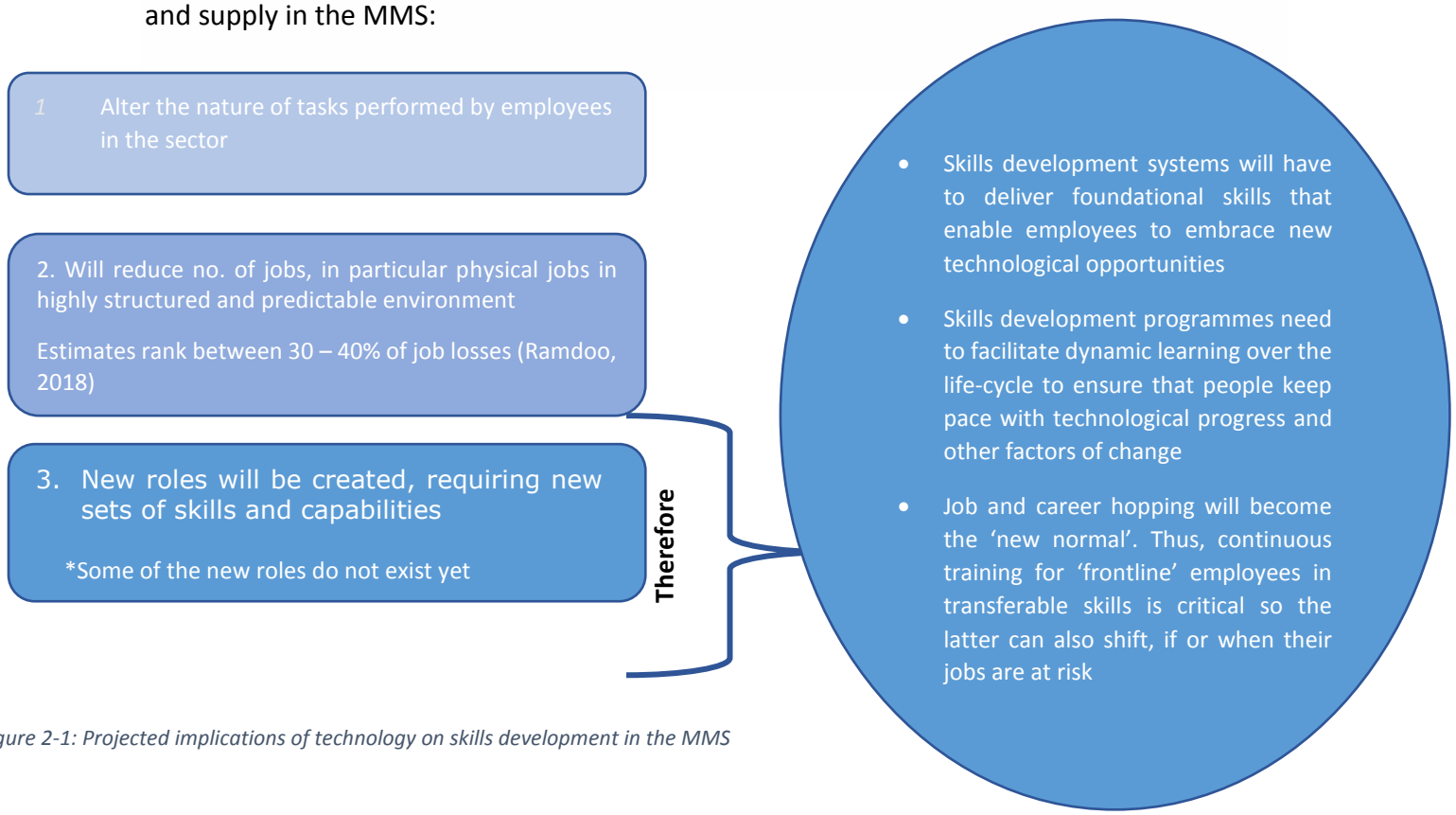


Figure 2-1: Projected implications of technology on skills development in the MMS

2.1.4.2 Diversity pool of generations (Millennials vs. the Ageing Workforce)

The workforce coming into the industry currently (Millennials) are all digital natives. In their personal lives they require rapid measures to function menial tasks and want to spend more time focusing on experiences. This doesn't translate into the work space in mining presently. Key informants asserted that the sector has not fully embraced the fourth industrial revolution-especially those in deep level mining. There is a significant gap between companies that have fully embraced technology compared to those who are running conventional operations. As a result, some millenials find it challenging to be attracted to the sector. Those that do get absorbed in the sector find it challenging to adapt to conventional modes of

operations. As a result, the sector loses talent to other industries that are able to accommodate their needs. The MMS also needs to rebrand its image to increase its attraction among the millennial talents. This could be done by embracing the fourth industrial revolution notwithstanding the cost implications for digitally revolutionising production. Mining companies must consider not only the shifting nature of work, but how to attract a new variety of workers and tailor their workplaces accordingly. This will also lead to the retention of those that are already absorbed.

On the other hand, as the typical workplace progresses towards keeping up with sprouting technological trends, there are expectations for older employees to adjust to these developments. Skills development programmes will need to educate existing workforce about the new world of work, through innovative training; re-training/ re-skilling important for smooth transition for new types of tasks. Moreover, considering that many older employees are employed in managerial positions, there will be a need for the old to mentor the young in managerial skills as they will be the next wave if management once the old employees retire. This will ensure that the sector retains skills and has enough skills for future generations.

2.1.5 Environmental Concerns

2.1.5.1 Environmental Sustainability

The global emphasis on environmental impact as a result of mining activities is another key driver affecting the sector. The MQA's (2018) green skills study revealed that South Africa's air quality remains one of its most challenging environmental issues and is an issue that has been raised on several occasions with regards to the health and welfare of South Africa's population. Fugitive dust and spontaneous combustion emission from the mining sector are some of the most common sources of atmospheric emission that impact on air quality.

In addition, the availability and cost water is quickly rising to the top of mining companies' agendas as one of the greatest constraints to supply. Many parts of the world and South Africa specifically, are facing a water crisis, not only because of the scarcity of water, but also the quality of the available water (Askham et al., 2017). The water shortage in South Africa, has been exacerbated by changing rainfall patterns due to climate change. Therefore, insufficient water could limit large-scale mine development and restrict other economic and livelihood activities as it makes the social and ecological reserve vulnerable to water demands from new developments, which may affect the country's resilience to climate change.

Unlike companies found in the secondary and tertiary sectors, mining companies are dependent on the location of ore and thus, cannot change their operations' location to mitigate or adapt to environmental challenges. It is imperative for the sector to align their practices with goals closely linked to achieving the development path of the green economy. As the mining activities and environment change, the need for green skills in the MMS is also expected to be affected. All the mining subsectors are likely to experience an increased demand for green skills. This is also part of the critical investor requirements and fulfilment of legislative requirements regarding sustainable development. To achieve this the MQA green skills study proposed the following recommendations:

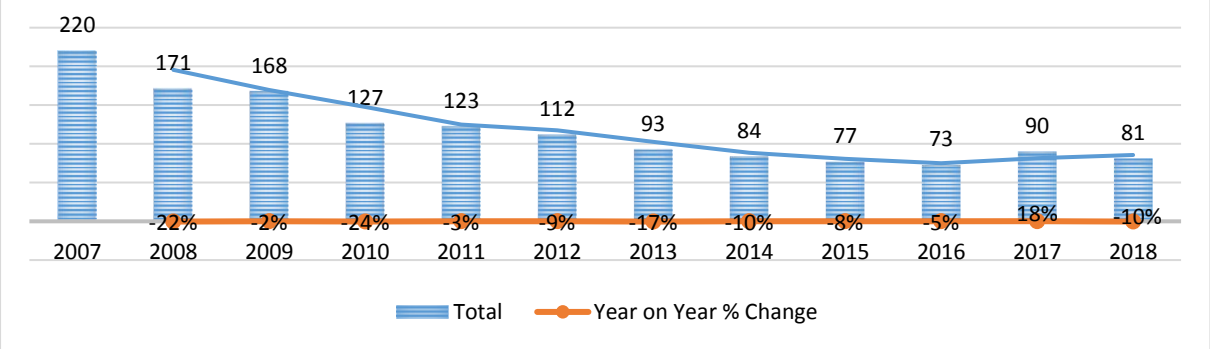
- Revision of the QCTO qualification framework to better align the needs of the MMS in relation to green skills.
- Bridge the gaps between the educational programmes and industry requirements by means of specialised courses (e.g. radioactivity).
- Broaden skills sets and develop sector-specific experience through internships and learnerships (specifically: Other mining, Gold mining, PGM mining).

2.1.5.2 Mine, Health and Safety

Mining operations come with inherent risks that can impact the health and safety of employees. Mining companies, the government and trade unions need to continue to place importance on employee safety since continued fatalities, injuries and occupational diseases jeopardise a mining companies' licence to operate. For the first time in a decade, an increase was observed in the number of fatalities in 2017. This was the first increase since 2007 where 220 fatalities were recorded. As illustrated in figure 2-2 below, fatality rates slightly declined to 81 (DMR, 2018).

The MQA continues to support training of employees with particular focus on health and safety in mines. There is also a need for further research to be conducted on ways and means of attaining a "zero harm" goal in the MMS. Through its partnership with the MHSC, the MQA aims at investigating factors affecting health and safety matters in the workplace and its skills development implications in the MMS. The research findings could provide insights into issues of concern to inform long term sustainable solutions to attain zero harm goal in the sector.

Figure 2-2: Mining fatality trend (2007-2018)



*Source: DMR (2017 & 2018)*2018 f*igures are as of 27 February 2018

2.1 Policy frameworks affecting skills demand and supply

There are many other policy and legislative instruments that are applicable to balancing the MMS against present and future trends to ensure its sustainability and growth. Sector skills planning in South Africa must consider a wide range of national policy imperatives that seek to support inclusive sector growth paths which advance economic growth, the social development and transformation agenda. The Table below summarises the key national policies which guide the strategy and operations of the MQA and the MMS.

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning in the sector
The Mineral and Petroleum Resources Development Act (MPRDA)	• The MPRDA is aimed at creating conditions that are conducive for equitable access and sustainable exploitation of petroleum and mineral resources in the country.	• Through its learnerships, bursaries, workplace exposure programmes and collaborations with TVETs and HETs, the MQA will be able to accelerate transformation to ensure the sustainable growth and development of the MMS to expand opportunities for HDIs.
Mining Charter, 2018	• The Mining Charter, 2018 aims to redress past inequalities by advocating opportunities of Historically Disadvantaged Persons to enter the MMS and to benefit from the exploitation of the nation's mineral resources. • Emphasis is placed on utilising and expanding the existing skills base for the empowerment of Historically Disadvantaged Persons**.** This also includes the promotion of HDIs and women into management positions. • Promotes the beneficiation of South Africa's mineral commodities • Calls for the development of entrepreneurial skills that improve people's livelihoods, and create mining led local and regional economic diversification. • Requires an investment of 5% of the leviable amount on essential skills development activities such as science, technology, engineering, mathematics skills, as well as artisans, internships, learnerships, apprentices, bursaries, literacy and numeracy skills for employees and non-employees (community members), graduate training programmes, research and development of solutions in exploration, mining, processing, technology efficiency (energy and water use in mining), beneficiation as well as environmental conservation and rehabilitation.	• Promotion of the transformation through the provision of learnerships, internships, bursaries related to the MMS and management development programmes continues to be a sectoral imperative. This also forms part of the Mining 2030 vision.
Mine Health and Safety Act (MHSA) No. 29 of 1996	• The MHSA aims to alter the culture and politics of health and safety in the mining sector through reducing accidents in the mines that result in fatalities and injuries which are a contributor of individuals sustaining disabling injuries.	• The implications of the legislative instruments on skills development include the promotion of health, leading to a capable and healthy workforce who will be retained in the sector.
Mineral Beneficiation Strategy	• The beneficiation strategy is aimed at developing mineral value chains and facilitating the expansion of mineral beneficiation initiatives in the country, up to the last stages of the value chain. • The strategy is aligned to a national industrialisation programme which seeks to enhance the quantity and quality of exports,	• The MMS could form partnerships with other SETAs such as AgriSETA and MERSETA through programmes that support mineral beneficiation. In addition, greater collaboration with industry councils and jewellery manufacturers needs to be implemented to promote the sustainability and growth of the sector.

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning in the sector
	promote creation of decent employment and diversification of the economy, including promotion of the green economy.	• The increasing need to implement innovative technology in the sector will have an impact in beneficiation as it would signify the need to manufacture technology locally and implementing that technology locally. This will then create employment opportunities for new entrants in the sector, employees that get retrenched, community members and upskilling existing employees. Therefore, qualifications will also need to be carefully scoped against these new developments with a longer-term view of the type of workforce in mind. • Considering that contemporary and future beneficiation trends indicate the dependence of employees with science technology engineering & maths (STEM) skills (science, technology, engineering and mathematics); supporting these skills will become a critical component of sustainable industrial development.
National Growth Path	• The New Growth Path is the government's vision to place jobs and decent work and has set a target of five million new jobs to be created by 2020. It calls for the need to improve skills in every job and targets 1, 2 million workers for certified on-the-job skills improvement programmes annually from 2013. • The MQA is required to facilitate and co-finance training for approximately 10% of the MMS workforce annually. • Focus is also placed in supporting beneficiation on the final manufacture of consumer and capital goods, which can create large-scale employment. • Furthermore, the growth path also requires a radical review of the training system to address shortfalls in artisanal and technical skills	• The NGP and beneficiation strategy are expected to help grow the diamond manufacturing industry. Thus creating employment opportunities. • This will also lead to the development of new entrepreneurs with the relevant skills to enable South Africa to become a jewellery hub. • In striving to achieve the mandate of the NGP, the MQA has funded learnerships and bursaries to learners studying towards mining related qualifications. Workplace exposure support has also been provided to learners and lecturers in the sector.
Industrial Policy Action Plan 2018/19	• IPAP plans to address the key challenges of economic and industrial growth and race based poverty, inequality and unemployment. • It aims at promoting investment by the private sector in new industrial capabilities. In mining, mineral beneficiation has been identified in IPAP as a key instrument for the industrialisation agenda.	• Mineral beneficiation is a crucial measure that could develop economic linkages between the primary agriculture, mining and manufacturing sectors to secure much greater downstream beneficiation and maximise upstream linkages. Such linkages would result in multi-sectoral skills transfer and will address high rates of unemployment in the country. • Currently, small jewellery manufacturing companies face challenges in gaining access to markets that support their outputs. There is a need for programmes that would foster the provision of demand side approaches and incorporate small companies with supply-side inputs. This can be achieved for example, through partnering with SADC regions as it had been recommended by stakeholders.

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning in the sector
		• The MQA could partner with the DTI to contribute in this area by organising trade fairs. The DTI could provide small companies with access to new markets, giving them an exposure to international design skills or accessing new designs and above their designing skills, trading skills. This can then be brought back to South Africa and transferred to emerging small companies.
The National Development Plan (NDP)	• The National Development Plan aims to eliminate poverty and reduce inequality by 2030. • It aims to improve education, training and innovation, provide learning opportunities through Community Education and Training Centres and support the development of specialised programmes in universities focusing on training college lecturers and provide funding for universities to conduct research on the vocational education sector.	• Currently the MQA funds learnerships, workplace experience programmes, internships and bursaries aimed at developing a pool of HET graduates to pursue careers in the MMS. This includes universities, university of technologies, CETs and TVETs. The MQA should continue providing this funding. • Considering the implementation of innovative technology in the sector, R&D support should be given to HET to adjust their curriculum to be in line with these new developments. • Considering the decline of some subsectors in the MMS, there is a need to develop linkages with other sectors other than mining to accelerate employment creation and accommodate those that lose their jobs due to retrenchments.
NSDP	• The NSDP was derived from the NDP and seeks to ensure that South Africa has adequate, appropriate and high quality skills that contribute towards economic growth, employment creation and social development. • The priorities that stand out in the NSPD for the MMS are as follows: ○ Identify and increase production of occupations in high demand ○ Linking education and workplace ○ Improving the quality of education, skills development and innovation ○ Support the growth of the public college system ○ Skills development for entrepreneurship ○ Support worker initiated training ○ Support career development service	• To address the key objectives of the NSDP, the MQA should establish credible skills planning measures through research to identify the skills that are needed in the sector and to develop interventions to address challenges in their supply. • There will be a need for the MQA to continue supporting: ○ Workplace experience programmes ○ Funding that support occupations in demand ○ Partnering with TVET and CET colleges ○ Small scale mining programme ○ Career guidance events at regional career expos and high schools ○ Management development programmes for the sector's employees • Furthermore, research should be conducted to ascertain the impact of technology in the sector.
HRD Strategy for South Africa	The HRD Strategy for South Africa specifies that SETAs are mandated to:	• There is a need to collaborate with the sector's key role players to address sector skills priorities

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning in the sector
	• Put in place a skills system that is effective in brokering partnerships to address priority skills needs in the economy • Expand in the provision of workplace training in priority skills needs, i.e. number of apprenticeship, learnership & internship opportunities created	• Support should continue to be provided to career awareness programmes, workplace exposure, learnerships, internships and artisan training for mining related occupations.

Table 2-1: Policy frameworks affecting skills demand and supply

In addition to the above mentioned policies and strategies is the National Youth Policy (NYP) 2015-2020 which states that the mining industry needs to work towards enabling more equity participation of black people, support youth-owned businesses through procurement and enterprise development, explore beneficiation as a tool for creating future industrialists, and use the employment equity legislative requirements to develop and mentor youth to strategic positions within mining companies. The White Paper sets out strategies to improve the capacity of the post-school education and training system to meet South Africa's needs. The skills implications for these policies is the need for the MQA to improve the capacity of post-school education through the provision of on-going support for bursaries, learnerships, internships, lecturers' workplace exposure and leaners' workplace experience programmes. Moreover, the National Environmental Management Act 107 of 1998 (NEMA) defines the national approach to environmental management and is aimed at promoting sustainable development of renewable and non-renewable resources. Given the existing environmental challenges facing the sector, there will be a need for the sector to align their practices with goals closely linked to achieving the development path of the green economy

2.1 Conclusions

Technological transformations remains at the forefront of the sector's ability to become as safe, healthy, efficient and sustainable as possible. The MMS presents a unique opportunity for a new industrialisation drive and advancement in the economy as a whole. This applies across the value chain: from mining equipment and services, to extraction, infrastructure development, beneficiation, skills development as well as research and development. Along with this, there are opportunities for more profound empowerment of the previously disadvantaged including unskilled and semi-skilled employees, females, communities and entrepreneurs. This however, this can only be achieved if the sector fully embraces technology and address energy and water crisis that are affecting mining operations.

With the developments brought on by the change drivers in the MMS, it will be prudent for the sector to consider how the demand profile of employees will change. While the education and training system may not be able to respond with perfect timing, understanding the different sets of skill that will be in demand in years to come provides a good starting point for planning. This is also accompanied with the need to consider interdisciplinary training that will allow students to develop skills and knowledge in a range of subjects even outside mining.

Chapter 3 : Occupational Shortages and Skills Gaps

This chapter focuses primarily on understanding the occupational shortages and skills gaps, the extent and nature of skills supply, as well as the sectoral priority occupations and Interventions (PIVOTAL).

3.1 Sectoral Occupational Demand

3.1.1 Hard-to-fill Vacancies

Hard-to-fill vacancies refers to occupations that an employer was unable to fill within 12 months or took longer than 12 months for the employer to find a suitably qualified and experienced candidates (DHET, 2019). The identified occupational demands and skills gaps were informed by the hard-to-fill vacancy and skills gap section of the submitted WSP and ATRs during the 2019 submission period. Employers are required to indicate reasons for the hard-to-fill vacancies for each occupation identified on the list.

The methodology used was a frequency run on occupations that employers listed as hard-to-fill then filtered by subsector and province to understand the sector's needs.

Table 3-1: Hard-to-fill vacancies

HTFV Occupation name	OFO Code	Vacancies	Reasons for Hard-to-fill
Mine Manager	2017-132201	8	Lack of relevant qualifications/Lack of relevant experience
Production Manager	2017-132201	7	Lack of relevant experience/Equity considerations/Lack of relevant qualifications
Engineering Manager	2017-214601	10	Lack of relevant experience/Equity considerations
Mechanical Engineer (Mines)	2017-214401	9	Equity considerations/Lack of relevant qualifications/Lack of relevant experience
Mining Engineer	2017-214601	7	Lack of relevant experience/Lack of relevant qualifications
Occupational Hygienist	2017-226302	7	Lack of relevant qualifications/Absolute lack of skilled people/Lack of relevant experience
Mine Overseer (Production)	2017-312101	7	Lack of relevant experience/Lack of relevant qualifications
Diesel Mechanic	2017-653306	11	Lack of relevant qualifications/Lack of relevant experience
Fitter and Turner	2017-652302	7	Lack of relevant experience/Equity considerations
Auto Electrician	2017-671208	7	Lack of relevant experience/Lack of relevant qualifications

Source: Weighted MQA WSP/ATR (31 May 2019)

The table above shows the top ten occupations which employers identified as hard-to-fill in the WSP/ATR submissions by OFO code order, with the accompanying reasons and their number of vacancies.

An analysis of the expert interviews conducted across the subsectors using the DHET interview guide revealed at a large extent a confirmation of the table above. The only subsector that seems to not experience a challenge in filling vacancies is Diamond Processing.

3.1.2 Skills Gaps

Skills gaps refers to skills deficiencies in employees or the lack of specific competencies by employees to undertake job tasks successfully required by industry standards. Skills gaps may arise due to the lack of training, new job tasks, technological changes, or new production processes. According to the DHET, the term "top up skills" also refers to skills gaps. Skills gaps usually requires short training interventions (DHET, 2019).

Table 3-2: Skills gaps by major occupational level

Major Occupation Group	Occupation name	OFO Code	#Mentions	Most common skills gaps
Technicians and Associate Professionals	Shift Supervisor (Mining)	2017-312101	28	Leadership, Supervisor, Planning and organising
	Engineering Foreman	2017-312103	24	Leadership, Supervisor, Communication - written
	Shift Foreman / Boss (Mining)	2017-312101	20	System Skills, Planning and organising, Leadership
	Mining Operations Supervisor	2017-312101	18	Leadership, Supervisor, Mine production process
	Production / Operations Supervisor (Manufacturing)	2017-312201	15	Technical - job-specific, Supervisor
	Production Plant Supervisor	2017-312201	15	Supervisor, Planning and organising, Problem-solving
	Engineering Supervisor	2017-312103	13	Technical - job-specific, Supervisor, Problem-solving
Trades Workers (Artisan category)	Diesel Mechanic	2017-653306	26	Technical - job-specific
Plant and Machine Operators and Assemblers	Drill Rig Operator	2017-711301	15	Technical - job-specific, Occupational health & safety skills, Mine production process
Elementary Occupations	Mining Support Worker	2017-831101	16	Occupational health & safety skills, Active Learning, Active Listening

Source: Weighted MQA WSP and ATR (31 May, 2019)

As shown in table 3-2, Diesel Mechanic features on both the hard-to-fill vacancies and the top-up skills. The top up skills needed the most across all occupations above are the following:

- Leadership - The process of influencing others to understand and agree what needs to be done, how to do it as well as the process of facilitating individual and collective efforts to accomplish shared objectives.
- Technical (job-specific) - Applying principles, techniques, procedures, and equipment specific to the job.
- Supervisor - Monitors and regulates processes and employees in their performance of assigned or delegated tasks.

This section was crossed checked against the analysis of the expert interviews conducted across the subsectors using the DHET interview guide.

Findings revealed that the most common skills gap related to 'Technical' which falls into the category listed above as Technical (job-specific) - Applying principles, techniques, procedures, and equipment specific to the job.

3.2 Extent and Nature of Supply

The future growth prospects of a sector is 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 Minerals Council South Africa on education and training was analysed. Findings from the key informant and expert interviews as well as desk research were included in this section.

3.2.1 Current state of education and training provision

Skills development has a huge dependence on basic education as a foundation phase to enable individuals to move into further areas of education and training. Similarly to other economic sectors; skills required for the MMS are produced at basic education level, TVET colleges, through private Training Providers, Universities of Technology, Universities as well as workplaces.

3.2.1.1 Overview of Basic Education

The skills available to the sector consist of people that are 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 (48%) have achieved the equivalent of Grades 10 - 12 as their highest level of education. In 2018, South Africa achieved a 78.2% matric pass rate (DBE, 2019). From this pool of matriculants, a small number of them wrote mathematics (UCT, 2019). Time and again learners choose Mathematics literacy over pure Mathematics (DBE, 2019). For learners who aspire to study towards STEM professions that require a strong knowledge of maths, this becomes problematic should they wish to switch careers at a later stage (ibid). In the MMS specifically, many occupations require a foundation of good quality Maths and Science subjects and to some extent Geography.

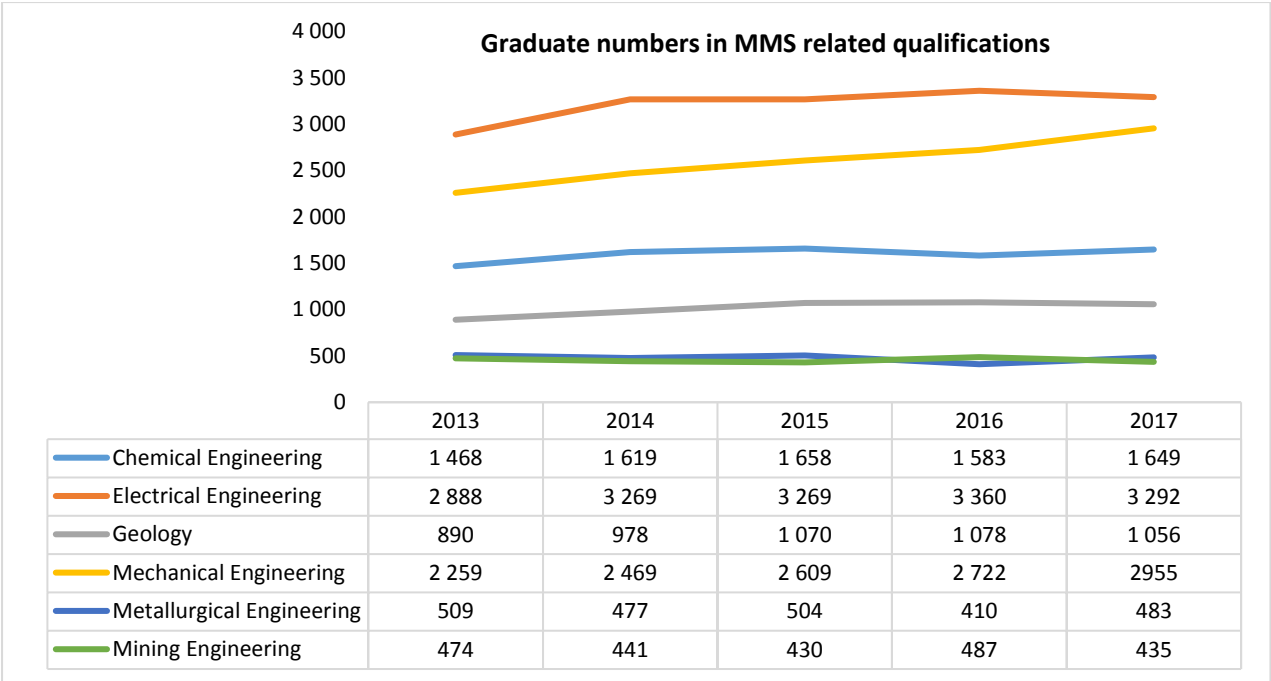
Another challenge is that school integration has been a persistent challenge for many rural provinces and a fair portion of the Department of Basic Education's budget is channelled to rural school integrated (ibid). The NDP calls for 450 000 Grade 12 learners to achieve university entrance passes with Maths and Physical Science by 2030. 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. According to academics, there is a need to focus on interventions that will promote the core business of teaching and learning itself – a curriculum that will be flexible to accommodate diversity teaching that actively engages learners and assessments that do not only test but promotes learning (UCT, n:d). On the other hand, the MQA should continue to provide support to programmes aimed at improving this challenge.

3.2.1.2 Higher Education and Training

Higher education and training or tertiary education, includes education for certificates, diplomas as well as undergraduate and postgraduate degrees. In recent years, more school-leavers have been obtaining marks that enable them to enrol for studies at university level – however, owing to the poor Maths and Science pass marks in the country, the uptake for the sector itself remains relatively low.

At tertiary level, some of the fields of study relevant to the sector are mining engineering, mine surveying, metallurgy, chemical engineering, geology, electrical engineering, mechanical engineering, as well as jewellery design and manufacturing. Mining engineering is offered at the University of the Witwatersrand, the University of Pretoria, the University of Johannesburg, and University of South Africa (UNISA), while Mine Surveying is only offered at the University of Johannesburg and UNISA. Jewellery design and manufacturing is offered at Stellenbosch University and at four other Universities of Technology. The other fields of study are each offered at a number of institutions. Figures 3-1 and 3-2 demonstrate a 5 year trend of the number of graduates enrolled and completed core mining related qualifications.

Figure 3-1: Graduates that completed a MMS related qualification

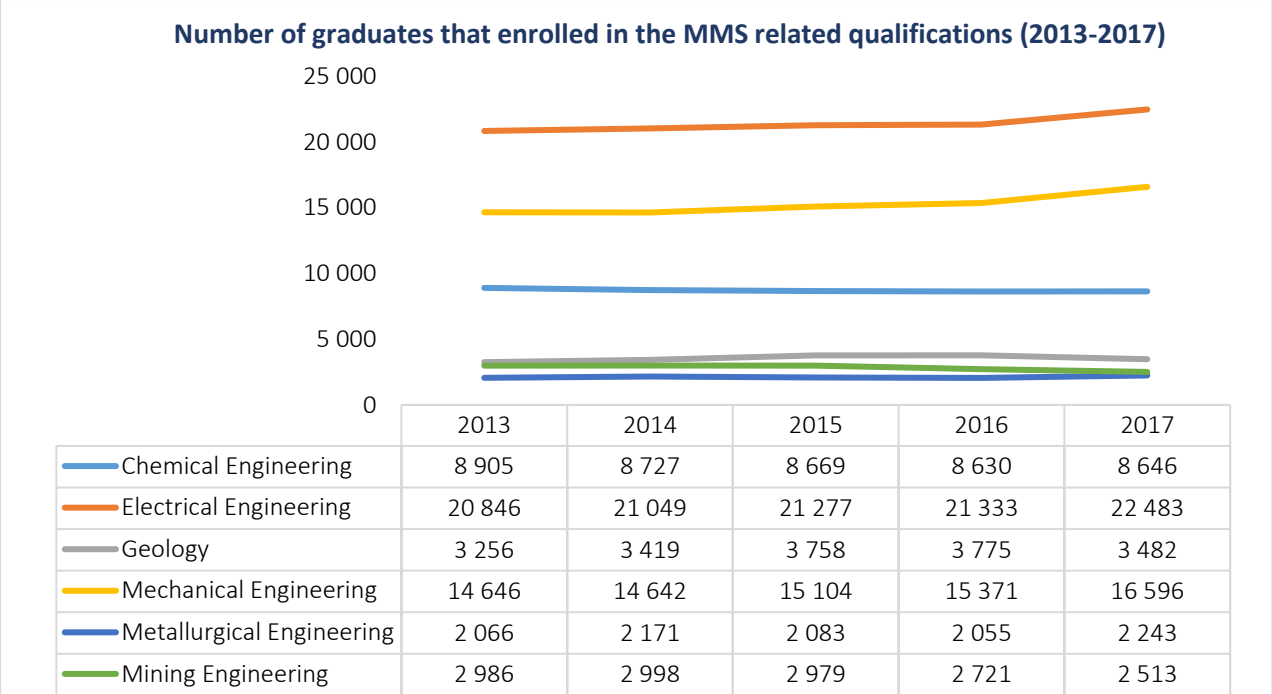


	2013	2014	2015	2016	2017
Chemical Engineering	1 468	1 619	1 658	1 583	1 649
Electrical Engineering	2 888	3 269	3 269	3 360	3 292
Geology	890	978	1 070	1 078	1 056
Mechanical Engineering	2 259	2 469	2 609	2 722	2955
Metallurgical Engineering	509	477	504	410	483
Mining Engineering	474	441	430	487	435

Source: DHET, HEMIS Data (2019).

Electrical engineering (3292 in 2017) continues to have the highest output, followed by mechanical engineering (2955 in 2017) and chemical engineering (1649 in 2017). Mining engineering graduates decreased from 487 in 2016 to 435 in 2017, this discipline has been cited as a hard to fill vacancy.

Figure 3-2: Graduates that enrolled in a MMS related qualification



	2013	2014	2015	2016	2017
Chemical Engineering	8 905	8 727	8 669	8 630	8 646
Electrical Engineering	20 846	21 049	21 277	21 333	22 483
Geology	3 256	3 419	3 758	3 775	3 482
Mechanical Engineering	14 646	14 642	15 104	15 371	16 596
Metallurgical Engineering	2 066	2 171	2 083	2 055	2 243
Mining Engineering	2 986	2 998	2 979	2 721	2 513

Source: DHET, HEMIS Data (2019).

The figure above demonstrates a 5 year trend of the number of graduates who enrolled into a qualification related to the MMS. The pipeline for supply of MMS related qualifications have shown an across the board increase in enrolments since 2016 aside from mining engineering and mechanical engineering which poses a concern for the sector.

3.2.1.3 Bursaries funded by employers to employees

Table 3-3: Employee bursaries funded by employer

Bursary Type	No of bursaries	% contribution
Other (non-mining related)	1310	93,3%
Mining Engineering	32	2,3%
Analytical Chemistry	16	1,1%
Electrical Engineering (Heavy Current Only)	10	0,7%
Chemical Engineering (Mineral Processing)	9	0,6%
Metallurgy	7	0,5%
Environmental Health and Management	6	0,4%
Electro Mechanical Engineering	4	0,3%
Geology	4	0,3%
Extraction Metallurgy	2	0,1%
Mine Survey	2	0,1%
Industrial Engineering	1	0,1%
Jewellery Design	1	0,1%
Total	**1404**	**100%**

Source: MQA WSP/ATR 31 May 2019.

The top three bursaries provided by the employers to their employees within the MMS, aside from "other", are mining engineering (2, 3%), analytical chemistry (1, 1%) and electrical Engineering - Heavy Current Only (0, 7%).

Table 3-4: Community bursaries funded by employers

Bursary Type	No of bursaries	% contribution
Other	245	58,3%
Mining Engineering	33	7,9%
Electrical Engineering (Heavy Current Only)	32	7,6%
Geology	22	5,2%
Chemical Engineering (Mineral Processing)	18	4,3%
Electro Mechanical Engineering	17	4,0%
Environmental Health and Management	12	2,9%
Metallurgy	10	2,4%
Mine Survey	9	2,1%
Extraction Metallurgy	5	1,2%
Analytical Chemistry	4	1,0%
Industrial Engineering	4	1,0%
Mechanical Engineering	3	0,7%
Community Study Assistance	1	0,2%
Electrical Engineering	1	0,2%
Metallurgical Engineering (Extractive Only)	1	0,2%
Partial BCom Commercial Law	1	0,2%
Physical and Mineral Science	1	0,2%
Scholarship	1	0,2%
Total	**420**	**100%**

Source: MQA WSP and ATR 31 May 2019.

The top three bursaries funded by employers in the MMS to individuals who are not their employees, aside from "other", are mining engineering (7,9%), electrical Engineering - heavy current Only (7,6%) and geology (5,2%).

3.2.2 MQA's interventions to address Skills Supply in the MMS

3.2.2.1 MQA's interventions to address challenges at basic education level

The MQA, alongside the MMS have been developing skills interventions over the past years to meet the skills needs of the sector at various levels of education.

Employees whose highest level of education are between Grades 4 and 9 constitute 14% of the sector. This range includes AET levels 1–4. As discussed in Chapter two, given the influence of technology in the sector, there is a need for reskilling some of the current and future employees in areas such as machine operations and maintenance. Thus, it will be important for the MMS to prioritise funding for AET training, including level 4, also taking into account that numeracy and literacy skills that were identified by stakeholders as skills that need to be topped up for elementary workers. The objective of AET is to support employers to participate in AET training to progressively increase levels of literacy in the MMS. By so doing, this will

help develop adequate literacy and numeracy levels for the sector's emerging skills requirements. In 2018/19 a total of 831 employees received one or more AET training.

3.2.2.2 Career Guidance

Career guidance is a process of self-discovery that helps learners identify what they are good at, understand how their skills, talents, and interests translate into work and find the education and training they need to work in the existing job market. In 2018, the MQA increased its commitment to undertake 83 career awareness events exceeding its target of 70. This is in line with the NSDP's requirement to support career development services in the sector. The aim of the career awareness events are to promote occupations in the sector through the dissemination of comprehensive information related to careers and pathways to attract quality candidates for mining careers. In light of the current acute shortages in the sector, focus should also be placed on the retention and further development of learners' talent in the industry upon entering the market. The programme is also targeted at rectifying misperceptions about the MMS not being an attractive industry to work in.

3.2.2.3 TVET college sector

TVET colleges form a critical component of the current training capacity of skills for the sector. Their programmes include NCV, Nated (mainly for artisan development), skills programmes, learnerships and short courses. The majority of 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.

There are still concerns by stakeholders that many students are not adequately work-ready upon graduating, particularly artisans. This is derived from the notion that many college workshops are not equipped with modern equipment to adequately provide practical training required for the completion of qualifications. While employers in the sector appreciate the need to carry a measure of responsibility for training graduates to develop industry-specific skills, there is a need for curricula to be revised and updated with the latest technologies currently being used in the sector.

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

3.2.2.3.1 Employed and unemployed learnerships (Non-apprenticeship)

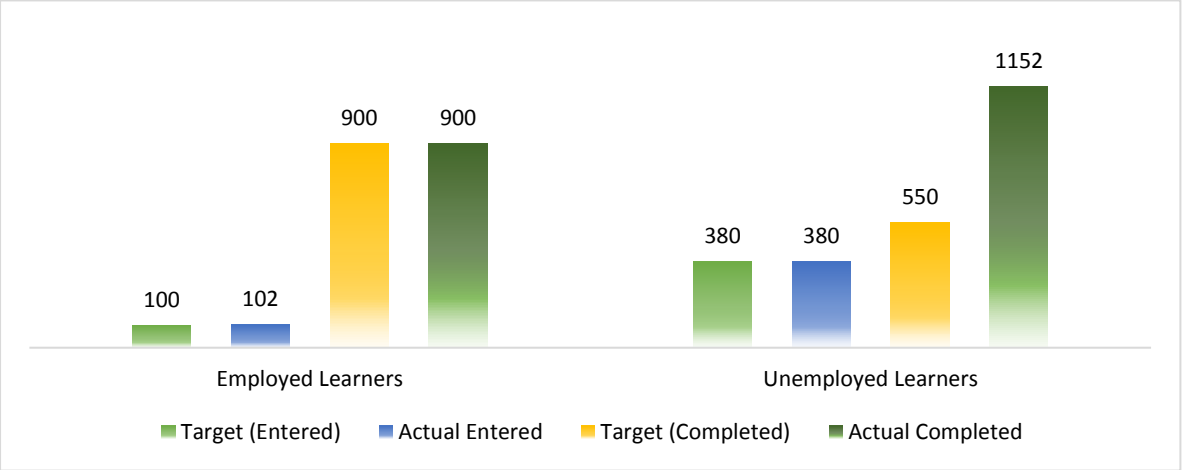


Figure 3-3: Employed and unemployed learnerships (Non-apprenticeship) *Source: MQA APR (June, 2019)*

The above figure illustrates the number of employed and unemployed learners that entered a learnership in 2018. The HRD Strategy for South Africa, NGP and NSDP emphasise the provision of workplace training in priority skills needs that could be in the form of learnerships. The MQA had a target of 100 learnership entries for employed learners and 380 for unemployed learners. The targets for the two cohorts were achieved. On the other hand, targets for completions was achieved for employed learners, whilst those of unemployed learners was over achieved. The exceeded targets can be attributed to learners from previous years completing their programmes in the 2018/19 financial year. The purpose of these learnerships is to enrol learners into core learnerships for the MMS. For those that are employed, these learnerships play an important role in advancing employees' careers, leading to qualifications recognised by the SETA and DoL.

In assessing the top 3 programmes completed, unemployed learners tend to complete programmes that are linked to beneficiation, whilst employed learners are mostly involved in core mining programmes as can be seen in the table below.

3.2.2.3.1 Top 3 Programmes completed by unemployed and employed learners by order

Employed Learners	Unemployed Learners
1. Occupational Health, Safety & Environment	1. National Certificate in Jewellery Manufacturing
2. National Certificate Mining Operations for Underground Hard Rock	2. National Certificate Diamond Processing
3. National Certificate Rock Breaking Underground Rock	3. National Certificate Occupational Health, Safety & Environment

Table 3-5: Top 3 programmes completed by unemployed and employed learners

Source: MQA APR (June, 2019)

3.2.2.3.2 MQA learnerships (apprenticeship)

The lack of skilled artisans is argued to be one of the major obstruction to employment creation and economic growth in South Africa. The MQA Artisan (apprenticeship) Development Projects' targets are set by the Department of Higher Education and Training and support the HRD Strategy for South Africa, the IPAP2, NGP, the NSDP and Chapter 9 of the NDP to produce artisanal and technical skills annually. In light of this requisite, figure 3-3 illustrates that the MQA set a target to enter 275 learners into an artisan programme in which it was exceeded at 320. The top 3 fields that learners entered were electrician (57), followed by fitter (49) and welder (45). In addition, the target for completions was also achieved at 1306 from a target of 1300. Similarly as the programmes entered, the top programmes completed were electrical (290), fitting (including machining) -282 and diesel mechanic (178).

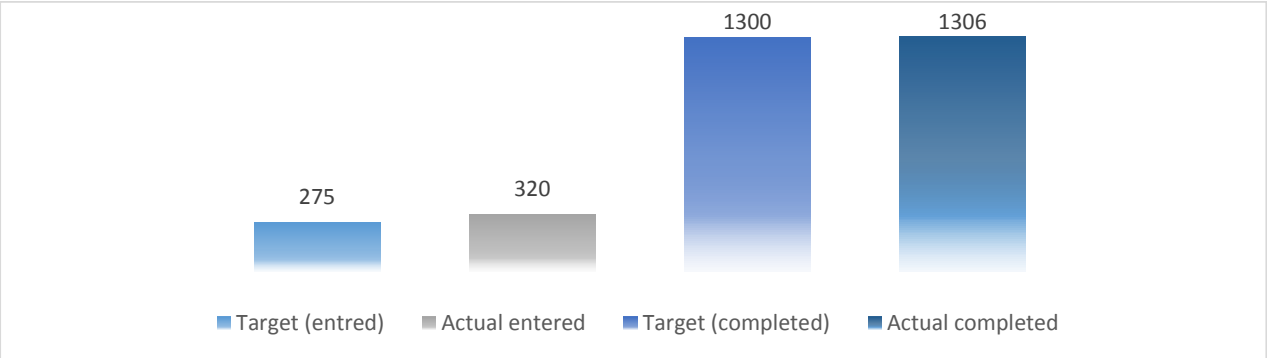


Figure 3-4: Apprenticeship entered and completed (2018/19)

Source: MQA APR (June, 2019)

It is encouraging to note that the MQA's support in artisan development is in line with the national demand as these apprenticeships appear on the DHET's 2018 national list of occupation in high demand. However, competition with other sectors for artisans as well as an uncertainty of job attainment in the MMS after completion still denotes that not all artisans developed within the MMS will be absorbed.

Moreover, as reported in Chapter 2, technology continues to play a role in shaping the skills sets in the sector. With this accounted for, stakeholders in the MMS still maintain 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 occupations and include work experience at suppliers of new technology to the mines as much as possible.

3.2.2.3.3 Practical training and workplace exposure

Outcome 2 of the NSDP articulates the need to link education and the workplace. SETAs can facilitate and broker the linkages between the labour market, employers and sectors with the education and training institutional supply such as Universities, Universities of Technology, TVET and CET colleges (NSDP, 2019).

In 2018/19 a target was set to place 100 TVET NCV graduates to enter a work placement programme with host employers. This target was met at exactly 100 entered TVET NCV graduates. The completion target for the work placement programme at TVET colleges was also achieved at 126 from a target of a 100. On the other hand, work exposure is also provided to university undergraduate students. Their entry targets (300) were higher than those of TVET college students. From this target, 93% (279) was achieved. Similarly, the completion target was not achieved, with a shortfall of 60%- 139 graduates completed as opposed to the 350 target. The non-achievement in the number of undergraduates entering a workplace experience programme could be attributed to challenges experienced in securing sufficient and available workplaces to host new learners. In terms of completion targets, there was an insufficient pipeline of learners from previous years completing the programme in 2018/19, hence the target was not achieved.

Moreover, the MQA and universities have identified the need to form a strategic collaboration to achieve employment equity and transformation within universities' mining engineering and mine survey departments. The collaboration seeks to achieve sustainable, high quality mining education in support of the transformation agenda of the government and the MMS through creating a pool of skills and promote interest in academia among HDSAs. It also aims to empower universities to transform and to be representative in its lecturer staff complement. In 2018/19, the target to place 30 lecturers in the programme was met at exactly 30. The lecturers all fall under the same NQF band level 6-10.

3.2.2.4 MQA interventions at HET level

The MQA bursary scheme contributes to the skills transformation agenda and was established to provide financial assistance to students from previously disadvantaged backgrounds and to increase the number of students pursuing careers in the MMS. To date the bursary scheme continues to assist students by offering them the opportunity to study mining related careers at HET institutions. The bursary support programme also forms part of the MQA learner support strategy, which is in line with the Mining Charter, 2018 and the objectives of the NSDP.

In previous years, bursaries were mainly targeted at unemployed students. However, due to the demand by the sector to promote transformation and the need to support employees with competencies that endorse upward career progression, in 2018 the MQA started providing bursaries aimed at employees. The bursaries are awarded to individuals who are currently employed in mining companies and studying or intending on studying towards a mining related qualification, be it a Certificate/Diploma/Degree/Postgraduate.

3.2.2.4.1 Bursaries awarded to employees

A target of 50 employee bursaries was set, however, 31 were awarded. This was due to the reason that this was a new indicator and thus, there were insufficient applications received and some of the approved applicants declined the bursary offer at the last minute. To improve this, the MQA plans to create further awareness of this opportunity and strengthen its advocacy in the sector to increase responsiveness by employees.

3.2.2.4.2 Unemployed bursaries and entered and completed

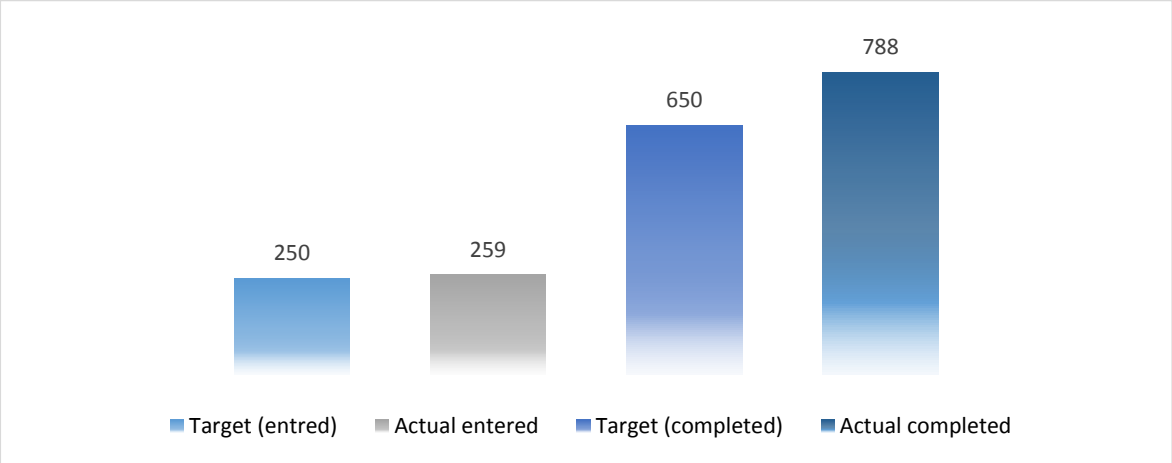


Figure 3-5: Unemployed bursaries entered and completed *Source: MQA APR (June, 2019)*

It is encouraging to note that targets set for unemployed bursaries entered and the number of learners that entered and completed a bursary programme were met. Albeit targets were achieved, the targets for bursary entries was reduced in comparison to last year's 1000.

The lessening of all the MQA's targets were due to the unavailability of financial resources in 2018. However, the SETA anticipates expanding the support of its transformation interventions when its financial position improves.

3.2.2.5 Other MQA interventions

In furtherance to its support to work-based skills development programmes, the MQA also provides access to economic opportunities to mine communities and labour sending areas. Supporting mining communities enables mining companies to fulfil their transformational mandate through skills development and places them in enhanced positions to manage any skills gap issues that lead to unemployment in those communities.

The sections below provide the targets and achievements of the MQA's support to youth development and small-scale mining in mine communities.

3.2.2.5.1 Youth Development and Mine Community Programme

The youth development programme aims at providing training to unemployed youth living in mine communities and labour sending areas with the aim of furnishing them with alternative skills which could enhance entrepreneurial skills post mining activities. A total 201, out of a target of 150 youth in mining communities and labour sending areas entered the youth development programme in 2018/19, whilst 161 out of a target of 100 youth completed the programme in the same financial year. The top 3 youth development programmes were in plant production NQF Level 1, electrical and plumbing. All targets for the youth development programme were exceeded due to the high demand of the programme amongst community members.

Furthermore, the mine community development programme is similar to the youth development programme, with the difference being that it provides training to a broader population, i.e. women, retrenched individuals and people living with a disability from mining communities and labour sending areas. The programmes provides support on portable skills and mining related programmes to retrenchees and unemployed individuals to enable employability and sustainability of the livelihoods of beneficiaries. The MQA set a commitment of a 100 training programmes each for both entered and completed mine community beneficiaries. Both targets for entered and completed beneficiaries were exceeded, with the latter achieving 312 and former 151. Similarly as the youth development programme, this was also due to the high demand of the programme amongst community members.

3.2.2.5.2 Support for small-scale mining skills

As seen in Chapter 1, small mines are well represented in the MMS. However, although represented, small-scale mining companies experience challenges with sustainability attributed to the capital intensive nature of the industry as well as broader market dynamics. Therefore, it is imperative to support these companies to develop a path that will empower them to perform efficiently. In its efforts to mitigate some of these challenges, the MQA has a programme aimed at training communities in small-scale mining. In the year 2018/19, a total of 60 beneficiaries participated in the small-scale mining programme. The support of small-scale mining skills is in line with outcome six of the NSDP which aims to increase skills development support for entrepreneurial activities and the establishment of new enterprises and cooperatives**.**

3.2.2.6 MQA-accredited Training Providers

A total of 229 from a target of 200 training providers were accredited by the MQA in the financial year 2018/19- exceeding the previous financial year's 123 accredited provided. This ensures that there is a pool of accredited training providers to offer MMS related qualifications. It also confirms the level of proficiency and quality of training undertaken for current and future employers.

3.2.3 Other supply-side considerations in the MMS

The following two sections provide details on other supply offerings which do not fall into any of the afore-mentioned education echelons, namely Government Certificates of Competency, Minerals Council South Africa certificates and management skills.

3.2.3.3 Government Certificates of Competency

Certain core occupations within the MMS, such as Mine Engineer and Mine Manager can only operate upon attainment 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 to qualify for a GCC. The table below shows the number of certificates which the DMR has issued in the past seven years. There was an increase in the number of GCCs issued for all certificates between financial years 2017/18 and 2018/19, except Mine Surveyor. Although there was an increase in certificates issued for Mine Engineer and Mine Manager, their low numbers remain a worrying factor as they are identified as a hard-to-fill occupation. In addition, although not major, there were slight improvements of females that attained GCC certificates in 2018-2019 compared to 2017-2018. This could indicate that some progress is being made to ensure transformation in the sector, although further improvements still need to be made.

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
2017-2018	47	39	8	27	22	5	76	65	11	11	9	2	20	11	9
2018-2019	68	56	12	49	36	13	104	83	21	7	4	3	36	21	15
Total	591	505	86	284	222	62	807	732	75	74	60	14	228	126	102
%	100%	85,4%	17,0%	100%	78,2%	27,9%	100%	90,7%	9,3%	100%	81,1%	18,9%	100%	55,3%	44,7%

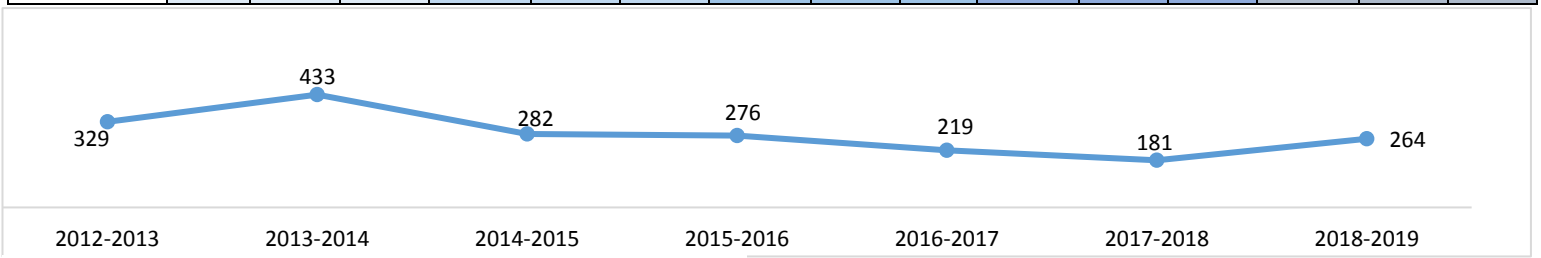


Table 3-6: 2018 DMR GCC issued certificates

Source: DMR, 2019

The MQA needs to work in collaboration with the DMR to implement supportive measures that will improve the pass rates of GCC candidates.

3.2.3.4 Minerals Council South Africa certificates

The table below demonstrates the number of certificates in MMS-related qualifications which the Minerals Council South Africa has issued since 2012. The Minerals Council South Africa Certificates of Competency (CoCs) were introduced to standardise stand-alone in-house qualifications for persons working in the South African MMS. The numbers have been declining significantly for most certificates, with the exception of intermediate certificate in mine environmental control and rock mechanics which have shown overall growth. These are attributed to some certificates phasing out to QCTO qualifications.

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	As at July 2017	As at Dec 2017	As at July 2018	As at Dec 2018
Certificate in Advanced Mine Surveying	70	58	91	57	6	54	19	19	17	19	20
Certificate in Advanced Mine Valuation	102	66	75	38	16	38	10	29	8	8	8
Certificate in Advanced Rock Engineering	11	3	4	4	3	5	1	3	0	5	3
Certificate in Basic Mine Sampling	141	63	164	80	43	73	26	50	28	47	12
Certificate in Basic Mine Surveying	130	142	156	77	66	120	14	42	19	40	58
Certificate in Elementary Mine Sampling	90	73	64	52	35	31	26	24	92	5	6
Certificate in Elementary Mine Surveying	130	88	141	95	25	46	46	24	9	29	39
Certificate in Mine Environmental Control	19	8	29	8	4	15	6	10	9	9	12
Certificate in Radiation Protection Monitoring Screening	125	109	181	61	41	108	37	63	32	61	34
Certificate in Rock Mechanics	27	25	25	16	2	12	14	11	6	6	25
Certificate in Strata Control	79	64	96	61	10	50	49	29	67	19	13
Intermediate Certificate in Mine Environmental Control	32	48	51	59	1	51	13	40	72	53	69
Certificate in Mine Survey Draughting	22	40	30	12	1	15	11	8	7	2	11
TOTAL	**978**	**787**	**1 107**	**559**	**253**	**618**	**272**	**352**	**366**	**303**	**310**

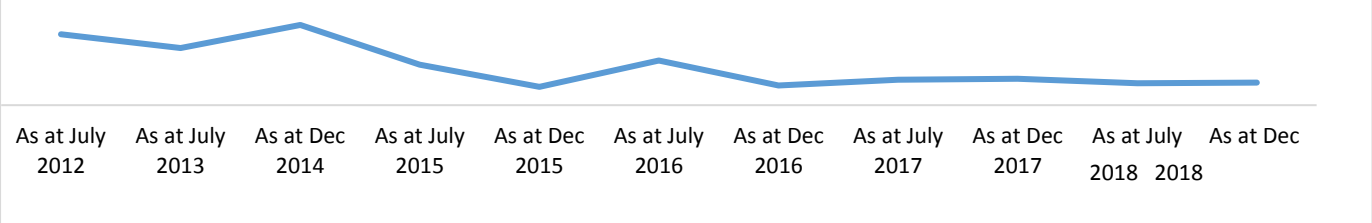


Table 3-7: Minerals Council South Africa certificates issued in 2018

Source: MCSA, 2019

3.2.3.5 Management skills

Technical individuals, 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 employees with a combination of senior technical knowledge and strong management skills which can negatively affect productivity and internal relations. Stakeholders believe that the best place to develop these skills is 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 80 HDSA employees who entered this programme was not achieved in 2018 with 76 HDSA MMS employees completing a management development program. This was due to an insufficient pipeline of learners from previous years completing training in the current year.

3.3 Sectoral Priority Occupations and Interventions (PIVOTAL)

The research study was designed to be as interactive as possible in the facilitation of the entire research process. Therefore, a consultative participatory approach with the MQA management and sub-Board Committee was used to inform and finalise the most appropriate methodology to develop the MQA Pivotal list. Once all parties were in agreement with the methodology, the PIVOTAL list was sent to the Board where endorsement was made in favour of it.

Through the consultation process, the MQA's OFO Code PIVOTAL Skills List in Table 3-8 was determined by considering the hard-to-fill vacancies reported in the WSP/ATRs. The analysis entailed a frequency run of the top 10 most identified occupations by companies through the WSP/ATR submissions. This was then cross- tabulated by provinces and subsectors to identify the frequency of mentions per occupation within 2 variables (province and subsector). Thereafter, the sum of province and subsector were calculated to develop the top 10 PIVOTAL occupations for the MMS.

It is important to note that since the PIVOTAL list is OFO code-based, it is not possible to reflect other critical priorities within the occupation due to the limitations with the reporting framework. For example, AET, MDP, 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 also applicable. Considering this, and that PIVOTAL skills are required to address skills gaps, the research team chose to focus its PIVOTAL list on occupations which were identified as hard-to-fill vacancies 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. The PIVOTAL list is ranked in order of OFO code according to advice by key stakeholders in the sector, including representatives of the industry, labour and government.

Table 3-8: MQAs' OFO Code Based Pivotal List (2020-21)

Occupation name	OFO Code	No. of hard-to-fill vacancies
Mine Manager	2017-132201	8
Production Manager	2017-132201	7
Engineering Manager	2017-214601	10
Mechanical Engineer (Mines)	2017-214401	9
Mining Engineer	2017-214601	7
Occupational Hygienist	2017-226302	7
Mine Overseer (Production)	2017-312101	7
Diesel Mechanic	2017-653306	11
Fitter and Turner	2017-652302	7
Auto Electrician	2017-671208	7

Source: MQA Weighted WSP/ATR (31 May 2019)

3.4 Conclusions

The analysis of the MQA's WSP/ATR submissions and discussions with stakeholders indicated that the hard-to-fill occupations are as follows:

Mine Manager, Production Manager, Engineering Manager, Mechanical engineer (Mines), Mining Engineer, Occupational Hygienist, Mine Overseer (Production), Diesel Mechanic, Fitter and Turner, and Auto Electrician. The reasons accounting for these vacancies ranged from individual, organisational and supply side levels. At individual level, reasons include lack of relevant qualifications and a lack of relevant experience, whilst organisational reasons were attributed to equity considerations. Efforts to address the challenge should not be isolated but well-coordinated and integrated to develop a holistic approach that involves a wide range of social partners.

The main supply-side concerns were found to be as follows:

- Basic education: low Maths and Science levels; and lack of early access to career awareness.
- TVET college sector: lack of practical training and workplace experience at colleges and low throughput rates.
- HET sector: sector still lagging behind in attracting females to critical mining qualifications.
- Other (not specific to a level of education): lack of specialised knowledge and experience in updated and new technology; lack of work experience; lack of management for core MMS-related occupations.

Chapter 4 : SETA Partnerships

4.1 Introduction

The purpose of this chapter is to evaluate the effectiveness of existing SETA partnerships in the sector with particular reference to value-adding partnerships. The Chapter identifies the status of existing partnerships in terms of their objectives, challenges experienced, their successes and areas of improvement to ensure their efficiency. In addition, the Chapter also provides an overview of planned partnerships for the 2020-25 cycle. Drawing on the failures and areas of improvement required for the efficacy of the different partnerships, a model for a successful partnership was developed as a proposal to ensure success of future partnerships. The model is elaborated further in the chapter.

4.2 Existing SETA Partnerships

4.2.1 Partnership with TVET and CET Colleges

According to the National Skills Development Plan (NSDP) 2030, Government Gazette No.42290, 7 March 2019, SETAs have a crucial role to play in facilitating workplace learning partnerships between employers and sectors within the education and training institutional supply. In its mission to create a linkage between education and the workplace, the MQA entered into a number of partnership agreements with TVET and CET colleges.

4.2.1.1 TVET Lecturer Support: Workplace Exposure

Continuous concerns have been raised by the industry that TVET college graduates have limited knowledge of industry specifics. Further to this, key informant interviews revealed that there are discrepancies between what is taught at colleges and what the industry requires from graduates. One of the reasons relating to this is the notion that lecturers at TVET colleges often possess the theoretical knowledge and lack the relevant practical experience such as the use of updated and new technology. In 2017-18, the MQA concluded Memorandum of Agreements (MoAs) with a number of companies for the purpose of placing lecturers for workplace experience. The **nature** of this partnership enables the parties involved to sign a 1 year contract, with the intention of placing lecturers at workplaces for a period of 3 months. In addition to this, tripartite contract agreements were signed between the MQA, lecturers as well as the following TVET colleges;

1. Goldfields TVET College
2. Sekhukhune TVET College
3. Mopani TVET South East TVET College

The **objective** of these partnerships is to improve the quality of teaching and learning at TVET colleges. To achieve this, the MQA facilitates access to industry for lectures to gain relevant workplace exposure. In addition to the work exposure, lecturers are also provided with progressive training interventions in the form of top-up skills such as assessor and moderator training. Through this partnership, the MQA plans to support 30 HDSA TVET lecturers for the 2019-20 period. This partnership adds **value** to the MMS by bridging the gap between education and the workplace. The partnership also speaks to sub-outcome 2.1 of the NSDP which places emphasis on opening workplace based learning opportunities in increasing the number of TVET lecturers exposed to the workplaces. Consequently, this improves the quality of learning by equipping learners with the relevant skillsets and therefore, increases prospects of employment.

4.2.1.2 CET and TVET Capacity Building and Accreditation

The MQA has existing partnership agreements with 26 TVET and 7 CET colleges across all the nine provinces of South Africa. This partnership is in line with the DHET's mandate to build the capacity of colleges. The **nature** of this partnership is structured in a way that allows the parties involved to sign a 1 year contract, while training is usually conducted over a period of 6 months or more.

All the partnership agreements share the same **objective,** which is to provide training interventions to CET and TVET employees or council members on corporate management and governance as well as assessor and moderator training. This is aimed at improving the TVET college management and governance systems as well as the quality of teaching and learning. This partnership adds **value** by closing some of the gaps experienced within the TVET and CET colleges, such as issues pertaining to governance, management and accreditation.

Below is a list of the names of TVET and CET colleges that the MQA currently has a partnership with for capacity building accreditation:

Colleges		
Province	**Name of CET**	**Name of TVET**
Gauteng	Gauteng CET College	Ekurhuleni East TVET College
Eastern Cape	Eastern Cape CET College	Buffalo TVET College
		King Sabbath Dalindyebo TVET College
North West	North West CET College	Vuselela TVET College
		Orbit TVET College
Western Cape	Western Cape CET College	West Coast TVET College
		College of Cape Town
		False Bay TVET College
Free State	Free State CET College	Maluti TVET College
		Gold fields TVET College
		Motheo TVET College
		Flavius Mareka TVET College
Kwazulu-Natal	Kwazulu-Natal CET College	Majuba College
		Coastal KZN TVET College
		Umfolozi TVET College
		Elangeni TVET College
Limpopo	Limpopo CET College	Vhembe TVET College
		Mopani South East TVET College
		Sekhukhune TVET College
		Capricorn TVET College
		Waterburg TVET College
		Letaba TVET College
Northern Cape	N/A	Northern Cape Urban TVET College
		Northern Cape Rural TVET College
Mpumalanga	N/A	Nkangala TVET College
		Gert Sibande TVET College

Table 4-1 - TVET & CET Capacity Building and Accreditation

4.2.1.3 Successes, Failures and Improvement Areas for partnership with TVET and CET colleges

Partnerships		
Indicators	**TVET Lecturer Support: Workplace Exposure**	**CET and TVET Capacity Building & Accreditation**
Successes	• In 2017-18 a target of 30 lecturers was set, 64 lectures participated in this programme.	• Most of the partnership agreements, whose purpose was amongst others, to train lecturers in assessment and moderation, train unemployed youths, fund maths programmes, and place 100 learners on-the-job for work exposure have achieved their targets. • The training provided for TVET employees and/or council members is coordinated by the MQA through its supply chain processes. This ensures the appointment of accredited and suitably qualified service providers to deliver training.
Failures	• The challenge experienced in facilitating this programme was the availability of lecturers. The colleges struggled to release lecturers for workplace exposure due to a lack of financial resources to temporarily replace them. Alternative measures were offered to place them for work exposure and training during school holidays. • There was also a concern that the 3 month period was too short for a lecturer the gain the necessary workplace exposure.	• The release of lecturers to scheduled training was a challenge as replacement lecturers could not be found on time, which in turn affected project deliverables. • There is a need to spread allocations to all TVET and CET Colleges, however not all institutions apply for funding. • The reporting lines within the TVET and CET are not clear. The role played by the partnership offices within these institutions was not clearly outlined and therefore, resulted in delays with project roll-out. • There was a lack of understanding regarding compliance requirements, thus resulting in delayed payments and affecting timeous delivery of training.
Improvement Areas	• The MQA intends to re-configure the workplace experience programme to allow lecturers adequate time to gain the necessary exposure and training.	• There is a need to ensure that continuous project management and monitoring systems are in place to eliminate delays in the implementation of the projects. This is to ensure that all the objectives are realised and met during the planned period. • Continue with regular meetings with the DHET regional offices where SETA officials and TVET colleges meet to improve their working relations.
Lessons Learnt	• Improve project planning and align DG to TVET and CET calendar to improve participation of lectures in the programme	

Table 4-2 - Successes, Failures and Improvement Areas

4.2.2 Partnership with private and public institutions regarding skills development research in the mining and minerals sector

In its strategic objective to partner with public and private institutions, the MQA has partnered with three institutions for the purpose of conducting research that will improve skills development planning and decision-making within the MMS.

4.2.2.1 Understanding the Impact of Changing Technology and its Skills Development Implications in the Mining Sector

The MQA concluded a partnership agreement with through MoAs with the Council for Scientific and Industrial Research (CSIR) and Mintek. The partnership with the CSIR is in relation to the Successful Application of Technology Centred Around People (SATCAP) programme driven by the Nelson Mandela Precinct. These partnerships share the same **objective**, i.e., to conduct a research study to probe the integration of technology into the mining production processes and its effects on skills requirements in relation to the MMS' core occupations.

The **parties involved will remain bound for a period of two years**, however the aim is to complete this particular study by March 2020.

This partnership is at its initial stages. The **value add** would be gaining an insight on the skills necessary to address the demand brought upon by changing technology in the MMS. Sharing of research knowledge and skills between the CSIR and Mintek will assist the MQA in realising its mandate to building research capacity for skills planning and research internally, thereby improving skills development planning and decision-making through research.

At this point, it is difficult to make a judgement on the partnership's level of success since it is still in its initial stages.

4.2.2.2 Understanding health and safety matters to attain zero harm in the mining sector

The MQA concluded a MoA with the MHSC for the purpose of conducting a research study to investigate the occupational health and safety matters and its relations to skills requirements in the MMS. Therefore, the **objective** of this study will be to examine the nature and type of the health and safety interventions that are intended minimise injuries and fatalities in the MMS.

This partnership agreement **will remain binding for a period of two years**, however the parties involved aim to complete the study by March 2020. Similar to the partnership with the CSIR and Mintek, this partnership is also being rolled out for the first time. The collaborative efforts between the MQA and MHSC will seek to promote health and safety in mining through research informed education and training interventions. It is difficult to make a judgement on the partnerships' level of success since it is still in its initial stages.

4.2.2.2.1 Reasons for challenges experienced in securing research partnerships?

Soliciting partnerships with a co-funding concept proved to be a challenge. Interested partners expressed a reluctance to co-fund the MQA related research projects as they have their own research agenda, at times different to the MQA. The risk in this is that the MQA spends a lot of time soliciting research partners, which result in project delays.

4.2.2.2.2 What should be done to strengthen research partnerships?

The MQA has made a commitment to re-configure and explore the option of funding the MQA research agenda fully, whilst exploring areas of co-funding as additional to the MQA's identified projects.

4.3 Planned Partnerships

4.3.1 Minerals beneficiation Partnerships

South Africa's Minerals Beneficiation Strategy is planning to transform the industry from being largely resource-based to knowledge-based. The IPAP places mineral beneficiation as one of its key priority areas and has identified several growth factors including mineral beneficiation and jewellery manufacturing as potential areas to create jobs. Opportunities exists for downstream processing and adding value locally to iron, carbon steel, stainless steel, aluminium, PGMs and gold. Through a partnership with entities such as the DTI and DSBD (Department of Small Business Development), the country has the potential to develop unique capabilities and the necessary human resources with adequate skills and equipment to apply interventions beyond the mining sector. The DTI for instance, could play the role of developing master plans that will incorporate mineral beneficiation innovations with not only the MMS, but other sectors. The MQA in collaboration with the steel sector could form a partnership through the DTI to probe factors influencing aspects of cross-sectoral networking, trading and skills-transfer for the development and promotion of locally beneficiated products. Taking into account the need to develop locally produced products, the MQA could also partner with DSBD to equip small and emerging businesses with the necessary resources and skills to be involved in the beneficiation of minerals. This is aligned to outcome six of the NSDP that aims to increase skills development for entrepreneurial activities and the establishment of new enterprises and cooperatives.

4.3.2 Green skills partnerships

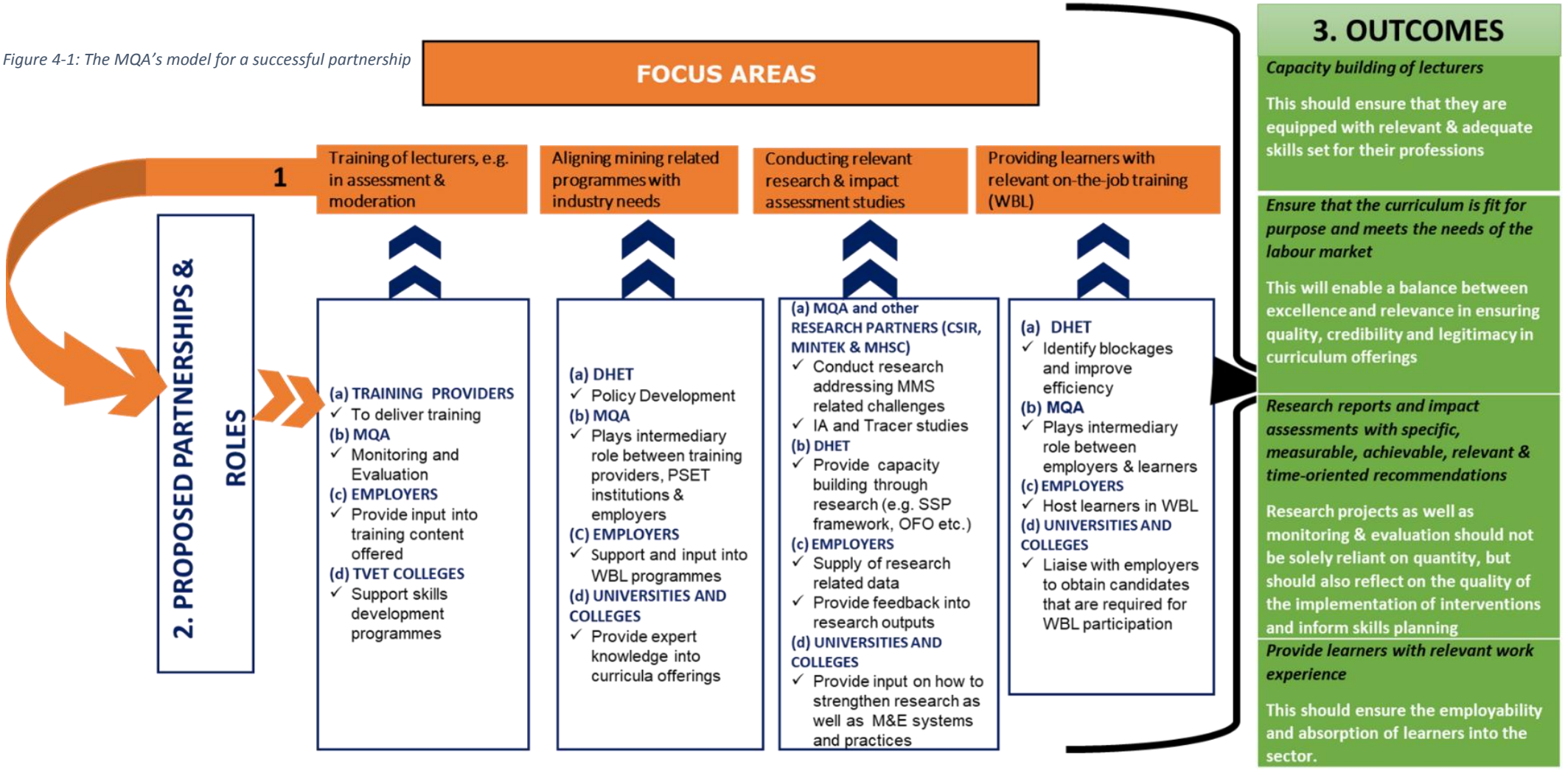
As seen in Chapter 2, South Africa has been experiencing a water crisis and the MMS has not been insusceptible to this challenge. The MQA could partner with the Department of Environmental Affairs (DEA) to conceptualise a project that would aim at investigating measures on how mining companies can recycle and optimally re-utilise waste water to other economic and livelihood activities such as agriculture. In turn, community members can benefit from this as they could develop subsistence farms which could be used to fight against the hunger challenge experienced by the majority of communities in the country. In addition, a research partnership should be established with the National Research Foundation (NRF) to identify factors that could possibly lead to the development of cleaner mineral production processes and alternative means of energy as well as cleaner coal consumption.

4.4 The MQA's model for a successful partnership

Currently, the MQA does not have an existing model for successful partnership(s). However, taking into consideration its existing partnerships, their successes, failures and lessons learnt, the MQA alongside its stakeholders identified key areas leading into the proposal of the model below (figure 4-1) for successful partnerships. The model has four focus areas, i.e. **training of lecturers in assessment and moderation** in alignment with the MQA's mandate and strategic objectives for the purpose of providing support to TVET and CET colleges to improve their institutional performance and responding to their conceptualised mandate; **course offering alignment** that aims at ensuring that the curriculum is in sync with the labour market needs as well as national development priorities that impact and is aligned to the

MMS; **research and impact studies** that aim to ensure that performance measurements of interventions provide empirical evidence to guide planning and skills priority alignment as well as **workplace based learning (WBL)** that seeks to develop an effective working model that addresses issues of access to work based experience to learners. The focus areas are accompanied by anticipated outcomes from the roles that would be played by the proposed partners. With this accounted for, the propensity to achieve the identified roles and outcomes will thus, result in a mutual understating and be beneficial to both the MQA and proposed partners; leading to a success.

Figure 4-1: The MQA's model for a successful partnership



Source: MQA, 2018

Chapter 5 : Monitoring and Evaluation

This chapter aims to reflect on the SETA's achievement of the strategic priorities outlined in the last SSP submitted. As part of this reflective exercise and in order to be able to plan for the following financial year, it is important for the SETA to look into the extent to which the previous year's priorities were met.

To this end, MQA has developed a Monitoring and Evaluation Framework used to provide assurance by tracking all the projects that are implemented in line with its mandate. M&E is an integral part of the MQA's value chain and its contribution towards, amongst others, organisational strategy, planning, monitoring, impact assessment and evaluation, and risk management enables the organisation to track the impact on skills development in the sector.

The following reflects many of 2018 interventions in terms of targets and achievement as reflected in the Annual Performance Report of MQA.

5.1 Sector Skills Planning Reflections

5.1.1 The MQA's Approach to conducting Monitoring and Evaluation

The MQA has developed a Monitoring and Evaluation Framework used to provide assurance by keeping a continuous record of all the projects that are implemented in line with its mandate. The purpose of the framework is among others, to develop and maintain monitoring and evaluation systems to meet national standards and the MQA requirements ensure that value for money is derived from all MQA interventions.

The framework is applicable to the strategic planning process and by extension to the implementation of the Strategic Plan (SP) and Annual Performance Plan (APP). During the planning process, the Strategic Planning Unit coordinates the formulation of the Strategic Plans and the Annual Performance Plans (APP) across all functions of the organisation. The planning process, references various internal and external sources which are used to influence and inform the decision making process before compiling the organisation's Strategic Plans and APPs.

The M&E Unit provides various impact study reports that influence the strategic planning process which are used to inform the decisions taken such as; Interventions to be considered for the target setting of APP KPIs, resources to be invested on the various interventions, advise on current and emerging risks associated with the various programmes, advising on which programmes have the most impact in the sector, lessons learnt during the implementation of current and past projects and recommendations for more effective implementation methods and efficient use of existing resources and capacity.

In addition the M&E unit also provides ongoing project implementation and verification reports which are also referenced to in the planning process as well as during the implementation of current projects. The trends and intelligence derived from these reports inform better decision making at the planning stage and also informs project management processes during the selection, inception, allocation and implementation of projects.

Monitoring of projects is an on-going process that focuses on the assessment of projects, programmes, their day to-day activities and deliverables required for achievement and performance. Against the annual target of 85%, the M&E Unit monitored **100%** of monitorable projects and programmes during the financial year. Monitoring, in this context

is conceptualised as a process that involves real time collection, analysis and reporting of data on inputs, outputs, outcomes, impacts and external factors. These also include regular feedback on progress, implementation, results and indicators of problem(s) requiring immediate corrective action.

5.1.2 Tracer Studies

M&E is tasked with conducting tracer studies (value for money analysis). During 2018, for the first time, the MQA conducted tracer studies aimed at investigating and exploring the following:

- The level of the MQA's contribution in the advancement of skills development within the MMS;
- Trace the whereabouts of former beneficiaries to determine what has happened in their careers and their lives during and after completion of their respective programmes;
- Analysing the outcomes of the MQA funded programmes and the impact thereof.

During the year under review M&E conducted the following four tracer studies:

- Bursary;
- Jewellery and Diamond Processing;
- Artisan Development; and
- Internship.

5.1.3 Strategic Priorities in the previous SSP captured in the MQA's Strategic Plan and APP

The following reflects on the MQA's strategic priorities that were captured in its Annual Performance Report and Strategic Plan.

<table>
<tr><th>Skills development Priorities</th><th>2019-2020 Strategic Plan</th><th>Annual Performance Plan 2019-2020</th></tr>
<tr><td rowspan="2">1. Support transformation of the sector through skills development.</td><td>Objective 3: Promote work-based skills development to support transformation in the mining and minerals sector.
AND
Objective 4: Facilitate access to occupationally directed learning programmes for the unemployed.</td><td>Programme 3: Learning Programmes /Skills Development.</td></tr>
<tr><td colspan="2">Impact:
3497 out of a target of 3100 beneficiaries completed a work-based programme (i.e. undergraduate workplace experience, learnerships- both apprenticeship and non-apprenticeship as well as internships) in 2018/19, thus enabling access to occupationally directed economic opportunities.
Beneficiaries of work-based skills programmes are mostly the youth and HDSAs.
The MQA also contributes positively in ensuring the representation of disabled individuals in the sector. Currently approximately 4% of disabled individuals are beneficiaries of the MQA's skills programmes. This is above the 2018 Mining Charter's requirement of 1, 5%.</td></tr>
</table>

Skills development Priorities	2019-2020 Strategic Plan	Annual Performance Plan 2019-2020
2. Continue to support interventions to improve mine health and safety through skills development.	Objective 3: Promote work-based skills development to support transformation in the mining and minerals sector. AND Objective 4: Facilitate access to occupationally directed learning programmes for the unemployed. AND Objective 6: Ensure the delivery of quality programmes in the Mining and Minerals Sector (MMS).	Programme 3: Learning Programmes /Skills Development AND Programme 4: Education and Training Quality Assurance.
	Impact: • *1001 out of a target of 1000 employees successfully completed the Occupational Health and Safety Representatives' skills programme as well as other Health and Safety Programmes.* • *There was a decrease in the number of fatality rates in 2018 (81 compared to 90 in 2017).* • *A formal partnership was established between the MQA and MHSC aiming to investigate factors affecting health and safety in the workplace within the MMS. This will contribute to efforts placed to obtain the zero harm goal in the MMS.*	
3. Monitor and respond to technological changes through skills development.	Objective 6: Ensure the delivery of quality programmes in the Mining and Minerals Sector (MMS). AND Objective 3: Promote work-based skills development to support transformation in the mining and minerals sector. AND Objective 4: Facilitate access to occupationally directed learning programmes for the unemployed.	Programme 4: Education and Training Quality Assurance. AND Programme 3: Learning Programmes /Skills Development
	Impact: • *A formal partnership was formed with the CSIR and Mintek to conduct a research study to probe the integration of technology into the mining production processes and its effects on skills requirements in relation to the MMS core occupations*. This collaboration will be proactive in revitalising curriculum and programmes to support the fourth Industrial revolution's needed skills as well as the inclusion of employees in equipment design as part of the SATCAP programme.	
4. Monitor support the skills required for minerals beneficiation.	Objective 2: Improve Skills development Planning and decision-making through Research. AND Objective 3: Promote work-based skills development to support transformation in the mining and minerals sector. AND Objective 4: Facilitate access to occupationally directed learning programmes for the unemployed.	Programme 2: Sector Skills Plan and Research AND Programme 3: Learning Programmes /Skills Development
	Impact: • *The top 2 learnerships supported by the MQA to unemployed individuals are in jewellery manufacturing and diamond processing-which are linked to minerals beneficiation.* • *The small-scale mining programme is another initiative that contributes to skills required for minerals beneficiation.*	

Skills development Priorities	2019-2020 Strategic Plan	Annual Performance Plan 2019-2020
5. Focus on increasing support to address the hard-to-fill occupations in terms of skills development in the MMS.	Objective 3: Promote work-based skills development to support transformation in the mining and minerals sector. AND Objective 4: Facilitate access to occupationally directed learning programmes for the unemployed.	Programme 3: Learning Programmes /Skills Development.
	Impact: • *The MDP, bursaries, learnerships, artisan development programmes are all aimed at addressing hard-to-fill occupations in the sector.*	

Table 5-1: Strategic Priorities in the previous SSP captured in the MQA's Strategic Plan and APP

**The detailed targets and achievements of the skills programmes highlighted in the Strategic Plan and Annual Performance Plan are discussed in detail in Chapter 3.*

All the above mentioned interventions are aimed at addressing the five national skills development priorities by continuing to support transformation through skills development, interventions to improve mine health and safety through skills development, monitor and provide support to interventions responding to technological changes, monitor and support interventions aimed at developing the skills required for minerals beneficiation and focus on increasing support to address the hard-to-fill vacancies in terms of skills development in the MMS. Overall, MQA makes the difference in terms of skills development within them MMS with particular reference to interventions such as learnerships, RPL, MDP, Artisan Programme, AET programmes which are mining related.

More particularly, AET programme seems to be making inroads into breaking the back of illiteracy within the sector as the majority of mining employees are at least in possession of a matric or its equivalent as a highest qualification. In terms of bursaries, most of them are allocated to beneficiaries studying towards the core mining related qualifications.

5.1.4 Plan of Action

Six targets on interventions aimed at supporting transformation through skills development were not met due to various reasons.

Target	Reasons for not meeting target	Mechanism to ensure achievement of strategic priorities not achieved
MDP (completions)	Insufficient number of learners in the programme	Re-configure the implementation model of the programme
HDSA candidacy (completions)	Misalignment of MQA funding window and University calendar.	Early advertisement and advocacy in the Sector and align advertisement to HEIs calendar.
Bursaries for the Employed (entered)	This was due some late start in the implementation and shortages of available workplaces to host learners	Allocations will be done early to allow for reallocations in the event that allocated employers do not take up their allocations

Undergraduate entering workplace experience	Insufficient pipeline of learners from previous years	Increase pool of entered learners to increase the pool of leaners who will complete the programme. Continuous monitoring and provide support for learners on the programme
Undergraduate completing workplace experience	The performance indicator for target reportable is only upon accreditation, whilst the actual received applicants and support given is not considered	Review and reconceptualise performance indicator to include supportive work done
Historically disadvantaged South African training provider support	Insufficient number of learners in the programme	Re-configure the implementation model of the programme

Table 5-2: Strategic Objectives not achieved and mechanisms to ensure achievement in future

To ensure that achievement of current strategic priorities;

- The MQA shall include the M&E Framework in its skills development value chain. This implies that all operations should treat M&E as intrinsic not extrinsic matter which is done once off. This would ensure that provision of assurance is formative (ongoing) and summative to gain insight into the efficiency, effectiveness and impact of every intervention by establishing that the intended outcomes of interventions supported by the MQA influence the landscape of skills development within the sector.
- Information yielded by M&E activities should inform research and organisational planning going forward.

Chapter 6 : SETA Strategic Skills Priority Actions

The purpose of this chapter is to consolidate and present key findings from the previous chapters to influence prioritisation and inform recommendations that are realistic consistent and achievable. The chapter also identifies the top five key priority actions for the MMS going forward.

6.1 Key Skills Findings

Chapter 1 reflected on the employer profile. Findings revealed that although black employees constitute a large proportion of the labour force, their representation at the different echelons of management (with exception of the senior management) is not equitable with the black employee population within the sector. In addition, the gender distribution is skewed towards males, with women representing only 16 % of the MMS workforce. This is against the backdrop of the Mining Charter (sets equity targets of 60% of blacks in senior management positions, of 25 % should be female, middle management must have a minimum of 60% black employees of which 25% should be female, 70% blacks in junior management of which 30% must be female) and the employment Equity Act that is intended to transform the profile of the workforce to reflect the national dynamics. Additionally, the Charter sets the target of employment of people with disabilities at 1.5%. However, findings revealed that only 0.8% of disabled individuals are employed in the MMS. Monitoring and evaluation of the effectiveness, efficiency and efficacy of initiatives aimed at redressing past inequalities is critical to provide key learning points to inform strategies to add impetus into the transformation agenda.

Chapter 2 examined the factors that drive change and impact on skills demand and supply within the sector. External and internal factors such as global market performance, local influences, Fourth Industrial Revolution, Beneficiation, Industrial relations, Diversity of pool generations, Increasing energy tariffs, availability of mineral resources and mine, Health and environmental concerns were identified as change drivers that influence the development of the MMS. All these drivers influence change and they interlock and reinforce one another to shape the skills development landscape. There is a need for understanding opportunities and mitigating factors that could present threats by the change drivers in order to influence skills supply and demand in the sector.

Chapter 3 stated that according to the WSP-ATR the most hard-to-fill vacancies are Mine Manager, Production Manager, Engineering Manager, Mechanical engineer (Mines), Mining Engineer, Occupational Hygienist, Mine Overseer (Production), Diesel Mechanic, Fitter and Turner, and Auto Electrician. The reasons accounting for these vacancies ranged from individual, organisational and supply side levels. At individual level, reasons include lack of relevant qualifications, lack of relevant experience and Equity considerations. The hard-to-fill vacancies was determined by conducting a frequency run of the top 10 mostly identified occupations by organisations. This was then cross-tabulated by provinces and subsectors through identifying the number of occurrences between the 2 variables (province and subsector). Thereafter, the sum of provinces and subsectors were used to rank the top 10 occupation in demand within the MMS.

Chapter 4 focused on existing partnerships within the MQA. The chapter evaluate the effectiveness of existing SETA partnerships in the sector with particular reference to value-adding partnerships. It also outlines both success stories and lessons learnt for interventions that were implemented. Examples of existing interventions included TVET lecturer workplace experience where lectures are placed in the workplace (mines) to gain experience of the real working environment. TVET and CET were capacitated and assisted with getting their courses accredited. In addition, the MQA's partnerships also included research partnerships. The idea is to forge partnerships to undertake research and share knowledge and skills in a collaborative manner to achieve specified outcomes directed towards addressing mutually inclusive skills priorities within a specified time frame. Key learning points should be extrapolated from these partnerships to inform development of a working sector partnership model which indicates the focal areas, usually the areas where challenges are, the partnership mix, and the goals of such partnerships.

Chapter 5

As mentioned in Chapter 5 of this report; the MQA has a Monitoring and Evaluation framework aimed at providing assurance for all projects implemented in line with its mandate and to determine the impact of the MQA's return on investment in the mining and minerals sector training programmes, against the number of people trained. Monitoring and Evaluation at the MQA provided assurance that the performance information of the MQA for each quarter fairly reflected the actual achievements against planned objectives, indicators and targets as per the SLA as well as the APP. To ensure that achievement of current strategic priorities; the MQA shall include the M&E Framework in its skills development value chain. This implies that all operations should treat M&E as intrinsic not extrinsic matter which is done once off. This would ensure that provision of assurance is formative (ongoing) and summative (summative) to gain insight into the efficiency, effectiveness and impact of every intervention by MQA intended to influence the landscape of skills development within the sector.

The section below discusses key recommended priority actions in no particular order of importance.

6.2 Recommended Priority Actions

6.2.1 Recommended Priority 1: Facilitate transformation and SMME development of the sector through skills development

As indicated in chapter 2, the purpose of the NSDP to ensure that South Africa has adequate, appropriate and high quality skills that contribute towards economic growth, employment creation and social development through attainment of eight outcomes. The National Growth Path IPAP intends to create an inclusive economic growth and development path through creation of jobs in the mining sector. In this respect, among others, Employment Equity plays a key role in South Africa's transformation agenda. In order to support this national priority, and attain the outcome of improving the level of workforce as outlined by NSDP, the MQA should continue to prioritise skills development to Historically-Disadvantaged South Africans (HDSAs) in order to drive transformation of the sector. These include, and are not limited to undertaking skills development interventions to capacitate more females and disabled people to be represented in the sector.

To increase the educational level of the employed populations by addressing the issues of inequities echelons of management in the MMS, the MQA should continue to support HDSAs in and for management roles in its Management Development Programme. It is also recommended that management programmes should also target engineering students for support to pre-empt their advancement to managerial positions at mining operations at later stages of their careers.

Furthermore, although there is an increasing number of graduate output with mine related qualifications, workplace experience still remains a critical issue. Therefore, priority should be given to addressing the outcome of linking education and the workplace by facilitating access to industrial experience and the placement of graduates into the MMS. The SETA should also conduct an impact study on the effectiveness of its programmes to gather intelligence which could be useful to address graduate development.

Low pass rates with of STEM subjects is recorded in this report. These subjects are a prerequisite for entry into the PSET system for mining related qualifications. More interventions are needed at basic education level for teachers with STEM subjects to improve both their pedagogical subject matter knowledge as well as the transmission (the ability to teach) capabilities to improve learner performance and ensure better school output. The starting point is by dedicating required resources to provide tailor made career advice services to direct youth to programmes that suits them and provide training in areas needed in the economy.

6.2.2 Recommended Priority 2: Continue to support interventions to improve Mine Health and Safety through skills development

The MHSA makes provision for the protection of the health and safety of all employees and persons in the mines through the promotion of training in mine health and safety. 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 and injuries. The government has put in place legislation and associated processes to ensure that safety of workers is paramount as a key feature for the sustainability of the mining sector. In this respect, MQA should continue to prioritise support for training in mine health and safety as one of its legislative mandates to improve the health and safety standards of the sector by continuing to fund interventions aimed at increasing access to occupationally directed programmes

6.2.3 Recommended Priority 3: Continue to monitor and provide support to interventions responding to technological changes through skills development

Technological transformation remains at the forefront of the sector's ability to become as safe, healthy, efficient and sustainable as possible. The MMS presents a unique opportunity for a new industrialisation drive and advancement in the economy as a whole. This applies across the value chain: from mining equipment and services, to extraction, infrastructure development, beneficiation, skills development as well as research and development. Along with this, there are opportunities for more profound empowerment of the previously disadvantaged including unskilled and semi-skilled employees, females, communities and entrepreneurs. This however, this can only be achieved if the sector fully embraces technology and address energy and water crisis that are affecting mining operations. Through research occupations in high demand (including water and energy related ones) can identified

to inform planning to prioritise resource allocation, qualification development and career information and advice to keep up with technologically induced changes.

6.2.4 Recommended Priority 4: Monitor and support interventions aimed at developing 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. The IPAP places mineral beneficiation as one of its key priority areas and has identified several growth sectors including mineral beneficiation, jewellery manufacturing as critical areas to create jobs. Lucrative opportunities exist for downstream processing and adding value locally to iron, carbon steel, stainless steel, aluminium, PGMs and gold. A wide range of materials is available for jewellery, other than gold, platinum and diamonds; there is also tiger's eye, and many other semiprecious stones (BrandSA, 2017). Arguments were held in that the sector needs to develop local capacity first instead of importing to create its own equipment. This could also be attained through identifying and increase occupation in demand with respect to beneficiation, continue quality assuring training of those already in this sector as well as developing the skills and competencies of youth and potential entrepreneurs in the sector to grow SMMEs and create more jobs in the sector.

Through partnerships with entities such as the DTI, the country has the potential to develop unique capabilities and the necessary human resources with adequate skills and equipment to apply interventions beyond the mining sector. With that, stakeholders expressed that there are opportunities for the mining sector to integrate with other sectors of the economy through mineral beneficiation. These opportunities could be embedded in the manufacturing sector (e.g. steel and iron ore, nickel, copper and zinc); energy sector (e.g. coal, uranium and gas); and agriculture sector (e.g. phosphates, potassium and sulphur). These in turn can be added jewellery for precious metals such as gold, diamonds and PGMs (Netshitenzhe, n: d).

6.2.5 Recommendation 5: Focus on increasing support for core mining skills and hard-to-fill occupations in terms of skills development in the MMS

There is a need to support interventions aimed at addressing hard-to-fill occupations by identifying and increasing production of occupation in high demand through provision of support to interventions such artisan development, internship programmes, learnerships and bursaries. By so doing, this will fill skills gaps and eliminate issues of supply and demand mismatches. Though some of the reasons cited for hard-to-fill vacancies are beyond the scope of the MQA, the SETA can still play an active role by continuing to fund workplace experience programmes as well as career guidance and awareness programmes.

6.2.6 Recommendation 6: Develop Skills for environmental sustainability

The global emphasis on environmental impact as a result of mining activities is another key driver affecting the sector. The MQA's (2018) green skills study revealed that South Africa's air quality remains one of its most challenging environmental issues and is an issue that has been raised on several occasions with regards to the health and welfare of South Africa's population. Fugitive dust and spontaneous combustion emission from the mining sector are some of the most common sources of atmospheric emission that impact on air quality. In addition, the availability and cost water is quickly rising to the top of mining companies' agendas as one of the greatest constraints to supply. The water shortage in South Africa, has been exacerbated by changing rainfall patterns due to climate change. Therefore, insufficient water could limit large-scale mine development and restrict other economic and livelihood

activities as it makes the social and ecological reserve vulnerable to water demands from new developments, which may affect the country's resilience to climate change. It is imperative for the sector to align their practices with goals closely linked to achieving the development path of the green economy. To achieve this the MQA green aims to do the following:

- Revision of the QCTO qualification framework to better align the needs of the MMS in relation to green skills.
- Bridge the gaps between the educational programmes and industry requirements by means of specialised courses (e.g. radioactivity)
- Broaden skills sets and develop sector-specific experience through internships and learnerships (specifically: Other mining, Gold mining, PGM mining).

Through green research priority skills have been identified to improve the level of skills in the workforce. To address the green skills supply issue planning should inform resource allocation in funding interventions, skills programme or qualification development and career services.

6.2.7. Support National Strategies and Plans through skills development

To support the development and advancement of the employees with the sector The MQA is committed to continue to support National Strategies and Plans through skills development. Through its offerings such as learnerships, internships, bursaries, skills programmes, workplace exposure programmes and collaborations with TVETs and HETs, the MQA is able to accelerate transformation to ensure the sustainable growth and development of the MMS to expand opportunities for HDIs and improve occupational health and safety. Through partnerships with relevant stakeholders, the MQA aims to promote the growth and sustainability of the jewellery sector through skills development.

Moreover, the MQA aims to explore measures that could develop economic linkages between primary agriculture, mining and manufacturing sectors to secure greater downstream beneficiation and maximise upstream linkages. Considering the decline in some subsectors, there is a need to develop linkages with other sectors. This may result in multi-sectoral skills transfer. The MQA aims to align the key objectives of the NSDP that impact the MMS in a direct and focus manner to ensure that the MMS has adequate, appropriate, and high quality skills that contribute towards economic growth, employment creation, and social development within the sector.

6.3 Conclusions

Taking into consideration the findings in this SSP, to attain the outcomes of NSDP and broader socio-economic imperatives the following skills priority actions are recommended:

- Priority 1: Facilitate transformation and SMME development of the sector through skills development
- Priority 2: Continue to support interventions to improve mine health and safety through skills development
- Priority 3: Continue to monitor and provide support to interventions responding to technological changes through skills development
- Priority 4: Monitor and support interventions aimed at developing the skills required for minerals beneficiation
- Priority 5: Focus on increasing support to core mining skills and the hard-to-fill occupations in terms of skills development in the MMS
- Priority 6: Develop skills for environmental sustainability
- Priority 7: Support National Strategies and Plans through skills development

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