Sector Skills Plan for the Mining and Minerals Sector Update for 2022-2023 Submitted by the Mining Qualifications Authority (MQA) to the Department of Higher Education and Training

FINAL SUBMISSION

02 AUGUST 2021

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 2022/23 annual update of the 5 year Sector Skills Plan (SSP) for the MMS for the period 2020-2025.

The SSP update 2022 -2023 has been prepared in such a way that it responds to the National Skills Development Plan 2030, ERRP and policies for driving the skills transformation agenda, aligned to the expectations of the DHET. This SSP was presented and endorsed by the MQA's executive management and approved by the newly appointed MQA Board. The SSP has been prepared in line with the DHET standards particularly the 2021 updated SSP framework for requirements.

The improvement of the competencies (knowledge, skills and attributes) of the MMS workforce is imperative for the economic development of our sector, improvement of our health and safety records, and the growth and well-being of all employees.

The main purpose of this SSP is to determine sectoral skills development priorities through the analysis of the skills demand and supply, the influence of key change drivers and legislative instruments. This is done to develop 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 research design, using both quantitative and qualitative research paradigms. The usage of a mixed methods research design aims to ensure credible research findings that are realisable, specific and generalizable, leading to manageable recommendations that will address skills development in the sector.

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Mr Mthokozisi Zondi

Interim Chairperson: MQA Board

2/08/2021

Date

ACRONYMS

Acronym	Description	Acronym	Description
AET	Adult Education Training	MMP	Mandela Mining Precinct
AgriSETA	Agriculture Sector Education Training Authority	MMS	Mining and Minerals Sector
AI	Artificial Intelligence	MoAs	Memorandum of Agreements
AIDS	Acquired Immune Deficiency Syndrome	MPRDA	Minerals and Petroleum Resources Development Act
APP	Annual Performance Plan	MYPD	Multi Year price determination
APR	Annual Performance Report	M&E	Monitoring & Evaluation
ATR	Annual Training Report	NCV	National Certificate Vocational
BEE	Black Economic Empowerment	NDP	National Development Plan
Bn	Billion	NEMA	National Environmental Management Act
BRICS	Brazil, Russia, India, China, South Africa	NERSA	National Energy Regular of South Africa
CAGR	Compound Annual Growth Rate	NGP	New Growth Path
CET	Community Education and Training	NQF	National Qualifications Framework
CGS	Council for Geoscience	NSDP	National Skills Development Plan
CLAS	Cement, Lime, Aggregates and Sand	NW	North West
CoCs	Certificates of Competency	NYP	National Youth Policy
CSIR	Council for Scientific & Industrial Research	OFO	Organising Framework for Occupations
DBE	Department of Basic Education	PESTEL	Political, Economic, Social, Technological, Environmental and Legal
DHET	Department of Higher Education and Training	PGMs	Platinum Group Metals
DMRE	Department of Mineral Resources and Energy	PIVOTAL	Professional, Vocational, Technical and Academic Learning
DoL	Department of Labour	QCTO	Quality Council for Trades and Occupations
DSBD	Department of Small Business Development	RCA	Regulatory Clearing Account
DST	Department of Science and Technology	RPL	Recognition of Prior Learning
DTI	Department of Trade and Industry	R & D	Research & Development
EMIS	Education Management Information System	SADC	Southern African Development Community
EU	European Union	SAMDA	South African Mining Development
FET	Further Education and Training	SAQA	South African Qualifications Authority
FS	Free State	SATCAP	Successful Application of Technology Centred Around People
GCC	Government Certificate of Competency	SDA	Skills Development Act

Acronym	Description	Acronym	Description
GCIS	Government Communication Information System	SETA	Sector Education and Training Authority
GDP	Gross Domestic Product	SETMIS	Sector Education and Training Management Information System
GP	Gauteng Province	SIC	Standard Industrial Classification
HDI	Historically Disadvantaged Individual	SITM	Services Incidental to Mining
HDP	Historically Disadvantaged Persons	SLA	Service Level Agreement
HDSA	Historically Disadvantaged South African	SLP	Social and Labour Plan
HEMIS	Higher Education Management Information System	SMME	Small, Medium and Micro-sized Enterprises
HET	Higher Education and Training	SSP	Sector Skills Plan
HIV	Human Immunodeficiency Virus	SP	Strategic Plan
HRD	Human Resource Development	Stats SA	Statistics South Africa
IDP	Integrated Development Plan	STEM	Science Technology Engineering & Maths
IPAP	Industrial Policy Action Plan	TVET	Technical and Vocational Education and Training
IRM	Industrial Raw Materials	UNISA	University of South Africa
KPIs	Key Performance Indictors	UoT	University of Technology
MCSA	Mineral Council South Africa	WBL	Work Based Learning
MDP	Management Development Programme	WSP	Workplace Skills Plan
MerSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority	WC	Western Cape
MHSA	Mine Health and Safety Act	WP-PSET	White Paper - Post School Education and Training
MHSC	Mine Health and Safety Council	YEA	Youth Employment Accord

Departmental Name Changes	
DMR	Department of Mineral Resources and Energy (DMRE)
DTI	Department of Trade, Industry and Competition (DTIC)
DEA	Department of Environment, Forestry and Fisheries (DEFF)

Contents

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 the 2022/2023 Sector Skills Plan 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 qualitative and quantitative research were used to develop this SSP. This involved the usage of primary and secondary research. Secondary research involved literature and document review. The data sources included external reports from various institutions such as the DMRE, DHET, Stats SA, DBE, and Minerals Council South Africa (MCSA), e-publications, newspaper articles and press releases. Primary research consisted of the MQA's APR and SP, WSP/ATRs and all studies that the MQA has previously conducted. Below are the key findings of the research in various domains

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). It is important to note that; mining companies are inescapably influenced by global developments, with macro-economic growth and international markets strongly affecting both the demand and supply for resources and profitability (Lane, et al., 2015). A five-year analysis of the sector reveals a decline in the number of employees from a peak of 520 003 in 2016 to 344 322 in 2021. As a result, on average over this period, all of the occupational categories ranging from Managers and Professionals through to Learners have been bleeding by -0, 9%. The MMS remains a male-dominated sector employing 83% of males. It is important to note that the average growth rate of females employed within the sector over the five years is at -0.8%.

4. Key Drivers of Change Affecting Skills in the MMS

Global influence and market performance, increasing energy tariffs, minerals beneficiation, the fourth industrial revolution, and environmental concerns are the main factors driving change. The MMS presents a unique opportunity for a new industrialisation drive and advancement in the economy. This, however, can only be achieved if the sector fully embraces technology, beneficiation and if the energy supply stabilises. The sector should also incorporate interdisciplinary training that will allow students and employees to develop skills and knowledge in various subjects to produce a flexible workforce that can adjust to changing skills demands within and outside the MMS.

5. Occupational Shortages and Skills Gaps

Analysis of May 2021 MQA WSP/ATR submissions revealed the following hard-to-fill occupations:

Mining Operations Manager	Mining Engineer	Engineering Manager	Mining Production Supervisor	Safety, Health, Environment and Quality (SHE&Q) Practitioner

Engineering Manager	Diesel Mechanic	Mechanical Engineer	Mining Technician	Driller

Further to the above, it is important to note that the sector identified skills gaps addressed in chapter three, as these also influence the skills demand in the sector.

6. Sector Partnerships

The MQA concluded Memorandum of Agreements (MoAs) with several companies to place lecturers into workplace experience programmes. It MQA has formalised partnerships with 28 TVET and 9 CET colleges across all nine provinces. These collaborations bring value to the MMS by assisting institutions in establishing institutional capacity to better respond to skill shortages by bridging the gap between education and the workplace.

In its strategic objective to partner with public and private institutions, the MQA partnered with three institutions to conduct research to improve skills development planning and decision-making within the MMS.

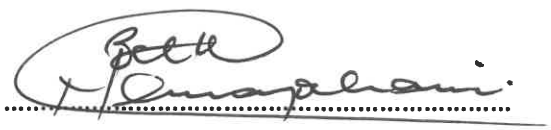
The outbreak of the COVID-19 pandemic ushered in a new era, a 'new normal', and a dispensation that requires partnerships that will explore new methods of training delivery in the sector. Planned partnerships will entail collaborations with entities that will respond to these changes.

7. Monitoring and Evaluation

The MQA has a Monitoring and Evaluation framework that is used to provide quality assurance by tracking all the projects that are implemented in line with the SETA's mandate. M&E is a critical aspect of the MQA's value chain, and it assists the organisation measure the impact of skills development in the sector by contributing to organisational strategy, planning, monitoring, impact assessment and evaluation, and risk management, among other things.

8. Skills Priority Actions

As a result of the findings in this SSP, the skills priorities are recommended for the MQA to continue to support national strategies and plans through skills development. The MQA is expected to play a significant role in developing skills in the MMS by giving effect to the SDA, addressing the outcomes outlined in the NSDP and ERRP. This can also be established by forging suitable partnerships and creating optimal conditions for innovation in the era of 4IR and Covid-19.



02/08/2021

Mr Bethuel Nemagovhani

Chief Executive Officer (Acting)

Date

RESEARCH METHODOLOGY

I. Introduction

SETAs are expected to facilitate the delivery of sector-specific skills interventions that assist in achieving the outcomes of the National Skills Development Plan (NSDP). It is, therefore, a core mandate for the SETA to develop an annual Sector Skills Plan (SSP) to inform adequate skills planning. In light of this, the MQA aims to support this objective by providing empirical insights through the SSP on the mining and minerals sector's skills development priorities. The 2022-2023 SSP update outlines the MMS' scope of coverage, its key role-players, economic performance, employer and labour market profile, key skills issues, occupational shortages and skills gaps, existing and planned partnerships, the SETA's monitoring and evaluation and lastly, the strategic skills priority actions.

This section aims to provide details regarding the research process and methods that informed the development of the SSP. The research was guided by the 2021 DHET updated SSP framework and guidelines.

II. Research Process and Methods

A concurrent mixed methods research design encompassing secondary and primary data were used to develop this SSP. Secondary research involved literature and document review. The data sources included external reports from various institutions such as the DMRE, DHET, DBE, Stats SA, and Minerals Council South Africa (MCSA), e-publications, newspaper articles and press releases. On the other hand, primary research consisted of the WSP/ATR, APR and SP, as well as studies that the MQA previously conducted. The WSP/ATR data used was weighted to make it more representative of the sector *(See Annexure 1: Weighting formula).* All the previously conducted studies by the MQA and incorporated in this SSP are elaborated further in Table 1 below.

Furthermore, key informant interviews were conducted with various stakeholders in the sector. Interviews provide insights on the economic performance and future outlook of the sector as well as the change drivers. They also play a critical role in providing input and validation of the hard-to-fill vacancies, skills gaps and priority skills actions.

The SSP is presented in different chapters and covers all the nine subsectors of the MMS. The MQA's Executive Committee and Board were involved in the entire research process and provided input, guidance, and oversight throughout the SSP development.

Table 1: Primary research conducted by the MQA in addition to the SSP update

Project name	Purpose & Objectives	Research Design	Sample Size	Data sources	Timeframe
2019 Workplace Skills Plan (WSP) – Annual Training Report (ATR) Analysis	• The objective of this project was to develop a profile of the MMS in terms of the geographic location, size, and composition of organisations that submitted WSP/ATRs to the MQA for the 2019/20 financial year. • The report profiled the MMS' workforce, hard-to-fill vacancies as well as the training priorities identified in the WSP/ATR submissions in 2019/20.	Quantitative	453311 (N)	WSP/ATR data	August 2019-February 2020
Employment and training trends analysis report covering the period 2010-2019	• The study aimed to update the ten-year WSP/ATR trends analysis. • This was done to provide an updated analysis of trends in the MMS in terms of the sector's composition, geographic location and size of companies. • This also encompassed the trends of training interventions previously planned and achieved for WSPs/ATRs submitted in the financial years 2010 - 2019.	Quantitative	453311 (N)	WSP/ATR data	August 2019-February 2020

Project name	Purpose & Objectives	Research Design	Sample Size	Data sources	Timeframe
2021 Mining and minerals sector Employer Study	• The study aimed to understand the MMS employers' viewpoints on factors affecting skill supply and demand and skills development priorities.	Qualitative research (key-informant interviews)	13	Primary data collected from stakeholders	May-July 2020
Women in Mining: Understanding factors that influence access and mobility in and within occupational structures in the MMS	• The study intended to provide the MQA with a better understanding of factors inhibiting women's movement into the top echelons of authority within the MMS.	Mixed methods in the form of: Literature Review	n/a	Relevant internet, books, e-publications, journal articles, newspaper articles, press releases and conference proceedings	October 2019- March 2020
		Quantitative (Surveys)	312	Empirical research using the MQA's Levy payer database & snowballing from the MQA's tripartite representatives	
		Qualitative (in-depth interviews)	29		
Understanding the occupational health and safety matters in the MMS	• The study aimed at investigating health and safety matters in the MMS and methods of attaining a "Zero Harm" goal.	Mixed methods in the form of: Literature Review	n/a	Local and international peered reviewed articles, policy documents, annual reports and various other relevant documents were reviewed	October 2019- March 2020
		Qualitative (in-depth interviews and focus group discussions)	Two focus groups, 34 participants from 20 companies across eight sectors (excluding SITM)	Empirical research using the MQA's Levy payer database & snowballing from the MQA's tripartite representatives	
Understanding the impact of changing technology and its	• The research aimed to investigate the extent of technological innovation and application in the	Mixed methods in the form of: Literature Review	n/a	Empirical research using the MQA's Levy payer database &	September 2019 – August 2020

Project name	Purpose & Objectives	Research Design	Sample Size	Data sources	Timeframe
skills development implications in the MMS	MMS and forecast potential emerging skills in demand.	Qualitative (in-depth interviews and focus group discussions)	34 participants across all subsectors and other key role players	snowballing from the MQA's tripartite representatives	
Tracer studies: AET, MEDP, Lecturer Development, Non-Artisan Apprenticeship for people living with Disabilities	• Assess the programmes' contribution to skills development within the MMS, trace the beneficiaries' whereabouts and determine what happened to them in their careers, the challenges and achievements, and what must be considered in advancing the programmes.	Qualitative and Quantitative	1830 learners for the AET programme, 555 employees for the MEDP, 867 lecturers for the Work Experience formed the sample each tracer study	Desktop research and beneficiaries of the programmes	April 2020 – February 2021

The usage of quantitative and qualitative research in the studies mentioned above enabled the MQA to acquire an extensive and in-depth understanding of the MMS while offsetting the weaknesses inherent in using each approach exclusively. Through the triangulation of data, findings are intended to ensure that conclusions met the methodological and procedural requirements of reliability, thus ensuring that the same findings could be made using the same methods (validity).

Chapter 1 : Sector Profile

1.1. Introduction

This chapter provides an overview of the MMS in South Africa. It details the scope of coverage, its key role-players, economic performance, employer profile and labour market profile. These factors assist in providing a depiction of its economic and employment contribution in the country and globally by reflecting on the current state of the sector and emerging trends. The data sources that informed this chapter include 2021/2022 WSP/ATR, 2021 Minerals Council facts and figures, DHET's levy file and DMRE's Public Labour data, Stats Sa's Quarterly Labour Force Survey (QLFS) and Mining Production and Sales reports and 2021 Mining and Minerals Sector Employer Study.

1.2. 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.

Included in the scope of coverage is the value chain of the MMS, as depicted in Figure 1-1 below. This 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. It is presented from the exploration of primary activities to the minerals value addition and the support activities in each value chain stage.

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 green skills can be prioritised across the values within all stages of the life cycle of mining in all subsectors within the MMS. Through its skills development funding mechanisms, the MQA prioritises the green skills required within the sector.

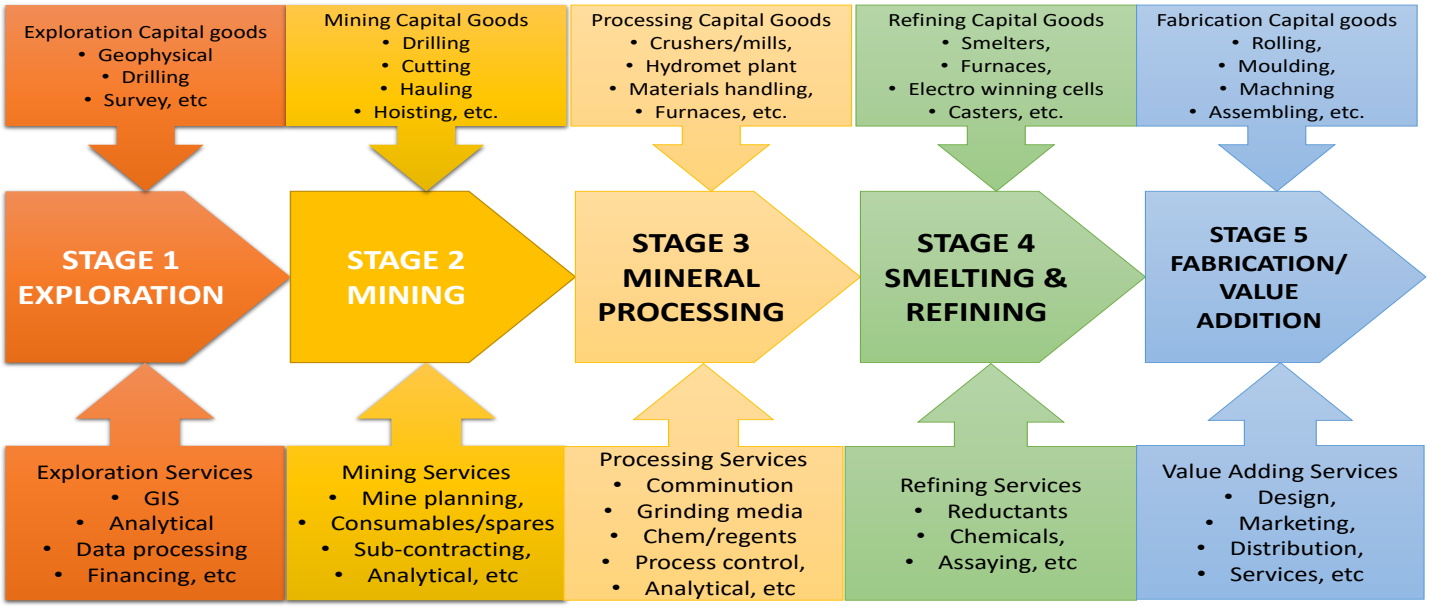


Figure 1.1: MMS Value Chain

Source: MQA, 2016

1.3. Key Role Players

Since the outbreak of COVID-19, several changes have affected the sector and its role players in the year 2020 and beyond. The National Skills Development Plan 2030 encourages partnerships and collaboration across the skills development system to facilitate linkages and efforts to sufficiently address skills issues in the sector. While there are many role players within the MMS, the list provided is not exhaustive and identifies a broader portrayal of the nature and type of role players that impact skills development in the sector. 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.

This section provides the roles of each MMS' key role player, their functions in relation to the MMS and relevant NSDP outcomes.

1.3.1 National Government Departments

Table 1.2 below illustrates the government departments interlinked with the MMS and plays a crucial role in achieving skills development and national outcomes.

Table 1.2: National Government Departments key role players

Department	Role in relation to the MMS and skills development	Relevant NSDP Outcome/s
Department of Mineral Resources and Energy (DMRE)	• Drives policies such as the 2018 Mining Charter, which aim to redress historical, socio-economic inequalities in the sector. The Charter is a crucial driver for skills development and transformation.	• Improves skills levels in the South African workforce, focussing on skills matters in relation to targets set by the Mining Charter.
Department of Higher Education, Science and Technology (DHET)	• Implements legislation by developing and implementing policies and strategies to transform post-school education by achieving the outcomes outlined in the NSDP. • Provides support to the MQA to fulfil its skills development mandate through research capacity building, development of SSP framework, CIP, OFO codes, and 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 TVET and CET programmes. • Link education and the workplace.

Source: MQA, 2021

1.3.2 State-Owned Enterprises

Table 1.3 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 in relation to the MMS and skills development	Relevant NSDP outcome/s
Mine Health and Safety Council (MHSC)	• Promotes the transformation of occupational health and safety in efforts to attain zero harm of mine workers and mine communities. • Promotes a culture of health and safety in the workplace through awareness, research and training interventions to reduce injuries, occupational diseases and fatalities.	• Improves the levels of skills concerning health and safety training. • Supports skills development programmes aimed at occupational, health and safety.
Council for Geoscience (CGS)	• Governs the onshore and offshore geology of South Africa. • Undertakes research to guide methods of developing modern technology to facilitates minerals and energy development- particularly those related to 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 recommend learning programmes falling within its scope of work.
Quality Council for Trades and Occupations (QCTO)	• Its mining and minerals Standards Generating Body (M&M SGB) is governed by the Mine Health and Safety Act of 1996, the Skills Development Amendment Act and the NQF Act of 2008. It provides a legislative framework for standards setting and quality assurance in South Africa. • The SGB Unit's main function is to design and develop fit for purpose occupational qualifications and make them available to the MMS and ensures registration of	• 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 TVET and CET programmes.

State-Owned Enterprises	Role in relation to the MMS and skills development	Relevant NSDP outcome/s
	qualifications on the National Qualifications Framework (NQF). • It ensures that appropriate qualifications are in place through collaborative initiatives with other relevant SETAs. The goal of the Unit is to form an updated OFO for aligned qualifications framework for the sector which is available and implemented by all stakeholders in the MMS. • In terms of the Skills Development Act, the QCTO has delegated the functions of qualification design and development to the MQA as a Development Quality Partner (DQP). The MQA is thereby required to supply the MMS related occupational qualifications in accordance with QCTO requirements and by OFO Code. • Once the qualifications are registered, the MQA develops appropriate learning materials for submission and registration by the DHET. The development of learning material for the associated registered unit standards-based qualifications and developed occupational qualifications is co-ordinated through Accredited Training Providers and ratified for technical content by the TRGs and CEPs.	• Link education and the workplace.

State-Owned Enterprises	Role in relation to the MMS and skills development	Relevant NSDP outcome/s
Council for Scientific and Industrial Research (CSIR)	• Fosters global and national partnerships in the narrow reef, hard rock mining equipment systems through R&D and the development of competitive local manufacturing capabilities. • Improves the technological base of the sector through the application of 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 (MQA)	• Support sector skills transformation through various skills development interventions.	• 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 occupations that are in high demand.
Source: MQA, 2021		

1.3.3 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.

Table 1.4: Industry key role players

Industry Stakeholder	Role in relation to Skills Development	Relevant NSDP Outcome/s
Minerals Council South Africa (MCSA)	• 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 conducts research regarding skills development. • Plays an active role in engaging and lobbying for skills development in various structures such as the MQA, Quality Council for Trades & Occupations (QCTO), Human Resource Development Council (HRDC), National Skills Authority (NSA), Umalusi and SAQA.	• Increase the 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 by offering certificate programmes focussing on mine surveying, mine sampling, strata control, rock mechanics etc. • Link education and the workplace by engaging with the sector to facilitate the establishment of workplace experience opportunities.
Organised Labour	• Advances the rights of employees in the labour market and society as a whole.	• Increase the level of skills development in the South African workforce by advocating for skills development.

Source: MQA, 2021

1.4 Economic Performance

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

1.4.1 Overview

South Africa ranks among the top ten producers of manganese ore, chrome, ferrochrome, iron ore, gold, platinum, piped medical gases, coal, and nickel in the world. It also produces 75.2 % of the world's chrome, 29 % manganese, 18.8 % zirconium, 17.5 % vanadium, and 11.1 % gold (MQA, 2019).

Although the sector plays a significant role in the economy, it has not been immune to challenges. On the 27th of March 2020, the government implemented a national lockdown that demanded the closure of businesses that were regarded as non-essential to curb the spread of COVID-19 (Stats SA, 2020). Operations were scaled down significantly, particularly deep level mining, which is labour intensive, except for collieries which were regarded as essential for the supply of coal to Eskom, though at reduced production levels. Productions that were scaled down included gold, chrome, manganese and surface material in the PGM subsector (Mining Review Africa, 2020). As a result, mines were compelled to undergo care and maintenance for the duration of the lockdown period to avoid the deterioration of operations (de Jager, 2020).

Encouragingly, in the third quarter, the sector withstood the COVID-19 pandemic as mining companies benefited from commodity price increases, which were aided by a weaker Rand, and resulted in an increase in certain commodity prices and investment. As a result, the MMS remains a significant contributor to the economy, exhibiting good profitability and maintaining strong balance sheets.

1.4.2 Overview of the MMS subsectors

1.4.2.1 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. PGMs are primarily used in the jewellery and automotive sector for their excellent catalytic properties. They are also used for investment (coins and bars), fuel cells, and other various industrial purposes (MCSA, 2021a).

PGM sales surpassed coal sales in 2020 for the first time in the last decade, becoming the major contributor to the MMS' total sales. The last time this occurred was during the platinum price boom between 2000 and 2010. The key drivers of the basket price in 2020 were increases in the US$ rhodium price (187.2 %) and palladium price (44 %). Platinum prices increased by 2%. Rand prices of PGMs were also aided by a significant decline in the Rand/Dollar exchange rate in 2020 when the Rand fell 12.4 % against the US dollar. This was due to the economic uncertainty caused by COVID-19 (MCSA, 2021a). This upward trend continued in 2021, with PGM sales increasing by 76.0%, accounting for 26.1% of the sector's mineral sales (Stats SA, 2021b).

1.4.2.2 Gold Mining

Globally, gold remains one of the most sought-after metals used for jewellery and many industrial applications. However, the gold subsector is affected by illegal mining, crime, theft of precious metals and security at the mines (MCSA, 2020). Seven tonnes of gold is reported

to be lost annually. As a result, rapidly increasing input costs, which in turn threaten the sustainability of the subsector, electricity, steel and wage costs have also risen much faster than producer inflation, alongside ongoing legislative and tax cost increases (e.g. municipalities taking over water and electricity supply at a much greater cost to the industry), community protests as well as inter-union rivalry, lack of union recognition of the dire economic and financial position of some mines/shafts) affect the subsector (MCSA, 2020).

Despite its challenges, in 2020, gold prices rose due to low interest rates and excess funds injected into the global economy by central banks worldwide to mitigate the economic impact of COVID-19. The price of gold increased by 45.3% in Rand terms, aided by the weakening of the exchange rate. Geopolitical and trade tensions between the United States and China, as well as the United Kingdom and the European Union, also increased the demand for gold in 2020. As a result, the price of gold in US dollars increased by 26.6% in 2020. This trend continued in 2021, with gold sales accounting for 61.3% of the sector's 46.9% mineral sales, contributing 7.2% points (Stats SA, 2021b).

1.4.2.3 Coal Mining

The South African coal subsector is ranked 6th globally in terms of production and 6th in terms of reserves, contributing 3.5% to global output (Minerals Council South Africa, 2020). Coal reserves and coal mining activities are predominant in Mpumalanga. It is one of the largest subsectors in South Africa, accounting for more than 24% of total production volumes (weighted). The major user of coal is the electricity generation sector, followed by exports, liquid fuels manufacturing, and other uses, including use by businesses for combustion processes and household use (MCSA, 2021).

Although one of the largest subsectors, coal prices declined for the third year in a row in 2020, averaging US$65.7/t, 8.6% lower than the previous year and 32.7% lower than in 2018. In the international market, there was an oversupply of coal coming from Indonesia. In addition, lower coal prices are discouraging investment in South Africa. The subsector has also seen little investment in the form of Greenfield projects. Due to the negative global outlook for coal and several countries enacting strict legislation prohibiting the use of coal, coal majors with the capital to finance new projects are also exiting coal mining (MCSA, 2021).

1.4.2.4 Diamond Mining

Diamond deposits are concentrated in Northern Cape, Free State and Limpopo provinces. They comprise an intricate lattice of carbon atoms, a crystalline structure that makes them harder than any other form in nature. Diamonds are popular in jewellery and sought after in high-tech cutting, grinding, and polishing tools (MCSA, 2021a).

The diamond subsector was the only one to record an increase in production in 2020 compared to 2019. In the first ten months to October, production was said to have increased by 12.3%. Export sales earnings from January to November 2020 slightly increased by 1.4% compared to the same period in 2019 (MCSA, 2021a).

Industry-specific challenges include the 2018 Mining Charter that now also applies to the diamond subsector (certain stipulated threshold may negatively affect the industry), rising illegal mining activities, safety, environmental and social concerns. This may place further pressure on a subsector that has been declining for the past decade.

Potential solutions include but are not limited to a clear regulatory framework in which illegal miners are formalised into artisanal miners (MCSA, 2018, 2020). In addition, diamond mining companies, the DMRE and the South African Police Service need to work together to facilitate the prosecution of those involved in illegal mining.

1.4.2.5 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.

Despite the country's wealth of resources, South Africa's jewellery manufacturing industry is small. The majority of jewellery manufacturing companies are located in Gauteng, the Western Cape, and KwaZulu-Natal. These companies beneficiate mining outputs such as gold, platinum, silver, and diamonds to manufacture jewellery for both domestic and export markets. The COVID-19 pandemic had a significant impact on the jewellery industry. COVID-19, according to stakeholders, is creating a slowdown in the industry's economic performance among small businesses. However, the opposite trend is observed for companies that sell high-end jewellery. With limited access to travel due to restrictions imposed by some countries, people are said to turn to high-end jewellery (antique jewellery, jewellery with high-quality gemstones and diamonds) as an alternative investment channel.

Furthermore, there has been an increase in robberies at jewellery stores as a result of COVID-19. Stakeholders claim that the requirement that everyone wears a mask in public makes it even more challenging to report perpetrators. As a result, jewellery store owners are now fearful of walk-in clients. Employers have increased their investment in tighter security measures to protect their employees and properties and improve their online marketing strategies to attract new clienteles in response to this challenge.

1.4.2.6 Cement, Lime, Aggregates and Sand (CLAS)

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

Aggregate and sands recorded the highest total sales in 2019, amounting to R6.9 billion. This is despite a 1.8% decrease in physical production due to an ailing domestic construction sector where most of these materials are used. The depressed construction sector also affected limestone production as it decreased by 1.1%. Limestone is predominately used in cement production, a key ingredient for the construction sector (MCSA, 2020).

1.4.2.7 Other Mining

The Other mining subsector includes uranium producers, phosphates, copper, chrome, iron ore, manganese and salt. South Africa's copper deposits lie mainly in Limpopo. South African iron ore is ranked 13th globally 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 (MCSA, 2020).

The majority of iron ore is used to manufacture steel used in the construction, engineering, automotive and machinery industries. Although it is a limited resource, South African iron ore is of a higher grade, commanding world prices in the upper tier (MCSA, 2020). In 2020, iron ore prices were 16% higher year-on-year, averaging US$108.9/tonne, compared to 2019. In December 2020, iron ore prices were US$155.4/tonne, up from US$124.4/tonne in November 2020. Iron ore mineral sales were 47.9% in March 2021, accounting for 4.1% of the sector's mineral sales (MCSA, 2021a).

South Africa produces approximately 61% of the world's chrome. Chrome ore prices were lower year-on-year in 2020, averaging US$152.8/tonne, compared to US$167.4/tonne in 2019. Chrome ore has four main uses, i.e., steel or alloy making (metallurgical grade ore), chemical, foundry sand, and refractory grade. Steel or alloy production accounts for 94% of chrome ore consumption. Year-on-year, prices in Rand were R2,806/tonne, R2,298/tonne, and R2,352/tonne in 2018, 2019, and 2020, respectively. The cost of ferrochrome per tonne is typically five times that of chrome ore.

1.4.2.8 Services Incidental to Mining

The Services Incidental to Mining category consists of companies providing services incidental and closely related to the MMS. These include 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 on essential services. Stakeholders in the services incidental to mining subsector asserted that COVID-19 had hard-hit their industry. Companies are struggling to retain jobs, having to retrench some of their employees.

1.4.3 Mining and Quarrying GDP

The Figure below illustrates the MMS' contributions to the national GDP for the past six years (2016-2021). The sector's GDP has been fluctuating for the past six years. Its highest contribution was observed in 2019. The slight decrease in 2020 is attributed to the supply and demand disruptions caused by the hard lockdown enacted to combat the spread of COVID-19. However, in the third quarter, the sector recovered and became one of the country's largest drivers of economic growth. Increased PGMs, iron ore, gold, and manganese drove the improvement of the sector's contribution to GDP. The sector was also aided by an increase in exports (Stats SA, 2020).

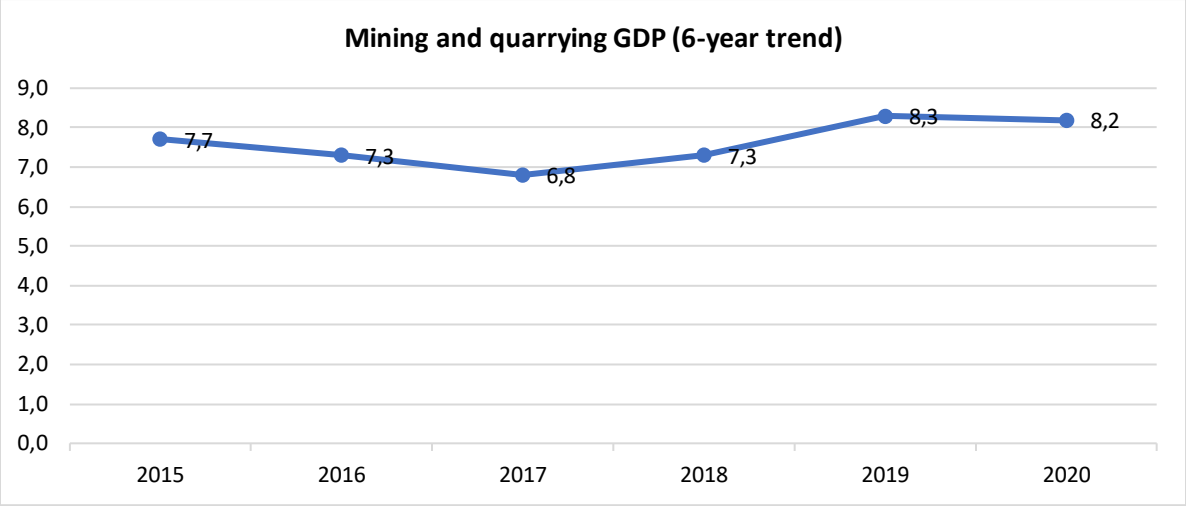


Figure 1.2: Mining and quarrying GDP (6-year trend) Source: *MCSA 2016-2021*

1.5 MMS Future Outlook

To ensure the competitiveness of the MMS, the sector's future outlook is largely influenced by various factors discussed in Figure 1-4 below. These factors each play a unique role in the sector's economic prospects, employment retention and will influence skills demand and supply.

MMS Future Outlook

PGM Mining

- The PGM basket price is expected to remain high into 2021. This is anticipated to be beneficial for PGM producers.
- Palladium is expected to remain in a supply deficit of 800,000 to 1 million ounces.
- Platinum is expected to contribute more to the basket price due to increased investment demand and continued substitution from palladium to platinum by automobile manufacturers.

Coal Mining

- On the domestic front, there is uncertainty about the subsector's future.
- Eskom appears to want to phase out coal use faster than the Integrated Resource Plan 2019 predicted.
- India, the largest coal export market, generates 64% of its electricity from coal, but is currently intending to reduce coal imports and has made the coal industry more open to private sector participation. Consequently, the private sector's appetite is extremely low.

Gold Mining

- The subsector's investment prospects are expected to remain bleak in the absence of a structural solution to the country's electricity crisis. The unstable nature of electricity supply raises health and safety concerns, while the high cost of electricity tariffs is also a major source of concern from an input cost perspective.
- However, on a positive note, the ongoing global economic uncertainty induced by COVID-19 is expected to promote gold prices in 2021. Gold is perceived as an attractive investment given its storer of value characteristics, where inflation does not erode its value.

Other Mining

- COVID-19 has resulted in a decrease in iron ore exports to China, which is South Africa's largest iron ore export market. Even in a post COVID-19 economy, prices are expected to rise further.
- The global economic slowdown which resulted from COVID-19 is also expected to affect the demand for manganese.
- South Africa will continue being the global leader of chrome ore supply. China is the largest importer of South African chrome ore, accounting for approximately 93% of South Africa's total exports.

Diamond Mining

- With the demand for diamonds almost 20% down in 2020 compared to 2019, there are predictions that there will be very little if any investment in new mines in South Africa.
- In the long-term, the performance of diamond mining will be determined by the global consumer's balance sheet, particularly that of the US consumer. The COVID-19 vaccine is likely to improve the demand for diamond as consumers return to work. However, it may take years for diamond demand to get back to pre-2020 levels as consumers recover financially.

Figure 1.3: MMS Future Outlook

Source: MCSA, 2021, MQA, 2021

1.6 Employer Profile

The analysis of employers within the MMS is predominantly based on the DHET levy registration file.

1.6.1 Geographical location of employers in the MMS

The table below shows the geographical location of companies in the sector - indicating that Gauteng hosts the majority of mining companies (45.1 %). The Eastern Cape (1, 7%) and Free State (2.3%) 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.

Table 1.5: Employers' geographical location

Province	No. of Employers	% of Employers
Eastern Cape	40	1,7
Free state	55	2,3
Gauteng	1078	45,1
KwaZulu-Natal	88	3,7
Limpopo	120	5
Mpumalanga	327	13,7
North West	293	12,2
Northern Cape	169	7
Western Cape	217	9
Total	**2387**	**100,0%**

Source: DHET levy registration file (February 2021)

1.6.1 Subsector, Size and Number of Companies Represented in the MMS

The table below shows the number of employers in the MMS, broken down by subsector and company size. The majority of employers are small (78%) followed by large (12, 1%) and medium (9, 9%). The largest number of employers can be found within the Other Mining subsector (44, 4%), followed by Services Incidental to Mining (22, 3%), whilst the least number of employers fall within Diamond Mining (1%) and PGM (1.1%) subsectors.

Table 1.6: MMS companies represented by subsector and company size

Subsector	Size of Employers			Total per subsector	
	Small	Medium	Large	No. of Employers	% of Employers
CLAS	90	23	16	129	5,4
Coal Mining	171	28	42	241	10
Diamond Mining	19	3	2	24	1
Diamond Processing	52	4	4	60	2,5
Gold Mining	89	19	32	140	5,9
Jewellery Manufacturing	162	7	1	170	7,1
Other Mining	815	110	137	1062	44,4
PGM Mining	4	2	22	28	1,1
Services Incidental to Mining	461	38	34	533	22,3
Total	1863	234	290	2387	100,0%
Percentages (%)	78,0%	9,9%	12,1%	100%	100%

Source: DHET levy registration file (February 2021)

1.7 Labour Market Profile

The labour market profile is obtained primarily from the MQA WSP/ATR dataset, the DHET levy registration file and DMRE's public labour data. Weighting of the data was applied to provide a close to a realistic outlook of the sector. The weighting formula and other relevant formulae can be found in the Annexure to the SSP.

1.7.1 Major Occupational Groups by Gender and Race

Table 1.7: Major occupational groups by gender and race

Occupational Categories	Gender		Race				
	Female	Male	African	Coloured	Indian	White	Total
Managers	1968	7196	3721	365	432	4688	9206
	21%	79%	40%	4%	5%	51%	100%
Professionals	5823	11232	10649	697	493	5233	17072
	34%	66%	62%	4%	3%	31%	100%
Technicians and Associate Professionals	7666	35646	32391	1433	295	9188	43307
	18%	82%	75%	3%	1%	21%	100%
Clerical Support Workers	8043	6315	10513	953	200	2720	14386
	56%	44%	73%	7%	1%	19%	100%
Service and Sales Workers	1119	2685	3181	157	28	430	3796
	29%	71%	84%	4%	1%	11%	100%
Skilled Agricultural and Related Trades Workers (Artisan category)	3052	23500	19074	1179	127	6137	26517
	11%	89%	72%	4%	-	23%	100%
Plant and Machine Operators and Assemblers	11557	126135	133011	2621	117	1939	137688
	8%	92%	97	2	-	1	100%
Elementary Occupations	15755	70197	82768	1351	52	1714	85885
	18%	82%	96%	2%	-	2%	100%
Learners	2496	3980	5942	289	29	204	6464
	39%	61%	92%	4%	-	3%	100%
Total	57551	286770	301250	9045	1772	32253	344320
	17%	83%	87%	3%	1%	9%	100%

Source: MQA Weighted WSP and ATR (30 April 2021)

The table above shows that the race composition in the sector is dominated by Africans constituting 87% of the sector's employees, followed by Whites (9%), Coloreds (3%) and

Indians (1%). This, however, is concerning as the dominant race group within the Managerial Occupations is Whites (51%) followed by African (40%), Indian (5%) and Colored (4%).

The MMS remains a male-dominated sector employing 83% males throughout the major occupational categories, with the exception of Clerical Support Workers.

1.7.2 Management Levels by Race and Gender

Table 1.8: Management Levels by race and gender

Management Level	Gender	Race	No. of employees	% of employees
Top management	**Female**	African	138	47%
		Coloured	11	4%
		Indian	23	8%
		White	120	41%
	Male	African	283	29%
		Coloured	39	4%
		Indian	30	3%
		White	615	64%
Senior management	**Female**	African	354	43%
		Coloured	32	4%
		Indian	67	8%
		White	372	45%
	Male	African	961	32%
		Coloured	100	3%
		Indian	160	5%
		White	1806	60%
Professionally qualified and experienced specialists and mid-management	**Female**	African	2594	58%
		Coloured	215	5%
		Indian	249	6%
		White	1422	32%
	Male	African	5743	46%
		Coloured	598	5%
		Indian	373	3%
		White	5743	46%

Source: MQA Weighted WSP and ATR (30 April 2021)

The table above shows that White and African females account for 47% and 41% at top management level, whereas African males account for 29%, whilst White males are at 64%.

1.7.3 Highest Education Obtained

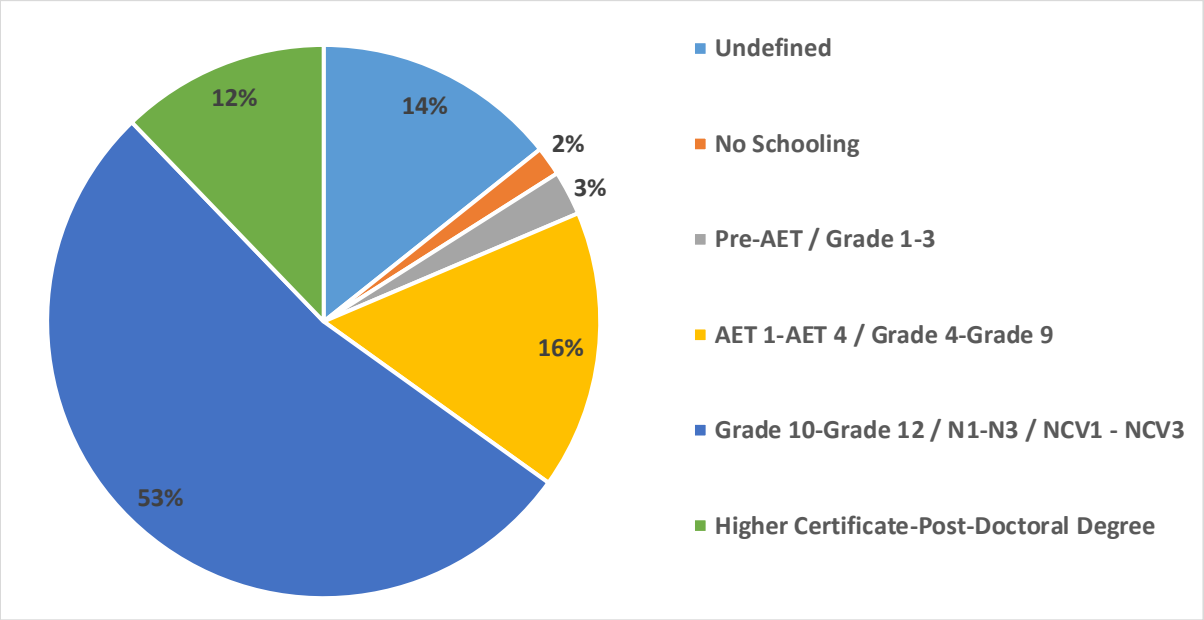


Figure 1.4: Highest Education Obtained *Source: MQA Weighted WSP and ATR (30 April 2021)*

Analysis of qualifications reveals that the highest proportion of employees (53%) 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 16%. On the other hand, 12% of employees have between a Higher Certificate and Post-Doctoral degree. Approximately 2% of the sector's employees are reported to have no schooling. The "Undefined" category represents employees whose education levels were not specified, equating to 14%.

1.7.4 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 2016-2020. 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 1.9: Provincial employment trends in the MMS (2016-2021)

Province	2016	2017	2018	2019	2021	CAGR
Eastern Cape	1 889	2 204	647	533	696	**-0,9%**
Free State	36378	39 665	15684	14823	18035	**-0,9%**
Gauteng	84559	87 043	157275	154995	76891	**-0,8%**
KwaZulu-Natal	10669	12 120	7718	8792	4543	**-0,9%**
Limpopo	86680	75 474	74790	77598	75519	**-0,8%**
Mpumalanga	63219	70 516	78801	79353	44556	**-0,9%**
North West	185352	225 320	132660	132801	102929	**-0,9%**
Northern Cape	44329	33 605	20015	22128	17142	**-0,9%**
***Western Cape**	6928	5 509	5882	7529	4010	**-0,9%**
Totals	**520003**	**550905**	**493472**	**498552**	**344321**	**-0,9%**

Source: MQA Weighted WSP and ATR (30 April 2021)

**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.*

All provinces have been experiencing an average decrease of -0, 9% of employment over the five-year period.

Table 1.10: Sub sectoral employment trends in the MMS (2016-2020)

Subsector	2016	2017	2018	2019	2021	CAGR
CLAS	13162	14424	15637	10746	6829	**-0,9%**
Coal mining	56930	26610	86235	89775	35325	**-0,9%**
Diamond mining	8974	8743	16714	15888	8924	**-0,8%**
Diamond Processing	1849	1758	1790	1461	1626	**-0,8%**
Gold mining	91357	238245	98965	94152	74424	**-0,8%**
Jewellery Manufacturing	2802	1631	1902	1853	1811	**-0,9%**
Other mining	129829	153057	68580	83103	43261	**-0,9%**
PGM mining	173529	87404	167794	166367	115990	**-0,9%**
Services incidental to mining	41509	19034	35854	35206	56132	**-0,7%**
Totals	**520003**	**550905**	**493471**	**498551**	**344322**	**-0,9**

Source: MQA Weighted WSP and ATR (30 April 2021)

All subsectors have shown a general decline of approximately 0, 8% over the five-year period.

Table 1.11: Gender distribution trends in the MMS (2016-2020)

Gender distribution	2016	2017	2018	2019	2021	CAGR
Male	444553	474217	418449	418218	286770	**-0,9%**
	85,5%	86,1%	84,8%	83,9%	83%	
Female	75450	76688	75023	80333	57551	**-0,8%**
	14,5%	13,9%	15,2%	16,1%	17%	
Totals	**520003**	**550905**	**493471**	**498551**	**344321**	**-1,0%**

Source: MQA Weighted WSP and ATR (30 April 2021)

The MMS remains a male dominated sector. However, the proportion of females have been increasing gradually from 2015 to 2019. The compounded annual average over the 5 years remains at a negative of approximately one percent for both genders. 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. 301250

Table 1.12: Racial distribution trends in the MMS (2016-2021)

Racial distribution	2016	2017	2018	2019	2021	CAGR
African	435100	474189	424537	427415	301250	**-0,9%**
	83,7%	86,1%	86,0%	85,7%	88%	
Coloured	19582	17349	13070	16052	9045	**-0,9%**
	3,8%	3,1%	2,6%	3,2%	3%	
Indian	3907	2701	2629	2538	1772	**-0,9%**
	0,8%	0,5%	0,5%	0,5%	0,5%	
White	61414	56666	53235	52546	32253	**-0,9%**
	11,8%	10,3%	10,8%	10,5%	9,1%	
Totals	520003	550905	493471	498551	344321	**-0,9%**

Source: MQA Weighted WSP and ATR (30 April 2021)

Equity composition of employees shows all race groups have been diminishing on average over the 5 years.

Table 1.13: Employment by major occupational group trends in the MMS (2016-2020)

Major Occupational Groups	2016	2017	2018	2019	2021	CAGR
Managers	13397	11871	13455	11952	9205	**-0,9%**
Professionals	25591	22960	23387	22999	17072	**-0,9%**
Technicians & Associate Professionals	57877	62986	53128	55499	43306	**-0,9%**
Clerical Support Workers	21582	22435	21290	22240	14386	**-0,9%**
Service & Sales Workers	6885	7100	6205	6550	3797	**-0,9%**
Trades category	39949	37320	40489	45305	26517	**-0,9%**
Plant & Machine Operators & Assemblers	216245	236402	206481	204540	137688	**-0,9%**
Elementary occupations	127534	140632	118436	117078	85884	**-0,9%**
Learners	10841	9122	10600	12388	6465	**-0,9%**
Total	**520003**	**550905**	**493471**	**498551**	**344321**	**-0,9%**

Source: MQA Weighted WSP and ATR (30 April 2021)

A review of employment by occupational categories on a compounded average annual basis over 5 years shows that the MMS is bleeding by 0, 9% across the board.

Table 1.14: Employment trends by disabled employees (2016-2021)

Disability distribution	2016	2017	2018	2019	2021	CAGR
Disabled Employees	4864	4575	4639	3948	4899	**-0,8%**
	0,9%	0,8%	0,9%	0,8%	1,4%	

Source: MQA Weighted WSP and ATR (30 April 2021)

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 0,8% in disabled employees.

Table 1.15: Management by Equity trend (2016-2021)

Total employment in MMS	2016	2017	2018	2019	2021	CAGR
African	4340	9018	5453	4523	1737	**-0,9%**
	32,4%	36,0%	40,5%	37,8%	34%	
Coloured	649	1311	518	521	181	**-0,9%**
	4,8%	5,2%	3,9%	4,4%	4%	
Indian	704	1071	550	540	279	**-0,9%**
	5,3%	4,3%	4,1%	4,5%	5%	
White	7704	13656	6933	6368	2913	**-0,9%**
	57,5%	54,5%	51,5%	53,3%	57%	
Total in management	**13397**	**25057**	**13455**	**11952**	**5110**	**-0,9%**

Source: MQA Weighted WSP and ATR (30 April 2021)

The equity profile of Managers depicts that over the five-year period all race groups have declined by a compound average growth rate of -0,9%. Whites continue to dominate the sector at 57% in management positions.

1.8 Conclusions

This chapter demonstrated that South Africa continues to play an important role in the global mining economy. Despite the fact that the COVID-19 pandemic caused several changes that impacted the sector, it is encouraging to see the recovery of subsectors such as PGM and gold. The future economic outlook for some subsectors, however, is bleak, with the likelihood of increasing South Africa's triple challenges of inequality, poverty, and unemployment. COVID-19. In addition, the employment rate has been affected over the years as it has been decreasing from a peak of 628 750 in 2012 to 344 322 in 2021.

The successful remediation of the COVID-19 pandemic will depend on global and national response effectiveness to address challenges brought by the pandemic. This provides a window of opportunity to develop innovative strategies to address skills development within the MMS. 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 mining occupations. The same applies to people living with disabilities. Individuals living with disabilities need to be provided with equal opportunities in employment within the MMS. Therefore, more efforts need to be placed to increase the representation of individuals with disabilities. Moreover, it is imperative that the transformational objective of the Mining Charter (see Chapter 2) be aligned to relevant skills development programmes in the MMS with the aim of increasing the participation of HDPs within management levels. The MQA, through its skills development programmes, may assist in addressing such challenges.

The next chapter aims at discussing the factors that drive change in the MMS and how they influence the skills demand and supply of skills in the MMS. Policy frameworks affecting skills demand and supply are also reviewed.

Chapter 2 : Key Skills Issues

2.1 Introduction

This chapter discusses factors that drive change and impact on skills demand and supply within the MMS. The chapter identifies macro and micro, internal and external factors that continue to shape the skills development landscape of the MMS. The data sources that informed the chapter include key informant interviews, Minerals Council's booklet on facts and figures, the 2021 Mining Indaba Conference, the MQA's Green skills and Fourth Industrial Revolution studies and other additional desktop research.

2.2 Key Drivers

Key drivers are factors that bring change in the sector. These changes compel the sector to modify their actions due to various factors that may affect them, whether positive or negative. Understanding how these change drivers intersect with skills development is imperative to navigate through the concomitant challenges. All change drivers discussed have direct implications for skills development in the MMS.

2.2.1 The impact of COVID-19

The pandemic has become an overarching key driver in the MMS with far-reaching implications. As mentioned in Chapter 1, in 2020, the COVID-19 pandemic brought about unexpected socio-economic challenges that also affected the MMS. The hard lockdown did not only impact the sector's economic performance but also affected Nated (mainly for artisan development) skills programmes, learnerships and short courses, learnerships and work placement programmes. The majority of MMS-related skills are developed at this level of education, covering various mining operations, including blasting, excavations, metallurgy and engineering. Practical training at college workshops and on-the-job workplace experience was impacted as access to mining companies were restricted. In instances where training was permitted, only a small number of students per class were allowed due to classroom training restrictions.

Moreover, all external training providers ceased operations in Gauteng. As a result, no external courses were attended, and safety could not be guaranteed. This has implications for NSDP Outcome 2, which articulates the need to link education and the workplace.

Employers stated that as a result of COVID-19, they had to reduce budgets for skills development at one point. This has an impact on the national skill base and jeopardises the achievement of national imperatives. In light of these developments, the MQA now has the opportunity to reassess and reconceptualise the sector's priorities. As a result, the COVID-19 pandemic has prompted the need to support training interventions geared toward changes brought about by the pandemic. One of these considerations should be in favour of online training methods that reduce the need for physical human interaction.

2.2.2 Global influence and market performance

Local mining companies manage unique operational challenges while still operating in the context of global pressures (Guzek & van Antwerpen, 2015). As mentioned in chapter 1, mining companies are influenced by the global economy, with macro-economic growth and international markets strongly influencing both the demand and supply for resources as well

as profitability (Lane et al., 2015). There is a strong correlation between the performance of commodity markets and mining stocks.

The increased global demand for PGMs, gold, iron ore, and diamonds provides some relief employees as it means that their jobs will be sustained. If this demand persists, it will provide opportunities to address the triple challenge of unemployment, poverty, and inequality. On the other hand, there will be a need to invest in the re-skilling, up skilling and portable skills for employees whose subsectors are not performing well.

2.2.3 Increasing energy tariffs and load shedding

The MMS continues to face an 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). Rising electricity prices affects consumers and will intensify further as NERSA ruled in 2019 that Eskom could 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). In 2020, an additional RCA balance of R13 271m was ruled in Eskom's favour. 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 2 years (MCSA, 2019).

Commodities that are projected to be vulnerable to the large adjustments in electricity tariffs include gold and platinum mining; ferrochrome and manganese smelting; basic chemicals; iron and steel and basic non-ferrous metals. 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, the increase in electricity tariffs will affect local beneficiation, thus making it impossible to render local beneficiation of minerals as a feasible option.

Furthermore, with the MMS being one of the most energy-intensive sectors, mining companies are negatively affected by load shedding. These power disruptions result in production losses which have an impact on the viability of mines. This then affects revenues, investment and will ultimately result in job losses as well. Unstable energy supply also poses a threat to the safety and security of employees, particularly when companies are uncertain about load shedding schedules and when these schedules are inaccurately implemented by Eskom.

To alleviate the above challenges, the sector requires a reliable supply of competitively priced and stable electricity. Stakeholders in the sector recommended that the relevant government leaders should permit regulatory processes that will enable the formation of self-generation facilities to supplement Eskom's constrained energy and not be heavily reliant on solitary supplier of energy. These challenges also compel mining companies to consider alternative green measures as a source of energy. However, that too will have an impact on the coal subsector in terms of production and employment. Moreover, there are indirect jobs created by the coal subsector through its multiplier effect on the economy that will also be affected.

2.2.4 Mineral 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, platinum, diamonds and gold. South Africa is the only African country that manufactures platinum jewellery. However, the majority of platinum is extracted and exported outside of the country. There is also tiger's eye, sugilite and many other semi-precious stones unique to South Africa. Stakeholders in the jewellery manufacturing subsector believe that the sector needs to develop local capacity by investing in interventions supporting and enabling local beneficiation instead of exporting. According to stakeholders, approximately 80% of South African jewellery is imported. The promotion of local jewellery manufacturers needs to be on a bigger scale. The Mining Charter, Mineral Beneficiation Strategy, Industrial Policy Action Plan (IPAP), and New Growth Path all identify mineral beneficiation as one of the key instruments for driving economic development in South Africa. Mineral beneficiation is also listed as a priority intervention for the ERRP. In light of this, there is an opportunity for the government and the sector as a whole to step up to support local businesses and help prevent foreign suppliers from dominating the market.

Moreover, stakeholders strongly assert that the sector needs to build the industry within the African continent. Due to a lack of information about local manufacturers, people seek to purchase jewellery outside of Africa as they are unaware of their existence in the continent. As a result, educational initiatives aimed at educating and connecting African jewellery manufacturers should be implemented.

The promotion of beneficiation necessitates the acquisition of specific skills. Stakeholders claimed that while learnerships enable the sector to have some form of beneficiation-related skills, they are still inadequate. These programmes are said to be too short to fully develop the skills of a well-rounded jeweller. In addition, the focus should not only be on CAD jewellery design but also hand-skills. Before specialising in CAD design, one needs to have hand-made experience.

The MQA continues to support the training of learners in the diamond processing and jewellery manufacturing disciplines to facilitate beneficiation. Since 2010, a total of 6 915 learners have been trained. Stakeholders recommend that MQA assist students in obtaining their own toolbox in order to promote beneficiation. If students decide to start their own business, having a toolbox will help them be more self-sufficient. This will also result in more job opportunities, benefiting not only the country but also the continent as a whole.

Furthermore, through partnerships with entities such as the DTI, the jewellery manufacturing subsector 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, it was 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.

2.2.5 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.

The MQA's 4IR study revealed that different subsectors have embraced technological innovation to different extents. For example, coal and diamond mining subsectors have enough or unlimited headroom and have made significant strides in technological innovation. On the other hand, conventional narrow reef gold and PGM subsectors have limited headroom and have been relatively stagnant when it comes to the introduction of new technologies.

As a result of innovation, the skills requirements will change. There will be a decline or increase in demand for certain roles and new roles will emerge (2-1). Thus, it is important for companies to align their human capital development strategies to their innovation strategies. This could include re-skilling, upskilling and continuous training of employees on the emerging skills.

Table 2.1: Roles and activities expected to change in the MMS

Increasing Roles	Decreasing Roles
• Specialists in the re-mining of waste dumps • Data Analysts • Collaborators • Workplace and worker experience reformers • Unmanned Aerial Vehicle (UAV) operators • Application developers • Re-designers of underground operations • Autonomous truck and loader operators and supervisors • Nanomaterial specialists • Robotics • Alternative energy specialists • Additive manufacturing (3D printing) specialists • Systems Engineers • Cloud computing developers • Information Systems Specialists • Modelling Practitioners	• Payroll and timekeeping clerks • Inspectors, testers, sorters, weathers, samplers • Procurement clerks • Crushing and grinding machine operators and setters • Surveying and mapping technicians • Rock splitters • Excavator and loader operators • Conveyor operators • Freight and cargo agents • Tool and die makers • Truck and ship loaders • Crane, hoist and winch operators

Furthermore, the adoption of autonomous operations could have associated implications on skills requirements such as:

- Leaders, particularly front-line – will now be leading a process rather than people.
- Professionals with engineering, systems thinking, and data analysis skills will be required to remotely operate and monitor a fleet of machines from a control room.

- Professionals with an understanding of geology, sampling and surveying, and skills in modelling, data analysis and interpretation will be in high demand. These professionals will require vigorous training to understand the functionality of the technologies used.
- New roles in an autonomous mine could include highly skilled computer and mechatronic engineers.
- Requirement of fewer ventilation professionals with skills in data analysis skills and systems and technology maintenance.
- Mining engineers and planners will work with models and simulations and apply a higher level of thinking to anticipate and plan the activities of the fleet of technologies.
- Training providers – the training volume increases exponentially during the initial stages of technology adoption and quality of training is critical.
- Skilled operator-artisans for the dual role of operating and maintaining equipment and technologies.
- Processing plant teams will require specialised data analytics, software modelling and IT skills

Furthermore, due to COVID-19, most companies are also under pressure to accelerate the pace at which critical elements of the fourth industrial revolution are integrated to ensure safety and sustainability. This implies that the nature of the jobs that will be available will change as well. Advanced technologies will drive the future of work, necessitating more educated skill sets.

2.2.6 Environmental concerns

2.2.5.1 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 the 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.

Support has been provided by the MMS' stakeholders for the sector to transition to a cleaner energy mix, i.e., transitioning to a growing role of non-fossil forms of power generation such as wind and solar power where costs are not prohibitive as well as nuclear power (MCSA, 2020). In addition, the Minerals Council mentioned that some progress is already being made to generate cleaner coal power through the introduction of new power plants and the closure of older plants associated with historical emissions. Even so, it is believed that coal remains a necessity in the country's future as the main source of power even with the expansion of renewables. With this accounted for, the government is advised to fast-track legislation that make it possible for mining companies to generate their own power, including the over 600MW of solar power projects already in the pipeline that will contribute further to a reduction in the sector's combined carbon footprint (MCSA, 2020).

In addition, the availability and cost of water are quickly rising to the top of mining companies' agendas as one of the greatest constraints to supply. The insufficient water supply 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 their ore and, thus, cannot change their operations' location to mitigate or adapt to environmental challenges. The sector must align their practices with goals closely linked to achieving the development path of the green economy. As 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. The ERRP also recognises the importance of expanding green economy interventions in the country. To address this, the MQA green skills study proposed the following recommendations:

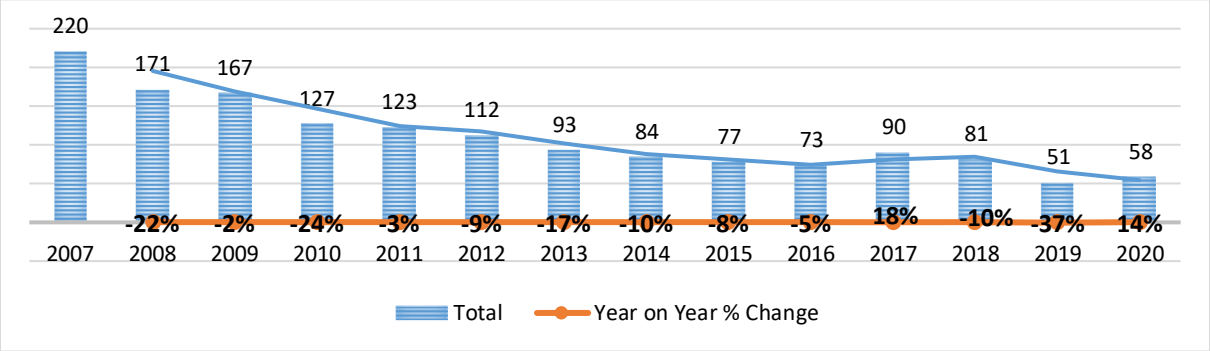
- Revision of the QCTO qualification framework to better align the needs of the MMS in relation to green skills.
- Bridge the gaps between the educational programmes and industry requirements by means of specialised courses (e.g., radioactivity).
- Broaden skills sets and develop sector-specific experience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

2.2.5.2 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 jeopardize a mining companies' licence to operate. As illustrated in Figure 2-1 below, there has been a significant decrease in the number of fatalities in the MMS between 2007 and 2016, though there was an exponential increase in 2017. That trend was reversed in 2018 and where figures decreased again. However, in 2020, figures slightly increased. Even so, within the global "zero-harm" goal, one miner dead is one too many (MQA, 2020). Fall of ground, transportation and general classified incidents are reported to be main contributors of the overall fatalities in recent years.

The MQA's study on "Understanding the occupational health and safety matter in the South African MMS" revealed that there is a lack of alignment between the existing OHS programmes and the MHSA. Therefore, there is a need to revise existing OHS qualifications such as SAQA 74269 Occupational Health and Safety to better align with the requirements of the MHSA and the needs of the MMS in relation to green skills. The MQA was also advised to work with other SETAs to incorporate certain existing programmes into the MMS such as courses in communication of OHS issues, OHS leadership and OHS organisational culture required to deal with OHS organisational issues. These recommendations indicate the need to continue to examine the issues in OHS in the MMS in order to enable the sector to achieve its zero-harm aspiration.

Figure 2-1: Mining fatality trend (2007-2018)



*Source: DMRE (2020) * figures are as of December 2020*

**2021 figures are awaiting the Minister's approval before being released.*

Furthermore, taking into account the huge number of employees employed in the MMS, in the early stages of the COVID-19 pandemic, the sector was perceived to be susceptible to the spreading the virus. However, the sector is lauded for having one of the best comprehensive and collaborative approach in responding to the spread of the virus. Over the past year, mines have taken rigorous initiatives to address COVID-19. These were in the form of the provision of equipment and consumables for testing facilities; provision and/or purchasing of personal protective equipment (PPE) and critical medical equipment for health and social development personnel in the field and in hospitals and clinics; purchase of water tanks and supply of water to public facilities and communities; provision of food parcels to vulnerable families in host communities; contributions to the Solidarity Fund and other non-governmental organisations (NGOs); and increasing awareness through radio and print and social media about the virus and vaccination (MCSA, 2020). It is encouraging also to note that as of 31 May 2021, 97.5% (35 033) out of 35 913 confirmed cases had recovered from COVID-19 (MCSA, 2021).

The Minerals Council has provided healthcare infrastructure since the introduction of vaccines, particularly in areas where mines and mining communities are concentrated. Its goal is to vaccinate not only employees but also their families and communities. Vaccination acceptance is also being promoted.

2.3 Policy frameworks affecting skills demand and supply

There are many 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
Mineral and Petroleum Resources Development Act (28 of 2002)	• The MPRDA is aimed at creating conditions that are conducive for equitable access and sustainable exploitation of petroleum and mineral resources in the South Africa.	• 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 skill base to empower Historically Disadvantaged Persons**.** This also includes the promotion of Historically Disadvantaged Individuals (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 amongst others 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 mines that result in fatalities and injuries which are a contributor of individuals sustaining disabling injuries.	• The promotion of health, leading to a capable and healthy workforce who will be retained in the sector.

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning 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, promote creation of decent employment and diversification of the economy, including promotion of the green economy.	• 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 encouraged to promote the sustainability and growth of the sector. • The increasing need to implement innovative technology in the sector will have an impact on beneficiation as it will prompt the need to manufacture the demanded technology locally. This will then create employment opportunities for new entrants in the sector, community members and up skill existing employees. Qualifications will correspondingly be required to be carefully scoped against these new developments with a longer-term view of the type of the emerging workforce in mind. • Considering that contemporary and future beneficiation trends demonstrate a high dependence of employees with knowledge of science technology engineering & maths (STEM); supporting individuals with this expertise will become a critical component of sustainable industrial development.
New Growth Path (NGP)	• The NGP is the government's vision to reduce the rate of unemployment through job creation. It 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 manufacturing of consumer and capital goods, which can create large-scale employment. • The growth path also requires a radical review of the training system to address shortfalls in artisanal and technical skills.	• The NGP in conjunction with the 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.
Industrial Policy Action (IPAP) 2018/19	• IPAP plans to address the key challenges of economic and industrial growth and race-based poverty, inequality and unemployment.	• Similarly, as the Mineral Beneficiation Strategy, IPAPS's plans to promote the investment of mineral beneficiation could be achieved through developing economic linkages between the primary agriculture, mining and manufacturing sectors to secure much greater downstream beneficiation and maximise upstream linkages. Such linkages may

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning in the sector
	• 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.	well result in multi-sectoral skills transfer and will address high rates of unemployment in the country. • The MQA could partner with the DTI to make its contribution in this area by organising trade fairs. This can be facilitated through providing small companies with access to new markets, giving them exposure to international design skills or accessing new designs over and above their existing design and trading skills. The acquired skills will ultimately 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. • 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.
National Skills Development Plan (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 levels of skills in South African workforce ○ Improving the quality of education, skills development and innovation ○ Increase access to occupationally directed programmes. ○ 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 continue establishing credible skills planning measures through research and identify skills that are needed in the sector and from that 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 ○ Management development programmes for the sector's employees

Policy/ Strategy	Policy input Relevant to the MMS (Policy Objective)	Implications for skills planning in the sector
Economic Reconstruction and Recovery Plan Skills Strategy (ERRP)	• The purpose of the strategy is to ensure that skills required to implement ERRP are available, maximise opportunities for new entrants to access labour markets and support re-training of employees to prevent further job losses. • The strategy is demand-driven, establishes linkages to other key government interventions, encourages national departments and entities and the private sector to support its implementation to build the nation • It also acknowledges the importance of public and private education and training providers and workplaces and recognises the need for a coordinated response across government and social partners.	• To achieve the objectives of the ERRP, the MQA should continue to support interventions that increase access to hard-to-fill occupations, support skills programmes, workplace experience programmes, support entrepreneurship and innovation, and employee retraining/up skilling through portable skills • This will ensure that the sector has adequate skills, existing jobs are retained, and new jobs are created
HRD Strategy for South Africa	The HRD Strategy for South Africa specifies that SETAs are mandated to: • Put in place a skills system that is effective in fostering partnerships that will 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.	• There is a need to collaborate with the sector's key role players to address sector skills priorities • Support should continue to be provided to career awareness programmes, workplace exposure, learnerships, internships and artisan training for mining related occupations.

Table 2.2: 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 of these policies are the need for the MQA to improve the capacity of post-school education through the provision of ongoing 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.

2.3.1 Measures implemented by the MQA to support National Strategies and Plans, including the Economic Reconstruction and Recovery Plan and its Skills Strategy

To support the development and advancement of the employees with the sector, the MQA is committed to continuing 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 can 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 and ERRP 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.

The measures implemented to support specifically the ERRP are discussed in the table below:

Table 2-3: Measures implemented to the Economic Reconstruction and Recovery Plan Skills Strategy

ERRP Intervention	Measures to be implemented	Number of beneficiaries (current)
INTERVENTION ONE: Embedding skills planning into sectoral processes (so that demand planning is dynamic)	• Focused engagement with DHET and other social partners to determine skills required for growth and recovery	
INTERVENTION TWO: Updating or amending technical and vocational education programmes	• Influence the space to update/amend existing TVET programmes to ensure that they meet the critical demands in the sectors.	

ERRP Intervention	Measures to be implemented	Number of beneficiaries (current)
	• Engagement to determine what adjustments can be made to ensure programmes are aligned with priorities of ERRP to preserve and create jobs	
INTERVENTION THREE: Increased access to programmes resulting in qualifications in priority sectors	• Continue to prioritize partnerships between TVET and CET colleges	28 TVET and 9 CET colleges partnerships
INTERVENTION FOUR: Access to targeted skills programmes	• Sills Programmes (Various programmes related to the MMS)	3875
INTERVENTION FIVE: Access to workplace experience	• Massify and expand opportunities for: • Learnerships	900
	Work Experience Training Programme	550
	Internships	900
	Artisan Aides	200
	Artisan Recognition of Prior Learning	100
	Artisan Development	1280
	Recognition of Prior Learning for Learnerships	25
	Foundational Learning Competence	200
	TVET College Support – NCV Level 4 Graduates	400
	Lecturer Development Programme	TBC
	Mine Community training programme	TBC

ERRP Intervention	Measures to be implemented	Number of beneficiaries (current)
	Youth in Mining Communities training programme	TBC
INTERVENTION SIX: Supporting entrepreneurship and innovation	Small-scale Mining programme	TBC
	SMME's supported as training providers in the MMS	TBC
INTERVENTION SEVEN: Retraining/up-skilling of employees to preserve jobs	Adult Education and Training	1350
	Management Development Programme	TBC
	Employee bursaries	TBC
INTERVENTION EIGHT: Meeting demand outlined in the *List of Critical Occupations*	• Continue to conduct research that significantly contribute towards the update of critical skills list to appropriately influence the nature of skills that are necessary for the sector. • Provide support in terms of bursaries, skills programmes, learnerships and internships	

The MQA will prioritise funding the skills development interventions required for the ERRP. Improvements will be made in the planning and funding mechanisms for delivering programmes in TVET colleges and working towards a demand-led system of skills development. This will qualify TVET colleges to become more embedded into industrial, social, and professional/occupational development. Certain programmes must be flexible so that institutions can be responsive to the short-term requirements of employers and the sector.

The MQA should continue to facilitate transformation and SMME development of the sector through skills development by prioritising skills development of Historically Disadvantaged South Africans. These include and are not limited to undertaking skills development interventions to capacitate more females and disabled people in the sector.

2.4 Conclusions

The chapter discussed the key skills issues that drive change and impact on skills demand and supply within the MMS. These include the global influence and market performance, increasing energy tariffs, minerals beneficiation, the fourth industrial revolution, and environmental concerns. The sector 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 empowerment of the previously disadvantaged, including unskilled and semi-skilled employees, females, communities and entrepreneurs. With the developments brought on by the change drivers in the MMS, it will be prudent for the sector to consider measures that will address the challenges affecting the sector for the benefit of employers, its employees and the community at large. It will be imperative for the sector to understand the different skill sets that will be in demand in years to come as this provides a good starting point for planning. This is also accompanied by the need to consider interdisciplinary training that will allow employees to develop skills and knowledge in various subjects outside mining.

Chapter 3 : Occupational Shortages and Skills Gaps

3.1 Introduction

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). The chapter was informed by the 2021/2022 WSP/ATR, the 2020 National list of occupations in high demand, DMRE GCC statistics, the Higher Education Management Information Systems (HEMIS) data and Minerals Council certificates of competency data. The first section discusses the sectoral occupational demand.

3.2 Sectoral Occupational Demand

3.2.1 Hard-to-fill Vacancies

Hard-to-fill vacancies (HTV) are significant indicators to measure occupational shortages and refer to occupations that an employer was unable to fill within 12 months or took longer than 12 months for the employer to find suitably qualified and experienced candidates (DHET, 2019). Table 3.1 below presents the hard-to-fill vacancies by the major OFO group. These were informed by the hard-to-fill vacancies' section of the 2021/2022 WSP/ATRs submissions. This section of the WSP/ATR requires employers to indicate the occupation title of hard-to-fill vacancies and their accompanied reason(s).

The analysis entailed a frequency run of the top 10 most identified occupations by companies. This was then cross tabulated by provinces and subsectors to determine the frequency of mentions per occupation within the two variables (province and subsector). Thereafter, the sum of province and subsector were calculated to develop the top 10 hard-to-fill vacancies.

Table 3.1: Hard-to-fill vacancies

HTFV	OFO Codes	Vacancies	Reasons for Hard-to-Fill
Engineering Manager	2019-132104	31	Lack of relevant experience/Lack of relevant qualifications
Mining Operations Manager	2019-132201	59	Lack of relevant qualifications (desired level of study not attained or inappropriate field of study or inappropriate subject specialisation)
Mechanical Engineer	2019-214401	15	Lack of relevant experience/Lack of relevant qualifications
Mining Engineer	2019-214601	50	Lack of relevant experience / Equity considerations
Safety, Health, Environment and Quality (SHE&Q) Practitioner	2019-226302	78	Equity considerations/ Poor remuneration
Mining Technician	2019-311701	27	Lack of relevant qualifications/Lack of relevant experience
Mining Production Supervisor	2019-312101	91	Unsuitable job location / Lack of relevant experience
Diesel Mechanic	2019-653306	77	Lack of relevant experience / Equity considerations
Millwright	2019-671202	66	Lack of relevant experience/Lack of relevant qualifications
Driller	2019-711301	67	Lack of relevant experience/Equity considerations

Source: MQA Weighted WSP and ATR (30 April 2021)

Furthermore, the WSP/ATR results were triangulated with findings from the key informant interviews. Stakeholders confirmed that employers face challenges in finding suitable candidates to fill the engineering manager, mining operations manager, mining engineer, safety, health, environment and quality practitioner and diesel mechanic vacancies, as shown in Table 3.2 below. In addition to these vacancies, challenges are also experienced in filling auto-electrician vacancies.

Four of the aforementioned occupations (Engineering manager, Mechanical engineer, Driller, and Diesel Mechanic) were included in the national list of in-demand occupations. Occupations in high demand are those that have experienced relatively high employment growth in the past, present, and future and are currently in short supply (DHET, 2020).

3.2.2 Hard-to-fill vacancies identified by stakeholders

Table 3.2: hard-to-fill vacancies identified by stakeholders

HTFV	OFO Codes	Reasons for Hard-to-Fill
Mining Manager	2019-132201	• Shortage of skilled, qualified, and experienced candidates • Competition within the sector • High attrition rate • Mines based in geographically inconvenient locations • A low number of people acquiring Certificates of Competency (GCC, MCC)
Engineering Manager	2019-132104	• Experience and not suitable geographical location • Lack of skills, qualified and experienced candidates • Extremely high remuneration expectancy from possible candidates
Mining Engineer	2019-214601	• Lack of relevant experience • Companies are losing skills to international companies
Environmental Specialist/Officer/SHEQ	2019-226302	• The pool of candidates vs. requirements • Absence of formal occupational qualifications • Occupation is perceived as unattractive • Competition with other industries
Diesel Mechanic	2019-653306	• Lack of qualified Artisans.
Auto-electrician	2019-671208	• Lack of qualified Artisans • Insufficient pipeline • Few TVET colleges offering the course

Source: 2021 MQA key-informant interviews

3.2.3 Skills Gaps

Skills gaps refer to employees' skills deficiencies 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. The term “top-up skills” also refers to skills gaps. Skills gaps usually require short training interventions (DHET, 2019). The table below shows skills from employers in the submissions.

Table 3.3: Skills gaps by major OFO group

Major Occupation Group	Occupation name	OFO Code	Most common skills gaps
Technicians and Associate Professionals (n=382)	Mining Production Supervisor(N=137)	2019-312101	Leadership skills
	Engineering Supervisor(N=53)	2019-312103	Technical (job-specific) skills
Professionals (n=254)	Training and Development Professional(N=34)	2019-242401	Advanced IT and software skills
	Safety, Health, Environment and Quality (SHE&Q) Practitioner (N=31)	2019-226302	Supervisory skills
Managers(n=152)	Mining Operations Manager(N=31)	2019-132201	Mine production process skills
	Finance Manager(N=12)	2019-121101	Management skills

Source: MQA Weighted WSP and ATR (30 April 2021)

Technicians and Associate Professionals (190), Professionals (65) and Managers (43) were the major occupational groups with the most indicated skill gaps.

Employers believe that the following top-up skills are critical for improving each of the indicated occupations:

- Leadership - The process of influencing others to understand and agree on what needs to be done, how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives.
- Management skills - Related to five fundamental functions: planning, organising, coordinating, directing, and oversight.
- Technical (job-specific) skills - Applying principles, techniques, procedures, and equipment specific to the job.
- Mine production process skills - Understands, informs, and supports the mining-related production processes.
- Advanced IT and software skills - Knowledge and ability to utilise computers and related technology that allows one to use personal computers for data entry, word processing, spreadsheets, and electronic communications.
- Supervisory - Monitors and regulates processes and employees in their performance of assigned or delegated tasks.

This section was cross-checked against the 2021 key informant interview analysis. With a few exceptions, the skills gaps identified are similar to those identified in the WSP/ATR results.

Table 3.4 summarises the findings:

Table 3.4: Most common skills gaps identified by stakeholders

Major Occupation Group	Most common skills gaps
Senior (managers and professionals)	• Job-specific skills (primarily underground) • Administrative skills • Presenting skills • Leadership skills • Business development and commercialisation • Emotional intelligence • Time management • Leadership • Communication skills • Change management skills • Digital literacy
Mid-Level (technicians, associates, artisans, clerical)	• OEM specialisation • Computer skills • Leadership skills • Time management • Change management skills • Stress management • Supervisory • Digital literacy
Lower-Level (plant operators and elementary)	• Job-specific skills • New design equipment knowledge • Lack of machine (OEM) specific experience • Communication skills • Problem-solving • Digital literacy

Source: MQA 2021 key informant interviews

Digital literacy is a cross-cutting skill gap that exists across all occupational levels. Stakeholders asserted that MMS employees must be digitally informed and familiar with new technologies and possess knowledge on how to operate them.

3.3 Extent and Nature of Supply

The future growth prospects of a sector are dependent on the availability of appropriate and affordable skills. Therefore, an analysis of the supply-side is necessary. This analysis entailed examining the MQA's APR, HEMIS data, and DMRE GCCs and Minerals Council certificates of competency. It is important to note that the MQA supply-side data may change post the final audit. Findings from the key informant interviews were also included in this section.

3.3.1 Current state of education and training provision

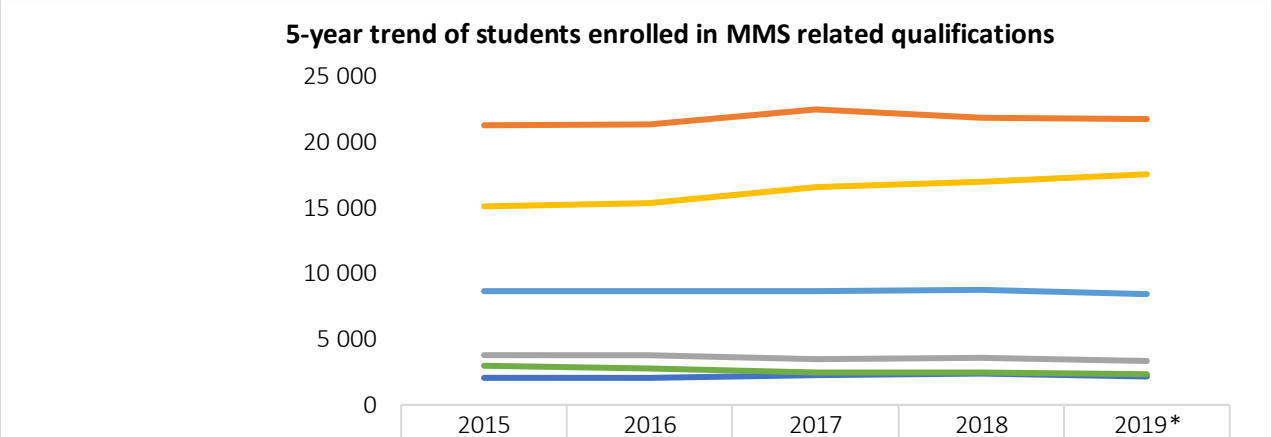
Skills development has a huge dependence on basic education as a foundation phase to enable individuals to progress further into areas of education and training. Similarly, to other economic sectors, skills required for the MMS are produced at the basic education level, TVET and CET colleges, through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

3.3.1.1 Overview of Basic Education

The skills available to the MMS consist of people currently employed and those that are unemployed but available for work. Chapter one's labour market profile showed that the biggest proportion of employees (53%) had achieved the equivalent of Grades 10 - 12 as their highest level of education. The overall matric pass rate in 2020 was 76.2%, down 5.1% from the previous year. The decrease was attributed to COVID-19's impact on distracted learning, which resulted in school closures, learner absenteeism, teacher well-being, and resource access. The number of pupils passing mathematics and physical sciences also continues to decrease. There were 53.8% learners that passed mathematics in 2020, compared to 54.6% in 2019 and 58.0% in 2018. Physical science had the largest drop in pass rate, with 65.8% passing in 2020 compared to 75.5% in 2019 and 74.2% in 2018 (DBE, 2021). For learners who aspire to study STEM professions that require a strong knowledge of mathematics, this becomes problematic as opportunities are limited in this area with mathematical literacy. In the MMS specifically, the majority of occupations require a foundation of good quality mathematics and physical science subjects and, to some extent, geography. It will, therefore, be critical to implement measures that will improve the pass rate of these subjects.

3.3.1.2 Overview of Higher Education and Training

Despite the decrease in 2020's matric pass rate, more school-leavers have been obtaining marks to enrol for studies at higher education levels. At the 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, and Jewellery design and manufacturing. Mining engineering is offered at the University of the Witwatersrand, the University of Pretoria, the University of Johannesburg, and the 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 additional fields of study are each provided at several institutions. Figures 3-1 and 3-2 demonstrate a five-year trend of the number of students enrolled and graduates that completed core mining-related qualifications. This information was extracted from the HEMIS 2019 data, which includes statistics for certificates, diplomas, and undergraduate and postgraduate degrees.



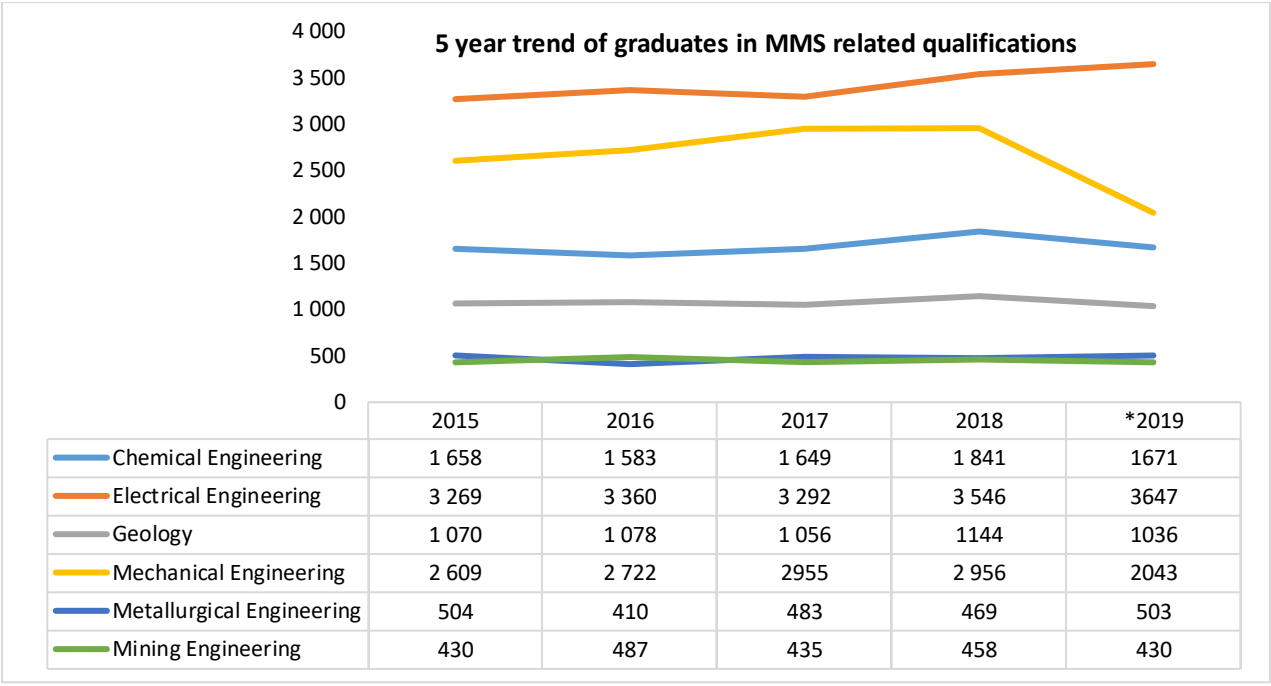
	2015	2016	2017	2018	2019*
Chemical Engineering	8 669	8 630	8 646	8 753	8 428
Electrical Engineering	21 277	21 333	22 483	21 876	21786
Geology	3 758	3 775	3 482	3 569	3 339
Mechanical Engineering	15 104	15 371	16 596	16 976	17 548
Metallurgical Engineering	2 083	2 055	2 243	2 383	2 140
Mining Engineering	2 979	2 721	2 513	2 435	2 334

Figure 3.1: Five-year trend of students that enrolled in MMS-related qualifications

**Please note that the 2019 statistics are the most recent data available.*

Source: DHET HEMIS, 2021

Figure 3.1 shows a five-year trend in the number of students who have enrolled in an MMS-related qualification. There has been a total of 275 285 enrolments between 2015 and 2019. In 2019, the total number of enrolments for the qualifications listed decreased. Electrical engineering, followed by mechanical engineering, had the most students. Although electrical engineering is essential to the sector, stakeholders mentioned that more focus should be placed on auto-electricians. Metallurgical and mining engineering had the lowest enrolments. As seen in Figure 3.2 below, the number of graduates (5.64%) compared to enrolments in the sector is extremely low. Mining and metallurgical engineering, similar to its enrolments, have had the lowest students graduating. Increased enrolment and graduations in these qualifications are critical for addressing skills demand in the sector



	2015	2016	2017	2018	*2019
Chemical Engineering	1 658	1 583	1 649	1 841	1671
Electrical Engineering	3 269	3 360	3 292	3 546	3647
Geology	1 070	1 078	1 056	1144	1036
Mechanical Engineering	2 609	2 722	2955	2 956	2043
Metallurgical Engineering	504	410	483	469	503
Mining Engineering	430	487	435	458	430

Figure 3.2: Graduates that completed an MMS related qualification over the past 5 years

**Please note that the 2019 statistics are the most recent data available.*

Source: DHET HEMIS, 2021

Employers in the MMS also play an essential role in supporting interventions to increase the number of qualified employees in the sector. Typically, this entails the awarding of bursaries. The bursaries awarded to employees by mining companies are discussed in the section below.

3.3.1.3 Bursaries funded by employers to employees

Table 3.5: 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%
Electromechanical 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 and ATR (30 April 2021)

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 3.6: 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%
Electromechanical 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 (30 April 2021)

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%).

3.3.2 MQA's interventions to address skills supply in the MMS

3.3.2.1 MQA's interventions to address challenges at the basic education level

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

Employees whose highest level of education are between Grades 4 and 9 constitute 16% 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 prioritize funding for AET training to increase literacy levels in the MMS. . In 2020/2021, 1250 employees received one or more AET training. This is a slight increase from the 2019 achievement of 1241.

3.3.2.2 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. Over the past years, the MQA has been committed to increasing its support for career awareness events. In 2018, 83 events were facilitated, and 93 in 2019. Due to COVID-19, physical career awareness events could not be facilitated in 2020. However, the SETA continued with its mandate and distributed 105 career guidance materials to various institutions and schools. The aim of the career awareness events is to promote MMS occupations and rectify misperceptions about the sector not being an attractive industry for work.

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 various mining operations, including blasting, excavations, metallurgy and engineering. Practical training at college workshops and on-the-job workplace experience is a significant component of this level.

There are still concerns by stakeholders that many students are not adequately work-ready upon graduating, mainly artisans. This is derived from the notion that many college workshops are not equipped with modern equipment to sufficiently provide the practical training required to complete qualifications. 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.

3.3.2.3 Employees and unemployed learners entering and completing learnerships

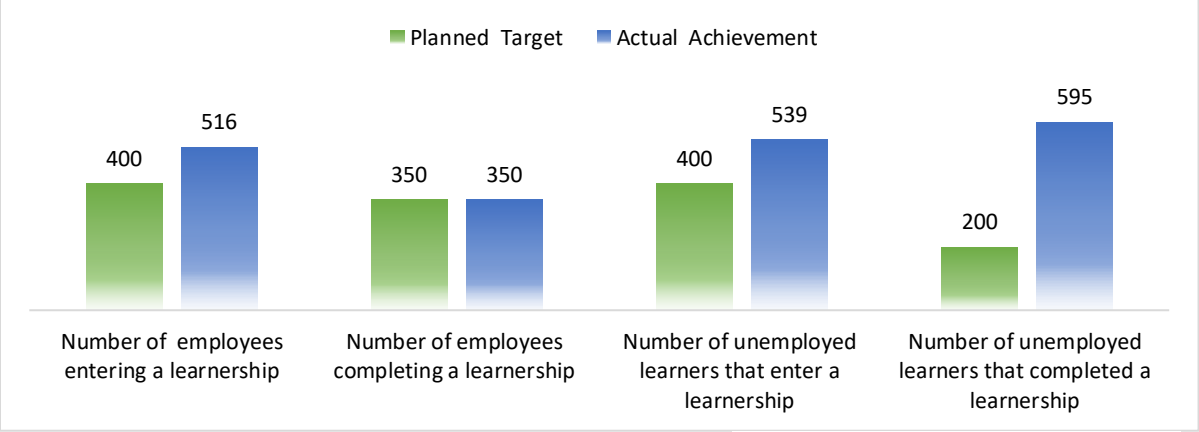


Figure 3-3: Employed and unemployed learnerships (non-apprenticeship) *Source: MQA APR (31 May 2021)*

The above Figure illustrates the number of employed and unemployed learners that entered and completed the learnership programmes in the 2020/2021 financial year. The HRD Strategy for South Africa, NGP and NSD emphasise the provision of workplace training in priority skills needs that could be in the form of learnerships. All targets were achieved, with the number of employees and unemployed learners entering and completing learnerships exceeding their target. The purpose of these learnerships is to enrol learners into core learnerships for the MMS. For those that are employed, these learnerships play a crucial role in advancing employees' careers.

3.3.4.5 MQA learnerships (apprenticeship)

The lack of skilled artisans is argued to be one of the major hindrances 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 3-4 illustrates that in 2020 the MQA set a target to enter 750 learners to enter into an artisan programme in which was exceeded. This was attributed to a higher-than-expected number of learners allocated in quarter four due to the additional budget available to train more individuals. The 2020 target for completed learnerships was set at 650 and was achieved at 652.

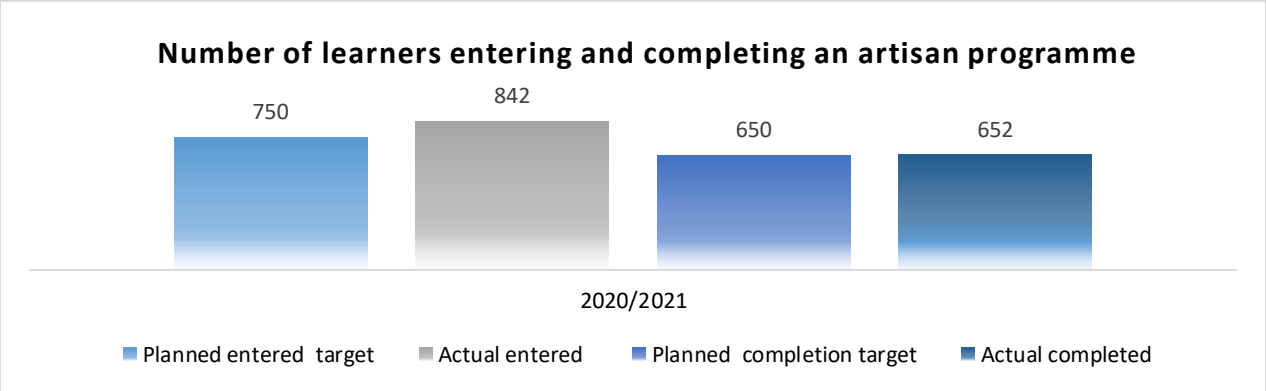


Figure 3-4: Apprenticeship entered and completed

Source: MQA APR (31 May 2021)

As reported in Chapter 2, technology continues to shape the skill sets in the sector. Learnerships need to incorporate changes brought by technology in their offerings. In addition, competition with other sectors for artisans and uncertainty of job attainment in the MMS after completion still denotes that not all artisans developed within the MMS could be absorbed into the labour market.

3.3.2.6 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).

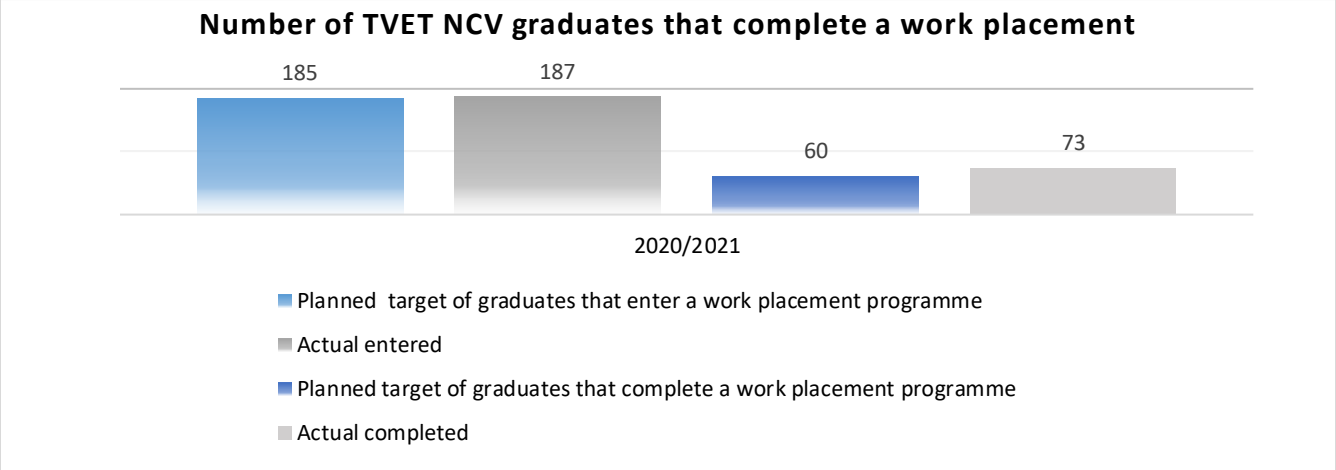


Figure 3-5: TVET NCV graduates entering and completing a work placement

Source: MQA APR (31, May 2021)

Figure 3-5 above shows that in 2021/2022 a target was set to place 185 TVET NCV graduates to enter a work placement programme with host employers. This target was met due to the appetite shown by the sector to recruit more learners. The completion target for the work placement programme was also achieved at 73 from a target of 60 due to sufficient pipelines of learners who were registered in the previous financial year and completed in 2020/2021.

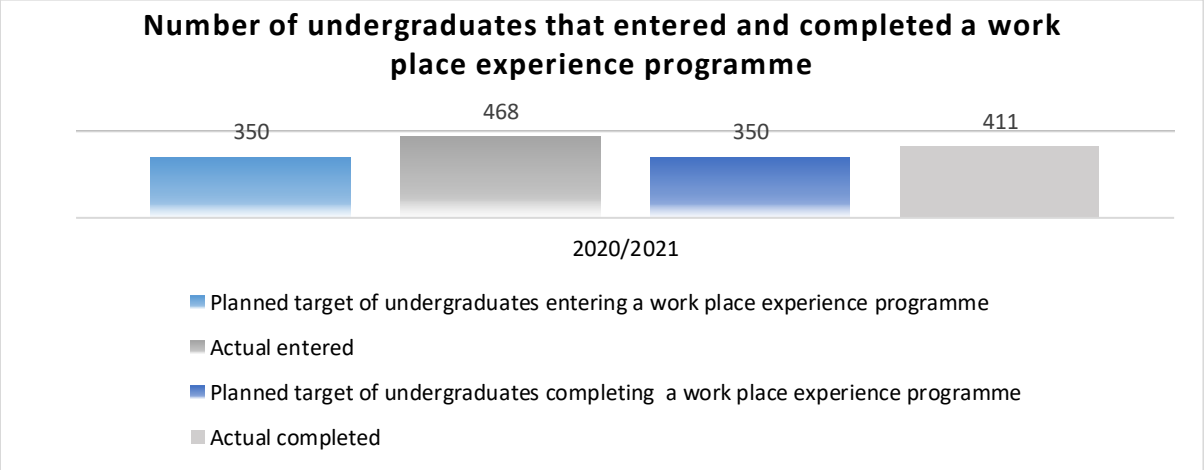


Figure 3-6: Workplace exposure undergraduates entered and completed

Source: MQA APR (31, May 2021)

On the other hand, work exposure is also provided to university undergraduate students. There was an equal target (350) for undergraduates entering and completing a workplace experience programme. Both of these targets were achieved. Target exceeded due to a high number of vacation work learners registered and completed in the same financial year.

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 to promote interest in academia among HDSAs. It also aims to empower universities to transform and to be representative in their lecturer staff complement. In 2020/21, the target to enter 14 lecturers into a lecturer development

programme was not met, short of 3. Due to the resignation of continuing lecturers from the previous year, the target was not met.

3.3.2.7 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 career progression upward, in 2018, the MQA started providing bursaries to MMS employees. The bursaries are awarded to individuals currently employed in mining companies and studying or intending to study towards a mining-related qualification, be it a Certificate/Diploma/Degree/Postgraduate.

3.3.2.8 Bursaries awarded to employees and unemployed individuals

A target of 50 employee bursaries was set in 2020/21; this target was not achieved with a shortfall of 12 due to the extension of the academic year by institutions. In comparison to 2019, the same target of 50 was set, and the sector achieved it (52).

Furthermore, the 2020 target set for unemployed bursaries entered of 780 was not met with a deficit of 127. This was largely due to the extensions of the academic year by institutions. The target for completions amongst this cohort was also not met by a deficit of 258 also due to the extension of the academic year by institutions.

3.3.2.10 Other MQA interventions

In addition to its support towards 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.

3.3.2.11 Youth Development and Mine Community Programme

The development programme aims to provide training to unemployed youth living in mine communities and labour sending areas to furnish them with alternative skills that could enhance entrepreneurial skills post-mining activities. A total of 2166, out of a target of 1700 youth in mining communities and labour sending areas, entered the youth development programme in 2020/2021. This is as a result of additional surplus funding on the programme. A total of 1182 out of a target of 1000 youth completed the programme in the same financial year. The target was exceeded because some companies allocated 2019/20 completed training in 2020/21.

Furthermore, the mine community development programme 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 assist retrenched and unemployed individuals in gaining employability and sustaining their livelihoods through portable skills and mining-related programmes. The MQA set a target of 860 training programmes for entered and 950 for completed mine community beneficiaries. Both targets for entered and completed beneficiaries were exceeded, with the latter achieving 1030 and the former 1438. Targets were exceeded due to excess funding allocated to the programme and some companies receiving funding in 2019/20 completing training in 2020/21.

3.3.2.12 Support for small-scale mining skills

As seen in chapter 1, small mines are well represented in the MMS. However, these companies experience challenges with sustainability due to the capital-intensive nature of the industry as well as broader market dynamics. Therefore, it is imperative to support these companies to develop strategies that will empower them to perform efficiently. Too mitigate some of these challenges, the MQA has a programme aimed at training communities in small-scale mining. In the year 2020/21, a target of 50 was exceeded at a total of 100. The support of small-scale mining skills is in line with outcome 6 of the NSDP, which aims to increase skills development support for entrepreneurial activities and establish new enterprises.

3.3.2.13 MQA Accredited Training Providers

From a target of 120, there were 124 quality-assured training providers in 2020/2021, including identified and approved workplaces. 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. The MQA should start accrediting companies that train digitally and in line with programmes introduced by the fourth industrial revolution.

3.2.2.14 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 their operations. 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, such as managing small tasks and attending management development courses.

The MQA has a management development programme in place to address the challenges mentioned above. The target of 60 HDSA employees participating in this programme was exceeded (131). However, the completion target was not met (77 vs. 80). This was due to students' contracts being extended and others resigning from companies before the programme was completed.

3.3.3 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 aforementioned education echelons, namely Government Certificates of Competency, Minerals Council South Africa certificates of competency.

3.3.3.1 Government Certificates of Competency

Certain core occupations within the MMS, such as mine engineer and mine manager, can only operate upon attaining a Government Certificate of Competency (GCC) by the DMRE. There are stringent qualification criteria, which include years of experience and passing of examinations to qualify. The table below shows the number of certificates which the DMRE issued in the past seven years.

Table 3.7: Awarded GCCs over the past five years

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
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
2020-2021	31	26	5	15	11	4	45	34	11	5	5	0	0	0	0
Total	591	505	86	284	222	62	807	732	75	74	60	14	228	126	102
%	100%	85,4%	17,0%	100%	78,2%	21,8%	100%	90,7%	9,3%	100%	81,1%	18,9%	100%	55,3%	44,7%

Source: DMRE, 2021

There was an increase in the number of GCCs issued between 2017/18 and 2018/19, except mine surveyor. However, the trend decreased in 2020/2021. This can be due to disruptions caused by the COVID-19 pandemic. The low numbers of certificates issued for mine engineers and mine managers are concerning because they are constantly identified as a hard-to-fill occupation. In addition, females are the least recipients of GCCs, highlighting the importance of addressing this gender disparity. The MQA needs to collaborate with the DMRE to implement supportive measures that will improve the pass rates of GCC candidates.

3.3.3.2 Minerals Council South Africa certificates

The table below demonstrates the number of certificates in MMS-related qualifications which the Minerals Council South Africa issued since 2018. The Council Certificates of Competency (CoCs) were introduced to standardise stand-alone in-house qualifications for persons working in the sector. Overall, the number of the issued certificates decreased in 2020, except Certificate in Radiation Protection Monitoring Screening. Similarly, to other learning programmes, COVID-19 had an impact on the completion of these programmes.

Table 3.8: Minerals Council CoCs (2018-2020)

Certificate	2018	2019	2020
Certificate in Advanced Mine Surveying	39	21	14
Certificate in Advanced Mine Valuation	16	15	8
Certificate in Advanced Rock Engineering	8	3	2
Certificate in Basic Mine Sampling	59	75	30
Certificate in Basic Mine Surveying	98	78	31
Certificate in Elementary Mine Sampling	11	**36**	10

Certificate	2018	2019	2020
Certificate in Elementary Mine Surveying	68	43	25
Certificate in Mine Environmental Control	21	**81**	31
Certificate in Radiation Protection Monitoring Screening	95	58	72
Certificate in Rock Mechanics	31	14	11
Certificate in Strata Control	32	**42**	23
Intermediate Certificate in Mine Environmental Control	122	88	58
Certificate in Mine Survey Draughting	13	6	6
TOTAL	**613**	**560**	**321**

Source: Minerals Council, 2021

3.4 Sectoral Priority Occupations and Interventions (PIVOTAL)

The research study was designed to be as interactive as possible therefore, a consultative participatory approach to include the MQA Executive Committee was used to conceptualise the most appropriate methodology to develop the MQA Pivotal list. Thus, the PIVOTAL list was endorsed by the Board.

The MQA's OFO Code aligned PIVOTAL Skills List in Table 3.9 was determined by considering the hard-to-fill vacancies reported in the WSP/ATRs. The methodological approach 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 determine the frequency of mentions per occupation within the two 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, and 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 exclude many others that are also applicable. Considering that PIVOTAL skills are required to address skills demands and gaps in the sector, the research team chose to focus its PIVOTAL list on occupations that 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 is concerned. The list is ranked by OFO code according to advice by key stakeholders in the sector, including representatives of the industry, labour and government.

Table 3.9: MQAs' OFO Code Based Pivotal List (2022/2023)

Occupation Name	OFO Code	No. of Hard-to-Fill Vacancies
Engineering Manager	2019-132104	31
Mining Operations Manager	2019-132201	59
Mechanical Engineer	2019-214401	15
Mining Engineer	2019-214601	50
Safety, Health, Environment and Quality (SHE&Q) Practitioner	2019-226302	78
Mining Technician	2019-311701	27

Mining Production Supervisor	2019-312101	91
Diesel Mechanic	2019-653306	77
Millwright	2019-671202	66
Driller	2019-711301	67

Source: MQA WSP and ATR (30 April 2021)

3.5 Conclusions

The analysis of the MQA's WSP/ATR submissions indicated that the hard-to-fill occupations are as follows: Mine Manager, Mining Engineer, Mining Production Supervisor, Safety, Health, Environment and Quality (SHE&Q) Practitioner, Engineering manager, Diesel Mechanic, Mechanical Engineer, Mining technician, Driller and Millwright. The main supply-side concerns were found to be as follows:

- Basic education: low mathematic enrolment and pass rate; and lack of early access to career awareness.
- TVET college sector: lack of adequate 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 with particular reference to value-adding partnerships. The NSDP (2018) highlights the role of SETAs as intermediary institutions that bridges the gap between the world of work and education. This is facilitated through fostering linkages between the labour market, employers and sectors with an institutional supply of relevant skills sets. The DHET (2019) defines partnerships as “a collaborative agreement between two or more parties intended to achieve specified outcomes directed towards addressing mutually inclusive skills priorities or objectives within a specified time frame.”

The chapter examines the MQA's existing partnerships, focusing on their nature, objectives, the value that each partnership adds to the MQA, the gaps that each partnership is meant to fill, and what should be done to strengthen the partnerships that are already working well. The chapter was informed by a consultative session with the MQA's regional managers of all 8 provinces and Stakeholder Relations Executive Manager. Research findings on the Fourth Industrial Revolution and Green Skills were also used to inform this chapter.

4.2 The nature, and objectives existing SETA Partnerships

The MQA has existing partnership agreements with 28 TVET and 9 CET colleges in all South African provinces. These are discussed in detail in the section below.

4.2.1 TVET and CET colleges

The NDP makes reference to building a strong relationship between the college sector and industry to ensure speedy absorption of graduates into jobs. The New Growth Path highlights the role that TVET colleges play in equipping the youth with middle-level skills, while the Green Paper for PSET (2012) supports TVET college partnerships while simultaneously acknowledging that such partnerships may at times have areas of improvement. The White Paper on PSET (2012) also recognises the importance of partnerships between educational institutions and employers. The Human Resource Development Strategy of South (HRD-SA) also emphasises the vitality of industry-institutional partnerships. Strategic goal 2.3., directs that each TVET institution “has at least one functional and sustainable industry-institution partnership aimed at enhancing the link between formal learning and world of work and providing opportunities for placements” (HRD-SA, 2012:34).

The National Skills Development Plan (NSDP) 2030 has a crucial role in facilitating workplace learning partnerships between employers and sectors within the education and training institutional supply (RSA, 2019). In its mission to create a linkage between education and the workplace, the MQA entered into several partnership agreements with TVET and CET colleges for a period of a year, subject to renewal depending on the contextual issues. Against this backdrop, the purpose of partnerships is to improve college institutional capacity with critical interventions in various domains such as governance, management, teaching, and learning to equip learners with the requisite competencies for the labour market. The objective is to address persistent concerns about the vocational education system's ability to provide people with the knowledge and/or competencies needed for specific occupations or, more broadly, in the labour market. Corporate governance practices are also taken into account to ensure ethical leadership, accountability, transparency, and sustainability, as there are concerns that most colleges do not view corporate governance practices as a major aspect of their activities (Moloi & Adelowotan, 2019).

Other challenges informing the need to support TVET and CET colleges include the lack of leadership and management skills to implement strategies to inspire and enable innovation to respond to hard-to-fill occupations, the persistent misalignment between supply and demand (education and the world of work), and the gap between theory and practice due to lecturers' limited technical skills and industry experience (SASSETA, 2019). The MQA has existing partnership agreements with 28 TVET and 9 CET colleges across all the nine provinces to address these systemic challenges, thus maintaining a national footprint to ensure maximum impact across. This partnership is in line with the DHET's mandate to build the capacity of colleges. The duration of these partnerships is structured to allow the parties involved to sign a 1-year contract, while training is usually conducted over a period of 6 months or more.

The table below indicates the details of the partnerships:

Table 4.1: MQA TVET & CET College Partnerships

			Colleges		
Province	**Name of CET**	**Duration**	**Name of TVET**	**Duration**	**Objectives**
Gauteng	Gauteng CET College	2020-2021	Ekurhuleni East	2020-2021	To increase access to occupationally directed programmes, particularly for intermediate and high-level skills in the areas of governance, management, teaching and learning
			South West Gauteng	2021-2022	
Eastern Cape	Eastern Cape CET College		King Sabata Dalindyebo	2020-2021	
			King Hintsa		
			Lovedale		
North West	North West CET College		Vuselela	2020-2021	
			Orbit		
Western Cape	Western Cape CET College		North Link	2021-2022	
			West Coast	2020-2021	
			College of Cape Town		
			False Bay		
Free State	Free State CET College		Maluti	2020-2021	
			Gold fields		
			Flavius Mareka		
Kwazulu-Natal	KwaZulu-Natal CET College		Majuba	2020-2021	
			Coastal KZN		
			Umfolozi		
			Elangeni		
Limpopo	Limpopo CET College		Vhembe		
			Mopani South East		
			Sekhukhune		
			Capricorn		

			Waterberg	2020-2021	
			Letaba		
Northern Cape	Northern Cape CET College	2021-2022	Northern Cape Urban	2020-2021	
			Northern Cape Rural		
Mpumalanga	Mpumalanga CET College		Nkangala	2020-2021	
			Gert Sibande		

All the partnership agreements share the same objective: strengthening institutional capacity with an object to improve pedagogical outcomes and ultimately producing students with the much required industry aligned, specific, and fit to purpose competencies.

Furthermore, areas of capacity building include equipping college employees or council members with the necessary knowledge, skills and values of the principles of corporate governance, management and accreditation, as well as training lecturers in facilitation, assessment and moderation competencies. The aim is to improve institutional performance related to management, governance, and teaching systems to create conditions optimal for improved classroom practice in learning design and teaching. This partnership adds value by addressing some of the colleges' systemic deficiencies in domains such as governance, management, and accreditation, which are strategically crucial for program rollout (teaching and learning).

4.2.1.1 Successes, Failures and skills development implications for partnership with TVET and CET colleges

Partnerships	
Indicators	**Institutional strengthening of systems**
Successes	• All partnerships are functioning well in accordance with the MOAs. • The response rate from colleges and participation in the discretionary grant process is improving. Council members of colleges were trained on governance issues with emphasis on the ethical standards and management teams were equipped with competencies necessary be able to provide strategic leadership to deliver on the organisational goals of colleges • Training of management on accreditation matters is important because they are enabled to facilitate institutional accreditation (unit standards aligned and credit bearing programme offerings) to comply with national standards and quality assurance systems • Training of lecturers in facilitation, outcome-based assessment and moderation improves the programme delivery as well as teaching and learning outcomes, they are able to train unemployed youth on both skills programme be it credit bearing and non-credit bearing. • Learners are beginning to access AET programmes.

	• In 2020-21 a target of 30 lecturers was set. The target was overachieved as 33 lecturers participated in this programme.
Shortcomings	• Submission of the required DG applications documents for reporting purposes • Beneficiaries not availing themselves within specified timeframes for training interventions. This applies where beneficiaries are college lecturers, management and council members.
Solutions	• Continue with regular meetings with the DHET regional offices where SETA officials and TVET colleges meet to improve their working relations. • MQA to embark on an advocacy drive to ensure that colleges are well acquainted with the kind of support the MQA offers and how to access that support. The target will be institutions that are not effectively taking part in the programmes.

Skills Implications: Improvement Areas

- Based on the lessons learned, the MQA intends to undertake research that focuses on the effectiveness of the partnerships with colleges in addressing skills matters to gain insight into the experiences and challenges thereof.
- There is also a need to understand the extent to which training offered to college staff and council members improves classroom practices and whether this suits supply in the labour market.
- There is a need to monitor and evaluate the impact of the MQA's support interventions on the colleges.
- The MQA needs to review the DG application policy so as to make it simpler to follow to enable colleges to easily access grants with respect to supporting skills development.
- Integrate COVID-19 interventions in its project offerings.

4.2.2 Research-specific Partnerships

In its strategic objective to partner with public and private institutions, the MQA partnered with the Council for Scientific and Industrial Research (CSIR) to conduct research to improve skills development planning and decision-making regarding technological developments within the MMS. This partnership is discussed in detail below.

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

Partner institution	Duration	Objectives	Successes /failure	Areas of improvement
CSIR (Mandela Mining Precinct)	March 2019 – September 2020	To investigate the integration of technology into the production processes and its effects on skills requirements in the core occupations within the MMS	The study provided insights into occupations affected and those in demand (See the Table 0-1)	To provide a nuanced picture of the extent and nature of innovation and application in every subsector within the MMS

4.3 Planned Partnerships

4.3.1 Mineral beneficiation Partnerships

South Africa's Minerals Beneficiation Strategy is intended 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. The table below highlights the partnership to meet some of the goals of these strategies.

Name of the proposed partner institution	Duration	Objectives
DTI	3 years	• To develop master plans incorporating beneficiation innovation, skills requirement required for this. • Investigate factors influencing aspects of cross-sectoral networking, trading and skills-transfer for the development and promotion of locally beneficiated products.
DSBD	3	• Facilitate the equipping of small and emerging businesses with the necessary resources and skills to be involved in the beneficiation of minerals in line with NSDP

4.3.2 Partnerships between the MQA and Community Education Training Centres (CETs)

The MQA places a high value on partnerships to achieve economies of scale in the MMS. The MQA will continue having partnerships with TVET and CET colleges. To assess the effectiveness of partnerships with CETs, the MQA has included a topic on its research agenda to determine the effectiveness of this partnership in driving skill development in the sector. The research seeks to unpack the nature (purpose, principles and goals), particularly in the context of the NSDP, seeking to expand access to skills development. The strengths and weakness as well opportunities of this partnership will be assessed through research that will focus on the effectiveness between MQA and CETs in particular.

4.3.3 Partnerships to mitigate the effects of COVID-19

The COVID-19 pandemic ushered in a new era, a "new normal," and a new epoch that necessitates partnerships to address challenges brought about by the pandemic. The MQA will enter into research partnerships that intend to explore the effects of COVID-19 on skills development in the MMS. This will also explore the possibility of forming a wide range of partnerships with various key players to equip employees with the updated competencies necessary to effectively adapt to the new operation methods.

4.4 The MQA's model for a successful partnership

Recognising the criticality of partnerships, the MQA developed a model that spells out critical success factors for its partnerships (depicted in Figure 4.1. below). The model is considered a success because, since its inception in 2018, it has guided organisational long-term vision and commitment to build, maintain and manage sustainable partnerships with different organisations to improve the efficiency of the skills development systems within the MMS.

Embedded in this model is the need to incorporate responses related to the pandemic across all the interventions. Figure 4.3. shows the model. This model informs partnerships of the MQA with other stakeholders and will continue being monitored to assess strengths and weakness and how best to improve them.

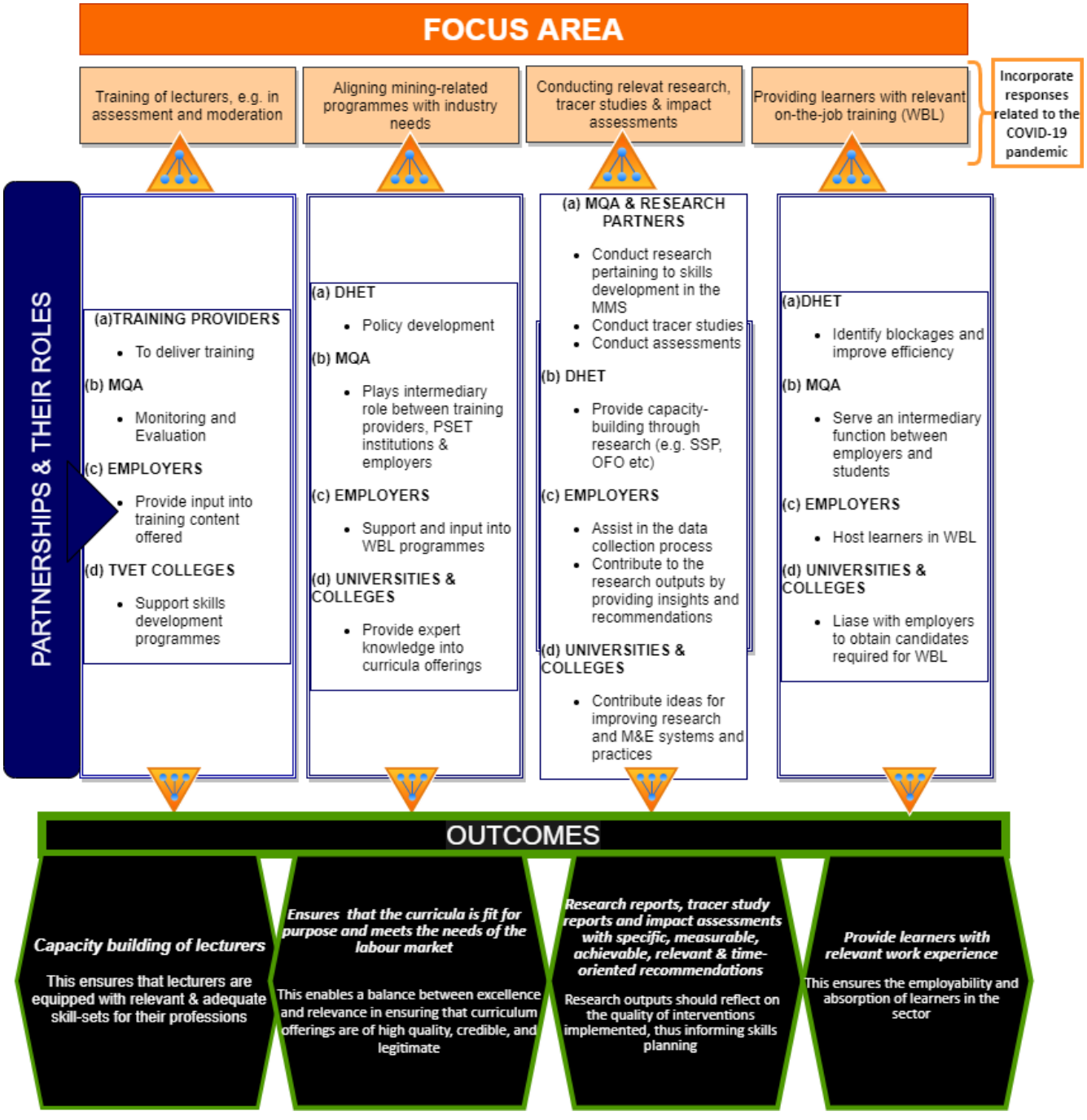


Figure 4.1: The MQA's model for a successful partnership

Source: MQA, 2018

4.5 Conclusions

Formal partnerships exist with 28 TVET colleges. The emphasis is that there is a need to increase the effectiveness of the collaboration between the MQA, TVET colleges to achieve economies of scale and to enable the industry to respond relevantly and sufficiently to the sector's needs and prepare learners accordingly. The MQA also has a national footprint as it partners with 9 CET colleges across the provinces. This is in line with DHET's mandate to capacitate community colleges. These partnerships have achieved their purpose and it has been learnt that they have also enhanced the provision of training and skills development at these colleges. In addition, 33 HDSA lecturers have entered into a lecturer development program.

Iron, carbon steel, stainless steel, aluminium, PGMs, and gold have lucrative downstream processing and value-adding opportunities. With this opportunity, the MQA intends to partner with organisations such as the DSI, DTI, and DSBD to capitalise on skills development opportunities provided by minerals beneficiation. A need has been identified to explore the effectiveness of the partnership between the MQA and CET colleges. In light of this, a research partnership will be established to address this to develop an efficient and effective partnership model for this cohort. A research partnership will also be formed to investigate the effects of COVID-19 on skill development in the MMS.

Chapter 5 : Monitoring and Evaluation

5.1 Introduction

This chapter addresses interconnected critical points related to Monitoring and Evaluation and how they are used to inform better planning processes within the MQA. The purpose of the chapter is to reflect on the SETA's accomplishment of the strategic priorities outlined in the previously submitted SSP. As part of this reflective exercise, and in order to plan for the coming financial year, it is critical for the SETA to consider how well the previous year's priorities were met. The chapter is informed by the integration of research findings from tracer studies and the analysis of the MQA's Annual Performance Report and Strategic Plan. The chapter concludes by examining the skills development implications of the outlined M&E processes and practices.

5.2 Sector Skills Planning Reflections

The Monitoring and Evaluation Policy Framework (M&EPF) of the MQA complies with the standards and requirements of a wide range of legislative prescripts. Its purpose is to develop and maintain systems for strategic planning, quality data, monitoring performance, ensuring that value for money is derived from all interventions, evaluating organisational programmes, projects, activities, policies, and processes, and meeting planning standards.

Through M&E, the MQA has developed and consistently implemented the Fraud Prevention Policy, which takes a zero-tolerance approach to fraud, corruption, and related activities and ensures consequence management in these cases of deviation and infraction in the dealings with both internal and external parties.

5.2.1 The MQA's Approach to Monitoring and Evaluation Informing Organisational Processes of Research & Planning

As a broad management strategy aimed at improving performance and demonstrable results, the MQA views planning and M&E as interconnected. This is an ongoing process of learning and improving results-based management cyclical approach concerned with learning, which improves results from existing interventions and improves the capacity to make better decisions and improve the formulation of future programmes, risk management, and effective measures for promoting a results-oriented culture.

Monitoring, in the context of the MQA, is conceptualised as a process that involves real-time collection, analysis and reporting of data on inputs, outputs, outcomes and impacts of programmes. These also include regular feedback on progress, implementation, results and indicators of problems requiring immediate corrective action. Evaluation is used to measure whether or not what was planned has had the intended impacts and ascertain reasons for not achieving the intended results. It is a systematic collection and objective analysis of evidence on the MQA systems policies, projects, activities, processes (interventions) and assesses the adequacy, effectiveness, efficiency and utility of investments made to facilitate skills development in the MMS. The MQA conducts audits to assess the adequacy of management controls for efficient resource use, compliance with rules, regulations, established policies, risk management efficacy, and the adequacy of organisational structures, systems, and processes to address the NSDP's skill outcomes. M&E also assist in identifying areas that could be part of the research agenda. These issues are factored in the Annual Performance reports to inform strategic planning going forward.

This M&E framework is applied to the strategic planning process and, by extension, to the Strategic Plan and Annual Performance Plan. During the planning process, the Strategic Planning Unit coordinates the formulation of the Strategic Plan and the Annual Performance Plan across all functions of the organisation. The planning process references various internal and external sources used to influence and inform the decision-making process before compiling the organisation's SP and APP. M&E provides ongoing project implementation and verification reports that are also referenced in the planning process and during the execution of existing projects. The trends and intelligence derived from these reports inform better decision making at the planning stage and inform project management processes during the selection, inception, allocation and implementation of projects.

The M&E Policy framework is depicted schematically below on Figure 5.1., and it explains how the progress of interventions is monitored, evaluated and incorporated into the MQA sectoral skills planning process.

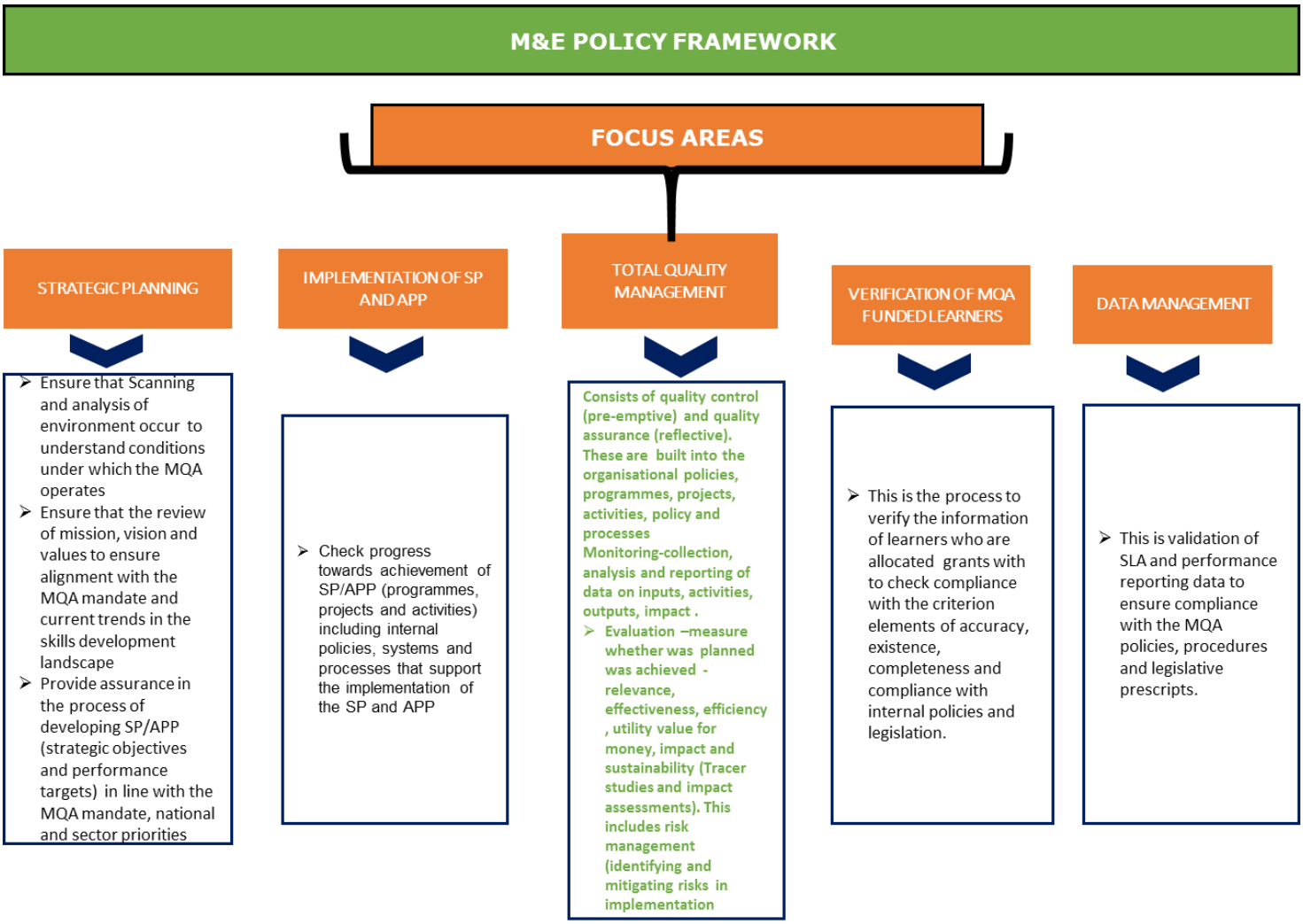


Figure 5.1: M&E Policy Framework

5.2.2 Tracer Studies

The M&E Unit conducted various tracer studies that inform the MQA's strategic planning process and are used to inform decisions such as interventions to be considered for setting APP targets, resources to be invested in 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. These studies provide recommendations on the most effective implementation methods and efficient use of existing resources.

In 2019-2020, the MQA conducted four tracer studies on bursaries, jewellery and diamond processing, artisan development and internships to investigate and explore the following:

- The programmes' contribution to skills development within the MMS,
- Trace the beneficiaries' whereabouts and determine what happened to them in their careers, the challenges and achievements, and what must be considered in advancing the programmes.

These tracer studies provided information on the organisational return on investment and aided in reconfiguring and improving an appropriate funding model for such programmes.

During 2020-2021 financial year, the MQA undertook four tracer studies as indicated in the table below:

Table 5.1: 2019-2020 tracer studies

Programme	Completion status	Key findings
MDP	Completed	• The sample was 555 • Difficult to maintain a balance between the expected workload and the academic workloads • Skills such as conflict resolution and supervision were learned as part of the program and applied in the workplace • Companies involve their employees in the programme for compliance purposes, as they are not provided opportunities to apply what they learn during the programme
Workplace Experience		• The sample was 867 • The majority of the candidates in the programme were Africans (between the ages of 26 and 30), who were starting in their careers • Candidates were given opportunities to put theory into practice • Host companies had limited space to offer beneficiaries internships once they completed the programme • The duration of the programme was perceived as not enough to secure permanent employment as most companies require more than two years of experience • Beneficiaries were able to acquire skills such as communication or interpersonal skills • Most of the beneficiaries have gone to obtain further qualifications and are willing to even further studies • The acquisition of various competencies in the workplace during the programme depended on the ability of mentors to provide the necessary support • Some companies with insufficient staff used the beneficiaries to fill gaps in the workplace and thus ignored certain aspects of the programme like the logbook requirements

Non-Artisan Apprentice for People with disabilities		• The sample was 466 • 80% of the beneficiaries were men and 20% were women • Africans constituted 91%, followed by Whites at 6%, and then Indians and Coloureds at 3%, with 75% employed and 25% unemployed • The programme gave the employed an opportunity to integrate theory and practice in the workplace and the unemployed were given competencies to make them employable within the MMS
AET		• The sample was 1830 • Most beneficiaries are still to reach AET level and FLC stages • The programme has had a positive impact on some of the beneficiaries. It increased the literacy and math level of those without formal schooling, and improved their confidence as they can now communicate in English in the workplace • Completion of the programme raises the expectation for promotion and salary increases • Some of the candidates found it difficult to create a balance between the programme and their family obligations • Some companies combined young and old learners, which created challenges as they have different abilities

5.2.3 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 2020-2021 Annual Performance Report and Strategic Plan.

Skills development Priorities	Strategic Plan	Annual Performance Plan
1. Support transformation of the sector 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 5: Support training initiatives in mine communities.	Programme 3: Learning Programmes /Skills Development
	Impact: • *Target exceeded for beneficiaries who completed a work-based programme (i.e., undergraduate workplace experience, learnerships - both artisan and non-artisan learnerships as well as internships in 2020/21, thus enabling access to occupationally directed economic opportunities.* • *Beneficiaries of work-based skills programmes are mostly unemployed youth in the mining communities and labour sending areas that complete training programme per annum.*	

Skills development Priorities	Strategic Plan	Annual Performance Plan
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 5: Support Training initiatives in mine communities AND Objective 6: Ensure the delivery of quality programmes in the mining and minerals sector.	Programme 3: Learning Programmes /Skills Development AND Programme 4: Education and Training Quality Assurance
	Impact: • *2877 out of a target of 2800 employees successfully completed the Occupational Health and Safety Representatives' skills programme*	
3. Monitor and respond to technological changes through skills development.	Objective 6: Ensure the delivery of quality programmes in the Mining and Minerals Sector 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 to conduct a research study to probe the integration of technology into the mining production processes and its effects on skills requirements concerning the MMS core occupations. This collaboration is proactive in revitalising curriculum and programmes to support skills emerging from the fourth industrial revolution. This will also open a platform for employees to be involved in equipment design as part of the SATCAP programme.*	
4. Monitor and 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

Skills development Priorities	Strategic Plan	Annual Performance Plan
	Impact: • *Training is provided to learners in the diamond processing and jewellery manufacturing disciplines to facilitate beneficiation. Since 2010, a total of 6 915 learners have been trained.* • *The small-scale mining programme is another initiative that contributes to skills required for minerals beneficiation.*	
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, skills gaps and occupational inequities 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 Chapter 3.*

Overall, the MQA makes the difference in terms of skills development within the MMS with its contribution to interventions such as bursaries, beneficiation skills, internships, learnerships, RPL, MEDP, artisan programme, AET programmes which are mining related. More particularly, the 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 matric or its equivalent as the highest qualification. In terms of bursaries, most of them are allocated to beneficiaries studying core mining qualifications. Nevertheless, there is a need for annual monitoring of institutional performance, tracking these activities, and determining the extent to which they are addressing or not addressing the short-term and long-term targets.

5.2.4 Plan of Action

The following programmes aimed at supporting transformation through skills development did not meet their targets.

Target not met	Reasons for not meeting target	Mechanism to ensure achievement of strategic priorities not achieved
The number of research outputs completed per annum	Delays in the advertisement of DG application and internal delay in appointment of service providers	This target has been carried over and included in the 2021-2022 financial year
Number of MOAs entered with public and private sector skills development research.		This target has been carried over and included in the 2021-2022 financial year.
Number of HDSA HET lecturer that enter into a lecturer	Lecturers resigned from the programme at the beginning of the financial year	Contracting of lecturers to be concluded before the 4th quarter. This will allow for the re-allocation of

development programme per annum		grants if a university does not recruit lecturers in accordance with their allocation.
The number of unemployed learners awarded a bursary per annum.	Extension of the academic year by institutions	The MQA continues to fund this project and monitors how improvements can be made going forward.
The number of unemployed learners awarded a bursary completing per annum		
The number of employed learners awarded a bursary per annum		

Table 5.2: Strategic Objectives not achieved and mechanisms to ensure achievement in future

To ensure achievement of current strategic priorities, based on the key findings, it is recommended that

- The MQA include its M&E framework, systems and processes for monitoring and evaluating the achievement of NSDP and the ERRP in its skills development value chain. This implies that all operations should treat M&E as intrinsic, not extrinsic, and done once off. This will certify that the provision of assurance is formative (ongoing) and summative to gain insight into the efficiency, effectiveness and impact of every intervention supported by the MQA.
- The MQA risk register, which reflects the organisational risks, should be cascaded down to operations to reflect each intervention's possible risks and mitigation plans.
- All targets reflected in the APP and SP should be annually monitored to keep track of changes, challenges and progress for remedial action if necessary.
- Information yielded by M&E activities should continue to inform research and organisational planning going forward.
- There should be a streamlining exercise of the cyclical relationship between research, programmatic, as well as monitoring and evaluation interventions.
- The MQA should factor in issues arising from COVID-19 in its APP and SSP.
- Based on the lessons learned, there should be a development of a framework for critical success factors or best practice for M&E.

5.3 Conclusions

Through the M&E systems the MQA is able to check progress, assess impact and extrapolate key learning for its interventions. The M&E is therefore embedded in the operational value chain of the organisation and is integrated to provide assurance for the SP and APP performance targets. Through tracer studies, the contribution of the MQA programmes is assessed to determine return on investment.

Chapter 6 : SETA Strategic Skills Priority Actions

6.1 Introduction

The purpose of this chapter is to synthesise key findings from the previous chapters, consolidate them to inform key priority actions for skills development and make recommendations that are specific, manageable, achievable, and realistic for the MMS.

6.2 Key Findings

Chapter 1 reflected on the MMS' scope of coverage, its key role-players, economic performance, employer profile and labour market profile. Due to the disruptions caused by the hard lockdown, the emergence of the COVID-19 pandemic had a negative effect on the sector's economic performance. However, it was encouraging to see the recovery of subsectors such as PGMs, gold, iron ore, and diamond mining, which benefited from commodity price increases and Rand's weakness in the third quarter of 2020.

In assessing the labour profile, African employees constitute a large proportion of the labour force. However, their representation at the different echelons of management (with the exception of the senior management) is inequitable with their demographics in the sector and the country. The gender distribution is skewed towards males, who form 83%, with women representing only 17 % of the MMS workforce. The 2018 Mining Charter sets targets for the employment of people living with disabilities at 1.5%. The sector is close to meeting this target as findings revealed that 1.4% of employees living with disabilities are employed in the MMS. Consequence management, monitoring and evaluating the effectiveness and efficacy of initiatives aimed at redressing past inequalities is critical to provide key learning points to inform strategies to add impetus to the transformation agenda.

Chapter 2 examined macro and micro factors that serve as key drivers with change and impact on skills demand and supply within the sector. Global economic factors as a result of global influences and market performance, increasing energy tariffs, minerals beneficiation, changing technological landscape influenced by the fourth industrial revolution and environmental concerns encompassing environmental sustainability and mine, health and safety were identified as change drivers that influence the development of the MMS. Moreover, a wide range of national policy imperatives such as the Mineral and Petroleum Resources Development Act that gave effect to the Mining Charter 2018, the Mine Health and Safety Act No. 29 of 1996, Mineral Beneficiation Strategy, New Growth Path, Industrial Policy Action Plan 2018/19, the National Development Plan, NSDP, HRD Strategy for South Africa, the National Youth Policy 2015-2020 and the National Environmental Management Act 107 of 1998 were discussed. This also included the Economic Reconstruction and Recovery Plan (ERRP) that seeks to support inclusive sector growth paths in South Africa to advance economic growth, social development and the transformation agenda. All these change drivers and policy and legislative instruments influence change, interlock and reinforce one another to shape the skills development landscape. Therefore, it is imperative to understand these factors and the opportunities that could be derived from them to respond to the skills issues in the sector appropriately.

Chapter 3 highlighted that the top 10 hard-to-fill vacancies are Mining Operations Manager, Mining Production Supervisor, Engineering Manager, Mining Engineer, Mechanical Engineer, Driller, Diesel Mechanic, Mining Technician, Millwright, Safety, Health, Environment and Quality (SHE&Q) Practitioner. The scarcity of these vacancies varies in terms of organisational context and range from individual, organisational, and supply-side levels. At the individual level, reasons include the lack of relevant qualifications, lack of relevant experience and equity considerations. The skills gaps skills identified differ in terms of occupational context. These top-up skills are related to leadership, technical (job-specific) and supervisory skills, computer skills, application and promotion of the health and safety policies and standards. The extent and nature of supply indicated that although there is an increase in the matric pass rate, the enrolment and pass rate of STEM subjects including mathematics is low. This creates a blockage in the skill pipeline as it limits the pool of students considering that such subjects are key requisites for MMS-related qualifications. There is a downward trend of the number of mining engineering graduates in mining engineering qualifications at tertiary level. This is a cause for concern as the discipline has been cited as a hard to fill vacancy. In addition to the basic and higher education, the MQA, alongside MMS' companies, have been implementing skills interventions to address the skills needs of the sector at various levels of education. These are in the form of career guidance, learnerships, intern=ships and bursaries. The MQA also provides access to economic opportunities to mine communities and labour sending areas through its youth development and small-scale mining programmes. The DMRE and Minerals Council are other entities that play an essential role in skills development in the MMS by providing their customised qualifications aimed at producing competent employees with the necessary skill set required to perform their jobs. It is critical to heighten efforts at various levels of education to increase the uptake of STEM subjects.

Chapter 4 focused on existing partnerships within the MQA. It assessed the effectiveness of existing MQA's partnerships with particular reference to the nature and objectives as well successes and shortcomings and the way forward to ensure the effective, efficient and efficacious partnerships. It distils both success stories and lessons learnt for interventions that were implemented for future application to strengthen partnerships 8and achieve economies of scale. TVET and CET colleges were capacitated and assisted with getting their courses accredited. In addition, the MQA's partnerships also included research partnerships. The purpose is to establish partnerships that will collaboratively develop knowledge and skills to achieve specified outcomes directed towards addressing mutually inclusive skills priorities in the MMS.

Chapter 5 reflected on the SETA's achievement of the strategic priorities based on the previous financial year. The MQA has an existing M&E framework that aims to provide assurance for all projects implemented in line with its mandate and determine the impact that training programmes have on the sector and its beneficiaries. The framework is also used to coordinate and formulate the SP and APP across all organisation functions. Since 2018, the MQA has been conducting tracer studies to determine the overall impact that these programmes have had on beneficiaries and the SETA's contribution to skills development in the MMS. The chapter also provided an analysis on how the SETA has addressed the previous financial year's strategic priorities. From that analysis, it emerged that the SETA's priorities

are supporting skills development and transformation in the sector. Though the SETA achieved the majority of its priorities, it is acknowledged that concerted efforts need to be placed in addressing those that were not achieved.

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

6.3 Recommended Priority Actions: Support national strategies and plans on skills development

The NDP, a national blueprint to address the triple challenges of poverty, unemployment and inequality, highlight the notion of a capable state and skills development as key drivers to attain the developmental goals of the society. The MQA is expected to play a critical role in skills development in the MMS by giving effect to the SDA, addressing the outcomes outlined in the NSDP and ERRP through programme interventions that address skills demand and supply issues in the workplace by forging relevant partnerships, funding skills development programmes and creating conditions optimal for innovation in the era of 4IR and COVID-19. The recommended priorities dovetail well with six core delivery and four enabling interventions identified by the skills strategy to support the implementation of the ERRP in the MMS as highlighted in chapter 2 under the measures to support national plans and strategies.

6.3.1 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 the attainment of eight outcomes. The National Growth Path IPAP intends to create inclusive economic growth and development path through the creation of jobs in the MMS. In this respect, among others, employment equity plays a critical role in South Africa's transformation agenda. In order to support these national priorities, the MQA should do the following:

- Continue to prioritise skills development of Historically Disadvantaged South Africans. These include and are not limited to undertaking skills development interventions to capacitate more females and disabled people in the sector.
- Address issues of inequities within the echelons of management in the MMS through supporting HDSAs to penetrate management roles. Management development programmes should also target engineering students to pre-empt their advancement to managerial positions at mining operations at later stages of their careers.
- Prioritise interventions that link education and the workplace by facilitating access to work experience for graduates.
- Considering that small organisations are likely to be hit the hardest by the COVID-19 pandemic, support of programmes such as the youth development programme and small-scale mining skills programmes is critical to enable small businesses to perform efficiently in the sector.

- Support should be provided to small businesses that are engaged in beneficiation to promote local economic development.
- Conduct more tracer studies to determine the impact and effectiveness of MQA's programmes.

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

The MHSA makes provision for the protection of all employees and persons in the mines through the promotion of training in mine health and safety. The COVID-19 pandemic has heightened the need to prioritise occupational health and safety matters in the MMS. As a result, the MQA will 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.

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

As mentioned earlier, companies will be shifting more aggressively towards digitisation and automated production systems and practices in the face of this pandemic. 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 employee empowerment, including unskilled and semi-skilled, people living with disabilities and females. Opportunities also exist for communities and entrepreneurs. However, this can only be achieved if the sector fully embraces technology and addresses the energy and water crisis affecting mining operations. Through research, occupations emerging from the fourth industrial revolution can be identified to inform planning to prioritise resource allocation, qualification development, career information, and advice to keep up with technologically induced changes.

6.3.4 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 mainly resource-based to knowledge-based. The IPAP places mineral beneficiation as one of its key priority areas and has identified several growth sectors, including jewellery manufacturing, as well as other critical areas to create jobs. This can also be attained through:

- Identifying occupations in demand with respect to beneficiation
- Continuing quality assuring training of those already in this sector
- Developing the skills and competencies of youth and potential entrepreneurs in the sector to grow SMMEs and create more jobs in the sector
- Form inter-SETA partnerships 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 to jewellery for precious metals such as gold, diamonds and PGMs.

6.3.5 Recommended Priority 5: Focus on increasing support for core mining-related skills and hard-to-fill occupations in terms of skills development in the MMS

There is a need to support interventions to address hard-to-fill occupations by identifying and increasing the production of high-demand occupations through supporting interventions such as artisan development, internship programmes, learnerships and bursaries. By so doing, this will fill skills gaps and eliminate issues of supply and demand mismatches. Support should also be provided to interventions supporting top-up skills such as leadership and supervisory and those related to job-specific skills.

6.3.6 Recommended Priority 6: Develop Skills for environmental sustainability

The global emphasis on environmental impact as a result of mining activities is one of the key drivers 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 air quality. In addition, the availability and cost of water is quickly rising to the top of mining companies' agendas as one of the greatest constraints to supply.

The sector must align its practices with goals closely linked to achieving the development path of the green economy. To achieve this, the following can be done:

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

In light of all the recommended priority actions, the MQA will continue to support the national strategies and plans, including the Economic Reconstruction and Recovery Plan Skills Strategy.

6.4 Conclusions

To achieve the vision of NDP, give effect to the skills development Act, it is crucial to incorporate the outcomes of the NSDP and implement programmes that take into account the purpose of the ERRP. Over and above, it is important to continue to facilitate transformation in the sector with focus on skills development on the domains such as the 4IR, health and safety.

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