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Sector Skills Plan Update 2024/25 for the Mining and Minerals Sector Submitted by the Mining Qualifications Authority (MQA) to the Department of Higher Education and Training

FINAL SUBMISSION

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MINING QUALIFICATIONS AUTHORITY

FOREWORD

The Mining and Minerals Sector (MMS) continues to be at the forefront of skills development. In light of this, the Mining Qualifications Authority (MQA) endeavours to be an authority in the most authentic sense of the term, by providing scientifically-grounded and empirically-based labour market intelligence of factors influencing the supply and demand for skills in the sector. This paves the way for sector-specific skills planning that simultaneously addresses socio-economic imperatives for inclusive growth and measures to combat the triple challenges of unemployment, poverty and inequality in our country. In order to keep up with this progression, the MQA Board prepared and submits the 2024/25 Sector Skills Plan (SSP) update to the Department of Higher Education and Training (DHET).

The SSP was developed in response to the National Development Plan (NDP), National Skills Development Plan (NSDP) 2030, Economic Recovery and Reconstruction Plan (ERRP), and other legislative and policy iterations driving the skills transformation agenda, in accordance with the DHET's expectations. This SSP was presented to and approved by the oversight bodies, i.e. the MQA's Governance and Strategy Committee and the Board. Through the development of the SSP, augmented by other research with functional imperatives, the MQA recognises its mandate and responsibility to actively contribute to the socio-economic development of the society in general. This is realisable through partnerships with like-minded organisations and institutions such as the MHSC, DMRE, organised labour and mining houses with respect to skills development, thus contributing to the achievement of the 'zero harm' goal. In this context, the focus is on engendering the environment for improving productivity, cost and safety outcomes in the MMS.

The main purpose of this SSP is to profile the sector in terms of the skills needs or demand and supply, determine sectoral skills development priorities and inform the fit-for-purpose interventions that need to be implemented in the MMS. This was done by assessing the sector's economic performance, identifying change drivers and determining occupational shortages and gaps. An assessment of our partnerships was also conducted to assess the degree to which they are effectively supporting our mandate of facilitating skills development. This was done with the aim of developing concrete plans that will inform interventions that address skills development in the MMS considering competencies that are relevant, efficient, effective, sustainable and, more importantly, impactful in the sector and aligned to broader national development priorities. The research recognises the context and changes taking place in the sector and the broader economy. The SSP is informed by a rigorous research process entailing a mixed method research design, using both the quantitative and qualitative research paradigms. The use of a mixed methods research design aimed at ensuring credible and valid research findings that are realisable and specific, and which lead to specific, manageable, attainable, realistic, time-bound and implementable recommendations that will meet skills requirements by addressing shortages and gaps in the sector.

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Mr David Msiza

Chairperson: MQA Board Date

ACRONYMS

Acronym	Description	Acronym	Description
AET	Adult Education and Training	MQA	Mining Qualifications Authority
AgriSETA	Agriculture Sector Education Training Authority	N	Population size
AMMSA	Association of Mine Managers of South Africa	n	Sample size
APP	Annual Performance Plan	NCV	National Certificate Vocational
APR	Annual Performance Report	NDP	National Development Plan
ARPL	Artisan Recognition of Prior Learning	NGO	Non-governmental Organisation
ATR	Annual Training Report	NLRD	National Learners' Record Database
AQP	Assessment Quality Partner	NQF	National Qualifications Framework
CAGR	Compound Annual Growth Rate	NSDP	National Skills Development Plan
CET	Community Education and Training	OFO	Organising Framework for Occupations
CIP	Continuous Improvement Plan	OHS	Occupational Health and Safety
CLAS	Cement, Lime, Aggregates and Sand	OQSF	Occupational Qualification Sub-Framework
CSIR	Council for Scientific & Industrial Research	PIVOTAL	Professional, Vocational, Technical and Academic Learning
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	PMF	Partnership Management Framework
DTI	Department of Trade and Industry	PYEI	Presidential Youth Employment Initiative
EMIS	Education Management Information System	QCTO	Quality Council for Trades and Occupations
ERRP	Economic Reconstruction and Recovery Plan	QLFS	Quality Labour Force Survey
ESG	Environmental Social Governance	R&D	Research & Development
FGDs	Focus Group Discussions	SAF	Sustainable Aviation Fuels
FLC	Foundation Learning Competence	SASME	South African Small and Medium Enterprises
GCC	Government Competence Certificate	SETA	Sector Education and Training Authority
GDP	Gross Domestic Product	SETMIS	Sector Education and Training Management Information System
GFC	Global Financial Crisis	SEZ	Special Economic Zone
HDSA	Historically Disadvantaged South African	SIC	Standard Industrial Classification
HEMIS	Higher Education Management Information System	SMME	Small, Medium and Micro-sized Enterprises
HET	Higher Education and Training	SP	Strategic Plan
HRD	Human Resource Development	SSP	Sector Skills Plan
HTV	Hard-to-fill Vacancies	Stats SA	Statistics South Africa
IPAP	Industrial Policy Action Plan	STEM	Science, Technology, Engineering & Maths
MerSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority	TVET	Technical and Vocational Education and Training
MHSA	Mine Health and Safety Act	VAT	Value-Added Tax
MHSC	Mine Health and Safety Council	UNISA	University of South Africa

Acronym	Description	Acronym	Description
M&E	Motoring & Evaluation	WP -SET	White Paper – Post School Education Skills Plan
MMS	Mining and Minerals Sector	WSP	Workplace Skills Plan
MoA	Memorandum of Agreement	4IR	Fourth Industrial Revolution

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EXECUTIVE SUMMARY

Introduction and Background

The MQA is the Sector Education and Training Authority (SETA) for the Mining and Minerals Sector (MMS). It prepared the Sector Skills Plan (SSP) Update according to the Department of Higher Education & Training (DHET) 2022 SSP framework. The SSP serves as a strategic planning document that outlines the skills requirements, priorities and interventions needed to develop a skilled and capable workforce in the sector. It involves a comprehensive analysis of the sector's profile (key role players, economic performance, employers and labour market profile), change drivers, occupational shortages and skills gaps, partnerships, risk, monitoring, evaluation and quality assurance.

This analysis helps in allocating resources and focusing efforts on the most critical skills needs of the sector. It also provides a framework for designing and implementing training and development initiatives, including learnerships, internships, apprenticeships and other skills programmes. It helps to guide the content, duration and delivery methods of these initiatives to ensure that they address the identified skills gaps effectively. The SSP encourages collaboration between SETAs, industry stakeholders, educational institutions and government departments. It facilitates partnerships to coordinate efforts, share resources and align training programmes with industry requirements.

Research Methodology

A mixed methods research design involving qualitative and quantitative methods were used to develop this SSP. This involved the use of empirical and secondary research. Secondary research involved literature and document review. By using both methods, researchers can benefit from the strengths of each and compensate for their respective limitations. The data sources included external reports from various institutions such as the DMRE, DHET, Stats SA, DBE and Minerals Council South Africa, as well as e-publications, newspaper articles and press releases. Primary research consisted of the MQA's Annual Performance Report (APR) and Strategic Plan (SP), WSP/ATRs and all studies that the MQA has previously conducted. The use of different sources of data ensured enhanced validity and reliability of the research findings. The key findings of the research are discussed below.

Sector Profile

The MMS continues to be a vital contributor to the economy, with good profitability and a strong balance sheet in terms of some of its minerals. South Africa has a rich mining history and is known for its vast mineral resources, including gold, platinum, coal, diamonds and various metals. Mining activities have been integral to the country's development and economic growth, and the sector generates substantial revenue, foreign exchange and employment opportunities. Mining exports play a crucial role in the country's balance of trade.

In terms of the geographical distribution of registered levy-paying employers, 42.2% of registered companies in the MMS are located in Gauteng, with Other mining (the mining of iron ore, chrome, manganese, copper, phosphates and salt) constituting the largest sub-sector (39.2%). The sector provides direct employment to slightly over 500 000 people and indirect employment to a large portion of South Africa's population. Mining jobs are often labour-intensive and have played a pivotal role in alleviating poverty and supporting livelihoods, especially in rural areas. Among the different types of mining, platinum group metals (PGM) mining employs the majority of the sector's workforce, i.e., 35.2%. Males continue to dominate the sector at 80.8%. However, women's representation has gradually increased from 16.1% in 2019 to 19.2% in 2023. In the workforce, 87.9% of employees are Africans and a

significant portion (37.4%) falls within the age range of 35-44 years. White people dominate senior (50%) and top management (52.3%). This suggests that despite being a minority in terms of overall employment in the sector, white employees have a relatively larger share of leadership positions.

South Africa is a global leader in the production of various minerals, and is the world's largest producer of platinum, chrome, manganese and vanadium. The country also has extensive gold reserves and is a major producer of coal, iron ore and diamonds. However, there are also challenges. These include deep-level mining, which is costly and poses a safety risk to employees. Despite these challenges, the sector aims to ensure responsible mining practices, promote sustainability, protect workers' rights and address socio-economic issues, such as black economic empowerment and community development. In terms of transformation and empowerment, South Africa has placed significant emphasis on transformation and empowerment in the mining sector, and the government seeks to address historical imbalances by promoting participation and ownership of mining assets by previously disadvantaged individuals and communities.

Key Drivers of Change Affecting Skills

The future of the mining sector is dependent on key change drivers influencing its performance and skills development. These were identified as geopolitics and market performance, mineral beneficiation, the impact of load-shedding, the integration of Environment Social Governance (ESG), the Fourth Industrial Revolution (4IR) and illegal mining. The skills implications of these change drivers include employment creation, upskilling of some occupational levels, promotion of entrepreneurship skills and, for some, possible job losses. MQA acknowledges the importance of responding to these change drivers to facilitate relevant, adequate and efficient skills development.

Occupational Shortages and Skills Gaps

Analysis of the 2023 MQA WSP/ATR submissions and stakeholder interviews revealed the following hard-to-fill occupations:

Mine manager	Production manager	Engineering maintenance manager	Mechanical engineer (mines)	Mining engineer	Millwright
Rock engineer	Electrical engineer (mines)	Miner	Section engineer	Diesel mechanic	

The reasons cited for hard-to-fill vacancies (HTV) are mostly related to a lack of work experience and relevant qualifications (desired level of study not attained or inappropriate field of study or inappropriate subject specialisation), and equity considerations. It is important to note that the sector also identified skills gaps that are top-up skills, which usually require a short training intervention. These also affect skills demand in the sector.

Sector Partnerships

The MQA has partnerships with various role players in the sector. For example, it has partnerships with 30 technical and vocational (TVET) colleges and nine community education and training (CET) colleges across the country to address governance, strategic leadership, curriculum delivery and learner support issues. This helps to ensure that the sector produces fit-for-purpose graduates who can fit into the world of work locally and internationally and become global citizens. These partnerships may involve collaboration between mining companies, government bodies, educational institutions and community

organisations. Partnerships foster collaboration in the mining sector, and mining companies work with organisations, governments and communities from different countries to share knowledge, best practice and technological advancements. This collaboration enhances cross-cultural understanding, encourages innovation and promotes responsible mining practices. In short, partnerships in the mining sector are vital for preparing learners for the world of work and developing them into global citizens. These partnerships facilitate education and training, workforce development, health and safety measures, community engagement, environmental responsibility, ethical practices and global collaboration. By working together, stakeholders in the mining sector can ensure that employees are equipped with the skills, knowledge and values necessary to build a sustainable and responsible sector.

Monitoring and Evaluation

The MQA has a Risk, Compliance, Monitoring, Evaluation and Quality Assurance framework that is used to provide quality assurance by tracking all 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 to measure the impact of skills development in the sector by contributing to organisational strategy, planning, monitoring, impact assessment and evaluation, and risk management.

Skills Priority Actions

Based on the findings in this SSP, the following skills priorities are recommended:

1. Heighten efforts to support the Presidential Youth Employment Initiative (PYEI) as well as the ERRP.
2. Facilitate the growth of small, medium and micro-sized enterprises (SMME) in the sector through skills development through various means.
3. Continue to support interventions to improve mine health and safety through skills development.
4. Continue to monitor and provide support to interventions that respond to technological changes through skills development.
5. Monitor and support interventions aimed at developing the skills required for mineral beneficiation.
6. Focus on increasing support for core mining-related skills and hard-to-fill occupations in terms of skills development in the MMS.
7. Develop skills for just transition.

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Dr Thabo Mashongoane Date

Chief Executive Officer

RESEARCH PROCESS AND METHODS

Introduction and Background

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) and other iterations of the transformation agenda in the MMS. It is, therefore, a core mandate for the SETA to develop an annual Sector Skills Plan (SSP) to inform adequate skills planning. The MQA aims to support this objective by providing empirical insight through the SSP on the MMS's skills development priorities. The 2024/2025 SSP Update outlines the MMS scope of coverage, its key role-players, economic performance, employer profile, labour market profile, key skills issues, occupational shortages and skills gaps, existing and planned partnerships, the SETA's M&E function, 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 2022 DHET SSP framework and guidelines.

Research Process and Method

The SSP was developed using a concurrent mixed methods research design incorporating secondary and primary data. Secondary research involved literature and document review. The data sources included external reports from various institutions such as the DMRE, DHET, Department of Basic Education (DBE), Statistics South Africa (Stats SA), and Minerals Council South Africa, e-publications, newspaper articles and press releases. Primary research consisted of the WSP/ATR, APR and SP, and previous studies conducted by the MQA. The WSP/ATR data utilised was weighted to make it more representative of the sector *(See Annexure 1: Weighting formula).* All the MQA's previously conducted studies that were incorporated into this SSP are detailed in Table 1.

In addition, 32 key informant interviews with sectoral stakeholders were undertaken to acquire insight into the economic performance, future outlook, and change drivers of the sector. The interviews were conducted between June and August 2023. These interviews were crucial in providing insight and validating the HTV, skills gaps and priority skills actions.

The SSP is presented in a number of chapters and addresses all the nine sub-sectors of the MMS. The MQA's Management Team, Executive Committee and Board were involved in the entire research process and provided input, guidance and oversight throughout the process of developing the SSP.

Table 1: Primary research completed as functional imperatives by the MQA in addition to the SSP Update 2024/25

Project name	Research purpose	Research design	Target population & sample Size		Data collection instruments	Data sources	Study timeframe
10 Year Workplace Skills Plan (WSP) – Annual Training Report (ATR) Trends Analysis (2012-2022)	To track trends and patterns with respect to key issues influencing demand and supply of skills over a 12-year period	Quantitative	Mining companies that submitted WSP/ATRs between 2012-2022 and number of employees		WSP/ATR source data template	WSP/ATR data	August 2022-February 2023
			Companies that submitted WSP/ATRs	2012: N = 590			
				2022: N = 809			
			Employees	2012: N = 497 972			
				2022: N = 425 341			
2022 WSP/ATR submission analysis report covering the period	To provide insight into key issues influencing demand and supply, with particular focus on the latest WSP/ATR submissions	Quantitative	Mining companies that submitted WSP/ATRs in 2022 and number of employees				
			Companies that submitted WSP/ATRs	N = 809			
			Employees	N = 425 341			
Understanding the relationship between scarce and critical skills (hard-to-fill occupations) and interventions that are implemented in the MMS	To provide insight into the relationship between hard to fill occupations and training interventions implemented in the MMS	Document analysis and qualitative (in-depth interviews)	Employer representatives in mining companies n = 24		Interview schedule	Levy payer database, WSP/ATR and relevant internet, books, e-publications, journal	April 2022 – March 2023

Project name	Research purpose	Research design	Target population & sample Size		Data collection instruments	Data sources	Study timeframe
Exploring the state of managerial progression of historically disadvantaged South Africans (HDSAs) in the MMS	To provide insight into factors inhibiting managerial progression of HSDA employees in the MMS over the past 5-year period (2019-2022)	Mixed methods research design in the form of:	Historically disadvantaged individuals employed in junior, middle, senior, top management in mining companies and employer representatives		Questionnaire and interview guide		
		Quantitative (survey)	Employees	n = 95			
		Qualitative (interviews)	Employers, trade unions and other key informants	n = 60			
The impact of COVID-19 and its skills development implications in the MMS	To provide key insight into the effects of the pandemic across demand and supply chains and how mines should respond in terms of skills development in the MMS	Mixed methods research design in the form of:	Mining companies and employees		Questionnaire and interview guide		
		Quantitative (survey)	Employees	n = 550			
		Qualitative (interviews)	Mining representatives	n = 15			
Tracer studies (OHS, Small-Scale Mining Skills Programme and Unemployed Youth Development Programme)	The purpose of the studies was to determine the impact of MQA's Employed Occupational Health and Safety, Small-Scale Mining, and Youth Development Skills Programme on the nine sub-sectors of the MMS	Mixed methods research design in the form of quantitative surveys and focus group discussions (FGDs)	Learners and MQA stakeholders		Questionnaires and discussion guides	MQA I-Share database	April 2022–March 2023
		OHS	Survey	n = 703 learners			
			FGDs	n = 3 with learners, employers, Labour Unions etc.			
		Small-Scale Mining	Survey	n = 217			
			FGDs	n = 3 with learners, employers, Labour Unions etc.			

Project name	Research purpose	Research design		Target population & sample Size	Data collection instruments	Data sources	Study timeframe
		Unemployed Youth Development Programme	Survey	n = 203			
			FGDs	n= 3 with learners, employers, Labour Unions etc.			

Chapter 1 : Sector Profile

1.1 Introduction

This chapter provides an overview of the MMS in South Africa. It details the scope of coverage, key role-players, economic performance, employer profile and labour market profile of the MMS. These factors assist in providing insight into the MMS' economic and employment contribution in the country and globally by reflecting on the current state of the sector and the emerging trends. The chapter was informed by the 2023 WSP/ATR submissions and information gathered from various sources such as 2023 Minerals Council South Africa facts and figures report, DHET's Levy file, DMRE's public labour stats, Stats SA's Quarterly Labour Force Survey (QLFS) and mining production and sales report and stakeholder interviews.

1.2 Scope of Coverage

The MMS is categorised into the nine sub-sectors, which are analysed throughout the SSP. A breakdown of the relevant Standard Industrial Classification (SIC) codes are provided in Table 1.1.

Table 1.1: Scope of coverage

Sub-sector	SIC code
Coal Mining	21000, 22100
Gold Mining	23000, 23001, 23002, 23003
Platinum Group Metals (PGM)	24240
Diamond Mining	25200, 25201, 25202
Other Mining (includes the mining of iron ore, chrome, manganese, copper, phosphates and salt)	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

The scope of coverage includes the MMS value chain, as represented in Figure 1.1. A value chain is a series of activities performed by businesses in a particular industry to offer a valuable product or service to the market. The value chain is illustrated from exploration of primary operations through the value addition of minerals and the support activities at each stage of the value chain.

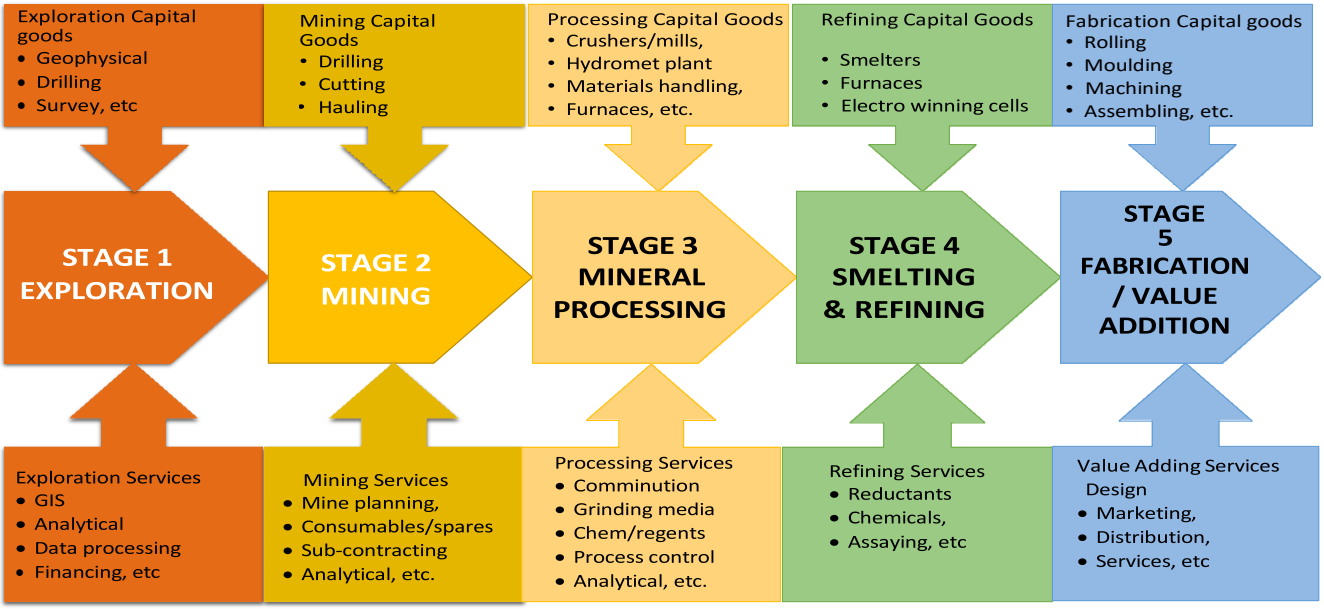

Figure 1.1 : MMS value chain

Source: MQA (2016)

1.3 Key Role Players

The NSDP 2030 encourages partnerships and collaboration across the skills development system to facilitate linkages across the skills development ecosystem and efforts to address skills issues in the sector sufficiently. While there are many role players in 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 the specific role context or mandate to influence the achievement of the NSDP outcomes and the broader national socio-economic imperatives.

This section details the role of each MMS key role player, its function in relation to the MMS and the relevant NSDP outcomes.

1.4 National Government Departments

Table 1.2 details the national government departments that are interconnected with the MMS and play a crucial role in achieving skills development and their relevance to the NSDP outcomes.

Table 1.2: National government departments - key role players

Department	Role in relation to the MMS and skills development	Relevant NSDP outcome
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 transformation in the domain of ownership, management, skills provision and community development.	Improves skills levels in the South African workforce, focussing on skills matters in relation to targets set by the Mining Charter.

Department	Role in relation to the MMS and skills development	Relevant NSDP outcome
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 the SSP framework, the Continuous Improvement Plan (CIP) and OFO (Organising Framework for Occupations) 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 public college institutional systems by providing more funding to scale up TVET and CET programmes. Link education and the workplace.

1.5 State-Owned Enterprises

Table 1.3 provides details on state-owned entity role players, their role as well as relevance in addressing skills development in the MMS envisaged in the NSDP.

Table 1.3: State-owned Entities

State-owned enterprises	Role in relation to the MMS and skills development	Relevant NSDP outcome
Mine Health and Safety Council (MHSC)	Promotes the transformation of occupational health and safety (OHS) in the effort 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 level of skills concerning health and safety training. Supports skills development programmes aimed at occupational health and safety.
Council for Geoscience	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 address the production of skills in high demand by supporting and contributing towards the growth of public colleges as key providers of higher learning and recommend learning programmes within its scope of work.

State-owned enterprises	Role in relation to the MMS and skills development	Relevant NSDP outcome
Quality Council for Trades and Occupations (QCTO)	Oversees the development and implementation of occupational qualifications and quality assurance in the TVET sector. The area of its functions include occupational qualifications development in line with industry needs, set quality assurance standards, guidelines policies to ensure industry training providers deliver high quality programmes including accreditation of training providers, assessment centres and moderation of assessment, oversee accreditation and assessment processes of occupational qualifications and working together with stakeholders to ensure that qualifications meet industry needs, contribute to economic development and job creation.	Improves the skill 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.
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. Supports career development initiatives.
Mintek	Conducts research and development (R&D) to promote innovation, efficiency and sustainability in the MMS. Provides technical support, expertise and training to enhance competitiveness and growth – small scale mining.	Links education and the workplace. Improves the level of skills in the South African workforce. Increase access to occupationally directed programmes. Skills development support for entrepreneurship and cooperative development. Identify and increase production of occupations in high demand.
MQA	Support sector skills transformation through various skills development interventions.	Facilitate access to industrial exposure through workplace experience programmes. Provide funding through bursaries, learnerships and internships to increase the level of skills in the South African workforce. Conduct research to identify occupations that are in high demand.

1.6 Other Key Role Players

In addition to the national government departments, state-owned enterprises and industry key role players, there are additional key role players who contribute to skills development in the MMS. Their role in relation to skills development and relevance to the NSDP outcomes are discussed in Table 1.4.

Table 1.4: Other key role players

Other key role players	Role in relation to skills development	Relevant NSDP outcome
Civil society (NGOs, lobby and advocacy groups)	Mobilise communities for buy-in into mining to ensure stability and good relations among various stakeholders in mining communities, for the purpose of securing the social licence to operate. Contributing to the formulation of CSI plans for the benefit of mining communities. Ensure access to various learning interventions such as bursaries, apprenticeships, internships and job opportunities by local community members.	Links education and the workplace. Improves the level of skills in the South African workforce. Increase access to occupationally directed programmes. Skills development support for entrepreneurship and cooperative development. Identify and increase production of occupations in high demand.

1.7 Economic Performance

This section provides in-depth data and insight into the status and performance of the mining industry and its contribution to the economy.

1.7.1 Overview of the MMS

Over the past year, the South African economy has faced a series of global and local challenges, including slowing global growth as a result of having to recover from the negative effects of COVID-19, geopolitical tensions, energy supply constraints, inefficiencies in state-owned enterprises and climate change. If these challenges persist, the economy will continue to struggle, particularly in 2023. To minimise further deterioration and create conditions for future growth, urgent action is needed to address supply-side constraints to the country's growth, such as ensuring stable electricity access and improving freight and logistics to enable exportation of mineral resources (Deloitte, 2023). Despite its challenges, the mining sector continues to contribute significantly to government revenue and managed to remain a trillion-rand industry for the second year in a row in 2022 (Minerals Council South Africa, 2023). However, while the value of mining production reached R1.1 trillion in 2021 and R1.18 trillion in 2022, the volume of mining production remained, on average, below pre-COVID-19 levels (Minerals Council South Africa, 2023a). The economic performance of each sub-sector is discussed in detail in the section below.

1.7.1.1 Sub-sectoral Economic Performance

Table 1.5: Sub-sectoral economic performance

Sub-sector	Economic performance	Future outlook
PGMs	The PGMs hold a pivotal position in the ongoing 'green metal/industrial revolution' and are presently confronted with uncertainties stemming from swift technological advancements, consequently impacting market conditions. Notwithstanding this revolution, sales generated by the PGMs continue to serve as the principal catalyst for the overall sales in the mining sector in South Africa. The sector has also experienced significant impact	• The ongoing Russian-Ukraine war has resulted in economic and trade sanctions that have had a significant impact on the production of Russian PGMs. As a consequence, the supply of PGMs has been subjected to considerable pressure, leading to a state of market uncertainty. • Due to the imposition of sanctions on

Sub-sector	Economic performance	Future outlook
	due to the electricity crisis in the country, leading to reduced capacity for concentrators and smelters to operate effectively. Consequently, a significant buildup of work-in-progress has been observed among the majority of producers in the precious metals group. The present level of production continues to be below the levels observed before the onset of the COVID-19 pandemic, and the persistent and steady decline in physical output is a matter of concern. The year 2022 witnessed a decline of 17.1% in total sales of PGMs compared to the previous year, primarily attributed to a decrease in production levels. In the same year, there was a notable decline in the price of international PGMs. This decline is supported by the observed decrease of 11.7% in the dollar price of platinum, the 11.5% decrease in the dollar price of palladium, and the 22.8% decrease in the dollar price of rhodium.	Russian PGM production and a subsequent recovery in economic conditions subsequent to the COVID-19 pandemic, it is anticipated that the platinum market will experience a deficit in supply amounting to approximately 303,000 ounces in 2023. • The anticipated impact of changing demand and production patterns for vehicles, accompanied by emissions and environmental regulations, as well as advancements in automotive powertrain development, is expected to have a favourable influence on the demand for PGMs in 2023.
Coal	Projected coal production for 2022 was 231.2 million tonnes, down 3 million tonnes (1.2%) from 2021. Despite this projection, South Africa's Coal Price in International Commodity Markets in May 2023 was 103.00 dollars per metric tonne, and it dropped further in June 2023 to 98.58 according to World Bank's estimations. Despite this decline, coal continues to maintain its prominent position in the country's energy portfolio: it accounts for a substantial 80% share of the total system load. The insufficiency in the availability of locomotives, coupled with sub-optimal rail and port operations, has resulted in adverse consequences for the export of coal. The coal sub-sector has also experienced a decline in long-term investment due to the adverse impact of global sentiments against its use.	• In the short-term, the demand for coal will remain high, due to the global energy shortage brought on by Russia's invasion of Ukraine. • The decommissioning of coal power plants in the domestic context is expected to result in a significant reduction of coal demand by Eskom. • It is anticipated that there will be a projected decommissioning of approximately 24,100 megawatts (MW) of coal-fired generation capacity in the period following 2030. The decrease in domestic coal demand will require dependence on the export market in order to maintain employment levels in the mining and logistics sectors of South Africa.
Gold	The COVID-19 pandemic has provided evidence that during periods of high inflation rates, gold can serve as a reliable and secure asset for preserving long-term value. The store of value characteristics of gold has rendered it an appealing investment option. In 2022, the price of gold in US dollars exhibited a stable trend, maintaining a relatively constant value of $1,800 per ounce. Conversely, the prices denominated in South African rand experienced a notable increase of 10.5% when compared to the previous year. This upward trajectory was primarily influenced by the depreciation in the exchange rate. In the local context, the production of gold in South Africa experienced a decline of 20.42%, resulting in an approximate output of 84 tonnes in 2022. The	• The imposition of sanctions, including those by Russia and other countries, has prompted central banks to acquire significant amounts of gold as a means to facilitate transactions and safeguard against inflation, thus increasing demand for it. • If immediate structural remedies for South Africa's electricity crisis are not implemented, it is anticipated that the investment prospects for gold will continue to be unfavourable. • The sporadic nature of electricity provision gives rise to concerns

Sub-sector	Economic performance	Future outlook
	industry faces significant production constraints, including sporadic and unreliable electricity supply, water shortages, illegal mining, crime, theft and policy uncertainty. The mining industry is confronted with a notable obstacle in the form of declining ore grades, resulting in decreased production efficiency.	regarding health and safety, while the sharp upward trend in electricity tariffs poses a significant concern in terms of input cost.
Diamond mining	Local diamond production has surpassed the milestone of 10 million carats for the first time since the occurrence of the 2008 Global Financial Crisis (GFC). However, the industry has yet to fully recover and attain production levels comparable to those prior to 2008. The current instability in the global economy does not effectively promote consumer confidence. It is worth noting, however, that the United States economy, which accounts for over 50% of global diamond consumption, continues to experience growth despite higher-than-average levels of consumer inflation. When comparing the production figure of 2022 to that of 2021, it was expected that there would be a 5.1% increase. The statistics on these projections are yet to be published.	• The inherent instability in the global economy does not effectively cultivate consumer confidence to attract investment. • One of the primary impediments to local promotion of diamond beneficiation and enhanced consumption is VAT. The Minerals Council South Africa has been playing a critical role in advocating for the elimination of VAT on the transaction of rough diamonds - a measure that is expected to enhance the sub-sector's overall performance.
Other mining	Iron ore is the fourth most extracted mineral in South Africa. The nominal capacity of the iron ore rail channel is 60 million tonnes per year, but it continues to operate at approximately 51 million tonnes per year. Manganese ranks fourth in tonnage after iron, aluminium and copper. In 2022, manganese production and sales were higher than in 2019, indicating a good pre-pandemic performance. 87.5% of manganese produced in 2022 was exported. They can be attributed to the high demand for steel in China, India and parts of Europe. Compared to 2021, sales increased by approximately 30% (R48 billion). The utilisation of chrome is imperative in the manufacturing process of stainless steel. The Transnet strike and floods in the KwaZulu-Natal region had a notable impact on the export volume of chrome. Despite inefficient South African rail and port facilities, chrome export volumes performed well after switching logistics to the Komatipoort border post to Maputo harbour. However, the escalation and prevalence of criminal activities along the chrome rail line are having a detrimental effect on exports and leading to heightened security expenses for chrome producers.	• Inadequate railway capacity and operational inefficiencies are expected to persistently impact the export of iron ore in the near to intermediate future. • China has recently eased its zero-COVID policy, a decision that is anticipated to stimulate the domestic market for industrial minerals such as manganese and steel. • The cost of road transportation for chrome is approximately 40% higher than rail, thus affecting the current and future performance of the sector.

Sub-sector	Economic performance	Future outlook
CLAS	Small and medium-sized companies dominate the CLAS sub-sector. Large firms in this sub-sector include cement manufacturers, phosphates, vermiculate and dimension stone producers. Most of the small-scale mining (90%) also falls into this group of industrial commodities. The growth in sales for non-metallic minerals was primarily driven by the aggregate and sand sector (which contributed 31.1%) and the limestone and lime sector (which contributed 18.9% in 2022).	• The demand for cost-effective housing and continuous infrastructure advancements, including the construction of roads, bridges, and ports, will contribute significantly to the increased demand for CLAS in South Africa.
Diamond processing and jewellery manufacturing	The South African diamond processing sub-sector consists of 221 licenced diamond manufacturers. Despite the country's wealth of resources, South Africa's jewellery manufacturing industry is small. Most jewellery manufacturing companies are 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 market. In early 2023, South Africa's jewellery sub-sector accounted for $0.72 billion in revenue, with India generating the most revenue globally (US$76,770.00 million).	• The market for jewellery is anticipated to increase annually by 6.53% (CAGR 2023-2026). It is anticipated that by the end of 2023, non-luxury goods will account for 92% of sales in the jewellery segment.
Services incidental to mining	The Services Incidental to Mining category consists of companies providing services incidental and closely related to the MMS. These include R&D in terms of 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 sub-sector asserted that COVID-19 had hit their industry hard. As a result of the pandemic, some companies were compelled to lay-off some employees, whilst others closed.	• The sub-sector is expected to experience a rebound to pre-COVID levels as several service sectors associated with the sub-sector demonstrate signs of recovery.

Source: Minerals Council South Africa (2023a), CSIR (2023), Statista (2023)

The stakeholder interviews revealed that the industry's current business conditions are neither favourable nor unfavourable. The Jewellery Manufacturing subsector emerged as the subsector facing the greatest challenges, as its representatives reported that the subsector was not performing well. Consequently, this subsector does not anticipate a performance improvement within the next 12 months. Coal, Other Mining, and Services Incidental to mining were the leading subsectors, indicating favourable subsector business conditions. These subsectors also expect this favourable situation to persist in the future.

1.7.1.2 Mineral Sales and Exports

The value of exports in October 2022 was 70% greater than monthly averages prior to the lockdown. However, although October export values remained higher than pre-lockdown averages, export volumes decreased by over 20%. Volumes decreased by 20% in October compared to September, and export disruptions continued through November, which likely led to the 20% decline in exports during the fourth quarter (Minerals Council South Africa, 2023a). Export performance in 2022 was also hampered by transport and logistic issues, with monthly export volumes at 2017 levels. This trend will continue to be observed to determine whether there will be any substantial changes.

1.7.1.3 Mining and Quarrying GDP Contribution and Other Sectors of the Economy

According to the Stats SA 2023 first quarter GDP report, the country's GDP increased by an estimated 0.4% in the first quarter of 2023 (January-March). Figure 1.2 shows that eight out of 10 industries experienced positive growth between the fourth quarter of 2022 and the first quarter of 2023. The mining and quarrying industry was the third largest contributor to the positive economic growth of the country in the first quarter of 2023, accounting for 0.9% of total growth. The increase was attributed to increased economic activities in terms of gold, PGMs and iron ore.

The primary driver of the country's economic growth was the manufacturing sector, which experienced a substantial increase of 1.5%, followed by the transport, storage and communication, as well as the construction sectors, which contributed 1.1% to overall economic growth. Personal services contributed 0.8%, followed by trade, catering and accommodation (0.7%), finance, real estate and business services (0.6%), and lastly, the general government services sector (0.2%).

The agriculture, forestry and fishing sector experienced a decline of 12.3%, resulting in a -0.4% contribution to the overall growth of the GDP. This can be attributed to a decline in economic activities related to the cultivation of field crops and the production of animal products. The electricity, gas and water sector experienced a decline of 1.0%, primarily attributed to a reduction in electricity and water usage.

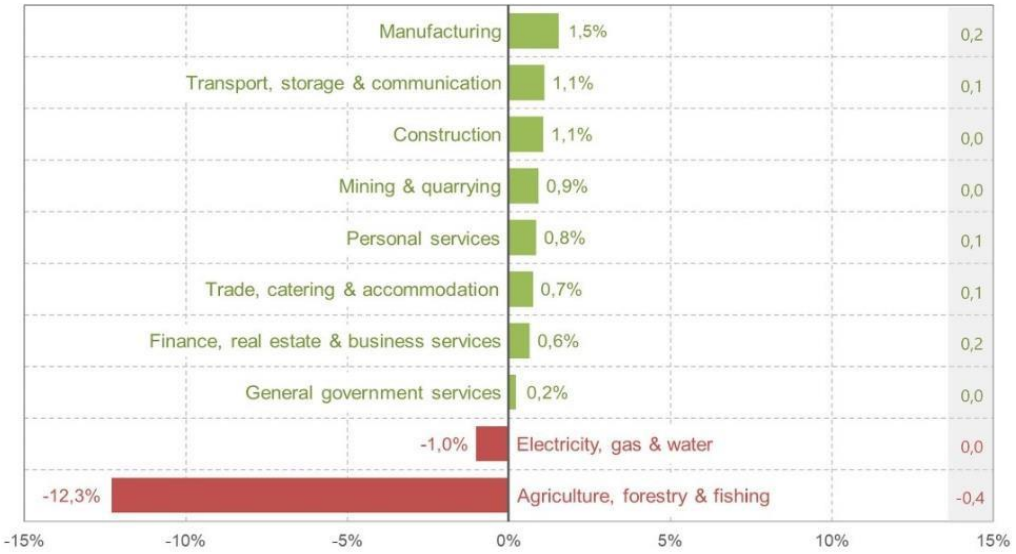

Figure 1.2: Q1 2023 SA GDP contribution by sector

Source: Stats SA (2023)

The next two sections provide details on employers and the labour market of the MMS.

1.8 Employer Profile

The analysis of employers in the MMS is predominantly based on the DHET levy registration file. The employers' geographical location, size and number of employees are provided below.

1.8.1 Geographic Location of Employers in the MMS

Figure 1.4 illustrates the geographical location of the 2 352 registered levy paying employers in the MMS, as of June 2023. Most of these are situated in Gauteng (42.2%), with the Eastern Cape (1.8%) and Free State (2.4%) having the least employers in the sector. There is no relevant information on start-ups and closures of mines published at this period.

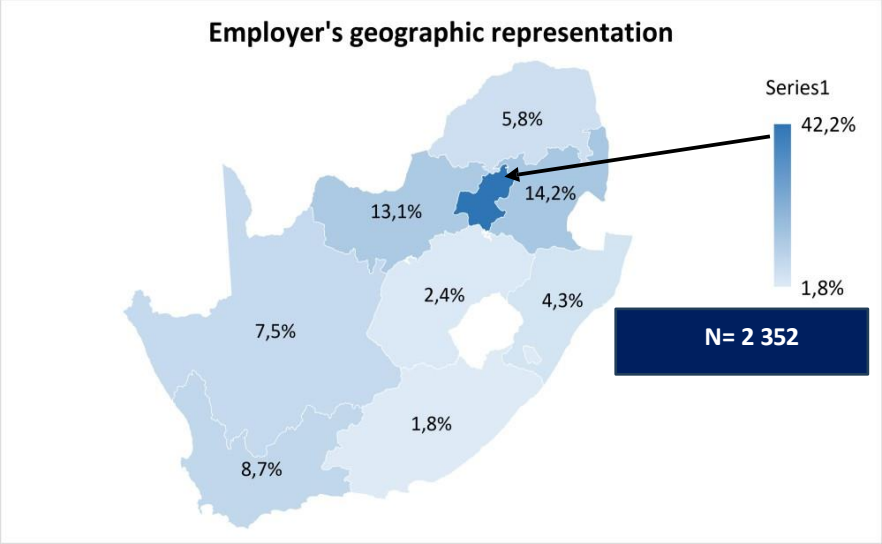

Figure 1.3: Employers' geographical representation
Source: DHET registration file (June 2023a)

1.8.2 Employer Distribution by Sub-sector

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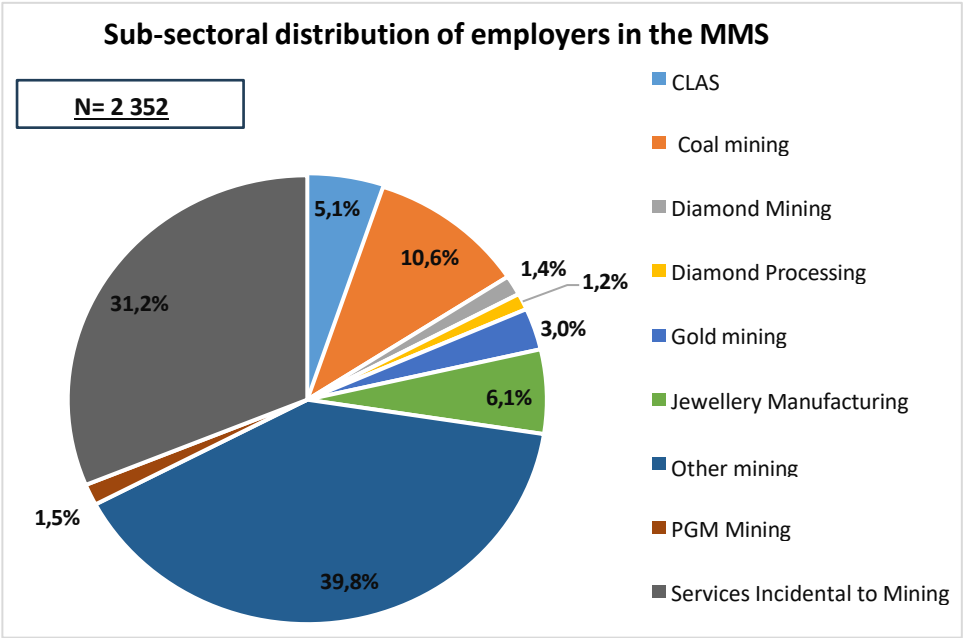
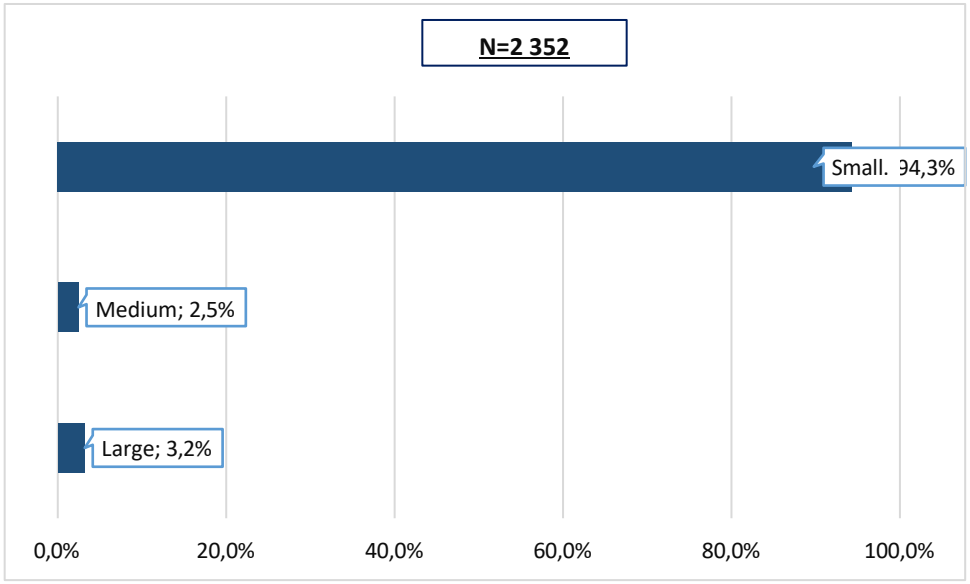


Figure 1.4: Sub-sectoral distribution of employers in the MMS
Source: DHET registration file (June 2023a)

The majority of mining companies (39.8%) are in Other Mining, followed by Services Incidental to Mining (31.8%). The sub-sectors with the least number of companies are Diamond processing (1.2%), Diamond mining (1.4%), and PGMs (1.5%). However, as will be seen in the following section, despite having a small number of companies, PGMs are among the largest employers in the MMS.

1.8.3 Employer Distribution by Company Size



The majority of mining companies are made up of small companies (94.3%).

Figure 1.5: Employer distribution by company size
Source: DHET registration file (June 2023a)

The following section presents the demographic labour market profile of the MMS.

1.9 Labour Market Profile

The labour market profile was obtained from the 31 May 2023 MQA WSP/ATR dataset, the June 2023 DHET Levy registration file and quarter 1 2023 DMRE labour statistics. The data was weighted to provide a more realistic outlook of the sector. The weighting formula and other relevant formulae can be found in Annexure A.

1.9.1 Employment by Gender, Race, Age and Major Occupation

Table 1.6: Employee profile by gender, race, age and major occupation

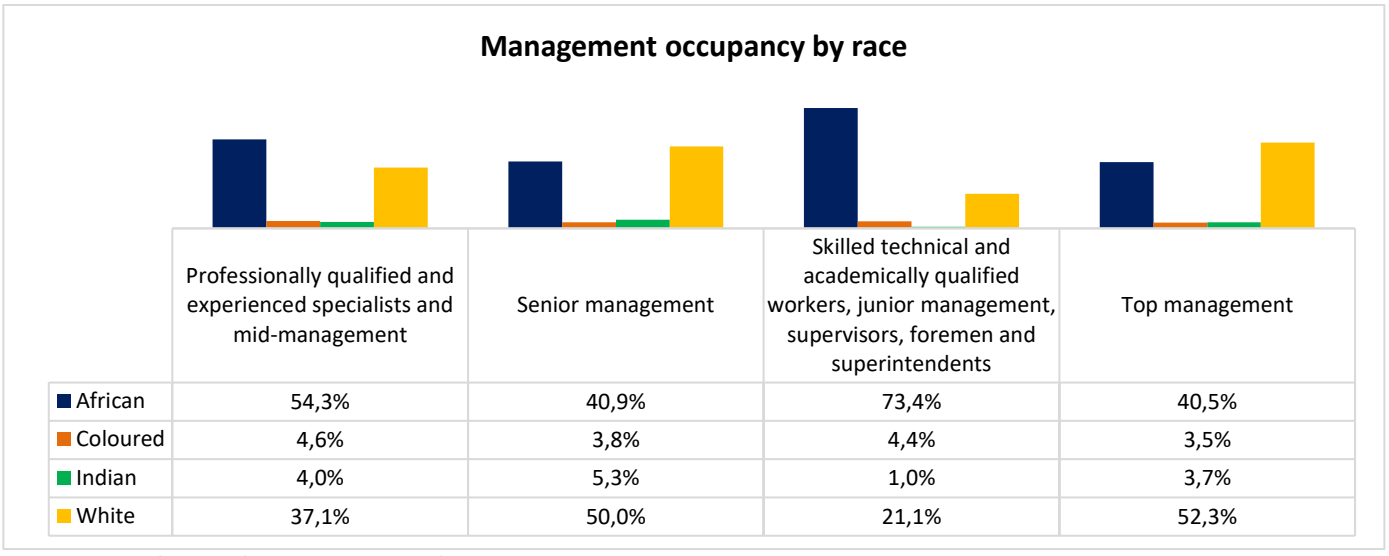
Demographic	Category	N	%
Gender	Female	98 730	19.2%
	Male	415 489	80.8%
Race	African	451 999	87.9%
	Coloured	14 398	2.8%
	Indian	3 085	0.6%
	White	44 737	8.7%
Age	<25	10 284	2.0%
	25-34	111 071	21.6%
	35-44	192 318	37.4%
	45-54	133 697	26.0%
	55-64	64 792	12.6%
	65+	2 057	0.4%
	Managers (2021-1)	13370	2.6%
	Professionals (2021-2)	24 683	4.8%

Demographic	Category	N	%
Major occupation	Technicians and associate professionals (2021-3)	73 533	14.3%
	Clerical support workers (2021-4)	21 597	4.2%
	Service and sales workers (2021-5)	7 199	1.4%
	Skilled agricultural, forestry, fishery, craft and related trades workers (2021-6)	48 337	9.4%
	Plant and machine operators and assemblers (2021-7)	188 204	36.6%
	Elementary occupations (2021-8)	137 296	26.7%
Total		**514 219**	100%*

Source: Weighted MQA WSP and ATR (31 May 2023b)
*The total for major occupations excludes learners.

Table 1.6 indicates that the MMS remains male dominated, with males representing 80.8% of the workforce. The majority of employees (87.9%) are Africans and are mostly between the ages of 35 and 44 (37.4%). Most employees are employed at lower-level occupational levels. Plant and machine operators and assemblers make up the majority of the employees (36.6%) and elementary workers represent 26.7% of the MMS population. The three most common plant and machine operators and assemblers are scraper winch operator, rock drill operator and mining operator.

1.9.2 Employment by Management and Race



	Professionally qualified and experienced specialists and mid-management	Senior management	Skilled technical and academically qualified workers, junior management, supervisors, foremen and superintendents	Top management
African	54,3%	40,9%	73,4%	40,5%
Coloured	4,6%	3,8%	4,4%	3,5%
Indian	4,0%	5,3%	1,0%	3,7%
White	37,1%	50,0%	21,1%	52,3%

Figure 1.6: Employment by management and race
**The population size on the graph only includes management roles*
Source: Weighted MQA WSP and ATR (31 May 2023b)

An analysis of the MQA's WSP/ATR biographical data revealed that Africans account for 68.6% of management roles. However, the majority of them of them are in junior (73.4%) and middle management (54.3%). Despite making up 25.3% of the management workforce, white employees dominate senior (50%) and top management (68.6%) positions.

According to MQA's (2023c) study on factors inhibiting the advancement of historically disadvantaged

individuals (HDIs) into managerial positions, there are several factors affecting the representation of HDIs into senior and top management roles. These include insufficient support from certain mining companies in implementing transformation initiatives, a lack of relevant skills among HDIs employees, and limited job opportunities leading to layoffs within companies. The study's primary recommendation for addressing this issue was the importance of maintaining continuity in MQA's Management Development programme.

1.9.3 Highest Education Level

Table 1.7: Highest qualification obtained by employees

Qualification	N	%
No Schooling	10 284	2.0%
AET Level 1 / Grade 1-3	12 341	2.4%
AET Level 2 / Grade 4-6	16 969	3.3%
AET Level 3 / Grade 7-8	20 569	4.0%
AET Level 4 /Grade 9 / Standard 7 / Form 2 / Level 1 Occupational Certificate	30 339	5.9%
Grade 10 / Standard 8 / Form 3 / National Certificate Vocational (NCV) Level 2 / Level 2 Occupational Certificate / N1(NATED Level 1) / Elementary Certificate	37 024	7.2%
Grade 11 / Standard 9 / Form 4 / National Certificate Vocational (NCV) Level 3) / Level 3 Occupational Certificate / N2 (NATED Level 2) / Intermediate Certificate	53 479	10.4%
Grade 12 / Standard 10 / Form 5 / National Senior Certificate / Matric / National Certificate Vocational (NCV Level 4) / Level 4 Occupational Certificate / N3 (NATED Level 3)	**203 117**	**39.5%**
Higher Certificate	9 770	1.9%
N4, N5 or N6 (NATED 4, 5 or 6) or NTC 4, 5 or 6	9 256	1.8%
Artisanal Trade Certificate	13 884	2.7%
Diploma / National Diploma / N Diploma / Advanced Certificate	16 455	3.2%
Bachelor's Degree / Higher Diploma / B-Tech Diploma / Advanced Diploma	15 427	3.0%
Honours Degree / Postgraduate Diploma	4 628	0.9%
Master's Degree	2 057	0.4%
Doctorate / PhD	514	0.1%
Other	12 341	2.4%
Uknown	45 765	8.9%
Total	**514219**	**100%**

Source: Weighted MQA WSP and ATR (31 May 2023b)

According to the MQA's WSP analysis study (2022), the MMS was historically associated with a high rate of illiteracy among its workforces. However, the results shown in Table 1.7 indicate that this has changed, as over one-third of employees (39.5%) now have a standard 10 or grade 12 qualification. Only a small percentage of employees (2%) have no schooling. Exposure to some form of education is critical for developing the competencies of employees who occupy low skilled occupations (MQA, 2021). MQA's (2023d) study on understanding the relationship between scarce and critical skills revealed that mining companies are increasing their expectations with regard to basic education (i.e. potential employees must have a matric) and numeracy and literacy. While this is positive, the proportion of employees with a post-matric remains low - only 14% of the workforce. There is also currently a trend towards recruiting employees with qualifications higher than a standard 10/matric, as these credentials are required for advancing more skilled occupations. In addition, the nature of work and jobs created as a result of technology implementation will necessitate the acquisition of new skills. Individuals with lower levels of education and skills are most susceptible to being impacted by technological innovations that alter the nature of work. As a result, they must be provided opportunities to access tertiary education, as emerging occupations will require that they possess a post-matric education.

1.9.4 Employment Trends in the MMS

This section provides a 5-year trend analysis of employment in the MMS for the period 2019-2023 by sub-sector, gender and people living with a disability.

1.9.4.1 Sub-sectoral Employment Trends

Table 1.8: Sub-sectoral employment trend (2019-2023)

Sub-sector	2019	2020	2021	2022	2023	Average difference
CLAS	10746	10746	6829	12275	12275	**14.2%**
Coal mining	89775	89775	91271	91123	94437	**5.2%**
Diamond mining	15888	15888	13889	13489	15825	**-0.4%**
Diamond processing	1461	1461	1626	1408	1408	**-3.6%**
Gold mining	94152	94152	93537	92452	93988	**-0.2%**
Jewellery manufacturing	1853	1853	1811	2317	2317	**25.0%**
Other mining	71198	71198	77210	78494	79545	**11.7%**
PGMs mining	166367	166367	165308	177780	182158	**9.5%**
Services incidental to mining	35206	35206	56132	32266	32266	**-8.4%**
Total	**486646**	**486646**	**507613**	**501604**	**514219**	**5.7%**

Source: MQA weighted WSP and ATR (2019-31 May 2023) and DMRE (2029-2023)

PGMs account for the largest employer in the MMS (35.2%). In the past five years, the sector has experienced a 5.7% increase in employment, as indicated in Table 1.8. This is evidence that the sector is showing signs of recovery from the COVID-19 pandemic. Five of the nine sub-sectors are experiencing employment growth, with the three largest increases occurring in the Jewellery Manufacturing (25%), CLAS (14.2%) and Other mining sub-sectors (11.7%). Services incidental to mining (-8.4%) had the most job losses.

1.9.4.2 Gender Employment Distribution Trend

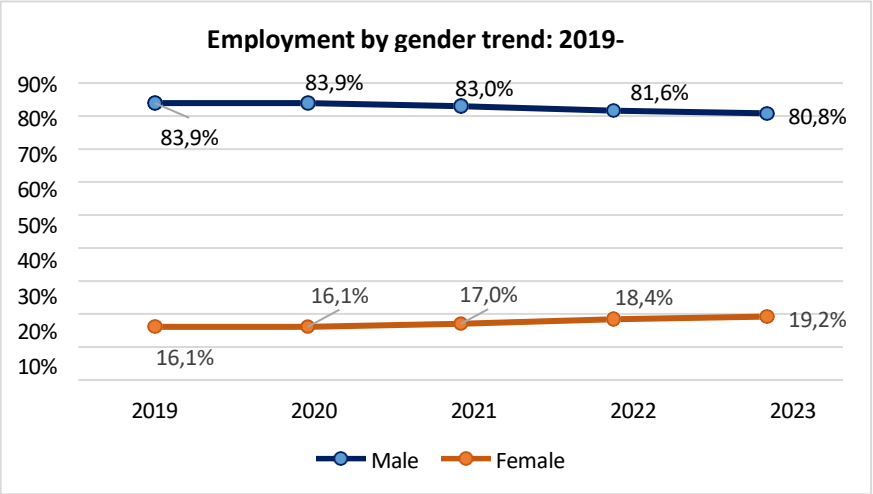


Figure 1.7: Employment by gender (2019-2023)
Source: Weighted MQA WSP and ATR (31 May 2023b)

Despite being under-represented in the sector, the proportion of female employment in the MMS increased gradually from 16.1% in 2019 to 19.2% in 2023. Although this increase is encouraging, there is still room for improvement.

1.9.4.3 Employment by Employees Living with a Disability

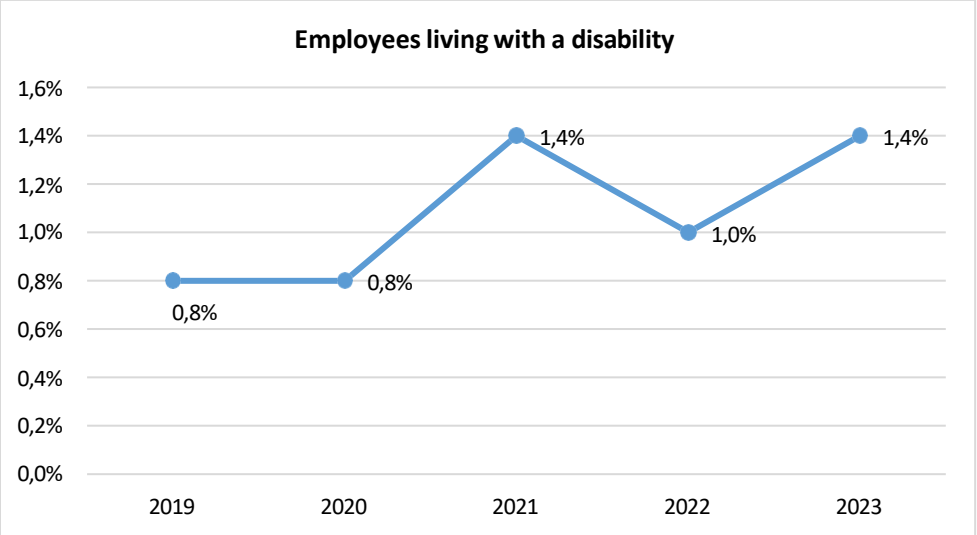


Figure 1.8: Employment trend of employees living with a disability (2019-2023)
Source: MQA Weighted WSP and ATR (2019-31 May 2023b)

The 2018 Mining Charter requires a minimum of 1.5% representation of people living with a disability, in line with national or provincial demographics. Figure 1.7 shows fluctuation in employees living with a disability. However, it is encouraging to note that improvements have been made for 2023, bringing the sector's current representation of 1.4% close to the target.

1.10 Conclusions

This chapter explained that South Africa continues to play an important role in the global mining economy. Even though the COVID-19 pandemic brought about several challenges that negatively impacted the sector, most of the sub-sectors managed to rebound. The future economic outlook for some sub-sectors, however, is bleak, with the likelihood of increasing South Africa's triple challenges of inequality, poverty and unemployment. Successful remediation of the effects 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 in the MMS.

The majority of registered employers in the MMS are from Gauteng (42.2%). PGM mining (35.2%) employs most of the sector's employees. Transformation in the sector is moving at a snail's pace as males remain dominant and targets set by the 2018 Mining Charter for employees living with a disability have not been met. This is cause for concern and indicates a need to address this challenge. Demographic disparities in gender and management by equity composition 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 a disability. 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 historically disadvantaged people at management level. The MQA, through its skills development programmes, may assist in addressing these challenges.

Chapter 2 : Change Drivers

2.1 Introduction

This chapter discusses factors that drive change and impact on skills demand and supply in the MMS. These factors were informed by the literature review, MQA's past studies and findings from interviews conducted with stakeholders in the sector. In the MMS, numerous factors affect skills development politically, economically, socially, technologically and environmentally, and have legislative implications, as discussed in the sections below. Understanding how these drivers interact with skills development is crucial for implementing effective measures to address the skills needs of the sector. All change drivers discussed have direct implications for skills development in the MMS and are discussed in no particular order. In addition to the drivers of change, a policy framework is presented that outlines key national policies that guide the strategies and operations of the MQA and the MMS, as well as their implications for skills planning.

2.2 Geopolitics and Market Performance

South Africa's mining sector is confronted with challenges in managing distinctive operational challenges specific to the country, while simultaneously operating in the global context. Consequently, mining companies are inevitably influenced by global developments, as macro-economic expansion and worldwide markets exert a substantial influence on the supply of minerals, demand, profitability and employment. As seen in Chapter 1, there is a strong correlation between the performance of commodity markets and mining stocks. The ongoing Russian-Ukraine war, for example, has resulted in economic and trade sanctions that have had a significant impact on the production of Russian PGMs. As a result, the supply of PGMs has been subjected to considerable pressure, leading to a state of market uncertainty. On the other hand, whilst the uncertainties caused by the Russian-Ukraine has had a negative effect on the performance of the PGMs sub-sector, certain sub-sectors, such as gold, have experienced gains due to its perception as a secure investment option. In addition, the sector's long-term investment has been adversely impacted by the prevailing global sentiment of opposing the use of coal. However, in the short-term, the current global energy shortage resulting from Russia's war will continue to sustain the demand for coal.

2.3 Mineral Beneficiation

The South African diamond processing sub-sector consists of 221 licenced diamond manufacturers. The Master Diamond Cutters' Association has 80 registered members, which employ 95% of the employees in this sub-sector. Despite the country's wealth of resources, South Africa's jewellery manufacturing industry is small. Jewellery manufacturing companies beneficiate mining outputs such as gold, platinum, silver and diamonds, to manufacture jewellery for both domestic and export markets. Beneficiation refers to the process of adding value to raw materials or natural resources to make them more valuable and usable. By adding value to raw materials, countries or companies can maximise their economic potential, create additional revenue streams and foster local industries.

Opportunities exist for downstream processing and adding value locally to iron, carbon steel, stainless steel, aluminium, PGMs and gold. A wide range of materials is available for jewellery, other than gold, platinum and diamonds: there is also tiger's eye and many other semi-precious stones (BrandSA, 2019). Stakeholders in the MMS believe that the sector needs to develop local capacity by investing in interventions that will support and enable local beneficiation, instead of exporting minerals. These can be developed by establishing formal partnerships with entities such as Department of Trade & Industry

(DTI), South African Small and Medium Enterprise Association (SASME), National Empowerment Fund and mining companies.

2.4 The South African Energy Conundrum: The Impact of Load-shedding

The MMS continues to face increased risk on the energy front, as electricity has become a scarce commodity in recent years, which is subject to supply interruptions and rising prices (SBPR, 2019). The ongoing load-shedding problem has had cost implications on the sector, although the effects of the load-shedding differ from one mine to another. However, there are some potential impacts that are cross-cutting, such as disruption of production. Mining operations rely heavily on a stable and uninterrupted energy supply. Power outages or energy shortages can disrupt mining activities, and lead to production delays and reduced output. Minerals that are most 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.

Load-shedding is compelling organisations to adopt alternative energy sources. These alternative energies are generated through non-hydroelectric means, such as solar and wind power. If these are implemented and utilised, the demand will increase for expertise in terms of installation, repair and maintenance of the infrastructure. These specialised skills can be obtained through outsourcing from contracting firms or through internal acquisition by mining companies, resulting in the generation of both direct and indirect employment opportunities. In addition, mines are now permitted to independently generate up to 100 megawatts of electricity. This necessitates that their employees possess the required competencies and skills for electricity generation, distribution, and maintenance.

2.5 Just Transition: Integration of ESG in mining

There has been a global transition away from coal extraction, particularly in Europe and Asia. This transition has increased awareness for the need for new policies that effectively address issues such as employment losses, skills shortages, and the transformation of value and supply chains. South Africa is facing significant pressure to adopt similar measures, given its status as the seventh largest producer of coal globally and the fourteenth highest emitter of carbon dioxide. In addition, South Africa is going to experience greater temperature increases than the global average and adaptation to climate change is a growing concern (Cole, 2022). As a result, there is a need to achieve just energy transition, which focuses on the transition of South Africa's energy sector as the country navigates away from coal towards cleaner sources of energy. The pursuit of a 'Just Energy Transition' is a primary focus of the Presidential Climate Commission, as it seeks to prevent the abandonment of individuals and communities associated with high-emitting energy sectors, such as coal, during the transition to a low-carbon economy.

Furthermore, mining poses an inherent risk for environmental degradation in air quality, water supply and quality, and biodiversity. Therefore, there are calls to take environmental sustainability into consideration in mining. This too, necessitates the need for energy transition. In the context of South Africa, a just energy transition would involve addressing the country's heavy reliance on coal for electricity generation and transitioning towards renewable energy sources such as solar, wind and hydroelectric power. The mining industry will play a key role in this transition, as many renewable energy technologies rely on critical materials that are mined, such as lithium for electric vehicle batteries, copper for wind turbines and solar panels, and PGMs for hydrogen fuel cells, auto catalysts and electrolysis in the manufacture of hydrogen (Minerals Council South Africa, 2023a). Overall, a just energy transition in South Africa should strive to balance the environmental, social and economic aspects of the transition, to ensure that no one is left behind as the country moves towards a more sustainable and equitable energy future.

Socially, a just energy transition in South Africa should prioritise aspects such as social equity and economic development. This should aim to minimise the negative impact on vulnerable communities, such as those living near coal mines or power plants, by providing support and alternative livelihood opportunities. It should prioritise job creation, skills development and re-training of employees in the coal sector to ensure a just transition for affected workers. Stakeholders in the MMS emphasise that a just energy transition increases the need for environmental and social management skills, policy and regulatory, as well as entrepreneurial and innovation skills, and requires a change in mining practises. Additionally, leadership and collaboration skills are also essential.

2.6 Fourth Industrial Revolution

Very often, when a new turn or change beckons in human history, be it a new era, a new revolution or a new paradigm shift, there is some element of hype associated with its impending arrival. The same seems to be the case with the fourth industrial revolution (4IR) in the MMS. 4IR refers to a world in which individuals move between digital domains and offline reality with the use of connected technology to enable and manage their lives (Miller, 2016).

The MQA 4IR study revealed that various sub-sectors have adopted technological innovation to varying degrees. For instance, the coal and diamond mining sub-sectors have room for growth and have made significant technological advances. On the other hand, the conventional narrow reef gold and PGM sub-sectors have limited room for growth and have been relatively slow to adopt new technologies. Because of innovation, skill requirements will evolve. The roles and activities that are currently and expected to be impacted by 4IR in the MMS are presented in Table 2.1.

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

Increasing role	Decreasing role
• Specialists in the re-mining of waste dumps • Data analysts • Collaborators • Workplace and worker experience reformers (change management specialists) • 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, weighers and 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

Source: MQA (2021)

According to stakeholders, the current scope of 4IR in mining includes both digital transformation and industry 4IR. In the context of digital transformation, it refers to how the mining industry is evolving and incorporating more digital interfaces into everything. In this case, 4IR refers to the use of various technologies and modernised mining techniques, such as driverless vehicles and remotely operated rock drills. To achieve this, the sector's organisations will need to embrace digitalisation. Collision avoidance

systems are an additional aspect of 4IR that will require individuals who are able to perform installation, repair and maintenance of these systems, which will influence the demand for diesel mechanics, fitters and electricians and mechatronics technicians.

2.7 Illegal Mining

The sector has been significantly impacted by the issue of illegal mining, which has emerged as a substantial economic sector worth billion of rands. Illegal mining occurs in both abandoned and operational mines, as unauthorised miners frequently engage in dangerous activities. This poses considerable obstacles and risks to both the security of the country and its socio-economic performance. Moreover, illegal mining amplifies the likelihood of the emergence of alternative and illicit economic systems, as all unlawfully manufactured goods are channelled into the illicit market, resulting in government loss of revenue from royalties, income tax and value added tax. The diamond mining and gold sub-sectors experience adverse effects due to the escalation of illicit mining operations and the theft of valuable metals, which subsequently compromises the security of mining operations. Possible resolutions encompass the establishment of a well-defined regulatory structure that facilitates the transition of illicit miners into the realm of artisanal mining (Mineral Council South Africa, 2023).

According to the stakeholders, there is currently no strategy in place to combat illegal mining. Although there are no laws and policies governing illegal mining, stakeholders believe that it has the potential to significantly impact the existing legal framework and regulatory measures that govern the mining sector. There will be an increased demand for efficient operation of artisanal mining activities. In the absence of regulations governing illegal mining, stakeholders emphasised that MQA will be unable to obtain definitive indications of skills interventions that will combat illegal mining until regulations change.

2.8 Skills Implications

The change drivers discussed above have implications for skills development, as indicated in Table 2.2.

Table 2.2: MMS change drivers' skills implications

Change driver	Sectoral implication	Skills implication
Geopolitics and market performance	• Creates market uncertainty • Inhibits fixed investment in minerals • Could result in the economic decline of some minerals (e.g. PGMs and gold)	• Potential job losses • The need for training in portable skills
Mineral beneficiation	• Maximisation of the country's raw minerals • Contribute to the development of a domestic processing industry • Generation of higher-value exports	• Identification of skills related to beneficiation • Creation of employment opportunities in mining and other allied industries • Promotion of entrepreneurship for small-scale mining
Impact of load-shedding	• Inability of mining operations to operate at full capacity • Impacts the profitability of mining operations significantly • Affects production output • Can result in reduced foreign investment • Affects local beneficiation • Utilisation of alternative energy sources	• May lead to potential mine closures. This can impact the MMS's contribution to the skills levy, thereby impacting the provision of skills development. • Could result in potential job losses • The implementation of alternative energies will necessitate skillsets for installation, repair and maintenance of alternative energy supplies, e.g. solar
Just transition	• Will have a major impact on the coal sub-sector • Facilitation of access to affordable, reliable and clean energy services, particularly in under-served areas • Reduction of greenhouse gas emissions and mitigation of the environmental impact of energy production • Interdisciplinary collaboration	• Strong driver of employment creation • Heightened demand for green skills • Potential job losses for unretained employees • Will result in the advancement of interdisciplinary skills • Provision of alternative livelihood opportunities (contribution to entrepreneurship) • Increase in the demand for skills related to environmental science, risk, and impact analysis, solar, fuel cells wind power, and hydroelectric power installations, repairs and maintenance
4IR	• Increase in productivity due to AI • Improvement in health and safety for employees	• Decrease in skills requiring physical strength and stamina • Operational transformation in terms of the type, level and mix of skills

Change driver	Sectoral implication	Skills implication
	• Optimisation of resource usage • Promotion of opportunities to attract more women to the sector, thus addressing gender disparities in the sector	required. Rock drill operator, blaster, drill rig operator and the majority of artisan trades will most likely be transformed. • Increased demand for mechatronics required for the installation and maintenance of collision avoidance systems • Upskilling and reskilling of occupations affected
Illegal mining	• Increases the likelihood of the emergence of alternative and illicit economic systems • Theft of precious metals endangers the safety of mining operations • Results in unaccounted employee fatalities and injuries • If regulated, it could result in increased artisanal mining and also contribute positively to the economic growth of the sector	• Most likely to benefit artisanal mining. Therefore, creating more employment and entrepreneurial opportunities

Source: MQA stakeholder interviews (2023)

2.9 Policy Frameworks Affecting Skills Demand and Supply

The process of sector skills planning in South Africa necessitates the consideration of various national policy imperatives. These imperatives aim to facilitate inclusive sectoral growth that promote economic growth, social development, and the transformation agenda. Table 2.3 provides a synopsis of the key legislative instruments, policies, plans and mechanisms that inform the MQA's key planning frameworks and programmatic interventions to make a difference in the MMS. The Table also indicates the implications of these policies for skills planning in the sector.

Table 2.3: Legislative and policy frameworks affecting skills demand and supply

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 a legislative transformation instrument intending to create enabling conditions conducive for the redress socio-economic inequalities, equitable access, meaningful participation of the black persons and sustainable exploitation of mineral and energy resources in the MMS.	The MQA's planning frameworks (SP and Annual Performance Plan (APP)), policies and mechanisms (funding policies and grants allocation criteria) and skills development interventions (learning programmes and special projects) should be underpinned by the principles equity, equality (race, class and gender), fairness, social and economic justice.
Mining Charter (2018)	Is a policy framework in South Africa that outlines the transformation objectives for the mining industry. It was first introduced in 2002 and has undergone revisions over the years, with the most recent version published in 2018. The Mining Charter is designed to promote the inclusive growth and socio-economic development of the mining sector, with a particular focus on historically disadvantaged individuals, including black South Africans. It entails several key elements and provisions, as detailed below. Ownership: The charter sets targets for the ownership of mining companies by historically disadvantaged individuals. It specifies that mining rights must be held by entities with a minimum of 26% black ownership, which should be distributed among employees, mining communities and black entrepreneurs. Procurement: The charter emphasises the importance of local procurement, requiring mining companies to prioritise the sourcing of goods and services from local suppliers, particularly those owned by historically disadvantaged individuals. Employment Equity: The charter aims to promote employment equity by setting targets for the representation of historically disadvantaged individuals in various job categories in mining companies. These targets encompass management, core and critical skills, and all levels of employment. Human Resource Development (HRD): The Mining Charter focuses on skills development and capacity building in the mining sector. It requires mining companies to develop and implement meaningful programmes that address skills gaps, provide training opportunities for employees, and support the education and training of individuals in mining communities.	Skills development programmes: The Mining Charter emphasises the importance of skills development and capacity building within the mining sector. Mining companies are required to implement meaningful skills development programmes to address skills gaps and promote the training and development of employees. This implies that mining companies need to engage in robust skills planning to identify the specific skills required in the sector and develop targeted training initiatives to meet those needs. Employment equity targets: The Mining Charter sets targets for the representation of historically disadvantaged individuals in various job categories within mining companies. This includes targets for core and critical skills positions. To achieve these targets, mining companies need to proactively plan for the recruitment, training, and advancement of historically disadvantaged individuals in skilled positions. This involves identifying skills gaps and implementing strategies to ensure a diverse and inclusive workforce with the necessary skills. Collaboration with SETAs: The MQA is the SETA responsible for the MMS. Mining companies need to collaborate with the MQA and other relevant SETAs to align their skills planning efforts with the National Qualifications Framework (NQF) and industry-specific standards. This collaboration ensures that skills development programmes meet the required standards and qualifications, leading to recognised and transferable skills in the mining sector. Local community development: The Mining Charter emphasises the development of sustainable mining communities, including initiatives related to education and skills development. Mining companies are expected to contribute to the education and training of individuals in mining communities. This implies that skills planning should consider the needs of the local communities and align training programmes to address those needs. It may involve partnerships with local educational institutions, the establishment of training centres, or the provision of scholarships and bursaries for communities.

Policy / Strategy	Policy input relevant to the MMS (policy objective)	Implications for skills planning in the sector
	Mine Community Development: The charter highlights the importance of social and community development in mining areas. It requires mining companies to contribute to the development of sustainable mining communities through various initiatives, including housing, healthcare, education, and infrastructure development. Reporting and Compliance: Mining companies are required to report regularly on their progress in meeting the targets and commitments outlined in the Mining Charter. Compliance with the charter is a prerequisite for obtaining and maintaining mining rights in South Africa. The Mining Charter has been a significant policy instrument aimed at promoting transformation and socio-economic development within the mining industry in South Africa. It seeks to address historical inequalities and ensure that the benefits of mining activities are shared more equitably among all South Africans, particularly those who were previously disadvantaged.	In addition, partnerships with employers to ensure alignment and co-own of training / development done in the sector in local mining communities. Reporting and compliance: Compliance with the Mining Charter is a requirement for obtaining and maintaining mining rights in South Africa. Mining companies are expected to report regularly on their progress in meeting the targets and commitments outlined in the charter, including those related to skills development. This reporting and compliance process requires mining companies to have robust systems in place for tracking and monitoring skills planning initiatives, as well as demonstrating progress towards meeting the specified targets. Overall, the Mining Charter emphasises the importance of skills development, employment equity, and community development in the mining sector. It places a strong focus on inclusive and sustainable growth, which requires mining companies to engage in comprehensive skills planning to meet the requirements and objectives outlined in the charter.
Mine Health and Safety Act (MHSA) No. 29 of 1996	The Act exist to create enabling conditions for ensuring the health and safety employers and every stakeholder in the mines.	In collaboration with entities such as the DRME, MINCSA and MHSC, through research and benchmarking, the MQA should continue to identify factors contributing to the safety and health or lack thereof, and implement or support training that is intended to entrench a healthy and safe culture at mines.
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 that 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 Manufacturing, Engineering and Related Services Sector Education Training Authority (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 upskill existing employees. Qualifications will correspondingly be required to be carefully

Policy / Strategy	Policy input relevant to the MMS (policy objective)	Implications for skills planning in the sector
		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.
The National Development Plan (NDP)	The NDP 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 performance by some sub-sectors, there is a need to develop linkages with other sectors other than mining, in order to accelerate employment creation and accommodate those that lose their jobs due to retrenchments.
NSDP (2030)	The NSDP was derived from the NDP and seeks to ensure that South Africa has adequate, appropriate and high-quality skills that contribute to 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 fast-track and continue supporting: • Workplace experience programmes • Funding that supports occupations in demand • Partnering with TVET and CET colleges • Small scale mining programme • Career guidance events • Management development programmes for the sector's employees
Mineral Beneficiation strategy	Aims at developing mineral value chains and promoting the development of mineral beneficiation initiatives up to the final phases of the value chain and to fundamentally transform the industry from one that is resource-based, to one that relies significantly on knowledge, i.e. innovation and research.	Demand for a skilled workforce: The implementation of mineral beneficiation strategies typically involves the establishment of processing plants, R&D facilities, and other related industries. These activities create a demand for a skilled workforce with expertise in fields such as engineering, metallurgy, geology and process optimisation. Skills planning needs to anticipate and align the training and

Policy / Strategy	Policy input relevant to the MMS (policy objective)	Implications for skills planning in the sector
		education of individuals to meet these specific skill requirements. To support the mineral beneficiation strategy, there is a need for a well-developed TVET system that provides practical and technical skills to meet the demands of the industry. Skills planning should focus on enhancing TVET programmes by aligning the curriculum with the needs of the beneficiation sector and providing relevant training opportunities to equip individuals with the necessary technical skills.
HRD Strategy for South Africa (2010-2030)	The strategy offers a blueprint for skills development by identifying strategic priorities and subsequently puts in place in frameworks to achieve institutional coherence and operational plan to implement, coordinate, monitor and evaluate HRD interventions. Thus, it seeks to optimise the efficacy of HRD as a permanent feature of the global discourse on development in respect to the country development agenda. To this effect, it seeks to improve competencies (skills, knowledge, and abilities) of individuals to raise productivity levels in the workplace and better the quality of life for all.	This implies that the MQA mandate needs to be under-girded by people centric interventions as means to achieve social, economic and development goals. To this end, the focus should be to: • Drive a deliberate process informed by a proper strategic partnership model that will ultimately produce a skills ecosystem model that links studying, working, living and skill development in an inclusive, sustainable, and social way. To achieve this, there is a need to bring together a spectrum of partnerships (social partners) that will gather relevant labour market information, address bottlenecks and priority skills needs in the in the sector and economy cognisant of the everchanging global conditions. • Expand and accelerate the provision of workplace training in priority skills needs, i.e. number of apprenticeships, learnership and internship opportunities and scaling up funding mechanisms such as bursaries and put in place measures to ensure equity and access to success. • Intensify efforts to support SMMEs to expand the employer pool for creation of job opportunities and assess its small business support (entrepreneurial) intervention programme to identify weakness and strength to craft innovative ways to create conditions necessary for growth and sustainability of emerging business for creation of more job opportunities. • Continue supporting career awareness programmes, workplace exposure, learnerships, internships and artisan training for mining related occupations and assess the efficacy and outcomes of this interventions to inform the sectoral skills planning process.
Economic Reconstruction and Recovery Skills Plan (ERRP)	The ERRP is borne out of the strategy that aims to create a balance between the short terms and long-term skills needs as well strengthening the implementation of the skills system of the country. Therefore, in the context national recovery and reconstruction process, therefore, the over-arching goal is to create sustainable, resilient, and inclusive economy in various strategic sectors of the economy including in the MMS.	This implies that the MQA mandate needs to be under-girded by people centric interventions as means to achieve social, economic and development goals. To this end, the focus should be to: • Drive a deliberate process informed by a proper strategic partnership model that will ultimately produce a skills ecosystem model that links studying, working, living and skill development in an inclusive, sustainable, and social

Policy / Strategy	Policy input relevant to the MMS (policy objective)	Implications for skills planning in the sector
		way. To achieve this, there is a need to bring together a spectrum of partnerships (social partners) that will gather relevant labour market information, address bottlenecks and priority skills needs in the in the sector and economy cognisant of the everchanging global conditions. • Expand and accelerate the provision of workplace training in priority skills needs, i.e. number of apprenticeships, learnership and internship opportunities and scaling up funding mechanisms such as bursaries and put in place measures to ensure equity and access to success. • Intensify efforts to support SMMEs to expand the employer pool for creation of job opportunities and assess its small business support (entrepreneurial) intervention programme to identify weakness and strength to craft innovative ways to create conditions necessary for growth and sustainability of emerging business for creation of more job opportunities. • Continue supporting career awareness programmes, workplace exposure, learnerships, internships and artisan training for mining related occupations and assess the efficacy and outcomes of this interventions to inform the sectoral skills planning process.
Just Energy Transition Framework (JETF)	South Africa has been grappling with various energy challenges, including a heavy reliance on coal for electricity generation and persistent issues of energy poverty. It has also made commitments to reduce greenhouse gas emissions and increase the share of renewable energy in its energy mix. To this end, the country has developed the framework to address both environmental concerns and social justice issues in the process of transitioning to a low-carbon or renewable energy system. It aims to ensure that the transition is fair, inclusive, and equitable, considering the needs and well-being of all stakeholders, including workers, communities, and marginalised groups.	The energy transition in the mining sector requires a range of key skills to successfully navigate the shift towards a more sustainable and environmentally friendly industry. Here are some essential skills needed for the just energy transition in the mining sector: • Renewable Energy Expertise: Understanding and knowledge of renewable energy technologies such as solar, wind, hydro and geothermal is crucial for integrating sustainable energy solutions into mining operations. • Energy Management: Skills in energy management and efficiency are essential to optimise energy consumption in mining processes. This includes implementing energy-saving measures, conducting energy audits, and developing energy management plans. • Environmental and Sustainability Knowledge: A solid understanding of environmental regulations, sustainability frameworks, and best practices is necessary to minimise the ecological impact of mining operations and ensure compliance with environmental standards. • Technological Proficiency: Familiarity with emerging technologies such as automation, data analytics, and artificial intelligence can help drive innovation in the mining sector, improving operational efficiency and reducing environmental footprint. • Stakeholder Engagement and Collaboration: Effective communication and collaboration skills are crucial for engaging with diverse stakeholders,

Policy / Strategy	Policy input relevant to the MMS (policy objective)	Implications for skills planning in the sector
		including local communities, government bodies, NGOs and investors. Building strong relationships and managing expectations is essential for a just energy transition. • Social and Environmental Impact Assessment: The ability to conduct thorough assessments of social and environmental impacts is vital. This involves identifying potential risks, evaluating mitigation strategies, and implementing measures to safeguard local communities and ecosystems. • Circular Economy and Waste Management: Expertise in circular economy principles and waste management strategies is valuable for reducing waste generation, promoting recycling and reuse, and implementing sustainable material sourcing practices. • Policy and Regulatory Understanding: A good understanding of energy and mining policies, regulations, and incentives is important for navigating the legal landscape, identifying opportunities for innovation, and ensuring compliance. • Policy / Strategy: Policy input relevant to the MMS (Policy Objective) Implications for skills planning in the sector. • Project Management: Strong project management skills are necessary for overseeing complex energy transition projects, including planning, resource allocation, risk management and monitoring progress. • Continuous Learning and Adaptability: The energy transition is an evolving field, and individuals with a willingness to learn, adapt, and stay updated with the latest trends, technologies, and best practices will be well-equipped to contribute to a just energy transition in the mining sector. These skills encompass technical, environmental, social, and managerial aspects, reflecting the multidisciplinary nature of the just energy transition in the mining sector. • Renewable Energy Technologies: SETAs should focus on providing training and upskilling programmes related to various renewable energy technologies such as solar, wind, hydro, and bioenergy. This includes technical skills for installation, maintenance, and operation of renewable energy systems. • Entrepreneurship and Innovation: Promoting entrepreneurship and innovation is essential for fostering a sustainable and resilient energy sector. SETAs can provide training and support for aspiring entrepreneurs in the renewable energy and clean technology sectors. • Transition Management: Effective planning and management of the energy transition are critical. SETAs can offer training on project management,

Policy / Strategy	Policy input relevant to the MMS (policy objective)	Implications for skills planning in the sector
		transition planning, and change management to ensure a smooth and well-coordinated transition process. It is important for SETAs to collaborate with industry stakeholders, educational institutions, and government agencies to identify the specific skill needs and design relevant training programmes. Regular assessment and updating of skill requirements will also be essential to keep pace with the evolving energy landscape.
Hydrogen South Africa Strategy (HySA)	South Africa is the world's largest producer of PGMs (platinum, palladium, ruthenium, rhodium, iridium, and osmium), accounting for more than 75% of global PGM output These are essential for hydrogen production technologies such as fuel cells. However, this output is largely beneficiated. PGMs are a key component of electrolysers in hydrogen production and catalysts in fuel cells, and South Africa has identified PGM beneficiation as a key economic opportunity and a driving force for advancing hydrogen and fuel-cell RDI. The country has a window of opportunity to develop PGM-based components for hydrogen production to meet the demands of other countries that have developed policies to integrate hydrogen in their economies. The country has been exploring various initiatives and projects related to hydrogen as part of its broader energy and sustainability goals. To kickstart the hydrogen economy in South Africa, four catalytic projects. These include the Platinum Valley Initiative (South African Hydrogen Valley), the CoalCO2 -X Project, Boegoebaai Special Economic Zone (SEZ) and the Sustainable Aviation Fuels (SAF) project. Through their implementation, the flagship projects are expected to produce approximately 500kt of hydrogen and create at least 20 000 jobs annually by 2030 and a gross domestic product (GDP) contribution of at least USD5 billion to the economy by 2050. The projects will contribute to a growth of sustainable green industries that are resource and energy-efficient, low-carbon and low-waste, non-polluting and safe. Seeks to propel the country into becoming one of the biggest global players in the hydrogen market, leverage the opportunity as part of the ERRP. The Hydrogen Society Roadmap is one of government's strategies and **policy** direction aimed at bringing together a variety of stakeholders and institutions (both public and private) around a common vision on how to use and deploy hydrogen and hydrogen related technologies as part of our economic development and greening objectives.	Skills planning in mines should consider the unique requirements and challenges associated with the adoption of hydrogen technologies. By preparing the workforce with the necessary skills and knowledge, mining companies can successfully integrate hydrogen systems while ensuring safety, efficiency, and environmental sustainability. For example, technical. Expertise: The adoption of hydrogen technologies in mines, such as fuel cells or hydrogen-powered vehicles, will require a workforce with expertise in hydrogen systems. Skills planning should focus on training or hiring individuals who are knowledgeable about hydrogen technologies, including their maintenance, safety protocols, and integration into mining operations. Systems integration: Integrating hydrogen technologies into existing mining operations requires expertise in system design and integration. Skills planning should consider training individuals with experience in renewable energy integration and electrical systems to ensure smooth integration of hydrogen infrastructure into mining operations.

2.10 Conclusions

The chapter discussed the key skills issues that drive change and impact on skills demand and supply in the MMS. Global influence and market performance, increasing energy tariffs, minerals beneficiation, the fourth industrial revolution and environmental and just energy transition concerns are the main factors driving change in the MMS. The MMS presents a unique opportunity for a new industrialisation drive and advancement in the economy. This applies across the value chain – from mining equipment and service to extraction, infrastructure development, beneficiation, skills development and R&D. Along with this, there are opportunities for more profound empowerment of the previously disadvantaged, including unskilled and semi-skilled employees, females, communities and entrepreneurs. With the developments brought on by the change drives 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 accompanied by the need to consider interdisciplinary training that will allow employees to develop skills and knowledge in various subjects outside mining. Having explored the key skills in terms of the sector's change drivers. and the policy frameworks that affect skills demand and supply, the next chapter examines occupational shortages and skills gaps in the MMS.

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 draws upon various sources of data and information to provide a comprehensive analysis of skills supply and demand in the MMS. These sources include the HTV section of the WSP/ATR, which offer insight into the sectoral occupational demand. Data from DHET's HEMIS (Higher Education Management Information System), DBE's EMIS (Education Management Information System), MQA's APR, DMRE's Government Competence Certificate (GCC) and Minerals Council South Africa Certificate statistics were utilised to gain a broader understanding of the extent and nature of skills supply. Furthermore, interviews were also conducted with stakeholders to gather their perspectives and insight on matters affecting skills supply and demand. By incorporating these diverse sources, the chapter aims to present a well-rounded and evidence-based examination of the subject matter. It should be noted that all statistics provided are the most recent publicly reported and accessible statistics.

3.2 Sectoral Occupational Demand

3.2.1 Hard-to-fill Vacancies

HTV is a metric to measure occupational shortages / demand and refer to occupations that an employer was unable to fill within 12 months (DHET, 2019). The analysis of the HTV entailed a frequency run of the top 10 most identified occupations by companies through the WSP/ATR submissions. This was then cross-tabulated by occupational shortages by province and sub-sector, in order to validate the findings. The overall top ten HTV are detailed in Table 3.1 by OFO code.

Table 3.1: Hard-to-fill vacancies

Occupation Name	OFO Code	Vacancies	Main reason for hard-to-fill
Mine manager	2021-132201	42	Lack of relevant experience
Production manager	2021-132201	16	Lack of relevant experience and equity considerations
Engineering maintenance manager	2021-132201	11	Poor remuneration
*Section engineer	2021-132104	34	Lack of relevant qualifications (desired level of study not attained or inappropriate field of study or inappropriate subject specialisation)
Mechanical engineer (mines)	2021-214401	31	Lack of relevant experience
Mining engineer	2021-214601	33	Lack of relevant qualifications (desired level of study not attained or inappropriate field of study or inappropriate subject specialisation)
Rock engineer	2021-214601	27	Lack of relevant qualifications (desired level of study not attained or inappropriate field of study or inappropriate subject specialisation)
Electrical engineer (mines)	2021-215101	20	Lack of relevant experience, lack of relevant qualifications (desired level of study not attained or inappropriate field of study or inappropriate subject specialisation) and unsuitable job location
*Miner	2021-312102	34	Poor remuneration and slow recruitment processes
Diesel mechanic	2021-653306	15 3	Lack of relevant experience
Millwright	2021-671202	82	Equity considerations

**Based on their equal number of vacancies, these occupations were counted as one.*
Source: MQA WSP and ATR (May 2023b)

The preceding table displays the top ten occupations as determined by employers. According to the findings, the most in-demand occupations are primarily managerial, professionals, technicians and associate professionals. These occupations require education beyond a matric and extensive industry experience. This explains why the lack of qualifications and relevant experience are cited as the primary reasons for their shortage.

In addition to the WSP/ATR data, interviews were conducted with stakeholders in the sector to ascertain their perspectives of HTV. From their findings, consensus was reached regarding the top 10 HTV identified by the WSP and ATR. They asserted that it is critical to note that the reasons given for the vacancies' lack of experience are due to companies considering employment equity for those positions. It was mentioned that the historically disadvantaged candidates for those positions lacked relevant experience. The majority of those who do have relevant experience are mostly white males. As a result, mines tend to be hesitant to fill a vacancy with a candidate who will not meet their equity targets. As a result, the positions remain vacant for a considerable amount of time until a qualified equity candidate with sufficient experience can be identified.

3.2.2 Skills Gaps

Skills gaps refers to skills inefficiencies of 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 requires short training interventions (DHET, 2019).

Table 3.2: Skills gaps by major occupational level

Broad occupational levels	Occupation name	OFO code	Most common skills gaps
Senior (managers and professionals)	Human resource manager	2021-121201	Leadership
	Programme or project manager	2021-121905	Occupational health & safety skills, mine production process, project Management and leadership
	Production manager	2021-132201	Operations management & leadership
	General manager mining	2021-132201	Management & leadership
	Training manager	2021-121202	Management
	Mine manager	2021-132201	Mine production process
	Mining engineer	2021-214601	Technical (job-specific)
	Training officer	2021-242401	Leadership
	Training coordinator	2021-242401	Computer literacy, planning and organising and problem-solving
Mid-Level (technicians, associates, artisans, clerical)	Boilermaker	2021-651302	Technical (job-specific)
	Diesel mechanic	2021-653306	Technical (job-specific)
	Electrician	2021-671101	Technical (job-specific)
	Mining production supervisor	2021-312101	Management
	Administration clerk / officer	2021-411101	Computer literacy
	Administrative assistant	2021-411101	Computer literacy

Broad occupational levels	Occupation name	OFO code	Most common skills gaps
Lower-Level (plant operators and elementary	Mining operator	2021-711101	Technical (job-specific)
	Plant operator	2021-711101	Occupational health & safety skills, mine production process and computer literacy
	General worker	2021-862202	Communication and occupational health & safety skills

Source: MQA WSP and ATR (May 2023b) and stakeholder interviews

As shown in Table 3.2, Production manager, Mine manager, Mining engineer and Diesel mechanic appeared on both the HTV and the top-up skills lists, indicating that it is necessary to prioritise these occupations when implementing skills development initiatives. The most common skills gaps among senior occupational levels (managers and professionals) relate to management and leadership, whereas those in the middle and lower occupational levels experience skills gaps primarily related to technical (job-specific) and computer literacy requirements.

This section was crossed checked against the analysis of the stakeholder interviews. Stakeholders noted that there is a common tendency to concentrate heavily on capturing the occupations that are in high demand in the sector. However, equal considerations need to be taken in prioritising skills gaps. They are asserted that in most cases, the skills that are lacking are competency-related and soft skills. Existing occupations must be augmented with skills in innovation, leadership, collaboration, networking, problem solving and decision making, for instance. Environmental management, environmental analysis and science are a some of the competencies identified by stakeholders as important in addressing skills demand in the MMS. This assertion was corroborated by MQA's (2023) study on scarce and critical skills, which revealed that the lack of soft skills is one of the main reasons reported for under-performance in mid-level and upper-level occupations. In particular, a lack of leadership skills, people management skills and communication skills were noted as being drivers for under-performance.

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, to determine the extent to which the state of skills meet the demand is necessary. Figure 3.1 illustrates the key role players who contribute significantly to enabling the supply of skills in the MMS. The participation of these role players varies at different stages of the supply process, and their involvement is interdependent in addressing the skills needs of the sector. A subsequent section of the chapter provides an analysis of their nature of skills supply.

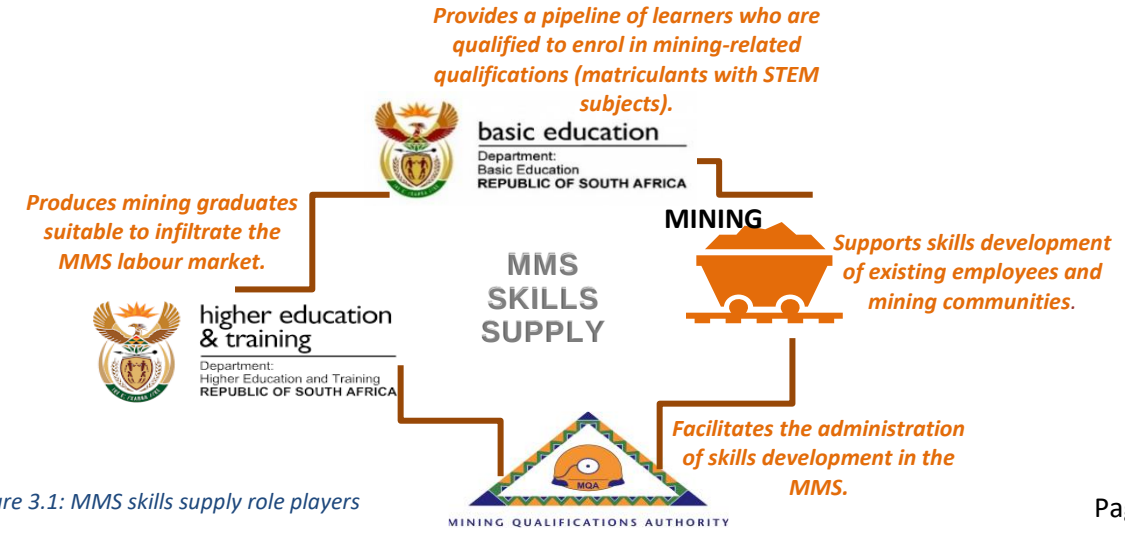


Figure 3.1: MMS skills supply role players

3.3.1 Current State of Education and Training Provision: Stock of Skills in the MMS

Skills development hugely depend on basic education as a foundation phase to enable individuals to move into further areas of education and training. Similarly, to other economic sectors, skills required for the MMS are produced at basic education level, TVET colleges, through private training providers, universities of technology, universities as well as workplaces.

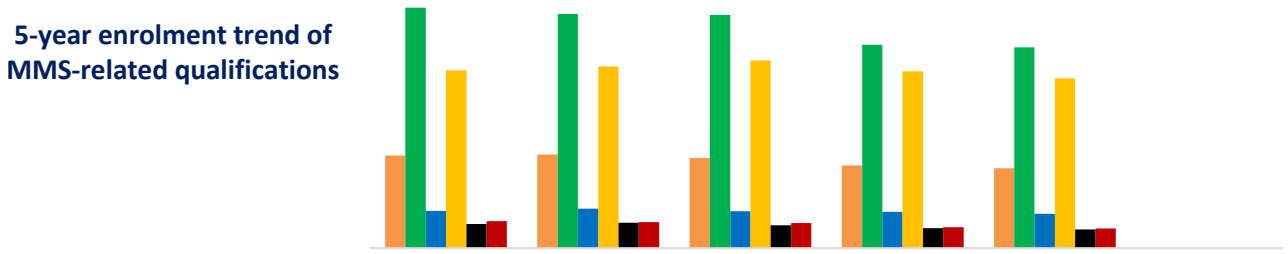
3.3.1.1 Overview of Basic Education

The schooling system made up of the DBE and the DHET play a crucial role in shaping the skills pipeline as they shape supply of skills and qualifications. These qualifications act as indicators to employers since they provide information about an individual's abilities or competencies (DHET, 2022). Most MMS occupations require students to pass STEM subjects to enrol in mining qualifications at tertiary level. The determinant of adequate learners' entry into the MMS sector is matric in STEM subjects. The matric pass rate for 2022 was 80.1%, showing a 3.7% increase compared to the 76.4% achieved in 2021. In 2022, there were improvements in specific subjects that are essential to mining. Geography saw an increase from 74.3% to 81.3%, while Physical Science improved from 69% in 2021 to 74.6%. However, there was a slight decrease in performance in Mathematics, with a pass rate of 55% compared to 57.6% in 2021. The DBE has reported a trend in which learners are choosing to drop Mathematics in favour of Mathematical Literacy (DBE, 2023). Previous findings by the Trends in International Mathematics and Science Study (TIMMS) found that South Africa's performance in Science and Mathematics ranked the lowest and second lowest, respectively, among the 39 countries that participated in the study (DBE, 2019). This is a concerning issue as the enrolment of core mining qualifications is heavily dependent on passing Mathematics. MQA will continue providing support to programmes aimed at improving this challenge.

3.3.1.2 Higher Education and Training

Higher education and training (HET) or tertiary education, includes education for certificates, diplomas as well as undergraduate and postgraduate degrees. In recent years, more school-leavers have been obtaining marks that enable them to enrol for studies at university level. However, owing to the poor maths and science pass marks in the country, the uptake of mining-related qualifications remains relatively low.

At tertiary level, some of the fields of study relevant to the sector are mining engineering, mine surveying, metallurgy, chemical engineering, geology, electrical engineering, mechanical engineering, as well as jewellery design and manufacturing. Figures 3.2 and 3.3 demonstrate a 5-year trend in the number of graduates enrolled and completed core mining related qualifications.

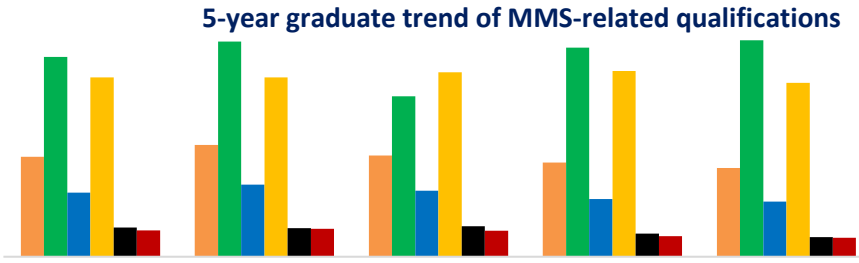


	2017	2018	2019	2020	2021	Enrolment difference (2017-2021)
Chemical Engineering	8 646	8 752	8 428	7 723	7 452	-14%
Electrical Engineering	22 483	21 876	21 786	19 016	18 778	-16%
Geology	3 482	3 681	3 447	3 378	3 223	-7%
Mechanical Engineering	16 596	16 976	17 548	16 511	15 857	-4%
Metallurgical Engineering	2 243	2 383	2 140	1 856	1 730	-23%
Mining Engineering	2 513	2 435	2 334	1 951	1 835	-27%

Figure 3.2: Enrolment of MMS related qualifications (5-year trend)

Source: DHET, HEMIS Data (2017-2023)

Figure 3.2 depicts the 5-year enrolment trends for MMS-related qualifications. All enrolments in mining-related qualifications decreased, with mining engineering and metallurgical engineering experiencing the greatest decline.



	2017	2018	2019	2020	2021	Graduate difference (2017-2021)
Chemical Engineering	1 649	1 841	1 671	1 555	1 462	-11%
Electrical Engineering	3 292	3 546	2 647	3 446	3 566	8%
Geology	1 056	1 190	1 086	951	909	-14%
Mechanical Engineering	2955	2 956	3 043	3063	2 867	-3%
Metallurgical Engineering	483	469	502	380	324	-33%
Mining Engineering	435	458	430	341	312	-28%

Figure 3.3: Graduates who completed an MMS related qualification (5-year trend)

Source: DHET, HEMIS Data (2017-2023)

Similar to the enrolment rates, the number of students graduating from MMS-related qualifications has been decreasing. Metallurgical and mining engineering have the lowest number of graduates and the greatest decline. This is cause for concern, given that mining engineering has been identified as both a hard-to-fill and an occupation with skill gaps. This indicates that the MQA should intensify its efforts to increase the uptake of mining-related bursaries.

3.3.2 Industry Skills Supply

The sections below explain the skills supply provided by the industry, including by mining companies, the DMRE and Minerals Council South Africa.

3.3.2.1 Mining Companies

Table 3.3: Employee bursaries funded by employers

Top 3 bursary types	No. of bursaries
Mining and Mineral Engineering	67
Electro Mechanical Engineering and Engineering Science	64
Metallurgical Engineering	18

Source: MQA WSP/ATR 31 May (2023b)

From a total of 1 604 bursaries awarded for studying bachelor's degrees, the top three bursaries provided by the employers to their employees in the MMS, aside from 'Other', are listed in Table 3.3. 'Other' bursaries account for a total of 1 455 at a 59.7% contribution. The revision of WSP source data template in future are to prompt companies if chosen other, please specify. A detailed breakdown of bursaries provided can be made available upon request.

Table 3.3: Community bursaries funded by employers

Top 3 bursary types	No. of bursaries
Mining Engineering	92
Electrical Engineering (Heavy Current Only)	60
Electro Mechanical Engineering	53

Source: MQA WSP and ATR 31 May (2023b)

From a total of 993 bursaries, the top three bursaries funded by employers in the MMS to individuals who are not their employees, aside from 'other' are tabulated in Table 3.3. It is a positive development that the awarded bursaries are aligned with occupational shortages in the sector. However, there is room for improvement to enable a larger number of beneficiaries to enrol in these qualifications.

In addition to the skills supply provided by mining companies, the DMRE and Minerals Council South Africa (two of MQA's key role players) play an imperative role in the supply of skills in the MMS. Their contributions are presented in the sections that follow.

3.3.2.2 Government Certificates of Competency

Certain core occupations in the MMS, such as mine engineer and mine manager can only operate upon attainment of a GCC issued by the DMRE, which confirms that the employee has the necessary skill set required to perform the job. There is a stringent qualification criteria, which include years of experience and passing examinations to qualify for a GCC. The following table presents the data on the number of collective number of certificates issued by the DMRE between 2020-2023.

Table 3.4: Awarded Certificates of Competency issued by DMRE (2020-2023)

Year	Mine Engineer (Elec & Mech)			Mine Manager (Coal & Metal)			Mine Overseer (Coal & Metal)			Mine Surveyor			Winding Engine Driver			Total number of certificates issued
	M	F	**Total**	M	F	**Total**	M	F	**Total**	M	F	**Total**	M	F	**Total**	
April 2016 – 31 March 2019	152	33	**185**	82	23	**105**	215	42	**257**	22	11	**33**	44	40	**84**	**662**
April 2020 – 31 March 2023	86	20	**106**	98	43	**141**	183	50	**213**	21	3	**24**	3	5	**8**	**492**

**M = Males*
**F = Females*
Source: DMRE (2023)

Between 2020-2023, the total number of GCCs issued by the DMRE decreased by a quarter (26%) compared to 2016-2019. The issuance of certificates witnessed a decline across all competencies, except for mine manager, which saw a notable increase of 34%. This is encouraging given that mine manager was identified as a hard-to-fill vacancy. Furthermore, the number of females awarded mine manager certificates doubled between 2020-2023, from 43 to 23. In addition, 50 certificates were issued to female mine overseers in 2020-2023, up from 42 in the previous period. In contrast, winding engineer has the lowest number of certificates issued for years 2020-2023 and the largest decrease of all certificates issued by DMRE compared to 2016-2023. This is due to the DMRE's inability to conduct regular examination boards for winding engine drivers. Collaboration between the MQA and the DMRE remains crucial for the successful implementation of measures aimed at enhancing the pass rate of GCC candidates in the examination.

3.3.2.3 Minerals Council South Africa Certificates

The MMS sector is also involved in training interventions with learners qualifying for certificates to increase worker productivity and thus enhancing company performance. To this extent, the Minerals Council South Africa introduced Certificates of Competency (CoCs) to standardise stand-alone in-house qualifications for persons working in the MMS. All exams written by the Survey, Sampling, Ventilation and Rock Mechanics disciplines are organised and administered by the Minerals Council South Africa. The qualifications enable the candidate to perform their work with greater confidence and understanding, paving the route for them to have upward social mobility. Candidates must undergo training in specific subjects as well as complete several notional hours before sitting for the examinations. Table 3.5 demonstrates the number of certificates in MMS-related qualifications that the Minerals Council South Africa has issued since 2017.

Table 3.5: Minerals Council South Africa certificates (2017-2022)

Certificate	2018	2019	2020	2021	2022
Certificate in Advanced Mine Surveying	39	21	14	20	20
Certificate in Advanced Mine Valuation	16	15	08	11	15
Certificate in Advanced Rock Engineering	8	3	02	02	03
Certificate in Basic Mine Sampling	59	75	30	58	73
Certificate in Basic Mine Surveying	98	78	31	73	72
Certificate in Elementary Mine Sampling	11	36	10	10	23
Certificate in Elementary Mine Surveying	68	43	25	25	44
Certificate in Mine Environmental Control	21	81	31	41	31
Certificate in Radiation Protection Monitoring Screening	95	58	72	85	75
Certificate in Rock Mechanics	31	14	11	17	14

Certificate	2018	2019	2020	2021	2022
Certificate in Strata Control	32	42	23	44	63
Intermediate Certificate in Mine Environmental Control	122	88	58	77	100
Certificate in Mine Survey Draughting	13	6	06	04	13
Total	**613**	**560**	**321**	**467**	**546**

Source: Minerals Council South Africa (2023b)

The observed trend in the issuance of Minerals Council certificates recorded a notable decline from the year 2019, where a total of 560 certificates were issued, to the subsequent year of 2020, where the number decreased to 321. This decline in certificate could potentially be attributed to the global pandemic caused by the Covid-19. However, the data reveals a notable trend towards recovery, as evidenced by the recorded increases in the number of certificates issued in both 2021 (467) and 2022 (546).

The next section presents the role that MQA plays in contributing to skills supply in the MMS.

3.3.3 MQA Interventions to Address Skills Supply

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

Table 3.6: MQA's interventions to address skills supply in the MMS

Intervention		Entered (planned target)	Actual (achievement)	Completed (planned target)	Complete d (achievement)	Nature of supply
Artisan programme		1 000	1 522	500	670	• Facilitate opening of workplace-based learning opportunities and access to occupationally directed programmes. • Facilitate training for stakeholders, communities and entrepreneurs. • Support industry collaboration with public college system.
Artisan recognition of prior learning (ARPL)		N/A		50	63	
Artisan aides programme		N/A		200	446	
Learnerships	**Employed**	415	552	**703**	**246**	
	Unemployed	1 000	1 531	675	1 620	
Employees completing RPL for learnership		N/A		35	51	
OHS Representative Development and Other MQA approved Skills Programmes		N/A		3 500	3 972	
Completed AET and NATED courses		N/A		1 550	1 661	
FLC		N/A		250	289	
Internship		650	930	N/A	N/A	
Work-place experience programme	Undergraduates	600	688	400	562	
	TVET NCV graduates	500	596	100	281	
Management development programme		150	210	70	137	

Intervention		Entered (planned target)	Actual (achievement)	Completed (planned target)	Complete d (achievement)	Nature of supply
Lecture development programme	University lecturers	N/A		13	41	
	TVET lecturers			20	40	
Candidacy for HDSAs		50	52	N/A	N/A	
Work-place coaching		N/A		100	118	
Bursaries	Unemployed	750	1 585	400	407	
	Employed	60	61			
Mine community training development		1 300	5 569	1000	2 964	
Unemployed youth Development		2 100	2 848	1 400	1 755	
Small business scale mining training		N/A		**250**	**237**	
Career guidance		N/A		95	119	
Training providers quality assured		N/A		130	180	• Ensures the delivery of quality and impactful learning programmes in the MMS
Number of reviewed or developed learning programmes / assessment toolkits / learning materials (packs or modules) for the MMS		N/A		90	152	
Number of HDSA supported on primary accreditation as training providers for entry into the MMS		**N/A**		**4**	**4**	

Source: MQA APR (2023e)

The skills supply of the MQA can be categorised into three main components. Firstly, MQA focuses on providing skills at the educational level, ensuring that individuals receive the necessary training and knowledge to enter the workforce. Secondly, MQA offers skills support for novice employees, assisting them in their transition from education to employment and helping them develop the required competencies for their respective roles. Lastly, MQA also emphasises ongoing skills support for existing employees, recognising the importance of continuous learning and professional development to enhance their performance and adapt to evolving industry demands.

All targets, except learnerships completed by employed individuals and training completed by small scale mining beneficiaries were either achieved, or exceedingly achieved.

MQA's skills supply also responds to South Africa's national priorities such as the HRD Strategy for South Africa, the IPAP2 (Industrial Policy Action Plan), NDP and NSDP. These interventions play a critical role in:

1. Promoting occupations in the sector and rectifying misperceptions about the MMS not being an attractive industry.
2. Developing adequate literacy and numeracy levels for the sector's emerging skills requirements.
3. Driving the transformational mandate by assisting mining communities and youth to address any skills gap issues that contribute to unemployment in those communities.
4. Developing small scale mining businesses with the aim of furnishing them with alternative skills that could enhance entrepreneurial skills post mining activities.
5. Ensuring that there is a pool of accredited training providers to offer MMS related qualifications. This ensures a sufficient level of proficiency and training quality for current and future employers in the MMS.

3.4 Sectoral Priority Occupations and Interventions (PIVOTAL)

The research study was designed to be as interactive as possible in the facilitation of the entire research process. Therefore, a consultative participatory approach with the MQA management and sub-Board Committee was used to inform and finalise the most appropriate methodology to develop the MQA PIVOTAL (professional, vocational, technical and academic learning) list. Once all parties agreed with the methodology, the PIVOTAL list was sent to the Board where endorsement was made in favour of it. Through the consultation process, the MQA's OFO Code PIVOTAL Skills List in Table 3.7 was determined by considering the HTV reported in the WSP/ATRs. The analysis included 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 sub-sectors to validate and 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 in the occupation due to limitations with the reporting framework. For example, adult education and training (AET), MDP, and skills related to mineral beneficiation and sustainability are blanket priorities in the sector and required to be developed in many occupations and at different NQF levels. Considering this, and that PIVOTAL skills are required to address skills gaps, the research team chose to focus its PIVOTAL list on occupations that were identified as HTV only.

The interventions listed in the PIVOTAL list were informed by understanding the unique reasons for the challenges faced by employers where each of the occupations are concerned. The PIVOTAL list is ranked in order of OFO code according and also incorporates insight from key stakeholders in the sector, including representatives of the industry, labour and government.

Table 3.7: MQAs' OFO code based PIVOTAL list

Occupation name	OFO code	No. of HTV
Mine manager	2021-132201	42
Production manager	2021-132201	16
Engineering maintenance manager	2021-132201	11
***Section engineer**	2021-132104	34
Mechanical engineer (mines)	2021-214401	31
Mining engineer	2021-214601	33
Rock engineer	2021-214601	27
Electrical engineer (mines)	2021-215101	20
***Miner**	2021-312102	34
Diesel mechanic	2021-653306	153
Millwright	2021-671202	82

**Based on their equal number of vacancies, these occupations were counted as one.*

Source: MQA WSP and ATR (May 2023b) and stakeholder interviews

3.5 Conclusions

The analysis of the MQA's WSP/ATR submissions and discussions with stakeholders indicated that the hard-to-fill occupations are as follows: mine manager, production manager, engineering maintenance manager, mechanical engineer (mines), mining engineer, rock engineer, electrical engineer (mines), miner, section engineer, diesel mechanic, millwright.

The reasons accounting for these vacancies ranged from individual, organisational and supply side levels. At individual level, reasons include lack of relevant qualifications and a lack of relevant experience, whilst organisational reasons were attributed to equity considerations and poor remuneration. 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.
- 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 : Partnerships

4.1 Introduction

The purpose of this chapter is to discuss the nature of MQA's existing partnerships, outlining their strengths and weaknesses in terms of value-add and highlight partnerships that are essential as informed by strategic priority actions. The MQA's annual performance report (APR) was used as a primary source to gather information regarding these partnerships. Additional insight was obtained from internal personnel who are accountable for managing stakeholder relations, as well as from pertinent research articles.

4.2 Analysis of MQA's Existence

SETAs are expected to identify and collaborate with relevant partners to influence and facilitate the skills development landscape. This is aimed at fostering linkages between the labour market, employers and sectors to ensure a better supply of the relevant skills. Partnerships in this context refers to "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" (DHET, 2019). One of the primary reasons for forming partnerships is the need to ensure favourable labour market outcomes, particularly by facilitating the swift integration of graduates into the workforce. Other reasons cited include upgrading machinery and equipment, increasing the supply of middle-level skills, lecturer placements, reducing skills shortages and mismatches, and adopting business principles in college administration and leadership. The MQA currently collaborates in two types of partnerships: research partnerships and partnerships aimed at bridging the gap between the worlds of work and education by supporting TVET and CET Colleges. These partnerships are covered in the subsequent sections.

4.2.1 TVET and CET Colleges

According to the NSDP 2030, SETAs have a crucial role to play in facilitating workplace learning partnerships between employers and sectors in the education and training institutional supply. In its mission to create a linkage between education and the workplace, the MQA entered into several partnership agreements with TVET and CET colleges. The MQA's partnerships with TVET and CET colleges are detailed in Figure 4.1, along with their nature, objectives and the value that they add to the SETA.

30 TVET Colleges

Ekurhuleni East, South West Gauteng, King Sabata Dalindyebo, King Hintsa, Lovedale, Vuselela, Orbit, North Link, West Coast, College of Cape Town, False Bay, Tshwane South TVET College, Ingwe, Maluti, Gold fields, Flavius Mareka, Majuba, Coastal KZN, Umfolozi, Elangeni, Vhembe, Mopani South East, Sekhukhune, Capricorn, Waterberg, Letaba, Northern Cape Urban, Northern Cape Rural, Nkangala and Gert Sibande

9 CET Colleges

- Gauteng CET College
- Eastern Cape CET College
- North-West CET College
- Western Cape CET College
- Free State CET College
- KwaZulu-Natal CET College
- Limpopo CET College
- Northern Cape CET College
- Mpumalanga CETA College

Objectives of partnerships:

- Equip people with knowledge and skills for corporate governance with respect to the principles, practices and frameworks governing effective governance, including roles, responsibilities and ethics.
- Expose people to the real world of work to gain experience.
- Capacitate lecturers in order improve teaching and learning, expand learning opportunities.

Areas of improvement

- MQA intends to look at its unused inventory and donate it to colleges facing most significant challenges, thereby helping to address their physical resource limitations.
- Formal platforms will be established between MQA and colleges to share success stories. This practice will serve as a valuable tool for tracking and monitoring the success of various projects, enabling institutions to learn from each other's achievements and replicate effective strategies.
- Monitor and evaluate the impact of interventions.

Effectiveness of partnership (How effective are they?)

Value adding to the MQA?

- Coverage of national footprint encompassing all nine South African provinces, aiding in engagement with role players to address national imperatives of poverty, unemployment and inequality, as well as the sectoral skills requirements of the MMS.
- Assists in scaling up skills development interventions to meet sectoral skills demand, to improve access to education and support for work integrated learning. This also assists in addressing the triple challenges of unemployment, poverty and inequality.

Successes

- A total of 281 TVET NCV graduates out of a target of 100 completed a workplace experience programme, which provided them with the opportunity to prepare for the workplace.
- 40 TVET lecturers out of a target of 20 completed a lecture development programme.
- Capacity building workshops that equipped beneficiaries with comprehensive knowledge and skills pertaining to the principles, practices and compliance related to accounting frameworks and ethical norms and standards for corporate governance.

Shortcomings/Setbacks

- Colleges often face difficulties in submitting proposals that specifically cater to the needs of their local environment.
- the possibility of forming partnerships and receiving support relies on the availability of a prescriptive DG window.
- Insufficient resources (such as tools and personnel) in colleges hinder the successful implementation of projects.
- The colleges also fail to communicate their success stories to the funders, even though they possess evidence of the positive impact of their interventions.
- Some colleges accept the allocation, but do not deliver on their commitment or withdraw the allocation, leading to unmet targets and time wasted in reallocating

Figure 4.1: MQA TVET & CET colleges

Source: MQA (2023f)

4.2.2 Research Partnerships

The MQA also forms partnerships with research institutions using scientifically grounded approaches to gain labour market insight into the key issues with regards to skills supply and demand in the MMS. This places the SETA to be in a position to respond to its mandate and inform skills planning and interventions to be implemented. Table 4.1 lists the research partnerships.

Table 4.1: Research partnerships

Institution	Partnership duration	Objectives
Mabatimi Management Services	1 April 2022 – 31 March 2023	• Understand the factors shaping the managerial progression of the HDSA in the MMS
Mthente Research Solutions	1 April 2022 – 31 March 2023	• Understand the relationship between the scarce / critical skills and training interventions being implemented in the MMS
Topline Research Solutions	1 April 2022 – 31 March 2023	• Assess the impact of Covid-19 and skills development implications in the MMS
Underhill Corporate Services	1 November 2022 - September 2023	• Explore the nature and future of AET in the MMS • Understand the state of the MQA Funding Policy with respect to grants
Red Flank Research Solutions	1 January 2023 - December 2023	• Analyse the nature and extent of technological application and innovation across all sectors in the MMS. • Examine the technological changes required in the MMS and their impact of the occupational profiling in the MMS. • Develop a framework for anticipating future skills needs in the MMS

Effectiveness of partnership (How effective are they?)

Value adding to the MQA

- Informing labour market intelligence pertaining to the MMS.
- Informs skills planning for the organisation and sector at large.

Successes

- All research projects that were conducted through partnerships were completed within the allocated timeframe.

Setbacks

- Challenges with regards to the quality of research outputs related to the studies.

Areas of improvement

- A targeted approach will be adopted in future whereby partnerships with universities and research institutions will be formed. These will be research chairs for a stipulated time in which they will be responsible for implementation the MQA annual research agenda, while also ensuring skills transfer for the internal staff.
- For the research projects that are currently undertaken, the MQA is in the process of forming a Research Review Panel that will be formed by experts from different disciplinary background with diverse expertise in different areas of research while focusing on skills development in the MMS.

4.3 Planned Partnerships

The MQA will be embarking on a drive to secure partnerships with different entities working in the skills development space in the MMS. Table 4.2 indicates the envisaged partnerships.

Table 4.2: MQA's planned partnerships

Institution Type	Type / Focus	Duration
Association of Mine Managers (AMMSA)	Resource partnership / Event Partnership / Research partnership	2024/25
Mine Development Agency	Offering bursary	2024/25
DHET and W&R SETA	Infrastructure funding	2024/25
Unions (NUMSA, AMCU, UASA, NUM)	Funding programmes to build capacity	2024/25
Department of Economic Development - Mpumalanga	Collaborate to implement skills development initiatives	2024/25
Minerals Council South Africa	Information sharing, Research, advocacy and employer feedback	2024/25
German Chamber of Mines	Funding of skills development related projects	2024/25

There are also the envisaged partnerships with universities in the areas such research (research chair), WIL and student funding through bursary scheme. Table 4.4 indicates the envisaged partnerships with universities.

Table 4.4: Planned research partnerships

University	Type / Focus	Duration
University of South Africa (UNISA)	Workplace experience and bursaries	To be confirmed
University of Pretoria	Offering bursary	To be confirmed
University of Venda	Infrastructure funding	To be confirmed

Going forward, the MQA will be guided by the adoption of the Partnership Management Framework (PMF). This framework is informed by the various considerations such as the government directives and guidelines including legislative prescripts (SDA, Mining charter, NDP, NSDP) directives such as SONA, SOPA, presidential directives and ministerial determinations. It also guides the MQA in terms of areas of focus, the nature of the partnerships as well as the potential partners. Figure 4.2 is a schematic representation of the partnership framework.

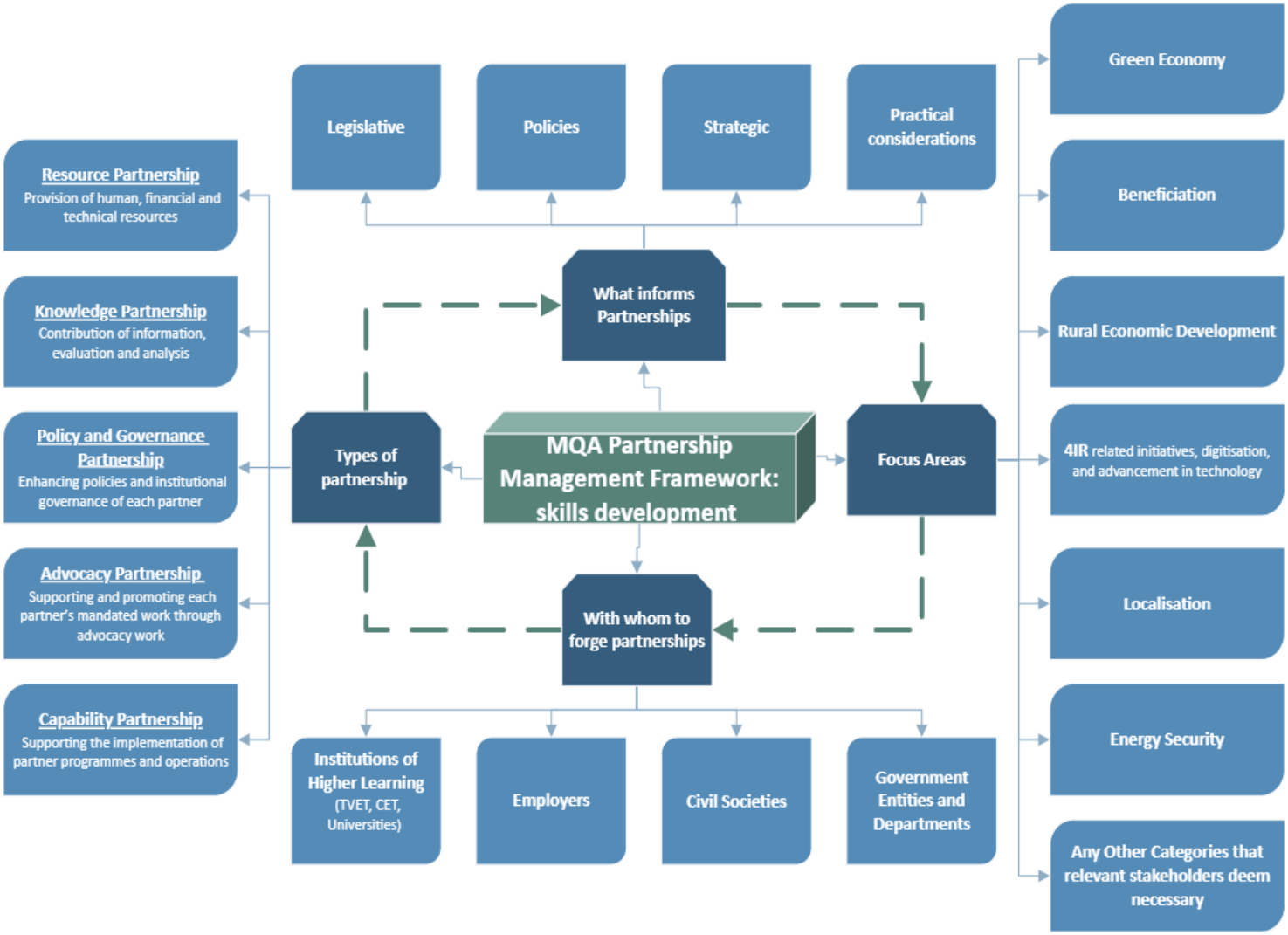


Figure 4.2: MQA's Partnership Management Framework

4.4 Conclusions

The chapter revealed that 30 TVET colleges and nine CET partnerships exist with on areas of governance, teaching and learning, funding (bursary) of studies for lecturers and lecturer industrial exposure. The MQA has also research partnerships various some of the research organisations with specific of grant funding, AET studies and 4IR. Planned partnerships are also envisaged with various stakeholders in the skills development arena such as universities, employers, government entities and so forth. The PMF will be the blueprint for guiding the MQA partnering approach on matters of skills development.

Chapter 5 : Risk, Monitoring, Evaluation and Quality Assurance

5.1 Introduction

The section discusses the role of the Risk, Monitoring, Evaluation and Quality Assurance Unit. The focus is on the MQA's M&E approach and how it informs skills planning and reporting within the organisations. The chapter additionally sought to provide a critical analysis of the SETA's progress in attaining the strategic priorities outlined in the prior year's SSP. To effectively plan for the upcoming financial year, it is imperative for the SETA to engage in a reflective exercise that involves assessing the degree to which the objectives set in the previous year were achieved. This process involved extracting valuable insight, identifying significant lessons and directing attention towards the challenges and opportunities that lie ahead. The critical success factors of effective M&E practise are also examined in this chapter. Reports from previously conducted tracer studies, risk registers, the APP and strategic plans were used as sources of information for this chapter.

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

The MQA's risk management philosophy is based on the principles that the MQA's Chief Risk Officer is accountable for the entity's overall governance of risk. The Unit is responsible for establishing, maintaining an efficient and effective risk management function. Management is responsible for executing their responsibilities using a risk-based approach by embedding risk management in their respective business units. All staff members are responsible for incorporating risk management into their daily operational activities.

The risk management elements are illustrated in Figure 5.1, i.e.: risk identification, risk assessment, response to risk events identified, assessing the effectiveness of existing controls, and implementing mitigating strategies to assist the core business in managing risks that could hinder it from achieving the strategic objectives. The final step is continuous monitoring of current and emerging risks at the organisation.

Figure 5.1: MQA's risk management process

Furthermore, MQA's Risk, Compliance, M&E and Quality Assurance Unit also assumes the responsibility of monitoring, which involves an ongoing evaluation of projects, programmes and daily activities to ensure achievement and performance. Learners' verification is conducted for all organisational programmes to achieve this. The primary roles and duties include providing strategic support to the MQA in monitoring compliance with policies, procedures and legislation at the MQA and its service providers. Additionally, the Unit validates the actual performance against source documents before reporting to the executive authority and conducts site visits to levy-paying companies and projects to ensure accuracy, existence, completeness and compliance with relevant legislation and MQA policies regarding eligible learners for grants.

In the financial year 2022/23, the Unit performed 304 learner verifications to confirm grant eligibility and the adherence to training plans, memorandums of agreement (MoAs) and SLAs signed with the MQA. It monitored a total of 8 624 verified learners across 10 different projects against the planned target of nine. Surpassing the annual target of 100%, the Unit achieved a monitoring rate of 111% during the financial year. The performance of MQA's programmes were discussed in detail in section 3.3.3.

In addition to the above interventions, the Unit also evaluate whether the planned deliverables met the intended impact in line with the M&E policy. This is done inter alia by conducting tracer studies aimed at assessing the relevance, efficiency, sustainability and impact of the organisational interventions. Tracer studies are vital as they evaluate skills development interventions by tracking past learners to gather post-interventions data. The objective is to measure the interventions' impact on employability, job placement, wages and career growth. By collecting employment rates, stability, salary changes, skill relevance, and insight into the intervention's strengths and weaknesses are gained, enabling informed decisions to enhance programmes and meet learner and job market needs. This data-driven approach boosts the overall effectiveness of skills development initiatives. The section below discusses the tracer studies that were conducted.

5.2.1 Tracer Studies

In the financial year 2022/23, the MQA conducted three tracer studies focusing on its OHS, Small scale mining and Unemployed Youth Development programmes. These are aimed at tracking the MQA funded learners' career paths and trajectories (progress, outcomes and experiences) to determine the overall effectives of the programmes. The key findings are presented in Table 5.1.

Table 5.1: Key findings from MQA's 2022/23 Tracer studies

Programme	Key findings	Recommendations
OHS	• After training, the majority of those who were enrolled onto the OHS programme remained employed, with better salaries better salaries than before. • Even though vertical promotion prospects were not high, more of them now had added responsibilities. • Whilst none were engaged in further education, beneficiaries expressed interest in considering OHS as a career pathway.	• Research studies of this nature should have a narrower focus to allow for thorough research. • SETA and associated training colleges need to socialise the idea of tracer studies. • There is a need to reposition vocational training in a more positive and futuristic way. • There is a need to reduce massification and aim for specialization. • There needs to be a shift from focus on enrolment figures to genuine outcomes and needs based training. • Work on the quality of mentors and coaches in the workplace.

Programme	Key findings	Recommendations
	• Mine accidents were mainly due to FoG, and the number of serious accidents and fatalities were on the decline, possibly due to the raised awareness and improved legislation and policy instrument introduced to address the health and safety challenges in the sector.	
Small Scale Mining	• Training in small-scale mining communities has been impactful, where the numbers of women in mining is steadily increasing as a result of the programme. • Whilst the programme is contributing to socio-economic transformation, however, more gains would be realised if training targeted all provinces, the disabled, youth and other races apart from black Africans.	• MQA to project skills required in small-scale mining. • Conduct regular workshops and expos in regions. • Send regular piecemeal information on social media. • Train miners regarding research techniques on internet • Introduce rigorous Exit and Work readiness programmes. • The MQA to help with online training facilities. • Research on rural-focused skills development • 'Fit for purpose' training to equip small-scale mining with portable skills.
Unemployed Youth Development	• The projects introduced by the MQA have assisted some beneficiaries to start their own entrepreneurial ventures. • The qualifications have addressed the low levels of youth skills and the immediate sequel is to encourage youth to form cooperatives and to access government funding available in order to start their own businesses.	• Programme content should lean more towards entrepreneurship. • Expose youth to important elements of the 4IR. • Teach youth to have realistic expectations of the path to employability and tenure. • Increase the number of field teachers and coaches. • Research studies of this nature should have a narrower focus to allow for thorough research. • MQA and associated training providers need to socialise the idea of tracer studies. • There is a need to reposition vocational training and training colleges in a more positive and futuristic way. • Coordinated efforts between MQA, training provider and host company to help learners find employment or establish their own businesses. • Aim to be beacons of hope and cultivate optimism through programmes that build self-efficacy, self-worthiness and emotional intelligence.

Source: MQA Tracer studies (2023h, I & j)

The key insight items are shared with internal stakeholders. The sharing of key findings with stakeholders is essential for making informed decisions, promoting transparency, aligning goals and objectives, fostering continuous improvement, sharing knowledge, enhancing communication, gaining support with respect to the implemented skills development interventions. It is a fundamental aspect of effective project management and organisational success.

The MQA has entered into an SLA with the QCTO, which grants certain roles and responsibilities to the MQA for all qualifications registered on the Occupational Qualification Sub-Framework (OQSF). As a Quality Partner, the MQA's Quality Assurance Unit performs various functions, including serving as the Partner Assessment Quality Partner (AQP) for developing assessment tools, assessment centres and moderating processes. It also acts as the Quality Development Partner, responsible for developing programmes and learning materials. Additionally, in its role as the Quality Assessment Partner (QAP), the MQA is involved in

accrediting skills development providers, TVET colleges and assessment centres. The MQA is also responsible for ensuring the quality of the National Learners' Record Database (NLRD), certifying learner completions for learning programmes, and approving workplace-based learning and linked practitioners. Furthermore, the MQA's mandate, as per relevant legislation (including SDA), includes identifying workplaces for practical work experiences in alignment with relevant legislative and policy guidelines. The performance was discussed in section 3.3.3).

5.3 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 APR and Strategic Plan.

Table 5.2: Strategic priorities in the previous SSP captured in the MQA's Strategic Plan and APP

Strategic priorities	2020-2025 Strategic Plan	2022-2023 Annual Performance Plan	Impact
Facilitate transformation and SMME development of the sector through skills development	Programme 3: Learning Programmes	Programme 3: Learning Programmes. Promote work-based skills development to support transformation in the mining and mineral sector. Support training initiatives in mine communities	See section 3.3.3: The Extent and Nature of Supply provided by the MQA.
Continue to support interventions to improve mine health and safety through skills development	Programme 3: Learning Programmes AND Programme 4: Quality Assurance, Monitoring and Evaluation	Programme 3: Learning Programmes. Promote work-based skills development to support transformation in the mining and mineral sector. Support training initiatives in mine communities AND Programme 4: Quality Assurance, Monitoring and Evaluation. Ensure the delivery of quality and impactful learning programmes in the MMS	
Continue to monitor and provide support to interventions responding to technological changes through skills development	Programme 3: Learning Programmes AND Programme 4: Quality Assurance, Monitoring and Evaluation.	Programme 3: Learning Programmes. Promote work-based skills development to support transformation in the mining and mineral sector. Support training initiatives in mine communities AND Programme 4: Quality Assurance, Monitoring and Evaluation. Ensure the delivery of quality and impactful learning programmes in the MMS.	

Strategic priorities	2020-2025 Strategic Plan	2022-2023 Annual Performance Plan	Impact
Monitor and support interventions aimed at developing skills required for Minerals beneficiation	Programme 2: Research AND Programme 3: Learning Programmes	Programme 2: Research. Improve skills development planning and decision–making through research. Support industry collaboration with public college system. AND Programme 3: Learning Programmes. Promote work-based skills development to support transformation in the mining and mineral sector	• Five research projects were completed to provide insight into issues of AET, DG funding, scarce and critical skills, factors shaping the managerial progression of the HDSA employees in the MMS as well the impact of Covid-19 and skills development implications in the MMS. • The learnership interventions and the number of beneficiaries trained in small scale mining were also presented in section 3.3.3: The Extent and Nature of Supply provided by the MQA.
Focus on increasing support for core mining- related skills and hard-to-fill occupations nterms of skills development tin the MMS	Programme 3: Learning Programmes AND Programme 4: Quality Assurance, Monitoring and Evaluation.	Programme 3: Learning Programmes. Promote work-based skills development to support transformation in the mining and mineral sector. Support training initiatives in mine communities AND Programme 4: Quality Assurance, Monitoring and Evaluation. Ensure the delivery of quality and impactful learning programmes in the MMS	• The information about the MDP bursaries (for the unemployed and employed), learnerships for the unemployment and employed, artisan development programmes all aimed at addressing hard-to-fill occupations in the sector were discussed under Chapter 3 (3.3.3): The Extent and Nature of Supply.
Develop skills for environmental sustainability	Programme 3: Learning Programmes	Programme 3: Learning Programmes. Promote work-based skills development to support transformation in the mining and mineral sector. Support training initiatives in mine communities	• Apart from the MDP, bursaries, learnerships, artisan development programmes that incorporate aspect of environmental sustainability, the MQA is looking into funding programmes that specifically focus on environmental sustainability.

Source: MQA APP (2023g) and APR (2023e)

5.4 Interventions Implemented in Support of the ERRP 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. The MQA undertake a wide spectrum of interventions to drive skills transformation and address shortages and gaps in the sectors through interventions such as learnerships, internships, bursaries, skills programmes, workplace exposure programmes and collaborations with TVETs and universities, the MQA can accelerate transformation to ensure the sustainable growth and development of the MMS to expand opportunities for HDIs and improve OHS. 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. There is a need to develop linkages with other sectors due to declining activities. 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 to economic growth, employment creation and social development in the sector. The measures implemented specifically to support the ERRP are provided in Table 5.3.

5.4.1 Measures Implemented to Support the ERRP

Table 5.3: Measures implemented to support the ERRP Skills Strategy

ERRP intervention	Measures to be implemented	Number of beneficiaries (current)
INTERVENTION 1: 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 in the country.	
INTERVENTION 2: 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. Engagement to determine what adjustments can be made to ensure programmes are aligned with priorities of ERRP to preserve and create jobs	
INTERVENTION 3: Increased access to programmes resulting in qualifications in priority sectors	Fund learners at TVET and university through bursary schemes as well as learnerships, candidacy programmes with focus on mining related qualifications	30 TVET and 6 CET colleges, universities
INTERVENTION 4: Access to targeted skills programmes (enable the development and provision of flexible demand lead skills training with alternative mechanisms of qualitative assurance)	To implement skills programmes that are flexible and agile (OHS)	3515 young unemployed
INTERVENTION 5: Access to workplace experience (Support for WIL for completion of qualification and work experience for transition into labour market)	Work Experience Training Programme	471
	Internships	818
	Artisan Aides	327
	Artisan Recognition of Prior Learning (ARPL)	127
	Artisan Development	527

ERRP intervention	Measures to be implemented	Number of beneficiaries (current)
	Recognition of Prior Learning for Learnerships	33
	Foundational Learning Competence	218
	TVET College Support – NCV Level 4 Graduates	205
	Lecturer Development Programme	40
	Mine community training programme	3505
	Youth in Mining Communities training programme	3515
INTERVENTION 6: Supporting entrepreneurship and innovation (skills required to grow income generating in local economies relying on RDI)	Small-scale Mining programme	283
	SMME's supported as training providers in the MMS	5
INTERVENTION 7: Re-training / up-skilling of employees to preserve jobs	Adult Education and Training	1499
	Management Development Programme	130
	Skills Programmes: OHS	3329
INTERVENTION 8: Meeting demand outlined in the List of Critical Occupations	Funding youth through bursaries to study mining related qualifications that are hard-to-fill	362
INTERVENTION 9: National Pathway Management Network: to enable transition from 'learning to earning' spaces by connecting youth to different platforms	Through career awareness or guidance help youth make informed decisions on career, connect them with job opportunities	128 career awareness events

Source: MQA APP (2023g)

5.4.2 Measures Implemented to Address the PYEI

During the 2022 State of the Nation Address, the President called for the allocation of 10 000 opportunities for students to participate in workplace exposure, with the aim of providing them with valuable industrial exposure. In response to this directive, the MQA has implemented a work-integrated learning programme. The targets and actual achievements are shown in Table 5.4.

Table 5.4: Measures to address the PYEI

Intervention	Target	Actual Achievement
PYEI - TVET college graduate placement	660	765 TVET

Source: MQA APP (2023g)

In addition to interventions that respond to ERRP and PYEI, the MQA also implemented a wide range of portable skills with youth as target audience focussing on construction, agriculture and electrical engineering. The MQA should continue to facilitate transformation and SMME development of the sector through skills development by prioritising skills development of the HDSAs. These include undertaking skills development interventions to capacitate more females and disabled people in the sector.

5.5 Plan of Action

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

Table 5.5: Strategic objectives not achieved and mechanisms to ensure achievement in future

Target not met	Reasons for not meeting target	Mechanism to ensure achievement of strategic priorities not achieved
3.2b Number of employees entering learnership per annum: ▪ Target: 703- ▪ Actual: 246 (variance = 457)	Insufficient pool of beneficiaries to complete programme	Consider the number of learners in the pipeline during the target-setting phase. Increase input rate and engage the industry.
3.16. Number of beneficiaries trained in small scale mining per annum: ▪ Target: 250 ▪ Actual: 237 (variance = 13)	Learners were unable to complete within the set period.	

5.6 Measures to Strengthen the Risk, Compliance, Monitoring, Evaluation and Quality Assurance Function

Efforts have been made to reinforce the risk and compliance, M&E and quality assurance function. Firstly, the Quality Assurance Unit discussed earlier has been merged with the Risk and Compliance and Monitoring and Evaluation Unit, resulting in the formation of the combined Risk, Compliance, Monitoring and Quality Assurance Unit. The position of Risk and Compliance Manager was vacant but has been filled, although the six administrator positions in the unit remain unfilled currently. Furthermore, a proposed new organisational structure is set to be implemented, introducing various new roles. These roles will include a manager responsible for International Organisation for Standardisation (ISO), an administrator, two officer positions, two senior administrators (Risk and M&E) and six administrators, all of which will contribute to the strengthened risk and compliance, M&E and quality assurance functions.

5.7 Conclusions

The section highlighted how the Unit systems and policies are infused into the organisational process, to ensure efficiency and impact of interventions to guide skills planning, reporting, continuous improvement to further enhance impact of interventions. It also highlighted the targets and what was that done with regard to the risk and compliance, learner verifications, tracer studies and quality assurance. Also included are the interventions implemented to support the ERRP including the PYEI, the plan of action to address key skills priorities in the MMS.

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. In terms of the labour profile, the MMS continues to be male dominated (80.8%), with African employees constituting a large proportion (87.9%) of the labour force. They account for 68.6% of management roles, most of them are in junior (73.4%) and middle management (54.3%). Despite constituting 25.3% of the management workforce, Whites dominate senior and management positions. White males dominate senior (50%) and top (52.3%) management positions. The research findings indicate that there is a need for continuous concerted efforts to be placed in driving the transformation agenda in the.

The 2018 Mining Charter sets targets for the employment of people living with disabilities at 1.5%. Currently, people living with disabilities are close to the set target, comprising 1.4% of the total workforce. This indicates that the sector is making strides in the transformation mandate to include persons living with disabilities in the sector.

Chapter 2 mapped macro, meso and micro factors that serve as key drivers of change that impact on skills demand and supply in the sector. Lack of a stable political environment, compounded by social ills such as corruption, protest and violence are among key important determinants of foreign direct investment. Conflict in Ukraine also affect the global commodity market as they induce volatility. Economic factors such as slow economic growth impacts on job creation, persistent inequalities and poverty also play a critical role in the skills development landscape, Covid-19, increasing energy tariffs and load-shedding, as well 4IR are also important factor. Also affecting skills demand and supply are a wide spectrum of legislative and policy frameworks such as the Mineral and Petroleum Resources Development Act that gave effect to the Mining Charter 2018, the MHSA No. 29 of 1996, Mineral Beneficiation Strategy, National Growth Path, Industrial Policy Action 2018/19, the NDP, NSDP, HRD Strategy for South Africa, National Priority Skills Plan, Exploration implementation Plan, Hydrogen South Africa Strategy and Economic Reconstruction and Recovery Strategy that seeks to contribute to a creating a sustainable, inclusive economic growth and development in South Africa. 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 identify proper avenues for interventions respond especially in skills development. The chapter also reflected upon the measures that support the implementation of national strategies and plans especially those in sync with the ERRP such as funding learnership, work experience and placement, foundation learning competence (FLC), AET programmes, supporting merging training providers with regards to accredited training as well as business development.

Chapter 3 highlighted that the overall top 10 HTV vacancies that serve as a strong indicator for occupational shortages as per the OFO Code. These were arrived at through frequency run as well as cross-tabulation by occupational shortage as per province and sub-sector. They include: mine manager; production manager; engineering maintenance manager; mechanical engineer (mines); mining engineer; millwright; rock engineer; electrical engineer (mines); miner; section engineer; diesel mechanic. These HTV vacancies varies across organisational contexts 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. These top-up skills are related to leadership and management, technical (job-specific) and supervisory skills and computer skills.

The extent and nature of supply indicated a marginal increase in matric pass rate from a 76.4% pass rate in 2021 to 80.1% currently. The Mathematics pass rate slightly dropped from 57.6% in 2021, to 55% in 2022. However, Physical Science recorded an increase from 69% in 2021 to 74.6% in 2022. Most occupations require a foundation of good quality maths and science subjects and to some extent geography. Therefore, MQA will continue supporting interventions aimed at increasing the intake and pass rate of these subjects.

A decline is observed in terms of the enrolment and graduation statistics of mining-related qualifications. The supply of mining engineering graduates decreased from 55 693 enrolments in 2017 to 48 877 in 2022 (a 13% decrease). Graduate statistics dropped from 9 870 in 2017 to 9 430 in 2021 (-4%). Mining engineering and metallurgy are qualifications that experienced the most declines in enrolments and graduations. This is a cause for concern considering that mining engineering was reported both a hard-to-fill vacancy and an occupation experiencing skills gaps.

To augment the basic and higher education outputs, the MQA, alongside MMS companies, have been developing skills interventions to address the skills needs of the sector at various levels of education. These are in the form of career guidance to support learners to make right choices regarding their careers in the MMS, AET programmes, NCV Nated courses, short courses and learnerships, workplace experience for industrial exposure, internships 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 South Africa 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 at the MQA. It assessed the effectiveness of existing MQA's partnerships with reference to the nature and objectives as well as the length of these value-adding partnerships. It also outlined both success stories and lessons learnt for interventions that were implemented. The MQA provides TVET colleges with financial support to enable placement of learners through the WIL programme with employers for them to qualify for their disciplines with the MMS such as fitting and turning, welding, boiler making and even outside the MMS such as hospitality, marketing and business studies. To further gain insight into the effectiveness of these partnerships between the MQA and CET colleges, research aimed at assessing the effectiveness of the partnership will be carried and findings will inform the nature and direction of future partnerships.

Chapter 5 reflected on the synergy in the organisational value chain with specific focus on research, strategic planning, implementation (reporting) and M&E 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. Between 2020 and 2021 the MQA completed three tracer studies namely AET, Work Experience and Management Development Programme. In 2021/2022, FLC, NCV and Mine Community project tracer studies were completed. The aim was to find out about the whereabouts of the beneficiaries and what they were doing after going through the different programmes of the MQA to improve performance and better planning. Successes and challenges are varied across context, however, there is a cross cutting recommendation of the continued implementation of the programmes. 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 many of its priorities, it is acknowledged that concerted efforts need to be placed in addressing those that were not achieved.

6.3 Key Priority Actions: Recommendations

Recommended Priority Actions: Support National Strategies and Plans on Skills Development

The MQA support national strategies to address poverty, unemployment and inequalities by providing training and skills development, ensuring quality assurance, fostering partnerships, conducting research, promoting inclusive access to training, supporting entrepreneurship and advocating for supportive policies. These efforts aim to equip individuals with relevant skills, improve training outcomes, align skills with industry needs, empower marginalised groups, facilitate entrepreneurship and influence policies for effective implementation.

6.3.1 Recommendation 1: Heighten efforts to support the PYEI and the ERRP

Industrial exposure or experiential training. The MQA should ramp up the placement of TVET graduates in workplaces through Work Integrated Learning and also come up with innovative ideas to respond to the presidential directive to place more learners in workplaces and also put more efforts on strengthening sector partnerships to ensure impact through absorption of these learners in the MMS.

6.3.2 Recommended Priority 2: Facilitate growth of SMME in the sector through skills development

Skills Development: MQA can provide tailored skills development programmes to address SMEs' needs, upskilling their workforce and enhancing their competitiveness. Training and Accreditation: MQA offers training and accreditation programmes that certify the competence and qualifications of SME employees, boosting their credibility and attracting clients and investment.

Funding and Grants: MQA may have funding schemes or grants to assist SMEs in purchasing equipment, developing infrastructure, conducting research, or expanding their operations. Business Development Support: MQA provides mentoring, coaching and advisory services to help SMEs with business planning, market research, compliance and strategic decision-making.

Networking and Collaboration: MQA facilitates networking and collaboration among SMEs, larger companies, industry associations and government bodies, fostering partnerships and access to markets.

R&D: MQA supports SMEs in their R&D efforts, providing access to data, technical expertise and innovation grants to encourage investment in new technologies and sustainable practices.

Overall, MQA's support in skills development, accreditation, funding, business development, networking and R&D helps SMEs in the MMS sector grow and contribute to the industry's economic development.

6.3.3 Recommended Priority 3: Continue to support interventions to improve mine health and safety through skills development

Health and safety training programmes: SETAs can develop specialised training programs focusing on health and safety topics such as regulations, risk assessment, emergency response and proper use of personal protective equipment (PPE).

Accredited Training: SETAs can ensure that health and safety courses meet industry standards and receive accreditation, providing learners with recognised certifications.

Identification of Skill Gaps: SETAs can conduct assessments and engage with industry stakeholders to identify skill gaps in health and safety. This information can help in developing targeted interventions and training initiatives to address specific areas of concern.

Continue collaboration with Industry Experts: MQAs can collaborate with industry experts, professional bodies and OHS organisations to gain insight and expertise. This collaboration can aid in developing relevant and up-to-date training materials and programmes.

Continue to support for Workplace Assessments: MQA can support workplace assessments to evaluate the effectiveness of health and safety interventions. This may involve conducting inspections, audits and evaluations to ensure compliance with regulations and identify areas for improvement.

Incentives: MQA can provide incentives to employers and employees who actively participate in health and safety training programmes. These incentives can include financial assistance, grants, or recognition for exemplary safety practices.

Continuous M&E: MQA should continuously monitor and evaluate the effectiveness of health and safety interventions. This includes tracking the impact of training programmes, assessing improvements in workplace safety and making adjustments as needed.

Collaboration with Regulatory Bodies: the MQA can collaborate with regulatory bodies responsible for health and safety standards to align training programmes with regulatory requirements. This ensures that the training provided by the MQA and other bodies such as MHSC meets the necessary compliance standards.

By implementing these measures, the MQA can actively support interventions in health and safety, providing relevant training, promoting compliance and bridging skill gaps in the workforce. Ultimately, this contributes to creating safer work environments and reducing occupational hazards.

6.3.4 Recommended Priority 4: Continue to monitor and provide support to interventions responding to technological changes through skills development

Continuous Monitoring: Stay updated on emerging technologies and trends in the mining industry through active monitoring and research.

Collaboration and Partnerships: Foster collaborations with industry experts, research institutions and technology providers to leverage external expertise and identify suitable technological solutions.

Technology Adoption Guidelines: Develop guidelines and frameworks to support the adoption of new technologies, addressing safety, environmental impact, regulatory compliance and operational efficiency.

Training and Education: Invest in training programmes to equip the mining workforce with the necessary knowledge and skills to operate and maintain advanced mining technologies. Regulatory Framework: Review and update existing regulations to accommodate technological advancements while ensuring safety and environmental standards.

Pilot Projects and Demonstrations: Encourage mining companies to conduct pilot projects and demonstrations of emerging technologies for testing and validation before wider adoption.

Data Management and Analysis: Improve data management capabilities and promote effective data collection, storage and analysis, for optimising operations and decision-making.

Innovation and Incentives: Establish innovation programmes and provide incentives such as financial support, tax breaks, or grants to encourage mining companies to invest in and adopt new technologies. By implementing these strategies, the MQA can effectively respond to the changing technological landscape in the mining sector, supporting the adoption of technologies that enhance efficiency, safety and sustainability.

6.3.5 Recommended Priority 5: Monitor and support interventions aimed at developing the skills required for minerals beneficiation

Align the mining sector with mineral beneficiation, collaborate with stakeholders to identify desired beneficiation outcomes, conduct a skills gap analysis, design tailored training programme, leverage existing educational resources, provide mentorship and apprenticeship opportunities.

Encourage research and innovation, emphasise continuous professional development, monitor and evaluate progress, and foster a supportive environment. By implementing these strategies, the necessary skills and knowledge can be developed in the mining sector to effectively engage in mineral beneficiation.

6.3.6 Recommended Priority 6: Focus on increasing support for core mining-related skills and hard-to-fill occupations in terms of skills development in the MMS

Raise awareness about the importance of mining-related jobs and skills, develop educational programmes and partnerships with institutions and industry experts and provide scholarships, grants and financial incentives to attract individuals to mining careers. Create clear career pathways and opportunities for upskilling and advancement, prioritise safety and well-being in mining operations, promote the mining industry through campaigns and success stories. Collaborate with government agencies to develop supportive policies. Embrace technology and provide training for digital skills. Focus on sustainable mining practices and environmental stewardship. Implementing these strategies can help attract more individuals to mining-related occupations and ensure a skilled workforce for the sector's sustainable growth.

6.3.7 Recommended Priority 7: Develop skills for just transition

A just energy transition refers to a shift from traditional fossil fuel-based energy systems to cleaner, more sustainable and equitable energy sources. The MQA can contribute to this process by fostering collaboration among various stakeholders, including government agencies, industry representatives, educational institutions and labour organisations. The MQA can facilitate dialogue and coordination to ensure a comprehensive approach to skills development in the energy sector. By bringing together different parties, SETAs help identify priorities, address challenges and establish partnerships that promote a just energy transition. Identifying skills gaps and developing relevant training programmes in the sector. In the context of a just energy transition, the MQA should focus on designing and implementing training initiatives that equip individuals with the necessary skills for working in the renewable energy sector, energy efficiency, and related fields. This includes facilitation of or developing courses, qualifications and apprenticeships that align with the needs of the transitioning energy industry. MQA should contribute to R&D efforts related to energy transition. They analyse industry trends, technological advancements and emerging job roles to inform the design of training programmes and qualifications. By staying updated on the evolving energy landscape, the MQA can ensure that their skills development initiatives align with the changing needs of the industry.

Equity and Access: A key aspect of a just energy transition is ensuring equitable access to opportunities for all individuals, including historically marginalised groups. SETAs promote inclusivity by designing training programmes that target under-represented communities and providing support systems to overcome barriers to entry. This can involve initiatives such as scholarships, mentorship programmes and outreach campaigns to encourage diversity and equal participation in the energy sector and monitor the effectiveness and impact of their skills development programmes.

6.4 Conclusion

This report provides a background by highlighting research purpose and research questions and objectives. Chapter 1 highlighted the importance of the mining sector, to the economy and the country. Chapter 2 highlight key drivers that interconnect with each other to inform interventions in the sector and the whole policy environment upon which preparation of the employability of the workforce is contingent. Chapter 3 reflects on the occupational shortages, skills gaps and the extent and nature of skills supply. Chapter 4 reflected on partnerships and the critical success factors that will make them impactful. Chapter 5 discussed M&E and how it is approach from the MQA perspective. Chapter 6 concluded by highlighting the key findings and recommendation thereof.

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Annexure A: Weighting formula

PROFILES

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

Coal Mining, Gold Mining, PGM Mining, Diamond Mining and Other Mining employment figures were located in the DMRE's database of mines. This database is maintained and updated every quarter when all mining operations are required to submit information to the DMRE. The employment and earnings figures provided on this database are used by Statistics South Africa in their quarterly Survey of Employment and Earnings (SEE) and are regarded as the official statistics on employment in the mining industry.

Information on population group, age, occupational distribution, and educational levels was not available from the DMR database. However, the MQA has a relatively high return of WSPs/ATRs every year and the WSPs-ATRs contain comprehensive information on the workforce of the sector. Thus, for the purpose of establishing a sector profile, the individual records in the source data were weighted using the following formula:

Wa = Ea (DMRE)/Ea (Source data)
Where:
Wa = the weight applied to records belonging to a particular subsector
Ea (DMRE) = total employment in that subsector as reported by the DMRE
Ea (Source data) = total employment in that subsector in the WSP/ATR submissions

Cement, Lime, Aggregates and Lime (CLAS), Services Incidental to Mining, Diamond Processing and Jewellery Manufacturing

The CLAS subsector includes Cement Manufacturing which is not included in the DMRE data. For this reason, the WSP-ATR data of the CLAS subsector were weighted, using SDL payment information. Similarly, to arrive at an estimate of total employment in the Services Incidental to Mining, Diamond Processing and Jewellery Manufacturing subsectors, the SDL payment information was used in weighting the WSP-ATR source data. Thus, the weights applied to individual employee records in these four subsectors were calculated using the following formula:

Wa =Ea- (SDL)/Ea (Source data)
Where:
Wa = the weight applied to records belonging to a particular subsector
Ea (SDL) = total employment in that subsector as reported by the SDL file
Ea (Source data) = total employment in that subsector in the WSP/ATR submissions