



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

**ANALYSIS OF THE DEVELOPMENTAL POTENTIAL OF
ARTISANAL AND SMALL-SCALE MINING: A STRATEGY FOR
SOUTH AFRICA**

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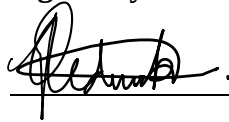
A Thesis submitted to the Faculty of Engineering and the Built Environment,
University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for
the degree of Doctor of Philosophy.

Johannesburg, 2023

DECLARATION

I declare that this Thesis is my own work. I understand the University's stance on Plagiarism and declare that there has been no conscious attempt at plagiarism. However, all sources are used *bona fide*, and the truth thereof cannot be guaranteed. This Thesis is being submitted for the Degree of Doctor of Philosophy to the University of the Witwatersrand, Johannesburg. I declare that it has not been submitted before for any degree or examination in any other University.

Signed by:



Pontsho Francinah Twala

Signed at Ruimsig on the 17 day of MAY 2023

PUBLICATIONS

Parts of the research presented in the Thesis contributed to the following publications.

- 1) Ledwaba, P.F., and Mutemeri, N. (2018). Institutional gaps and challenges in artisanal and small-scale mining in South Africa. *Resources Policy*, Vol. 56, pp. 141-148. <https://doi.org/10.1016/j.resourpol.2017.11.010>.
- 2) Ledwaba, P.F. and Modiba, D.G. (2018). Bridging the gap between artisanal and small-scale mining and large-scale mining sectors in South Africa: Exploring strategies for coexistence, *Artisanal and Small-Scale Mining (ASM) Conference 2018*, Southern African Institute of Mining and Metallurgy (SAIMM), 10-11 September 2018.

ABSTRACT

The mining industry remains central to the socio-economic development of mineral economies. While this is the case, most African countries have been struggling to translate the benefits of mining into positive developmental outcomes. This has been attributed to several factors including the failure to leverage opportunities from the Artisanal and Small-Scale Mining (ASM) sector which has been growing in most countries.

As is the case in other African countries, the mining industry continues to play a considerable role in South Africa's economy. The industry is expected to contribute significantly to the country's socio-economic agenda which aims to eradicate poverty and inequality by 2030. Despite the positive outlook, the performance of the industry has been declining resulting in the government identifying a series of interventions aimed at reviving the industry's activities. Amongst these is the formalisation of the ASM which has been earmarked for job creation and poverty alleviation. The objectives of the Thesis were to establish the developmental potential of ASM in the country, and subsequently develop a strategy framework aimed at enabling the sector to contribute to the mining industry and national development plan.

The study was conducted using multiple case studies with data collected and analysed using multiple methods. The major finding from the study is that the ASM sector has the potential to contribute towards the country's development priorities. This is taken from the evidence that shows a direct link between the sector's activities and the country's socio-economic landscape. It was established that the main drivers of ASM are socio-economic challenges in the country, mainly growing unemployment and poverty levels. To this end, ASM is playing a role in providing livelihoods to country's

population is that most affected by poverty and unemployment. As a livelihood strategy, ASM has improved the poverty status as well as the living standards of those that participate in its activities. The evidence from the study revealed that most of the miners measure above the country's subsistence level and can provide for themselves and their families. The benefits of the sector also extend to communities and overall, these can be linked to several objectives as captured in the country's development plan.

The conclusion from the study is that the developmental potential of ASM can only be leveraged if the challenges in the sector are addressed, and these encompass issues relating to the regulation of the sector, mining land and mineral resources; value chain constraints, and related support, responsible practices, institutional arrangements, and ASM stakeholder relationships.

Keywords: Artisanal and small-scale mining, national development plan, poverty, unemployment, living standards, strategy, South Africa.

DEDICATION

This Thesis is dedicated to a Black Child who dares to dream, who remains grounded, who is mindful of the important things in life, and who strives to make an impact. The Thesis is also dedicated to a community that nurtures and supports their own. A Community that celebrates Black Excellence for it epitomizes its own capabilities.

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DEFINITIONS

In the Thesis, the Artisanal and Small-Scale Mining (ASM) sector is understood as comprising of a spectrum of activities that are involved in the mining value chain including searching for minerals, ore extraction, processing, and trading of mineral products (Mutemeri *et al*, 2016). A major distinction between ASM and large-scale mining is the level of production, where ASM is characterised by the use of simple tools and methods of mining and processing. Within the ASM sector, two categories of activities are recognised, namely, artisanal mining (AM) and small-scale mining (SSM).

The former is found on the lower end of the spectrum and encompasses activities that are rudimentary. SSM is on the upper end and includes operations that employ machinery, however on a limited scale compared to large-scale mining. As is the case in most countries, the characterisation of ASM activities differs in South Africa. As will be picked up in the discussion, ASM is often referred to as *zama-zama* mining and/or the people engaging in the sector's activities are often called, or some miners refer to themselves as *zama-zamas*. These two connotations are local terms, with *zama-zama* being a Zulu word that means to “*try-try*” or “*take a chance*”. As used in some contexts, it simply means to seek a living.

The term has also been used to differentiate between illegal mining and criminal mining. Illegal mining encompasses activities that take place without appropriate mining licenses. Criminal mining, on the other hand, includes illegal mining activities that are associated with criminal syndicates. In the context of the Thesis, *zama-zama* mining (or *zama-zamas*) is taken as mining activities that are conducted by those who seek to make a living. Given that most *zama-zama* mining activities are carried out using basic tools and methods, they are taken to fall under the umbrella of ASM.

LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation/Acronym	Description
AM	Artisanal mining
AMD	Acid Mine Drainage
AMV	Africa Mining Vision
ASGM	Artisanal and Small-Scale Gold Mining
ASM	Artisanal and Small-Scale Mining
AU	African Union
CBO	Community-Based Organisation
CCSI	Columbia Centre on Sustainable Investment
CGS	Council for Geosciences
CIRDI	Canadian International Resource and Development Institute
CSO	Civil Society Organisation
D&O	Derelict and Ownerless
DME	Department of Minerals and Energy
DMR	Department of Mineral Resources
DMRE	Department of Mineral Resources and Energy
DPME	Department of Planning, Monitoring and Evaluation
DRC	Democratic Republic of Congo
EIA	Environmental Impact Assessment
FGT	Foster–Greer–Thorbecke indices
FPL	Food Poverty Line
GDP	Gross Domestic Product
HDI	Human Development Index
HDSA	Historically Disadvantaged South Africans
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
ICMM	International Council on Mining and Metals
IDP	Integrated Development Plan
IGF	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
ILO	International Labour Organisation
LBPL	Lower Bound Poverty Line

LED	Local Economic Development
LSM	Living Standard Measure
MCI	Mining Contribution Index
MD	Mahalanobis Distance
MDG	Millennium Development Goals
MMP	Minerals and Mining Policy
MPRDA	Minerals and Petroleum Resources Development Act
MQA	Mining Qualification Authority
NDP	National Development Plan
NEMA	National Environment Management Act
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NSC	National Steering Committee of Service Providers
NYDA	National Youth Development Agency
PGM	Platinum Group Metals
PSI	Population Stability Index
R	South African Rand
RDP	Reconstruction and Development Plan
SAARF	South African Audience Research Foundation
SAHRC	South African Human Rights Commission
SAFLII	Southern African Legal Information Institute
SAP	Structural Adjustment Policy
SDG	Sustainable Development Goal
SLO	Social License to Operate
SMME	Small Micro and Medium Enterprises
SOE	State Owned Enterprise
SPSS	Statistical Package for the Social Sciences
SSM	Small Scale Mining
SSMB	Small Scale Mining Board
SSMBD	Small Scale Mining and Beneficiation Division
UBPL	Upper Bound Poverty Line
UNECA	United Nations Economic Commission for Africa
UNICEF	United Nations International Children's Emergency Fund
USD	United States Dollars
VAT	Value Added Tax

TABLE OF CONTENTS

DECLARATION.....	i
PUBLICATIONS	ii
ABSTRACT	iii
DEDICATION.....	v
ACKNOWLEDGEMENTS.....	vi
DEFINITIONS	viii
LIST OF ACRONYMS AND ABBREVIATIONS	ix
LIST OF FIGURES	xvii
LIST OF TABLES	xix
CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY	1
1.1. Introduction.....	1
1.2. Mining and development	2
1.2.1. Mining as a source of development.....	2
1.2.2. Shortcomings of the mining industry	5
1.2.3. ASM and development.....	9
1.3. Background to the study.....	13
1.4. Problem definition.....	18
1.5. Aims and objectives of the study.....	22
1.6. Structure of the Thesis.....	24
CHAPTER 2: THE DEVELOPMENTAL CONTEXT OF SOUTH AFRICA.....	28
2.1. Introduction.....	28
2.2. Development theories and constructs	28
2.3. Definitions and interpretations of development	34
2.4. Expressions of development	37
2.5. South Africa's development context and key issues.....	41
2.6. Policy responses and interventions	46
2.7. The current situation	49
2.8. Chapter summary	53
CHAPTER 3: THE ROLE OF MINING IN SOUTH AFRICA'S DEVELOPMENT	55
3.1. Introduction.....	55
3.2. Landscape of the mining industry	55

3.3. Contribution of the mining industry	57
3.4. Key issues in the mining industry	59
3.5. Outlook on the mining industry	65
3.6. Potential role of ASM in view of the mining industry	68
3.7. Chapter summary	71
CHAPTER 4: THE NEXUS BETWEEN ASM AND DEVELOPMENT	72
4.1. Introduction	72
4.2. Historical account of ASM	73
4.3. Explaining the proliferation of ASM	81
4.4. Building the case for ASM	96
4.4.1. ASM and broader development agenda	96
4.4.2. ASM positive externalities	99
4.4.3. ASM negative externalities	109
4.5. ASM development gaps	119
4.6. Chapter summary	129
CHAPTER 5: THE ASM SECTOR IN SOUTH AFRICA	130
5.1. Introduction	130
5.2. South Africa's colonial history and ASM development	131
5.2.1. The fall of indigenous mining	131
5.2.2. The emergence of large-scale mining	136
5.3. The post-1994 agenda and ASM development	138
5.3.1. Recognising the ASM sector	138
5.3.2. Establishing ASM support	141
5.3.3. Assessing the impacts of ASM support	144
5.4. <i>Zama-Zama</i> mining phenomenon	149
5.5. Drivers of the ASM sector	151
5.6. Stakeholder perspectives and debates	159
5.7. ASM interventions and shortcomings	169
5.8. Chapter summary	177
CHAPTER 6: APPROACH TO PRIMARY DATA COLLECTION AND ANALYSIS	
179	
6.1. Introduction	179
6.2. Research paradigm and approach	179
6.3. The study areas	182
6.3.1. Selection of the study areas	182

6.3.2. Description of the study areas	184
6.4. Data collection and analysis methods	191
6.4.1. Quantitative data	192
6.4.2. Qualitative data	197
6.5. Research validity and reliability	206
6.6. Ethical considerations and requirements	209
6.7. Research challenges and limitations	210
6.8. Chapter summary	211
CHAPTER 7: BUILDING A PROFILE OF THE ASM SECTOR.....	212
7.1. Introduction	212
7.2. Socio-economic characteristics of the miners	213
7.2.1. Age distribution	214
7.2.2. Gender	216
7.2.3. Race and origin	217
7.2.4. Nationality	220
7.2.5. Education levels	222
7.2.6. Family and dependants	223
7.2.7. Employment status	224
7.3. Cross analysis of the demographics	227
7.3.1. Age and gender	227
7.3.2. Age and education	228
7.3.3. Age and nationality	229
7.3.4. Age and employment status	230
7.3.5. Age and family support	231
7.3.6. Gender and education	232
7.3.7. Gender and nationality	233
7.3.8. Gender and family support	233
7.3.9. Gender and employment status	234
7.3.10. Education and nationality	235
7.3.11. Education and employment status	236
7.3.12. Nationality and employment status	237
7.4. Identification of ASM groups	237
7.4.1. Model summary	239
7.4.2. Predictor importance	240
7.4.3. Cluster sizes	241

7.4.4. Characteristics of the clusters	241
7.5. Key findings and discussion	244
7.5.1. Broad characteristics of the miners	244
7.5.2. Emerging ASM groups	250
7.5.3. ASM and the country's socio-economic profiles	251
7.6. Chapter summary	252
CHAPTER 8: UNDERSTANDING THE DRIVERS AND PROSPECTS OF THE ASM SECTOR	255
8.1. Introduction	255
8.2. ASM drivers as shared by the miners	256
8.2.1. Lack of economic opportunities	257
8.2.2. Family support and responsibilities	262
8.2.3. Remuneration and benefits	263
8.2.4. Labour market restrictions	267
8.2.5. Self-employment and associated benefits	269
8.2.6. Potential for wealth generation and improvement of well-being	271
8.3. ASM drivers as identified by the practitioners	271
8.3.1. Socio-economic circumstances in the country	272
8.3.2. Historical legacies of mining	276
8.3.3. Nature of mining skills	280
8.3.4. Bureaucracies surrounding economic participation	281
8.3.5. Attractiveness of ASM	282
8.4. Contextualising the ASM drivers	285
8.4.1. Macro socio-economic factors	286
8.4.2. At the industry-related level	288
8.4.3. ASM-specific factors	296
8.5. The prospects of ASM	296
8.6. Chapter summary	301
CHAPTER 9: ASSESSING THE ROLE OF THE ASM SECTOR IN THE COUNTRY'S DEVELOPMENT PRIORITIES	303
9.1. Introduction	303
9.2. Impacts of ASM on the miners	304
9.2.1. Background on poverty measures	304
9.2.2. ASM and socio-economic patterns in the country	310
9.2.3. LSM as a measure of poverty	323

9.2.4. Perspectives of the miners	353
9.3. Perspectives of communities on ASM	360
9.3.1. Local economic development	361
9.3.2. Community livelihoods and well-being	364
9.3.3. ASM impacts on community security and environment	366
9.3.4. General perceptions and recommendations	369
9.4. ASM and the National Development Plan	371
9.5. Key findings and discussion	375
9.5.1. Impact of ASM on the miners	375
9.5.2. Impacts of ASM on communities	377
9.5.3. ASM and the NDP	379
9.6. Chapter summary	380
CHAPTER 10: UNPACKING THE CHALLENGES IN THE ASM SECTOR	381
10.1. Introduction	381
10.2. Challenges at the site level	382
10.2.1. Carletonville	382
10.2.2. Kimberley	386
10.2.3. Ermelo	387
10.2.4. Combined challenges	392
10.3. Broader perspectives on the challenges	395
10.3.1. ASM-specific challenges	398
10.3.2. Institutional framework and related challenges	418
10.3.3. Wider stakeholder challenges	424
10.4. Identifying areas of intervention	424
10.5. Chapter summary	426
CHAPTER 11: DEVISING A STRATEGY FOR THE ASM SECTOR	427
11.1. Introduction	427
11.2. Principles underpinning the ASM strategy	427
11.2.1. A holistic approach to the ASM strategy	428
11.2.2. An integrated approach to the ASM strategy	431
11.3. Elements of the ASM strategy	434
11.4. Proposed strategy interventions	437
11.4.1. Regulation of the sector	437
11.4.2. Mining land and mineral resources	452
11.4.3. Value chain constraints and related support	461

11.4.4. Responsible practices in the sector	465
11.4.5. Institutional arrangements and sector support	468
11.4.6. ASM stakeholder relationships	475
11.5. Levers of implementation	478
11.6. Chapter summary	483
CHAPTER 12: CONCLUSIONS AND RECOMMENDATIONS	486
12.1. Introduction	486
12.2. Recap of the study objectives	486
12.3. Responses to the study objectives	487
12.4. Contribution of the Thesis.....	492
12.5. Areas for future research work	496
REFERENCES	499
APPENDICES	540
Appendix A: Pictures taken at study locations.....	540
Appendix B: Baseline survey questionnaire	544
Appendix C: Living standard measure questionnaire.....	547
Appendix D: Interview questionnaire	548
Appendix E: ASM profiling data.....	553
Appendix F: Distribution of minerals amenable to ASM.....	558

LIST OF FIGURES

Figure 1:1: Total natural resource rents by category for Sub-Saharan Africa	4
Figure 1:2: Contribution of economic sectors to the country's GDP (2012 to 2021)	15
Figure 1:3: Total employment and GDP contribution of the mining industry	16
Figure 2:1: Poverty and inequality trends from 1992 to 2015	50
Figure 2:2: Unemployment levels, 2001 to 2021	52
Figure 3:1: Employment and production outputs by commodity, 1994 to 2021	57
Figure 3:2: Key challenges facing the mining industry in South Africa.....	61
Figure 4:1: Causal loop diagram showing the relationship between ASM components.....	83
Figure 4:2: Scenarios mapping the relationship between ASM and agriculture	92
Figure 6:1: Locations of ASM sites	190
Figure 7:1: Age distribution of the respondents.....	214
Figure 7:2: Age distribution of the respondents.....	215
Figure 7:3: Gender profiles of the respondents	217
Figure 7:4: Race profiles of the respondents.....	218
Figure 7:5: Where do the miners come from?.....	219
Figure 7:6: ASM locations of origin	220
Figure 7:7: Nationality of the respondents.....	221
Figure 7:8: Foreign nationality by country	222
Figure 7:9: Education levels	223
Figure 7:10: Family and dependents	224
Figure 7:11: Number of dependents.....	224
Figure 7:12: Employment status	225
Figure 7:13: Previous employment by economic sector	226
Figure 7:14: Reasons for leaving previous employment.....	227
Figure 7:15: Age distribution by gender	228
Figure 7:16: Age distribution by education levels	229
Figure 7:17: Age distribution by nationality	229
Figure 7:18: Age profiles by country	230
Figure 7:19: Age distribution and employment status	231
Figure 7:20: Age and the number of dependants	232
Figure 7:21: Gender profile by education levels.....	232
Figure 7:22: Gender by nationality	233
Figure 7:23: Gender and the number of dependants	234
Figure 7:24: Gender by employment status	234
Figure 7:25: Education levels by nationality	235
Figure 7:26: Education levels by country	236
Figure 7:27: Education levels by employment status.....	236
Figure 7:28: Nationality by previous employment status	237
Figure 7:29: Model summary.....	239
Figure 7:30: Predictor importance	241
Figure 8:1: Total employment and contribution to GDP across provinces.....	289
Figure 9:1: Monthly Income distribution of miners for all sites	314
Figure 9:2: Income levels of miners in Carletonville and Ermelo	315
Figure 9:3: Miners' per capita income against national poverty lines	316
Figure 9:4: ASM incomes against income from previous employment.....	317

Figure 9:5: Miners' incomes pre-and post-ASM against poverty lines	318
Figure 9:6: Spending patterns of the miners	323
Figure 9:7: LSM distributions showing before and after ASM (aggregated)	330
Figure 9:8: Combined LSM distributions (Aggregated)	331
Figure 9:9: LSM changes and percentage shares (Aggregated).....	332
Figure 9:10: LSM distributions showing before and after ASM (Carletonville)	333
Figure 9:11: Combined LSM distributions (Carletonville).....	333
Figure 9:12: LSM differences and percentage shares (Carletonville).....	334
Figure 9:13: LSM distributions showing before and after ASM (Kimberley).....	335
Figure 9:14: Combined LSM distributions (Kimberley).....	335
Figure 9:15: LSM differences and percentage shares (Kimberley)	336
Figure 9:16: LSM distributions showing before and after ASM (Ermelo)	337
Figure 9:17: Combined LSM distributions (Ermelo).....	337
Figure 9:18: LSM differences and percentage shares (Ermelo).....	338
Figure 9:19: LSM differences and percentage shares (Ermelo).....	339
Figure 9:20: LSM distributions according to gender	341
Figure 9:21: LSM distributions according to education levels	342
Figure 9:22: LSM distributions according to nationality	344
Figure 9:23: LSM distributions according to family support.....	345
Figure 9:24: LSM distributions and sources of income	346
Figure 9:25: LSM distribution according to previous employment status	347
Figure 9:26: LSM distributions according to working experience.....	347
Figure 9:27: Weighted average difference and percentage of the miners by working experience	348
Figure 9:28: Weighted average difference and percentage of the miners against income	350
Figure 10:1: Main challenges in Carletonville.....	382
Figure 10:2: Main challenges in Kimberley.....	386
Figure 10:3: Main challenges in Ermelo	387
Figure 10:4: Combined challenges from the three study locations	392
Figure 10:5: Classification of the challenges in the ASM sector	396
Figure 10:6: Mining permit application process	400
Figure 10:7: Factors affecting ASM and its income-generating potential	412
Figure 10:8: A summary of the challenges in the ASM sector	425
Figure 11:1: Positioning of the ASM strategy	429
Figure 11:2: Integrated approach to the ASM strategy	433
Figure 11:3: A six step process to identifying suitable licensing options	440
Figure 11:4: Process of mapping licensing pathways	444
Figure 11:5: Licensing options for the spectrum of ASM activities	446
Figure 11:6: Key considerations in developing a tailored ASM licensing system	448
Figure 11:7: Establishing a mineral base for the ASM sector.....	454
Figure 11:8: Framework for ASM support	464
Figure 11:9: Framework for assessing the adequacy of avenues of support.....	470
Figure 11:10: Current institutional structure supporting the ASM sector.....	473
Figure 11:11: Proposed institutional structure for the ASM sector.....	475
Figure 11:12: Aspects that should underpin the co-existence strategy	477
Figure 11:13: Summary of the requirements needed to support the proposed ASM strategy	483

LIST OF TABLES

Table 2:1: Development theories and elements	30
Table 2:2: NDP focus and key strategies	48
Table 3:1: An assessment of the mining industry against the NDP's objectives	70
Table 4:1: A summary of the SDGs and broad objectives	98
Table 4:2: Contribution of ASM to the national and local economy	100
Table 6:1: Details of study areas	184
Table 6:2: Locations of ASM sites.....	195
Table 7:1: Summary and characteristics of clusters.....	242
Table 7:2: Comparison of country's socio-economic profile and ASM characteristics	253
Table 8:1: Summary of the ASM drivers	286
Table 9:1: FGT measures at FPL	319
Table 9:2: FGT measures at LBPL	320
Table 9:3: FGT measures at UBPL	320
Table 9:4: National poverty gap and severity	321
Table 9:5: Social grants paid by government.....	322
Table 9:6: SAARF LSM variables and assigned weightings.....	324
Table 9:7: LSM categories and scale ranges	325
Table 9:8: Summary of the weighted average differences	352
Table 9:9: ASM and local economic development	361
Table 9:10: ASM and community livelihoods and well-being	365
Table 9:11: ASM impacts on community safety, security, and environment	367
Table 9:12: ASM and community perceptions and recommendations	369
Table 9:13: The nexus between ASM and national development priorities	374
Table 11:1: ASM strategic objectives	435
Table 11:2: Elements of the strategy with lines of enquiry for potential interventions	436
Table 11:3: Overarching objectives of the legal framework.....	439
Table 11:4: Resulting licensing pathways.....	445
Table 11:5: Proposed support interventions in the sector	465
Table 11:6: Interventions to address health, safety, security and environmental impacts	467
Table 11:7: Proposed interventions on institutional arrangements and sector support	472

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1. Introduction

South Africa has a long history of mining, and its developmental trajectory is closely linked to the evolution of mining, and its impacts and/or contribution thereof. While the mining industry continues to be an integral part of the economy, its overall contribution has been declining and this has affected the country's efforts to meet its development priorities¹. From the country's development plan (i.e., Vision 2030), the mining industry is expected to create 100,000 jobs by 2020. Instead, about 72,000 jobs were lost in the sector between 2012 and 2020.

With global attention on the Sustainable Development Goals (SDGs), the role of mining in development has been interrogated to establish the extent to which mining can contribute to countries' development objectives². Through these assessments, the realisation is that the large-scale mining sector as the pillar of *most* mineral economies³ will not alone be able to meet countries' development priorities. As such, there is a need

¹ Given the socio-economic challenges facing South Africa, several areas have been identified as being important to the development of the country. These areas are referred to as developmental priorities. These are understood as specific areas that need attention based on the socio-economic landscape of South Africa (i.e., its needs, challenges, and opportunities).

² On the other hand, development objectives encompass specific goals or targets set to achieve developmental outcomes. Development objectives are also a factor of needs, challenges, and opportunities in view of socio-economic landscape. In the discussion, developmental priorities and objectives are used interchangeably.

³ A mineral economy refers to an economy that is largely dependent on the exploitation of minerals to support its development. In the Thesis, the term is used interchangeably with mineral-dependent countries which are characterised as countries whose mineral resources account for more than 20% of export earnings with mineral rents contributing 10% and more to the GDP (See source on page 4).

to leverage opportunities that the mining industry⁴ can offer to maximise its contribution to socio-economic development.

This Thesis advances the premise that the Artisanal and Small-Scale Mining (ASM) sector has the potential to increase the benefits coming from the mining industry. In the case of South Africa, as the focus of the study, the ASM sector has the potential to complement large-scale mining thereby increasing the contribution of the mining industry to the country's development objectives. Based on this, the Thesis aims to establish the role of the ASM sector in the attainment of South Africa's development objectives, and in doing so, develop a strategy that will support the sector's activities as taking place in the country.

In setting the scene for the study, Chapter 1 comprises of several sections discussing the background to the study, the problem underpinning the study, aims and objectives, and the importance of the study. These sections are preceded by an overarching discussion on mining as a source of development, the shortcomings of the mining industry, and debates on ASM and development. The objective of this discussion is to situate the study and its focus within the broader aspects of mining and development.

1.2. Mining and development

1.2.1. Mining as a source of development

The realisation of the socio-economic development agenda depends on various drivers and resources. These are required to facilitate the economic growth needed to support development. Countries depend on a variety of resources to encourage the required economic activities, and these can be categorised into four broad groups, namely:

⁴ The use of the term 'industry' encompasses all mining activities. The various categories of mining (i.e., ASM, SSM, large-scale) are referred to as sectors.

natural resources, human resources, physical and technological factors, and institutional factors (Cleveland *et al*, 1996; Birdsall *et al*, 2000).

Natural resources include opportunities found in minerals, land, water, and climate; human resources include skills and labour availability; physical and technological factors encompassed machines, equipment, and other infrastructure; and institutional factors include processes and systems needed to create an enabling environment for development. The exploitation of natural resources continues to play a significant role in the development of many economies. According to the World Bank Data⁵, natural resource rents accounted for 2.1% of the global Gross Domestic Product (GDP) in 2019.

Figure 1.1 shows the contribution of the natural resource rents (i.e., by categories) to the GDP in Sub-Saharan Africa. Natural resources accounted for 7.3% of the region's GDP in 2019. This fell from 19% in 2008 and 16% in 2011. From the figure, oil rents accounted for the largest percentage, followed by rents generated from forest resources. Mineral rents accounted for less than 2% of the total natural resource rents. Overall, there has been a decline in the rents generated from natural resources (i.e., a decline of about 36%). The minerals rents have also decreased with a contraction of 62%, calculated between 1990 and 2019.

⁵ Available: <https://data.worldbank.org/indicator/NY.GDP.TOTL.RT.ZS>. [Accessed: 09 March 2023].

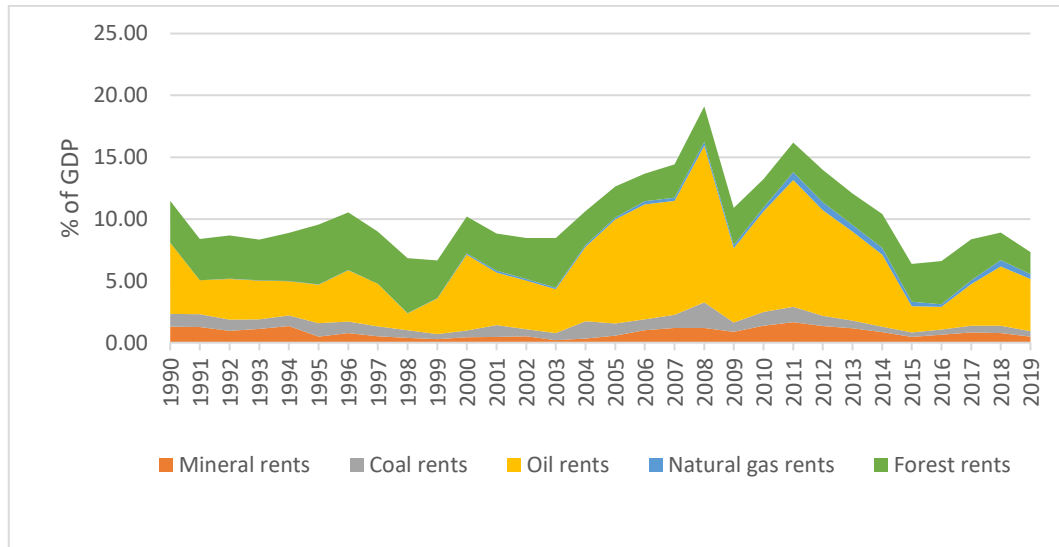


Figure 1:1: Total natural resource rents by category for Sub-Saharan Africa

Source: Compiled from World Bank Data⁶

While the contribution of mining through rents to the economy of Sub-Saharan Africa has declined, most mineral economies in the region still depend on mining for socio-economic development. According to Ushie (2017), half of Africa's economies are still dependent on export earnings and revenue generated from mining. The International Council on Mining and Metals (ICMM) created an indicator called the Mining Contribution Index (MCI) which is used to establish and rank the importance of mining in different countries. The index considers mineral and metal export contribution, mineral production value, and mineral rents as determinants of the level of dependence of countries on mining.

Based on these factors, mineral-dependent countries are defined as those where mineral resources contribute more than 20% to the export earnings and mineral rents constitute more than 10% of the GDP (ICMM, 2020). From its latest edition, three of the top five

⁶ Available: <https://data.worldbank.org/>. [Accessed: 01 June 2020].

countries marked to be highly dependent on mining are in Africa and these are the Democratic Republic of Congo (DRC), Zambia, and Guinea. According to ICMM (2020), mineral rents as a percentage of GDP in DRC and Zambia were 16% and 14%, respectively.

1.2.2. Shortcomings of the mining industry

Amongst the key issues surrounding the debates on mining and development is the ability of countries to translate the benefits of mining into positive developmental outcomes⁷. There is extensive literature on the shortcomings of the mining industry, and these are mostly linked to the resource curse theory. This theory was developed by Auty (1993) who argued that mineral-abundant countries perform poorer than mineral-poor countries. The conclusion coming from this argument has been that the poor developmental outcomes seen in mineral economies are because of their resource abundance. Auty's work stimulated significant scholarly interest looking at the relationship between mining and development.

The work of Sachs and Warner (1995) was amongst the first seminal studies to provide empirical evidence supporting the resource curse. Using cross-country regression models, Sachs and Warner (1995) provided evidence that linked economies with a high ratio of natural resources exports to GDP to slow growth rates. In support of the resource curse, Sachs and Warner (1995) attributed this relationship to the inherent characteristics of mining. Sachs and Warner (1995) argued that mining was a capital-intensive enclave industry with constrained linkages and division of labour. As a result, the economic multipliers emanating from mining were limited.

⁷ As used in the Thesis, the developmental outcome is understood as change and/or impact (i.e., intended, or unintended, as well as positive or negative) of a development effort/intervention (OECD, 2013).

With the evolution of the definition of development, the resource curse literature was expanded to analyse the relationship between mining and other dimensions of development other than macroeconomic factors. Gylfason (2001) established a negative relationship between natural resources and education. Fum and Hodler (2010) investigated the effects of natural resource abundance on income inequality. The study concluded that natural resources increase income inequality in divided societies (Fum and Hodler, 2010). Mainardi (1997) also looked at the resource curse and inequality in mineral economies. He linked the high dependence on natural resources with a dualist structure that is characterised by regional differences in infrastructure development and distorted distribution of basic needs.

Bulte *et al* (2005) investigated the relationship between natural resources and human development. The study corroborated the resource curse in concluding that natural resource-abundant countries suffered from low levels of human development. Some studies correlated natural resource abundance to numerous social ills namely poor health care, child mortality, malnutrition, and human rights violations (Ross, 2001).

While the negative relationship between mining and economic development in some countries has been acknowledged, several scholars have argued that the resource curse is not an automatic phenomenon inherent in mineral-abundant countries. This position is supported by evidence of the benefits generated from mining in some countries. Badeeb *et al* (2017) argued that the resource curse is a more encompassing phenomenon than previously considered and hence its effects on developmental outcomes will differ. Within this argument, scholars have linked the poor performance of mineral-rich countries to rent-seeking behaviour, weak institutions, poor governance, corruption and

conflicts (Lane and Tornell, 1995; Mikesell, 1997; Badeeb *et al*, 2017; Rosser, 2006; Ross *et al*, 2011; Mehlum *et al*, 2006; Van der Ploeg, 2011).

For African countries, the Africa Mining Vision (AMV) attributes the poor developmental performance to poor management of mineral rents, failure to invest in resource infrastructure, inadequate downstream and upstream value addition as well as technology development (African Union, 2009). The AMV came to the fore in 2009 following the global financial crisis in 2008. It was developed to serve as a roadmap for maximising developmental outcomes from Africa's mineral resources exploitation.

For most African states, the AMV represents a paradigm shift away from traditional thinking, where mining was vulnerable to economic externalities, to creating an environment that maximises opportunities for broad-based development. The Vision stands on the following pillars: transparency, equitability, optimal exploitation, broad-based sustainable growth, and socio-economic development (African Union, 2009).

These five principles provide an overarching framework for addressing the challenges associated with the resource curse and these encompass the following intervention areas: development of linkages and a single market economy; mineral resource management, governance, and sustainable development; diversification away from minerals to create a stronger manufacturing base; building competitive infrastructure platforms; expanding mining business through encouraging investment in both low and high-value minerals; building a competitive mining industry that is an international player in the capital and commodity markets; and encouraging ASM.

While the AMV is not prescriptive, its objectives are tied to the common challenges facing most mineral-abundant countries on the continent. In recognising the importance of context-relevant interventions, the AMV supports the domestication processes which

promote the need for development strategies that respond to countries' unique contexts. Broadly, the recognition of the ASM sector as an avenue to support the realisation of development priorities on the continent. This has been made against the potential of the sector to “stimulate local and national entrepreneurship, improve livelihoods and advance integrated rural socio and economic development” (African Union, 2009: v).

The contribution of the sector in the mining industry, and broadly, the socio-economic development of the continent is also recognised in African Union's Agenda 2063. This is a continental strategy that promotes the use of countries' resources to drive positive socio-economic development (African Union Commission, 2015). Agenda 2063 has several aspirations which encompass working towards a prosperous Africa that is characterised by inclusive growth and sustainable development. This is to be supported by several goals that can be mapped alongside the ASM sector to ascertain the role that it can play in the attainment of the continent's development priorities. These include increasing incomes, creating decent jobs, eliminating poverty, increasing social protection as well as ensuring environmental sustainability and economic diversification (African Union Commission, 2015).

At a global level, the key intervention areas to support the role of mining in development are encapsulated in the United Nation's Sustainable Development Goals (SDG). The SDGs were launched in 2015 and comprise of development objectives aimed at eliminating poverty by 2030. These objectives consist of 17 goals covering areas such as education, health, gender equality, economic growth and employment, water and sanitation, energy, communities, and others (United Nations, 2016).

In mapping the relationship between mining and SDGs, the Columbia Centre on Sustainable Investment (CCSI) *et al*, (2016) identified that mining has links (both

positive and negative) with all SDGs. With the growing attention on the SDGs, there has also been increased focus on establishing the role of ASM in development. This comes with the view that mining is diverse with different scope and nature of activities, particularly in Africa. As such, strategies for mining and development must consider and accommodate all categories of mining (Yakovleva, 2017; Hilson, 2019).

1.2.3. ASM and development

Amongst the criticisms directed to the atlas developed by CCSI *et al* (2016) on “*Mapping Mining to the Sustainable Development Goals: An Atlas*” (i.e., which is often used as a reference document) is the failure to provide adequate coverage of the ASM sector and how it links or fits in the role of mining in the SDGs. Hilson and Maconachie (2020) highlighted that, much like the Millennium Development Goals and other development agendas, the importance of ASM continues to be overlooked despite the sector’s growing presence in the poorest regions across the world. This has been an area of concern and gap in the formalisation of the sector and/or attempts to do so.

While ASM can be linked to ancient mining in most countries, its global recognition is located in the 1970s. According to Hilson (2009b) and Jönsson and Fold (2011), it was during this time that ASM was part of the donor discussions. In tracing this period, it coincided with the “*Era of Alternatives*” by the United Nations (UNICEF, n.d). This was a time when the donor community was investigating economic alternatives following the shortcomings of development interventions in addressing socio-economic ills in developing countries (Murawetz, 1977; Chen, 2012). Murawetz (1977) noted that the growing unemployment in developing countries despite positive economic growth resulted in development agencies looking at alternative strategies. It was during this period that the informal sector was recognised (Bangasser, 2000).

While it was believed then that the informal sector would disappear when countries attain sufficient levels of economic growth, the International Labour Organisation (ILO) employment mission in 1972 to Kenya suggested otherwise having experienced the resilience of the sector (Sida, 2004; ILO, 2014). The informal sector continued to grow in *most* developing countries and played a prominent role in employment creation.

While there is no proven connection between the United Nations' "*Era of Alternatives*", the acknowledgement of the importance of the informal sector, and the recognition of ASM activities, it does not come as a surprise that the United Nations' report produced in 1972 expressed interest in ASM activities. The report was aimed at providing governments with analytical data on ASM to inform the development of the sector for socio-economic development (United Nations, 1972).

Having been on the global development agenda for over four decades, the sector's activities have grown significantly. In 1993, the sector employed 6 million people (International Labour Organisation, 1999). This figure increased to 13 million in 1999, 30 million in 2013, and 40.5 million in 2017 (IGF, 2018). It is currently estimated that the sector employs about 44 million people with more than 100 million people receiving support from the sector. In Africa, the ASM workforce is estimated at 10 million people with a further 60 million depending on its activities for livelihoods⁸. According to the World Bank (2019), about 2.3% of the workforce in Africa works in the ASM sector. In Asia and Latin America, the sector employs about 10 million people across 15 countries, and 1.4 million people working in 19 countries (i.e., respectively).

⁸ See <https://delvedatabase.org/> [Accessed 07 March 2023].

With the growth of the sector, there have been competing views regarding its importance and role in development. Amongst the areas of debate that have dominated discussions is the motivation for participating in ASM activities. There has been a narrative that *most* people participate in ASM because of the prospects of becoming rich (i.e., this is known as a “*get quick rich perspective*”). The other side of the narrative was that ASM is a poverty-driven activity with most of the people coming to work in the sector in search of livelihoods. With a growing understanding of the sector, it is recognised that people engage in ASM activities for varied reasons, however, poverty is among the main drivers of the sector’s activities (IGF, 2018). With people moving into the sector because of poverty, the sector is playing a role in poverty alleviation.

Another narrative that has been promoted is tied to the sector’s potential for wealth creation and this is advanced at the back of the benefits and contributions that can be leveraged from the sector (de Haan *et al*, 2020). Some of the benefits in the sector include small business development, economic opportunities for women and youth, income diversification, and macroeconomic contribution to countries. Globally, it is estimated that 20% of gold and diamonds are produced by ASM activities (World Bank, 2013). In some countries, a considerable percentage of the national mineral production comes from the ASM sector. For example, in Ghana, the ASM sector accounted for 30% of the national gold production in 2016 (World Bank, 2019). In Rwanda, about 80% of the 3Ts (tantalum, tin, and tungsten) are produced from ASM operations.

As with large-scale mining, ASM has links with all the SDGs. The positive contribution of ASM is marked in SDG 1 (no poverty), SDG 2 (zero hunger), SDG 4 (quality education), SDG 5 (gender equality), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities) and SDG 11 (sustainable communities). As the case with

large-scale mining, ASM also has negative links with the SDGs with the *most* negative impacts affecting SGD 3 (health and well-being), SDG 6 (water and sanitation), SDG 7 (consumption and production), SDG 14 (life below water), and SDG 15 (life on land).

Notwithstanding the negative impacts of the sector, several scholars are of the view that the sector can play a bigger role in the attainment of the development objectives of most countries if the challenges in the sector are addressed (Hilson, 2002; Ghose and Roy, 2007; African Union, 2009; Thamani, 2015). Amongst the concerning issues in the sector is informality with most ASM activities taking place outside the legal frameworks governing mining operations in the different countries (i.e., it is estimated between 70% and 80% of the activities are informal) (World Bank, 2019). Secondary to this, are the shortcomings of the interventions implemented to formalise the sector, and to address the negative impacts associated with the sector's activities.

These gaps converge to three aspects namely, policy and regulation of the sector, institutional arrangements, and understanding of the sector's activities (Banchirigah, 2008; Childs, 2008; Spiegel, 2009; Maconachie and Hilson, 2011; Geenen, 2012; Collins and Lawson, 2014; Hilson, 2014; McQuilken and Hilson, 2016; Mutemeri *et al*, 2016; Salo *et al*, 2016; Smith *et al*, 2017). Overarching these aspects is the recognition and inclusion of the sector in development planning and decision-making (African Union, 2009; Hilson and Maconachie, 2020).

Several scholars have raised concerns about the failure of development agendas to influence and foster support for the transformation of the sector (African Union, 2009; McQuilken and Hilson, 2016; Hilson and Potter, 2005). The exclusion of the sector by policymakers and donors has been attributed to the heavy focus on the negative impacts of the sector and the lack of appreciation of the benefits of the sector (Spiegel and Veiga,

2010; Hilson and Gatsinzi, 2014; Mutemeri *et al*, 2016, Salo *et al*, 2016, Hilson *et al*, 2017, Hilson and Maconachie, 2020). As a result, most of the interventions implemented in the sector have focused on addressing the negative impacts with few efforts directed at maximising the socio-economic benefits of the sector.

Laing and Moonsammy (2021) argued that there is a need for a balanced assessment that considers both the positive and negative impacts of the sector. This is important in informing interventions that aim to maximise the positive benefits and minimise the negative impacts. Laing and Moonsammy (2021) further submitted that understanding both impacts allow for the value and contribution of the sector to be evaluated. Through this process, linkages between ASM and other sectors of the economy can be identified, as well as areas of synergies and conflicts leading to increased benefits for the whole mining industry. A recommendation from the AMV is that the sector's linkages need to be understood to ensure adequate coverage and consideration in development frameworks and interventions (African Union, 2009).

Over and above these recommendations, governments need to create environments that support the ASM sector thereby enabling poor communities to leverage the benefits offered by the sector. This is particularly important given the socio-economic realities that most African countries are grappling with, where there are few economic opportunities to support countries' populations.

1.3. Background to the study

While South Africa has made considerable progress in addressing the socio-economic challenges inherited from the colonial and apartheid regimes, poverty, inequality, and unemployment remain a concern. The country is still ranked to have the most unequal society in the world (i.e., it is ranked first among 164 countries) (World Bank, 2020).

According to the World Bank (2021), about 55% of the country's population is living in poverty (i.e., this is measured in terms of the Upper Poverty Line of ZAR992). On 29 March 2022, Statistics South Africa released the quarter four (i.e., Q4) Labour Force Survey Results with levels of unemployment being reported. Two measures of unemployment are used in the country, namely, the official unemployment rate and the expanded unemployment rate.

The official unemployment rate considers only the working-age population that is looking for employment. The expanded unemployment rate includes the working-age population that has given up looking for jobs (Statistics South Africa, 2022a). From the survey, the official unemployment rate was 35.3% and the expanded unemployment rate was 46.2% in 2022. According to Statistics South Africa (2022a), a total of 7.9 million people were not working in the country. Youth unemployment was reported at 66.5% (i.e., youth in the country are those aged between 14 and 35 years) (Department of Women, Youth and Persons with disabilities, 2020).

As is the case in most countries, South Africa's economy depends on various sources of growth and development. The key economic sectors include agriculture, forestry and fishing, mining, and quarrying, manufacturing, construction, electricity, gas and water, trade and transport services, as well as financial and government services. Figure 1.2 shows the contribution of various sectors to the country's GDP between 2012 and 2021. As seen in the figure, the contribution to GDP growth has remained below the targeted 5%. Moreover, the performance of various sectors has not been consistent over the study period.

The mining industry recorded positive growth only in 2013, 2015, 2017, and 2021. In the rest of the years, the sector recorded negative growth with the highest seen in 2020

at negative 0.6%. According to Statistics South Africa (2022a), about 724, 000 jobs were lost in the formal sector between 2020 and 2021. The sectors that contributed to this loss were trade, manufacturing, construction, mining, and utilities. The mining industry lost 35,000 jobs (Statistics South Africa, 2022).

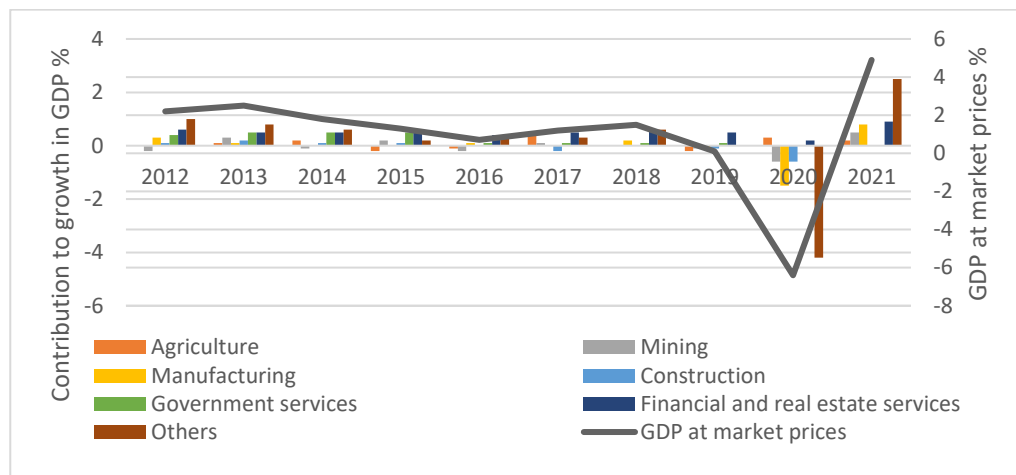


Figure 1.2: Contribution of economic sectors to the country's GDP (2012 to 2021)

Source: Statistics South Africa, 2022a

While the performance of the mining industry improved in 2021 (i.e., see figure 1.2), its overall contribution has been declining. Figure 1.3 provides the mining industry's total employment and GDP contribution between 2012 and 2020 (i.e., the latest figure). The mining industry employed 452,866 people in 2020. This compares to 524,869 in 2012 (i.e., this equates to a decline of 14%). The sector's contribution to GDP was 8.4% in 2020 and 9.1% in 2012.

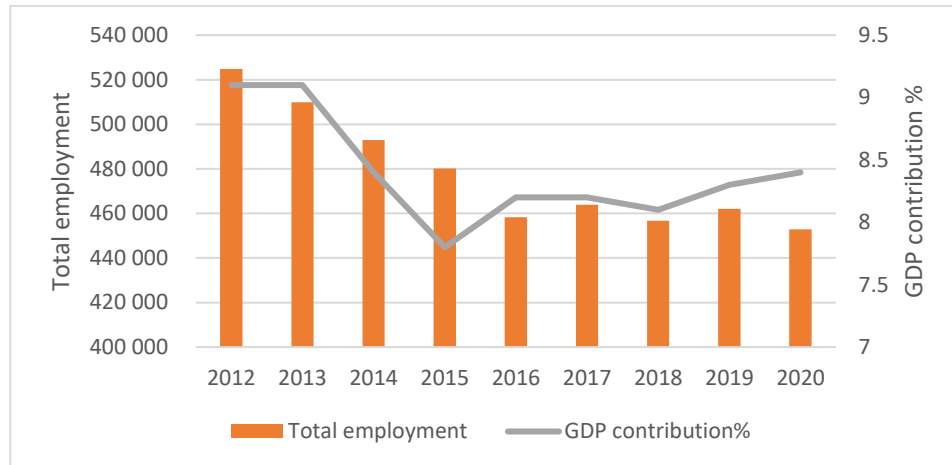


Figure 1:3: Total employment and GDP contribution of the mining industry

Source: Mineral Council South Africa (2021; 2016; 2014)

The decline in total employment and GDP contribution is linked to several factors affecting the performance of the mining industry. These include declining mineral demands and commodity prices, increasing operating costs, labour market instabilities, policy and regulation uncertainty, infrastructure constraints, declining productivity and outputs, and social license to operate (Baxter, 2016; Mbazima, 2020). Despite the current performance, the industry is of the view that mining still has the potential to contribute towards the attainment of half of the national development plan (NDP) goals (Baxter, 2015). These include contributions toward the economy and employment, infrastructure development, environmental sustainability, integrated rural economies, the transformation of human settlements, education, and skills training, as well as health (Baxter, 2015).

The question of the resource curse has also been raised in South Africa (i.e., on whether the country has been able to translate the benefits of mining to human development). According to Elbra (2013), South Africa's development path is constituted by the same characteristics that encompass the resource curse. Elbra (2013) highlighted slow

economic growth, inequality amongst the country's population, entrenched poverty, and the creation of a rentier state as evidence of the resource curse in South Africa.

In assessing the impact of mining on the South African economy, Stilwell *et al* (2000) also noted the poor linkages between mining and other sectors of the economy. Against the capacity of mining to create wealth and employment on a large scale, Stilwell *et al* (2000) highlighted that this will be possible in only two scenarios, (1) if exports increase and, (2) if policies are developed to foster linkages between mining and other sectors thereby increasing employment multipliers in the country.

The contribution of mining to human development (or lack thereof) has also been linked to the decline in total employment. The link between mining and poverty has also been raised. According to the Department of Mineral Resources and Energy (DMRE) (2018), one of the prominent features of the mining areas is poverty-stricken communities. As a result, the country has seen increasing protest action in mining areas over the past years (Ledwaba and Modiba, 2018). According to van Wyk (2018), an estimated 35 protests take place in mining areas every month. These are caused by high unemployment rates and a lack of economic opportunities in mining areas (van Wyk, 2018; ActionAid South Africa, 2018).

The other concerns that have been raised are environmental impacts affecting the livelihoods and well-being of communities (ActionAid South Africa, 2018). The shortcomings of the mining industry in terms of the transformation of the industry have also been highlighted to support the argument that the country has not fully leveraged the benefits of mining for broad socio-economic development.

In assessing the Mining Charter, which was implemented in 2004, the government expressed dissatisfaction in terms of the limited progress that the industry has made in

increasing the participation of Black South Africans and the benefits accruing to them from the mining industry (Government Gazette, 2018).

Against the challenges facing the mining industry, the DMRE (2021) has identified several intervention areas that are important in improving the performance and contribution of the mining industry in the country. These interventions cover the establishment of an exploration programme, improvement of the licensing system, implementation of regulatory frameworks, and investment in research and development, new mineral processing technologies as well as in the ASM sector (DMRE, 2021).

The identification of the ASM sector as a potential solution to the challenges facing the mining industry stems from the increase in the sector's activities across the country. Many of the activities take place in mining communities where economic opportunities are declining as a result of retrenchments in large-scale mining operations. For these communities, ASM has provided a source of livelihood to retrenched mineworkers as well as those who find themselves without employment and economic opportunities. The attention on ASM also comes at the back of the negative impacts associated with the sector's activities. In view of both impacts, there is a question on how the sector should be managed considering the role that it can play in supporting the country's development plan.

1.4. Problem definition

ASM is not a new phenomenon in the country. As in most countries, the history of the ASM sector can be situated during ancient times as well as colonial periods. Because of the history of South Africa, the sector was not supported by the colonial and apartheid governments when mining transitioned to large-scale mining. The recognition of the

sector only came through the Reconstruction and Development Plan (RDP) post-1994. The RDP was a policy framework aimed at addressing the past injustices instituted by colonial and apartheid governments (Government Gazette, 1994). Ledwaba (2017) highlighted that ASM was among the socioeconomic development programmes identified to address the disparities in the mining industry looking at ownership and participation of the country's population.

The recognition of the ASM post-apartheid led to the sector being included in the country's "new" mining policy. This then created an environment that facilitated support for the ASM sector leading to several interventions being implemented to address the challenges in the sector (Department of Minerals and Energy, 1998). Amongst the interventions was the recognition of its activities by the Mineral and Petroleum Resources Development Act (No.28 of 2002) (MPRDA) (i.e., as the "new" mining legislation). The MPRDA recognised all forms of mining including ASM activities.

At the time, the ASM sector was largely comprised of surface operations, exploiting mostly industrial minerals and construction materials, and taking place in rural areas (Ledwaba, 2017). A change in the landscape of the sector was seen in 2009, with a growing number of activities taking place in underground mines and peri-urban areas. Popularly known as *zama-zamas*, this category of miners started receiving a lot of attention in the country. One of the stories that were widely reported was an accident that killed 91 miners working underground in Harmony's disused shaft (Select Committee on Economic Development, 2009; Parliamentary Monitoring Group, 2009). Since then, there have been growing reports of accidents involving *zama-zamas*, as well

as criminal activities linked to ASM activities. These two issues have been at the centre of debates on *zama-zama* mining in the country.

Until 2017, the government's strategy has been to eradicate *zama-zama* mining activities. This was largely influenced by the perspective that the activities are conducted and/or controlled by criminal syndicates. This view has been challenged by those working in the sector, mainly civil society organisations. The opposing perspective is that *zama-zama* mining offers benefits to local communities, which cannot be ignored given the socio-economic challenges in the country. This was a submission by Oxfam during a press briefing (See Mapumulo, 2017):

“Government must acknowledge the role of artisanal mining in macro-economic development, in household income, job creation and securing livelihoods for the majority of the poor and unemployed” (dated 09 March 2017).

Against this view, several stakeholders have called for the decriminalisation of *zama-zama* mining citing its importance in job creation, poverty alleviation, small business development, empowerment of youth and women, and the ability to provide an economic option to retrenched mineworkers. The decriminalisation of the sector has also been raised against the need to address the negative impacts of the activities particularly on the environment and communities.

In calling for the recognition of the sector, several stakeholders have pointed out the shortcomings of the current mining legislation (i.e., MPRDA) and its failure to accommodate ASM activities in the country. The MPRDA has been criticised for failure to facilitate the development of the ASM sector. It was raised that it did not consider the profile of the people that engage in the sector's activities (Debrah *et al*, 2014;

SAHRC, 2015; Ledwaba and Nhlengetwa, 2016; Legal Resources Centre, 2016). The legislation has been labelled pro-large-scale mining looking at the requirements of licensing and operations (Debrah *et al*, 2014; SAHRC, 2015; Ledwaba and Nhlengetwa, 2016; Legal Resources Centre, 2016; Ledwaba and Mutemeri, 2018).

With consideration of the debates surrounding *zama-zama* mining (i.e., and broadly, ASM), the government decided to develop a policy for the sector. On 26 April 2021, the Department of Mineral Resources and Energy (DMRE) published the “*Draft Artisanal and Small-Scale Mining Policy*” for public comments. The objective of the policy is to:

“Foster the creation of a formalised Artisanal and Small-Scale Mining Industry that can operate optimally in a sustainable manner while contributing to the economy in the form of taxes and royalties and through job creation, and for the elimination of illegal ASM operations” (DMRE, 2021:6).

While this has been taken as a positive milestone for the ASM sector, there is still a need to define and establish the role of the ASM sector in the country’s development objectives so as to create an environment that supports the growth and contribution of ASM in the country’s economy. One of the conclusions from a study conducted by the South Africa Human Rights Commission (SAHRC) (2015) on unregulated ASM was that there is a need for an evidence base on the sector to understand the size, shape, and scope of ASM activities in the country. This is important in working towards economic inclusion in the mining industry, and the country.

As it stands, not much research has been conducted on the sector. There is therefore a need for research to understand the landscape of the sector, issues affecting the sector, its interactions with other economic sectors, and how these connect and/or impact the

role of the sector in the country's development objective. This is key in terms of identifying areas of intervention that will ensure that the sector's envisaged potential is attained vis-à-vis its role in the mining industry and the country's economy.

1.5. Aims and objectives of the study

The Thesis is based on the argument that the ASM sector has the potential to contribute to the country's development priorities, and hence it should be supported. This argument is translated into two overarching goals, which are:

- To establish the link between the ASM sector and the country's development objectives with the aim of ascertaining the sector's developmental potential; and
- To develop a strategy for the ASM sector. The strategy aims to identify areas of intervention and make recommendations on how the challenges in the sector can be addressed to leverage the sector's developmental potential.

The *first* goal is set out into three objectives, and these are:

- *Objective 1* – To build a profile of the people that engage in the ASM sector. This objective is underpinned by the questions, *who are the miners, are there specific groups of people that work in ASM, and how do the characteristics of the miners compare with the socio-economic profiles of the country's population*. These questions come at the base of understanding the link between ASM and the country's development because people are at the centre of development and what it seeks to achieve.
- *Objective 2* – To understand the drivers of the ASM sector and its prospects in the country. The drivers of ASM encompass the factors that underpin participation in ASM, and this is linked to the question, *what are people's reasons for working in ASM?* Understanding the drivers comes with insights

into the circumstances that are resulting in an increase in ASM activities as well as the contexts in which the sector's activities are taking place. These are important in establishing the links between the ASM sector and what is happening in the country and/or challenges facing the country's population.

- *Objective 3* – To assess the role of the sector in the country's development priorities. This objective is linked to the question, *does the ASM sector have the potential to contribute to the country's development priorities?* It involves assessing the impacts of ASM on the miners as well as communities to determine the role of the sector in the country's development plan.

Once the links between ASM and the country's development priorities have been established, the Thesis turns the attention to its *second* goal (i.e., as noted above). This goal comprises of two objectives, and these are:

- *Objective 4* – To understand the challenges in the ASM sector, and these are interpreted as factors affecting the growth and contribution of the sector. The view advanced in the Thesis is that addressing the challenges and leveraging the opportunities in ASM is a pre-requisite to leveraging the developmental potential of the sector. As such, this objective comes in with the purpose of providing a base on which the areas of intervention to inform the strategy are identified.
- *Objective 5* – To devise a strategy for the sector. Having marked the areas of intervention, this objective makes recommendations on how the challenges in the sector can be addressed to maximise its contribution to the country's development priorities.

1.6. Structure of the Thesis

Against the objectives of the study, the Thesis is structured such that it not only unpacks the various dimensions of ASM but also provides an understanding of the contexts in which the sector's activities take place which have a bearing on the role of the sector and how it fits in the country's development agenda. A funnel research approach was adopted to frame the Thesis. This is a research strategy that first provides an understanding of the aspects that are relevant to the study at the broad level to establish a base for the study. It then moves to the specific issues relating to the study. The Thesis comprises of twelve Chapters. A brief overview of each Chapter of provided below.

Chapter One: Introduction and background to the study

The introductory Chapter discusses the background to the study, problem statement, aims and objectives, and the importance of the study. These sections are preceded by a discussion on mining and development which provides a foundation for the study.

Chapter Two: The development context of South Africa

The Chapter provides a conceptual framing for the study and discusses the concept of development to understand what it entails, how it is interpreted and its key dimensions. These aspects are taken as the foundation to understand the developmental context of South Africa and the key issues underpinning the country's development objectives.

Chapter Three: The role of mining in South Africa's development

In understanding South Africa's development priorities, Chapter 3 turns the attention to the role of the mining industry in the country. The Chapter provides insights into the landscape of mining, its performance, and contribution, as well challenges and prospects. These aspects are discussed with the intention of identifying entry points to

establish the role of the ASM sector in both the mining industry and the country's development.

Chapter Four: The nexus between ASM and development

Chapter 4 provides an understanding of issues relating to ASM and development. It brings forth broad literature on ASM as it connects to various aspects of development. The Chapter discusses the history of ASM, its drivers, the sector's characteristics, interventions, and areas that need attention to support the role of ASM in development.

Chapter Five: The ASM sector in South Africa

Chapter 5 turns the attention to the South African case as the focus of the Thesis. The Chapter provides an understanding of the ASM sector alongside the socio-economic landscape of South Africa.

Chapter Six: Approach to primary data collection and analysis

The Chapter discusses the approach taken to conduct the study. The Chapter discusses the data collection and analysis methods that were used in the study. It also includes a discussion on the validity and reliability of the research, ethical considerations, and requirements, as well as the challenges and limitations of the study.

Chapter Seven: Building a profile for the ASM sector

As the first step in establishing the link between ASM and development, Chapter 7 provides the socio-economic profile of the people that are engaging in ASM activities. The Chapter also identifies ASM groups within sampled data and compares this with the demographic profile of the country's population that is most affected by poverty and unemployment.

Chapter Eight: Understanding the drivers and prospects of the ASM sector

The second step in connecting ASM and the country's development involves a discussion on the drivers and prospects of the sector. The Chapter also provides insights synthesised from the perspectives of the miners on how they view the ASM sector in consideration of their current and future participation.

Chapter Nine: Assessing the role of ASM in the country's development priorities

The third step in establishing the link between ASM and development includes an assessment of the role of the sector in the country's development objectives. This assessment is provided in three levels looking at the impact of the sector on the miners and their families, as well as on the communities where the activities are taking place. The third level of analysis provides a discussion on the links between ASM and the country's development objectives.

Chapter Ten: Unpacking the challenges in the ASM sector

Chapter 10 discusses the challenges in the sector. These are interpreted as factors affecting the growth and contribution of the ASM sector in the country, and hence form part of the areas of intervention to inform strategy for the sector.

Chapter Eleven: Devising a strategy for the ASM sector

The Chapter presents a strategy framework with recommendations on how the challenges in the sector can be addressed. The Chapter comprises of several sections discussing the principles underpinning the strategy, objectives and elements of the strategy, and recommended interventions.

Chapter Twelve: Conclusion and recommendations

This is the final Chapter in the Thesis and provides a summary of the Thesis with an overarching response to the objectives of the study. The Chapter also discusses the contribution of the study and makes recommendations for future research work.

CHAPTER 2: THE DEVELOPMENTAL CONTEXT OF SOUTH AFRICA

2.1. Introduction

To be able to explore the nexus between ASM and development, it is important to understand the concept of development, *what* it entails, and its key dimensions and measurements. The objective of the Chapter is two-fold. Firstly, the Chapter provides definitions and interpretations of ‘development’ as captured in literature. This is brought in to provide a frame through which the developmental context of South Africa is looked at considering the key aspects of development and *what* it constitutes. The second objective of the Chapter is to provide insights into the developmental context of South Africa, with a focus on the key issues and priority areas as set out in the country’s development plan. These aspects are important in establishing a base through which the developmental potential of ASM in the country is interrogated.

2.2. Development theories and constructs

The term development finds use in a variety of contexts, and it has evolved to explain certain phenomena in the global community. The debate on *what* development is continues to date with the emergence of new trends and viewpoints which challenge existing development theories and strategies. That said, there seems to be a consensus amongst scholars regarding the history of development thinking (See Hettne, 1983; Seers, 1969; Lewis, 2006; Pieterse, 2010; Vázquez and Sumner, 2013).

While some scholars trace the emergence of the ideas of development to the propositions found in major theories between the 16th and 18th centuries (See mercantilism, classical economics, economic nationalism, and others) (Pieterse, 2010),

there is substantial literature that locates the development theories at the aftermath of the Second World War.

According to Lewis (2006), the first mention of the word “development” was in the context of “post-war reconstruction”. In tracing the evolution of development, Rapley (2008) also marked the emergence of the concept at the end of the Second World War when countries were working towards rebuilding their countries. According to Rapley (2008), development theories became significant during that time. Thorbecke (2006) also noted that scholarly interest in development was invigorated by the decolonisation of most African states and the need for them to regain control of the social, economic and political landscape of their countries at that time.

According to Hettne (1983), the primary agenda of the post-war period was to transform the poor economies into modern societies thereby raising the standard of living of the people. Development thinking during that time was premised on the idea that “underdeveloped” countries will follow the same path as “industrialised countries” and become modern societies. Most of the development models at the time adopted this narrative because of the experience of Western countries, which was the only benchmark available (Tipps, 1973).

Since the 1940s, development thinking has been centred around the following models: Development Economics, Modernization Theory, Dependency Theory, Alternative Development, Human Development, Neoliberalism, and Post-development Theories. Each of these meta-theories accentuates various dimensions as prerequisites to achieving societal needs and meeting their expectations. Table 2.1 captures the dominant development theories and frameworks as well as their core elements. The various elements include economic growth and industrialisation, political and social

aspects, human development, structural reforms and liberation, authoritarian engineering and disaster (See Pieterse, 2010).

Table 2:1: Development theories and elements

Period	Perspectives	Meaning of development
1940	Development economics	Economic growth, and industrialisation
1950	Modernization theory	Growth, political, and social modernization
1960	Dependency theory	Accumulation, national, and auto-centric
1970	Alternative development	Human flourishing
1980	Human Development	Capacitation and enlargement of people's choices
1980	Neoliberalism	Economic growth e.g., structural reforms, deregulations, liberation, and privatisation
1990	Post-development	Authoritarian engineering, and disaster
2000	Millennium Development Goals	Structural reforms
2015	Sustainable Development Goals	Social, economic, environment, and governance aspects

Adapted from Pieterse, 2010

In the era of Development economics, the term development was used in the context of economic growth to explain the gap between the rich and poor countries; structural change to explain the qualitative changes that accompany economic development; poverty reduction to argue that economic growth does not automatically translate to poverty eradication; social welfare and well-being; modernisation; and sustainable development goals (Meier, 1989, Barro and Sala-i-Martin, 2004; Szirmai, 2015). At the start of the 1940s, development was equated to economic growth, and this was measured using Gross National Product (GNP), which reflected a country's national output and income over time.

Amongst the earliest models to emerge explaining the preconditions for economic growth were the Harrod-Domar growth model, Solow–Swan growth theory, and Lewis Turning Point (See Hettne, 1983). These models explained economic growth through the contexts of national savings and investments, capital accumulation, labour

productivity and output. Labelled the “*Golden Age of Capitalism*” many industrialised countries enjoyed prosperity post-1940 with rapid economic growth rates and high levels of employment (See literature on Western Europe, North America, and Japan). The economic successes of that era were associated with international commodity trade and increased exports, which led to high investments and productivity (Vonyó, 2008).

The era of Development Economics was followed by the birth of Modernisation theory in the 1950s. The theory defined development as a process whereby agrarian societies transform to become modern societies. Modernisation Theory argued that the main difference between successful and unproductive countries is the ability to embrace modernity and technological innovation (Hout, 2016). According to Antwi (2019), the theory contended that traditional societies were entangled by norms, beliefs and values which were hindering their development process. As such, the theory accentuated the importance of technology, social, and political factors as prerequisites for achieving the desired change in traditional societies.

The process to transform agrarian societies was based on Rostow’s five stages of Economic Growth Model⁹. Some of the major criticism of the model related to the linearity of the process and its disregard for the cultural diversity of traditional societies and its wanting to replace the traditional norms and practices with “modern ways”. In assuming a linear process of transformation, it was argued that Modernisation Theory

⁹ In his book “The Stages of Economic Growth”, Rostow (1960) elucidated the path, that traditional societies should follow to transition into modern societies, and this consisted of five stages i.e., the traditional society, the preconditions for take-off, the take-off, the drive to maturity and the age of mass-consumption (See Rostow, 1990). Rostow’s model defined a traditional society as one that largely depends on agriculture as means of production because of the limitations in technology to open up other production opportunities. To move away from this, these societies would have to embrace modern values and new ways of doing things. This will allow them to adopt new technologies thereby expanding their agricultural base, establishing new industries, and hence creating opportunities for income and economic growth.

failed to appreciate the unique needs and dynamics present in various societies and the influence of external factors on the process of development (Matunhu, 2011).

The criticisms toward the Modernisation theory in the 1960s precipitated new ideologies coming to explain the persistent underdevelopment of poor countries. With the widening income gap between the Western countries and Third World economies (i.e. The difference of USD3 841 and USD146 of average per capita income in 1950), economic growth as a measure of development was criticised looking at the socio-economic landscape of developing countries (Namkoong, 1999; Matunhu, 2011).

The Dependency theory is among the theories that were promoted in the 1960s. The theory criticised the viewpoint that underdevelopment was a result of internal inefficiencies brought by cultural backwardness (Namkoong, 1999). Poor developmental outcomes were connected to the relationship between Western and Third World countries, and it was argued that it was not beneficial to local development processes (Namkoong, 1999; Ferraro, 1996). Like any theory, the Dependency theory also received its fair share of criticism and most of which pertained to the ‘blind’ approach in blaming Western countries for the ills found in Third World economies (See Smith, 1979; Ray 1973; Cueva, 1976).

In 1962, the United Nations having been involved in the process of development in Third World countries reflected on its developmental journey. In the report, “The United Nations Development Decade”, the organisation proclaimed that:

“...we are beginning to understand the real aims of development and the nature of the development process. We are learning that development concerns not only man's material needs, but also the improvement of the social conditions of his

life and his broad human aspirations. Development is not just economic growth, it is growth plus change” (Department of Economic and Social Affairs, 1962).

The 1970s saw a shift in development thinking, with scholars promoting the expansion of the concept of development. According to Hettne (1983), the focus moved from devising empirical models to turning the attention to urgent issues at the grassroots level¹⁰. Several models emerged with a strong focus on people, and these accentuated principles of Basic Needs, Self-reliance, and Eco-development thereby promoting small-scale solutions, ecologically sound interventions, participatory initiatives, and other aspects (Hettne, 1983).

The focus on people as the centre of development spread to the 1980s with development defined in the context of “capacitation”, “freedom” and “enlargement of people’s choices”. Amongst the blueprint frameworks to be released was the United Nations’ Human Development Index (HDI). There was also the work of Sen (1999) which explained development as the “capability to function”. Sen (1999) equated development to freedom (i.e., the freedom to use individual capabilities to achieve what one values).

¹⁰ In 1969, the ILO launched the World Employment Programme aimed at investigating the root causes of unemployment to identify challenges and barriers, and priority areas for national governments and international donors (Bangasser, 2000; Singer and Jolly, 2012). The Programme included a series of missions to various countries and among the first countries visited was Kenya. According to Singer and Jolly (2012), the Kenya Employment Mission Report received the most spotlight in the international arena because it linked the previously dismissed “traditional economy” to persistent challenges of poverty, unemployment, and inequality. It was discovered that a significant percentage of people had turned to the traditional sector for economic opportunities and were earning some income. The issue as understood by governments and donors was not unemployment but a “problem of employment” and this was defined as a situation where people were working, but because of the *perceived* low remunerations compared to wage-employment, their work was deemed unproductive. Given these findings, the ILO urged governments to change their attitude towards the traditional sector because it had the potential to contribute towards employment and wider development priorities (Hart, 1973). On the scholarly front, the evidence emerging in Kenya was used to challenge the characterisation of traditional activities as marginal and unproductive, as well as notions that they will disappear amid industrialisation. Hart (1973) argued that the informal sector persisted during industrialisation and thrived under precarious conditions and policies providing economic opportunities to both the skilled and unskilled (i.e., see literature on the emergence of the informal sector). As noted in *Chapter 1*, the ASM sector became part of the international development agenda during the same period, in the 1970s.

The Millennium Development Goals (MDGs) were introduced in 2000 as agenda for international development. The MDGs comprised of eight goals which were tied to the objectives of alleviating poverty and hunger, promoting gender equality, decreasing diseases, protecting the environment, and forging collaborations and partnerships across the globe (World Health Organization, 2015). In 2015, the United Nations expanded these into the Sustainable Development Goals which aim to eradicate poverty by 2030.

2.3. Definitions and interpretations of development

Against the evolution of development, there is extensive literature on the interpretations of the concept. In defining development, Szirmai (2015) expressed that:

If a country has rapid development but no improvement in the living conditions of its people, we cannot speak of development.

Another popular quotation is that of British Economist, Dudley Seers (1969) who in his publication: “Meaning of Development” asserted that:

The questions to ask about a country's development are therefore: What has been happening to poverty? What has been happening to unemployment? What has been happening to inequality? If all these have declined from high levels, then beyond doubt this has been a period of development for the country concerned. If one or two of these central problems have been growing worse, especially if all three have, it would be strange to call the result 'development' even if per capita income doubled (pp. 5)

The first statement equates development to “improvement in living conditions” while Seers (1969) related development to the triple challenges of poverty, unemployment, and inequality. In both interpretations, there is an aspect of ‘change’ which is normally

equated to *what* development is. Chambers (1997) described development as ‘good change’. There is considerable literature that links development to the concept of well-being. Likewise, well-being is a multidimensional phenomenon. In some publications, well-being is defined as a dimension of poverty. Some of the characteristics attached to well-being connect it to Sen’s interpretation of the standard of living. The concept of well-being has also been captured within the “*doing well and feeling good*” mantra. This conceptualisation embodies material dimensions, economic success, personal values and perceptions, state of relationships and interactions, as well as levels of happiness, and satisfaction (White, 2010).

To explain well-being, Chambers (2006) made a distinction between “*ill-being*” and “*well-being*” with development constituting the change from the former to the latter. The dichotomy is explained within the view of *what* constitutes a “*good*” and “*bad*” life. Chamber (2006) identified the key factors separating the two extremes as material needs, health, social relations, security and protection, and freedom of choice¹¹. In his work on development, Todaro identified three objectives of development, and these include the need to: increase the availability and widen the distribution of life-sustaining goods; expand the range of economic and social choices; and raise levels of living e.g., improve the well-being of society. The first objective relates to providing basic services such as food, water, health, and security (Todaro and Smith, 2015). The second objective speaks to broadening peoples’ economic and social choices and allowing them to craft their development and the last objective is aimed at improving the well-being

¹¹ Material needs include access to basic and essential services such as income sources, food, water, shelter, and others. Being in good health without diseases is also another characteristic of well-being. Good social relations (e.g., social cohesion, respect, gender equality, and others). Security and protection (e.g., access to natural resources and safety of individuals, and communities); Freedom and choices (e.g., an environment in which people are capacitated to achieve what they value) (Butler and Kumar, 2014).

of society through various mechanisms such as the creation of jobs, increasing income levels, increasing access to better education, and others.

There was also Sen (1999) who explained development as the “capability to function”. In his work, Sen (1999) emphasised the need to eliminate a set of “unfreedoms” e.g., poverty, famine, starvation, undernourishment, tyranny, poor economic opportunities, systematic social deprivation, neglect of public facilities, intolerance, and over-activity of repressive states. The other dominant interpretation of development found in literature is the United Nations’ view on human development (i.e., as noted). The United Nation (1990) defined human development as “both the process of widening people’s choices and the level of their achieved well-being”. The HDI is a composite indicator based on three measures, namely, longevity, knowledge, and basic income for a decent living (Srinivasan, 1994; Streeten, 1994).

Within the sustainable development framework, development entails “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Keeble, 1987). The term ‘sustainable development’ was introduced in the mid-1980s. During that time, there was increasing concern about the environmental costs accompanying economic development and attention was directed to carbon emissions, environmental pollution, the use of renewable energy, global warming, and climate change. Through this lens, development involves balancing competing economic, environmental, and social demands and ensuring benefits in all spheres.

The meaning of development has also been extracted from countries’ socio-economic realities. The New Partnership for Africa Development (NEPAD) (2011) linked development to improvement in the well-being and standard of living of the people.

Based on the challenges facing most African countries, NEPAD (2011) described development as a process of ensuring that the African population has access to basic needs such as access to quality education, enhanced healthcare, decent housing, safe drinking water, and that they benefit from the natural resource exploitation in their countries. These various aspects are also the focus of the continent's developmental frameworks and also feature in the global SDGs.

2.4. Expressions of development

In the Harvard International Review (2003), Louise Frechette (former Deputy Secretary General of the United Nations) was asked if development was an external or internal process. Her response was that:

I think development is an internal process. The policy prescriptions that are promoted by bilateral donors or the United Nations may have a different impact or be received differently in different places. As a result, their success depends very much on local conditions. The leadership in these countries, however, can take charge by itself. What the outside world can and must do is make sure that external determinants are more supportive of development. This explains the importance of discussions about external debt, farm subsidies, access to markets, and the availability of official development assistance. But important initiatives must originate with the developing countries themselves (see Fréchette, 2003).

In talking about the domestication of global and continental development frameworks, Batala (2021) highlighted that the objective should not be to replace countries' development agendas but to draw linkages between the two. According to Batala (2021), the process of domesticating global and continental frameworks should involve

identifying areas of convergence and where there are gaps, the various countries need to craft strategies on how to address these. Through this process, the implementation of national development policies will translate into the attainment of global and continental development goals (Batala, 2021).

Frechette (2003) noted that countries should drive development by devising policies that provide a shared vision to guide the action of different players in realising the country's vision. Vargas-Hernández *et al* (2011) defined policy as a system of laws, regulatory measures, courses of action, and funding priorities put in place by governments to address particular issues or problems. Frederick (1963) defined policy as:

Proposed course of action of a person, group, or government within a given environment providing obstacles and opportunities which the policy is proposed to utilise and overcome in an effort to reach a goal or realise an objective or purpose.

Corkery *et al* (1995) noted that development of a country depends on the quality of the policy being developed, the decisions leading to particular policies, and the policy formulation processes. In sight of this, Corkery *et al* (1995) highlighted that the environment is the source of the demands to which policymakers must respond. Policies need to be well-defined and in tune with the issues or problems they seek to address to safeguard against any unintended consequences that may emerge during implementation. Some of the key elements to be considered during policy formulation include institutional frameworks, consultation with all stakeholders, knowledge and innovation, social, political, and economic dimensions, existing legislative frameworks, private and public partnerships, available resources, and external factors.

Given the difference in the local contexts, development as interpreted by individual countries can be expressed in different forms. As such, various strategies can be employed at different levels to achieve the set objectives. In most countries, development strategies encompass approaches conceived and implemented at the national, regional, and grassroots levels; within various contexts and locations (e.g., rural, and urban development); across various economic sectors or within particular industries; and targeting the broader society or specific groups in society (e.g., along the lines of gender, age, culture, skills, etc.).

The notion of development at the national level often embodies the role of the central government in development. Alolor (2014) explained national development as the “ability of a country or countries to improve the social welfare of the people”. Pritchett (2021) characterised national development as a four-stage transformation process that should aim to: (1) create a productive economy, (2) be a more responsive state, (3) provide capable administration, and (4) ensure identity and equal treatment of its citizens. Pritchett (2021) highlighted that national development is a crucial process in ensuring high levels of well-being. In most countries, the central government is entrusted with the responsibility of facilitating development of its country. In relation to the discussion above, this responsibility includes developing a national framework that will facilitate the process of development.

According to the United Nations Organisations (n.d.) cited in Pathak (2007), the main focus of national development is usually on the following factors (not limited to): ensuring an equal living standard for all, equal share of all profits, an equal distribution of income and capital, expansion of facilities such as education, health care, shelter, social welfare, and protecting the environment. These various aspects are informed by

local environments and the challenges facing the country's population, which are then translated to development priorities and objectives.

Development at the local level takes various forms e.g., community development, rural and urban development, and so forth. However, these are often classed under the umbrella of Local Economic Development (LED). Like most development strategies, LED approaches were first employed by Western countries. According to Roberts (1993) cited in Rodriguez-Pose and Tijmstra (2005), LED approaches emerged as alternatives to the development strategies which achieved mixed results in addressing poverty and unemployment at the grassroots level. In Africa, specifically, literature traces the history of LED to the 1990s (Reddy and Wallis, 2012).

In comparing the construct of LED approaches in Africa with those seen in Western countries, LED approaches can be 'boxed' into two categories, namely: formal activities which are driven by local governments and formal business sectors; and informal activities which include programmes initiated by community-based organisations (CBOs) and non-governmental organisations (NGOs) and may include projects targeting the informal sector (Nel, 2001).

LED frameworks were identified as potential instruments to effect economic development at the local level in developing countries. For the case of Africa, alternative strategies were needed to address the social and economic ills which at the time were aggravated by the failure of the central government to catalyse economic activities at the local level, debt crisis and currency collapses, the effects of structural adjustment programmes, and political and natural disasters (Taylor and Mackenzie, 1992; Binns and Nel, 1999). The introduction of LED in developing countries coincided

with strategy proposals on decentralisation, democratisation, state building, and so forth which were premised on addressing the shortcomings of national development.

LED approaches can be differentiated from national development by three factors e.g., where development is taking place, who the front runners are in terms of ensuring that the '*end goals*' are attained, and the principles that underscore the two development expressions. National development takes place at the national/country level and is steered by the central government. On the other hand, LED approaches are mostly restricted to particular areas and are headed by multiple stakeholders including local government, private and public institutions, and communities and their representatives. The overlap between the two is in relation to the '*end-goal*' and/or overarching objective underpinning the development strategies employed at both levels. Both levels of development aim to improve the well-being and standard of living of people.

2.5. South Africa's development context and key issues

South Africa has a three-tier system of government at the national, provincial, and local levels. All spheres of government are involved in the process of development, however, the various programmes as implemented feed from the country's national development plan (NDP). The focus of the discussion is on the country's NDP. As a base for understanding the priority areas as set out in the NDP, this section captures the country's socio-economic history to provide insights into the issues that are informing its development plan.

There is extensive literature on the importance of history in society, and in the case of South Africa, *how* its history remains a defining feature of its development context. According to Terreblanche (2002), none of the socio-economic problems facing South Africa take place in isolation, they are connected to its past. A proper diagnosis of the

country's socio-economic landscape lies in understanding its colonial and apartheid history. South Africa's timeline can be divided into seven development periods, and these include the Pre-colonial era, Dutch colonialism, British colonialism, Boer Republic, Segregation Era, Apartheid regime and Democratic government (Terreblanche, 2002; Thompson, 2001).

In his account of South African history, Thomson (2001) labelled the pre-colonial era "*The Africans*". This period is marked between Millennia B.C. and the 1480s before the Portuguese arrived in South Africa. The picture drawn by historians is based on three population groups, which are the '*first*' people in Southern Africa, and these are the San people, the Khoikhoi people, and the Bantu-speaking people. The Bantu people settled in the region after the first two populations in A.D. 300. Because of the region's vast area extent, the three populations settled in various parts of the region, with the San people in the western part, the Khoikhoi in the southern part and the Bantu-speaking settling in the eastern part of the region (Thompson, 2001).

These locations influenced livelihood patterns as practiced by indigenous people across the country. They survived on hunting, herding, and farming. There is also evidence of mining with the earliest extraction of minerals traced to the Late Stone Age. The mined products were used for domestic purposes, as well as to create wealth through trading. According to Terreblanche (2002), these livelihood strategies were sufficient for human survival, however, this changed with the arrival of Europeans in the country.

The period from 1652 until the early 1990s redefined the socio-economic landscape of the country. To summarise the impact of colonisation, Robert Elphick cited in Thompson (2001) expressed that:

“The Company and the settlers in combination ... assaulted all five components of independence together: [they] absorbed livestock and labor from the Khoikhoi economy, subjugated Khoikhoi chiefs to Dutch overrule and their followers to Dutch law, encroached on Khoikhoi pastures and endangered the integrity of Khoikhoi culture”.

Colonisation as it affected South Africa is characterised by invasion and land dispossessions, forced labour and slavery, exploitation, and economic and political exclusion. Many of the indigenous people lost their land and livestock from the raids by the Dutch and British. Land dispossessions marked the beginning of a poverty cycle and inequality amongst indigenous people. According to Terreblanche (2002), the displacement of indigenous communities had adverse impacts on their livelihood strategies. The land dispossession also destroyed the social structures that had been established to reduce the vulnerability of indigenous people shielding them from abject poverty.

The land dispossessions also gave rise to other problems which further disenfranchised indigenous people. As the share of land belonging to the Dutch and British settlers increased, there was a need for labour to work the lands and support agricultural activities. According to Terreblanche (2002), the labour demand was also necessitated by the discovery of diamonds and gold in 1876 and 1886, respectively.

To meet these demands, various laws were introduced at different points during colonisation. As noted by Feinstein (2005) and Morton (2005), the Dutch government introduced the *inboekeling* system¹² where children and women were captured during

¹² This is a system of indentured child labour instituted by Europeans in Southern Africa during the 18th and 19th centuries.

land raids to work for Dutch farmers. This system constrained indigenous people to living and working on the farms (Dooling, 2005). In taking control of the administrative powers in the 1800s (i.e., see British colonialism), the British regime also implemented a series of laws aimed at addressing the labour issues.

They introduced a system of labour contracts where workers were bonded to their employers and imposed penalties for non-compliance. The British instituted the proletarianisation process, where indigenous people were forced into wage labour. Literature links the British approach to economic development to Adam Smith's ideologies of economic liberation, self-regulating markets, atomistic individualism, self-interest, and sanctity of property rights (Terreblanche, 2002). The British's approach was also linked to segregationist ideologies and Social Darwinism, and these instituted principles of racial domination and superiority. Terreblanche (2002) argued that racist ideology and white domination were crystallised during the British tenure. These ideals were carried through the other development periods (i.e., Boer Republic, Segregation Era, and Apartheid regime).

According to Terreblanche (2002), segregation took several forms, namely: territorial segregation between whites and blacks, in rural and urban areas; segregation in political and educational institutions; and segregation in the workplace. The impacts of colonisation and apartheid rule had far-reaching consequences on indigenous people. In addition to losing their livelihoods, most lost their economic independence as they were subjugated to forced labour. There is abundant literature on the "rise and fall" of the peasant economy in South Africa, which entails the ability of indigenous people to develop a successful agricultural economy at the back of indigenous knowledge and skills (See Bundy, 1972; Lewis, 1984).

The period of colonisation also resulted in the end of entrepreneurship amongst indigenous people as the peasant economy was effectively destroyed. The peasant economy also provided avenues where indigenous people gained skills and further improved their agricultural knowledge, and this was destroyed. The policy on separate development further deteriorated the socio-economic status of indigenous people by restricting them to overpopulated homelands with no economic resources.

The reliance of indigenous people on mining, agriculture and *other* white-owned industries continued until the 1970s when economic opportunities started to diminish in the country (Terreblanche, 2002). This period saw the emergence of events that challenged the legitimacy of the Apartheid government. The country's economy fell into recession, and among the consequences of this was declining employment in the mining and agricultural sectors. As a result, many indigenous people were left without any livelihood sources.

Van der Berg and Bhorat (1999) linked the high levels of unemployment to the deceleration of economic growth, reduced job creation capacity, power struggles and political crises. The rise in unemployment was also linked to mechanisation in the mining industry leaving those without the required skills without jobs. With modernisation, a considerable percentage of the unskilled labour force became redundant and structurally unemployed¹³. Poverty was deepened by the loss of employment in the formal sector (Terreblanche, 2002). Poverty was most severe in rural areas (i.e., previously homelands), elderly, children, those with disabilities, and women.

¹³ Structural unemployment is a situation where the economy is unable to absorb labour because of the misalignment between available jobs and skills levels of the unemployed (Amadeo, 2019).

The other socioeconomic ills that the new government had to deal with were high levels of violence and crime. Terreblanche (2002) noted that the culture of crime in contemporary South Africa was nurtured by violence instigated during colonialism and apartheid regimes. The country had one of the highest crime rates in the world at the dawn of democracy. This was exacerbated by the poor socioeconomic conditions which resulted in a considerable percentage of the population seeking a living in criminal activities (Terreblanche, 2002).

2.6. Policy responses and interventions

The socio-economic issues inherited from colonial and apartheid governments became the central focus of policy interventions post-1994 when the democratic government took power. Since then, several development frameworks have been implemented and these include; the Reconstruction and Development Programme (RDP) of 1995 (Government gazette, 1994; Blumenfeld, 1997); the Growth, Employment, and Redistribution (GEAR) strategy of 1996 (Blumenfeld, 1997); the Accelerated and Shared Growth Initiative of South Africa (ASGISA) of 2005 (The Presidency, 2008); the New Growth Path (NGP) of 2010 (Hendriks, 2013); and the National Development Plan (NDP) of 2012 (National Planning Commission, 2011).

Alongside the evolution of development, these various agendas adopted different strategies of development. However, in considering the socio-economic landscape of the country, a common feature found across the development agendas encompasses the need for the country to address the injustices that came with the history of the country, which has strong links with the development issues in the country. Another common objective is to build the country's economy to address challenges of poverty, unemployment, and inequality.

The current development framework is the National Development Plan (NDP), which was introduced in 2012. The NDP aims to eradicate poverty and inequality in the country by 2030, and this is linked to improving the standard of living of the country's citizens. The various development targets as captured in the NDP include reducing the percentage of households with income below R419 per person per month from 39 % to zero in 2030. The NDP further aims to reduce the Gini Coefficient from 0.69 (i.e., in 2009) to 0.60 (i.e., in 2030) (National Planning Commission, 2011).

Other targets include increasing the national income of the bottom 40% from 6% (i.e., in 2010) to 10% (i.e., in 2030); expanding ownership of assets of historically disadvantaged groups; and ensuring continued access to basic services e.g., education, health care, energy, water and sanitation and others (National Planning Commission, 2011). The NDP also aims to increase the number of employed people to 24 million (i.e., this is set against the benchmark employment of 13 million in 2010), as well as the per capita income from R50 000 (i.e., in 2010) to R120 000 (i.e., in 2030) (National Planning Commission, 2011). Table 2.2 captures these focus areas with highlights of the key aspects.

The NDP is supported by thirteen focus areas, and these include creating employment, expanding infrastructure, transitioning to a low-carbon economy, transforming urban and rural communities, improving education and training, ensuring quality healthcare, building a capable state, fighting corruption, and fostering social cohesion. The strategies identified in the NDP include increasing exports, improving skills development, lowering the cost of living for the poor, investing in competitive infrastructure, reducing the regulatory burden on Small, Micro, and Medium (SMMEs), attracting private investment, improving the performance of the labour market, and

providing access to economic opportunities to young and unskilled workers, and transforming ownership of the economy (National Planning Commission, 2011).

Table 2:2: NDP focus and key strategies

Focus areas	Key aspects
Economy and employment	This entails fostering inclusive economic growth and increasing the levels of employment in the country. The key strategies identified include – attracting investments, increasing exports, skills development, creating a favourable environment for SMMEs, improving the performance of the labour market, economic opportunities to young and unskilled workers, and transforming ownership of the economy.
Economy infrastructure	This includes maintaining key infrastructure to support economic growth (i.e., electricity, water, transport, and telecommunication). Key strategies include – providing access to services, stimulating competition, supporting innovation and technology, promoting regional integration infrastructure programmes.
Environmental sustainability	This area covers environmental stewardship and building resilience to the impacts of climate change in the country. Key interventions - investment in consumer awareness, green processes, and technologies, investment in renewable energy technologies, education programmes, development of appropriate policy and legislative frameworks, and strategies to improve rural livelihoods.
Integrated and inclusive rural economy	This covers the need for economic and political opportunities for rural communities to eradicate poverty. Areas of intervention include agricultural development, land reform, and livelihood strategies, access to basic services, health care, education and food security, land use planning, and the role of the different government departments.
Positioning South Africa in the world	This encompasses defining the national interests concerning global commitments and sustainability of the country's natural resources, the role of South Africa on the continent, cooperation, and integration in Africa.
Transforming human settlement	This covers the need to address historic spatial patterns that continue to exacerbate poverty and inequality in the country. This focus area is also linked to the need to balance spatial equity, economic competitiveness, and environmental sustainability. Some of the interventions include improving housing and property rights policies, spatial planning and incentive programmes, and integrated development planning.
Improving education, training and innovation	This is linked to the need to build national capabilities and covers aspects such as enhancing the quality of early childhood development, basic education, and higher education, setting up adult learning centres, as well as research and development to increase the country's competitiveness.
Promoting health	The priorities outlined in this area include the need to address social challenges that affect health and disease, strengthen the health system, prevent and reduce the health burden, increase the funding mechanisms, and improve human resources in the health sector.
Social protection	The objective of this focus is to eradicate poverty, hunger, and malnutrition. Some of the key programmes include social protection for the unemployed poor, creating employment, household food security, and nutrition initiatives.
Building safer communities	The aspects covered include working towards an integrated approach to safety and security, revitalising community-safety centres, and the protection of vulnerable groups including women and rural communities.
Building a capable and developed state	Building a capable state is envisioned to require public service that is aligned to the developmental goals, organs of state that have skills and experience to deliver on their mandate, improving the working relationship between all spheres of government, and the need for clear roles and responsibilities.
Fighting corruption	Some of the key strategies include anti-corruption systems, increasing public awareness about corruption activities, access to information to ensure transparency and accountability, and strengthening the independence of the judiciary.
Transforming society and unity in the country	This area aims to build unity amongst its citizens for an inclusive society. Strategies include building capabilities through access to education, health care, and basic services, providing employment, and addressing transformation issues.

Source: National Planning Commission, 2011

2.7. The current situation

On 27 April 2019, South Africa commemorated 25 years of democracy. To reflect on the journey, the President of the Republic, Cyril Ramaphosa launched a national report to assess the progress made since the first democratic elections in 1994. The primary objective of the report was to identify the successes and failures in realising the aspirations of the NDP. In the report, the President asserted that significant progress has been made in numerous areas of the country's development plan. The policies and interventions implemented in the past 25 years have created an environment where the majority of the population has access to basic services and economic opportunities needed to improve the standard of living.

Specifically, the democratic government expanded the welfare system which was skewed towards the white minority to provide basic services and infrastructure to indigenous communities (DPME, 2019). This was achieved through the implementation of a series of pro-poor policies. At the core of government's programmes is the social wage system, which is targeted at impoverished communities, specifically women, children, the elderly, and people with disabilities (DPME, 2019; DPME *et al*, 2018). According to DPME *et al* (2018), the number of social grant's beneficiaries increased from 2.6 million in 1996 to 17 million in 2018.

In addition to the social wage system, the government introduced numerous programmes aimed at creating employment opportunities¹⁴. There have also been programmes aimed specifically at tackling youth unemployment. A series of programmes and policy frameworks have also been implemented in the workplace to

¹⁴ The flagship programmes include the Expanded Public Works Programme (EPWP), Community Work Programme (CWP), and subsidised employment programmes.

address challenges of underemployment and labour rights (DPME, 2019; DPME *et al*, 2018). Overall, these interventions have improved the socioeconomic landscape of the country, with the standard of living of most of the population reported to have increased compared to apartheid times. Figure 2.1 shows poverty and inequality trends measured in various periods.

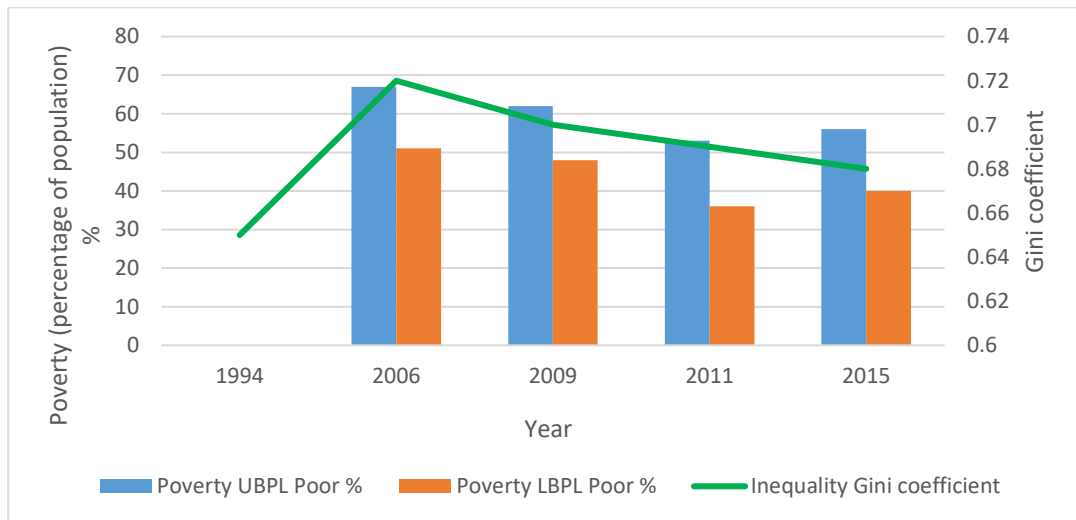


Figure 2.1: Poverty and inequality trends from 1992 to 2015

Source: DPME *et al*, 2018

As seen in figure 2.1, poverty and inequality are lower compared to 2006. South Africa uses various development indicators to track progress made in improving the standard of living. As noted by the Presidency (2009), the country has 76 indicators that converge into the following priority areas: economic growth and transformation, employment, poverty and inequality, health, education, social cohesion, safety and security, governance, and others. In measuring poverty, the country uses poverty lines, per capita income, living standards measures, and other tools (i.e., the details on the poverty indicators are provided in *Chapter 9* of this report).

The Lower Bound Poverty Line (LBPL) and Upper Bound Poverty Line (UBPL) as captured in figure 2.1 are the amounts needed for an individual to meet the *set* standard of living. The LBPL is based on a poverty line of R647 (i.e., 2015 prices) and the UBPL is measured from a poverty line of R992 (i.e., also 2015 prices). The government also measures poverty against the Multidimensional Poverty Index (MPI) which was built to include non-monetary items to measure poverty (DPME *et al*, 2018). From the figure, both the LBPL and UBPL show a decline in poverty levels between 2006 and 2015. The LBPL shows a decline from 51% in 2006 and 40% in 2015. The percentage of the population living below the UBPL decreased from 67% in 2006 to 56% in 2015.

While the figures provided show a decrease in poverty levels between 2006 and 2015, and when compared to the landscape in 1994; it is also seen that poverty levels increased between 2011 and 2015. According to DPME *et al*, (2018) the most affected by poverty continue to be female-headed households, Black South Africans, the population with low levels of education, those who are economically inactive, youth and children, and those residing in rural areas.

Figure 2.1 also shows the inequality between 1994 and 2015. As captured, the level of inequality has increased from 0.65 in 1994 to 0.68 in 2015. This has been attributed to the high-income inequality and wage gaps between low-skilled and high-skilled jobs. According to DPME *et al* (2018), high-skill jobs earn five times more than low-skill jobs. The growing inequality is also linked to high unemployment levels, which are affecting those that are already struggling.

Figure 2.2 shows the unemployment rates in the country from 2001 to 2021. Two definitions of unemployment are used, namely, official, and expanded unemployment rates. The expanded unemployment rate is calculated from the share of the working age

population (i.e., aged between 15 and 64 years), that is unemployed and are available for work, however, are not looking for employment because they are discouraged by the lack of employment opportunities in the country.

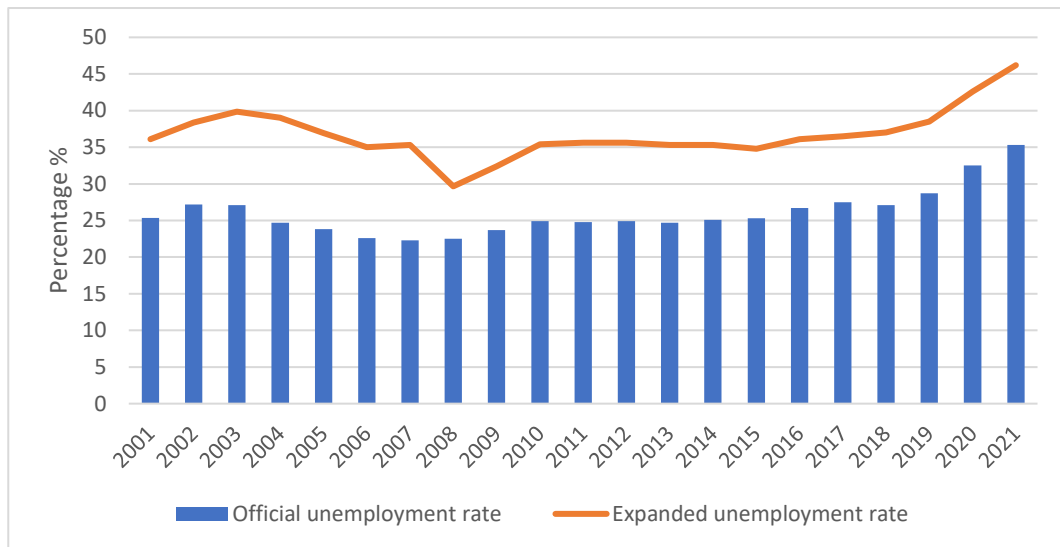


Figure 2:2: Unemployment levels, 2001 to 2021

Source: DPME, 2019; Statistics South Africa, 2020; 2022

The official unemployment rate includes the working age population, which is not working, and are looking for employment (Statistics South Africa, 2021). In 2021, the expanded unemployment rate was 46.2%; an increase from 38.5% in 2019. The official unemployment rate was 35.3% and this compared to 28.7% in 2019. The levels of unemployment are the worst among the young people in the country. The youth unemployment rates amongst the age groups 15 to 24 years, and 25 to 34 years were 63.3% and 41% respectively in 2021 (Statistics South Africa, 2022).

The high levels of unemployment are attributed to the failure of the labour market to create job opportunities. This is linked to skills disparities and poor education backgrounds, which result in most of the working-age population being unable to access

available jobs. The performance of the economy has also contributed to high rates of unemployment. The country recorded a GDP of 2.2% in 2015, and 0.2% in 2020 (National Planning Commission, 2020).

With less than ten years left to achieve the targets captured in the NDP, the broad assessment is that these will not be achieved given the challenges that the country is facing. The DMPE *et al* (2018) identified two factors that have contributed to lessening poverty and inequality in the country, and these are labour income and social grants. Labour income contributed 60% to the decline in poverty headcount and poverty gap in 2015. The social grants reduced poverty headcount and poverty gap by 8% and 30%, respectively in 2015. While social grants remain central to poverty alleviation, the sustainability of the system is expected to be comprised by the country's financial performance and as such, further expansion of the system may not be possible (DPME *et al*, 2018; Ngwakwe and Iqbal, 2021).

Labour income as a factor of poverty reduction depends on the expansion of the labour market and participation of the working-age population. As noted by the National Planning Commission (2020), there is a need to increase employment opportunities for the burgeoning working-age population. More so, there is a need for a labour market that is adaptive and responsive to the profile of the working age population. The government has identified several avenues amongst which include opportunities in the SMME sector particularly for those who are struggling to enter the labour market.

2.8. Chapter summary

The objective of the Chapter was to provide a foundation on which the role of the ASM sector in the country's development is interrogated. The Chapter provided a discussion on the concept of development, its constructs, *what* it means, and *how* it is interpreted.

In understanding the concept of development, the developmental context of South Africa was discussed. Particular attention was directed at the key issues underpinning the country's development plan. The insight from the Chapter is that South Africa's development is tied to the need to address structural issues as well as the immediate challenges that are affecting the standard of living of its population. The question on the role of the ASM sector in South Africa's development needs to be answered in terms of the ability of the sector to contribute towards addressing the socio-economic issues in the country.

CHAPTER 3: THE ROLE OF MINING IN SOUTH AFRICA'S DEVELOPMENT

3.1. Introduction

The mining industry is amongst the key sectors that are central to South Africa's development plan because of its links to several of the NDP's objectives. Specifically, the mining industry is expected to contribute towards the following objectives: environmental sustainability, integrated and inclusive rural economy, positioning South Africa in the world, transforming human settlements, education, innovation, and training, and promoting health (Baxter, 2015).

While this is the case, the contribution of the mining industry to socio-economic development depends on several factors. It is therefore important to understand the mining landscape as well as the challenges and opportunities to identify avenues to maximise the industry's contribution to countries' developmental outcomes. Against these, the Chapter discusses the role of mining in the country to provide a base for establishing the role of the ASM sector in both the mining industry and the country's development plan.

3.2. Landscape of the mining industry

South Africa has a long history of mining, with the start of mineral exploitation traced to 150 years ago. Mining in the country continues to be supposed by its mineral endowment which is estimated at USD2.5. trillion (DMRE, 2022a). The country ranks fifth in terms of the production value of metallic minerals and coal in the world (ICMM, 2018). It has the largest reserves of Platinum Group Metals (PGM), manganese, chromium, and vanadium. The country has deposits of more than 50 mineral

commodities falling under the following categories: precious minerals, energy minerals, non-ferrous metals and minerals, ferrous metals and minerals, and industrial minerals (DMR, 2019; DMRE, 2022). According to DMR (2019), the country has mineral reserves to support the mining industry for another 30 years because some of the available resources remain untapped.

Mining in the country is taking place in various provinces based on the distribution of mineral resources. The major mining provinces are Limpopo, Mpumalanga, and North West. In all provinces, mining accounts for more than 20 % of the provincial GDP (Mineral Council South Africa, 2022). In terms of the structure of the industry, there are three categories of mining operations mainly differentiated from the scale of operations. These include large-scale mining, junior and emerging mining, and ASM operations. The mining industry is dominated by large-scale mining accounting for 90% of the mining operations, while junior mining represents 10% of the mining industry. While there are registered ASM operations, most of the activities take place without mining licenses making their share in the industry negligible (Landu, 2014).

Over the years, there has been an increased focus on junior mining and what is called “*emerging miners*”. According to Mineral Council South Africa (2021a), junior mining companies are involved in exploration, early stages of mine development and some are mining. The various companies are involved in different minerals, but mostly industrial minerals, diamonds, coal, iron ore and manganese, and semi-precious stones. ASM operations also exploit several minerals, with the majority involved in industrial minerals and construction materials.

3.3. Contribution of the mining industry

The benefits of mining in South Africa are in the areas of foreign direct investment (FDI), GDP growth, state revenue, infrastructure development, employment, and communities' development (Baxter, 2015). Figure 1.3 illustrated the total employment, and GDP contribution of the mining industry in the country (i.e., from 2012 to 2020). From the figure, it was seen that while overall contribution has declined, the industry still employs a considerable percentage of the country's workforce with a GDP contribution of 8.4% in 2020. This equated to about R480 billion. Figure 3.1 provides mining employment by mineral commodity. The figure also shows the production outputs during the same period (i.e., 1994 to 2021).

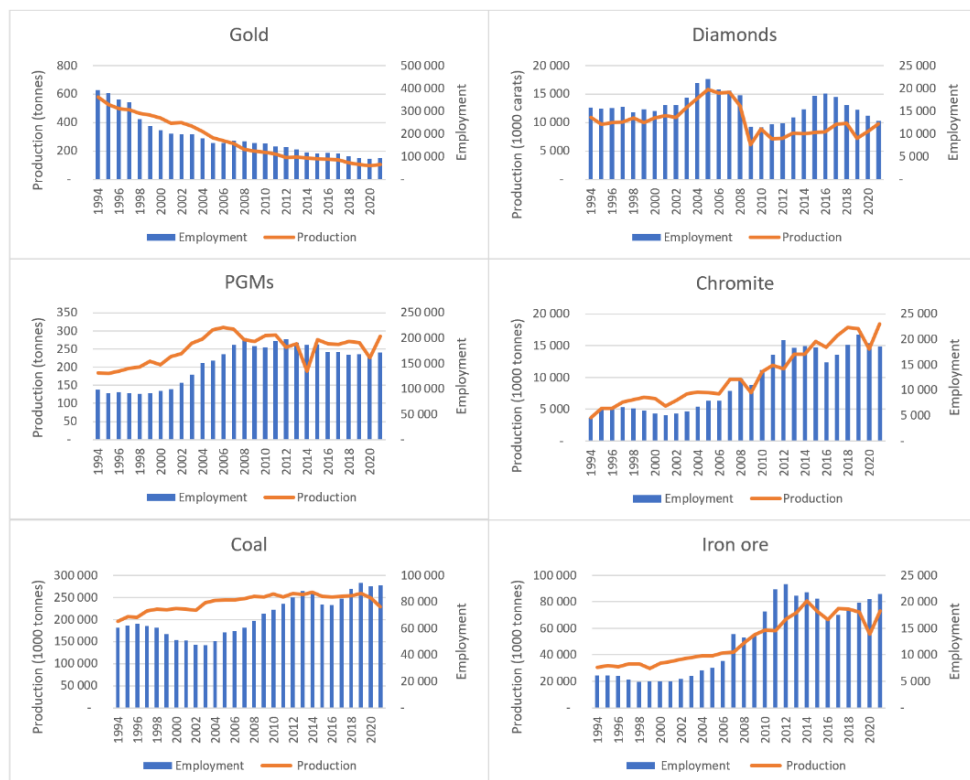


Figure 3.1: Employment and production outputs by commodity, 1994 to 2021

Compiled from Department of Mineral Resources, (2014; 2019); Mineral Council South Africa, (2010; 2021)

As seen in the figure, the gold sector experienced the largest decline with production and employment contracting by 77% and 83% between 1994 and 2021, respectively. The other sector that has contracted is the diamond sector. The employment figures declined by 18%, and the production output decreased by 10% during the same period. The other four sectors have been performing relatively better with the trends showing increases in production and employment. While the PGM sector has grown since 1994, it has experienced slumps in both production levels and employment figures. Total employment contracted by 15% between 2011 and 2020. This is concerning because the PGM sector is currently the largest employer in the industry accounting for 36 % of the total mining workforce¹⁵.

The second largest employers are the gold and coal sectors. In 2020, both sectors employed about 91,000 employees. A worrying observation concerning the coal sector (as depicted in the figure) is that the production outputs seem to have plateaued. This appears to have affected employment levels, with a decline reported between 2019 and 2021. In the case of the chrome and iron ore sectors, overall increases in total employment and production are seen. The two sectors currently employ about 18,599 and 21,427 people respectively.

In addition to employment and GDP growth, the mining industry contributes to state revenue, fixed investments, export earnings, and infrastructure development. State revenue is generated through private taxes, royalties, and employees' taxes. Mining contributes between 6% and 8% to the total government revenue (Baxter, 2015). In 2021, royalties amounted to R27.9 billion, compared to R14.2 billion in the previous

¹⁵ According to Mineral Council South Africa (2019c), among the factors affecting the performance of the PGM sector are the changes in supply and demand resulting in declining commodity prices. Recycling and the use of palladium in catalytic converters have also affected the demand for platinum.

year. The company and employees' taxes contributed R78.1 billion to the national fiscus in 2021 (i.e., compared to R38.6 billion in 2020). Mining also contributed 14% to total fixed investments, and 24% to export earnings (Mineral Council South Africa, 2021).

The other benefits from mining encompass its responsibilities towards the country's transformation and socio-economic development agenda, and these are targeted at employees and communities. These include the Skills Levy which is 1 % of the payroll (Mineral Council South Africa, 2020). According to Mineral Council South Africa (2022), the industry has contributed more than R6 billion to skills development between 2016 and 2020. The other contributions are made through the requirements of the Broad-Based Socio-Economic Empowerment Charter (i.e., Mining Charter) and the Social and Labour Plans, which cover areas of enterprise and supplier development, human resources development, employment equity, housing, and living conditions, downscaling and retrenchments and mine community development (Government gazette, 2018).

3.4. Key issues in the mining industry

The broad commentary coming from the industry stakeholders on the role of mining in South Africa's development is that while the contribution of mining is smaller compared to 1994, it remains crucial to the development agenda of the country. Netshitenzhe (2018) argued that mineral exploitation will remain part of South Africa's core strategy of development in the foreseeable future. Based on the country's mineral wealth, the government and mining industry remain positive about the prospects of the industry and its role in the country's development.

In response to this view, Jeffrey (2018) noted that mineral endowment alone is not enough to foster a successful mining industry. Global experience shows that natural

resource abundance does not automatically equate to positive developmental outcomes. A favourable environment must be created to improve the performance of the mining industry as well as its contribution to socio-economic development. At the base of this, is understanding the country's context and the challenges that it is facing. South Africa's mining industry has been constrained by several issues. Figure 3.2 broadly captures some of the main issues facing the mining industry. These are categorised into five groups, which capture the technical; economic; political; health safety and environment; and social and community issues.

Due to its long history of mining, several technical challenges confront the South African mining industry. While the country's mineral potential is still ranked high, the easily accessible deposits have been depleted. In 2007, the gold sector lost its position as the largest producer of gold in the world (George, 2007; 2008; Statistics South Africa, 2015). This is attributed to declining productivity as a result of increasing the depth of mining and associated costs. According to Neingo and Tholana (2016), 95% of gold produced in the country comes from underground mining. South Africa has the deepest mine in the world with mining taking place at 4km. Increasing mining depth affects working conditions and the cost of mining. Neingo and Tholana (2016) indicated that temperatures as high as 60°C have been recorded in some underground mines. There is therefore a need for refrigeration which further add to the costs.

Technical	Economic	Political	Health, safety and Environment	Social and community issues
• Deepening ore bodies • Declining grades • Increasing cost of production • Geological complexities • Diminishing reserves	• Commodity prices • Exchange rates • Cost of inflation • Cost of electricity • Supply and demand • Section 54 stoppages • Cost of compliance (i.e. Carbon Tax) • Infrastructure constraints	• Policy uncertainty • Licensing and administration • Compliance issues • Environmental obligations • Labour instability • Corruption • Land expropriation debates • Nationalisation • Transformation	• OSH challenges • Illegal mining • Past environmental legacies • Environmental impacts • Climate change	• Stakeholders' relationships and trust • Community unrests • Community expectations and demands • Free, Prior, and Informed Consent (FPIC) • Social license to operate • Challenges within municipalities • Traditional leadership • Delivery of SLP commitments • Illegal mining

Figure 3:2: Key challenges facing the mining industry in South Africa¹⁶

Source: Compiled from literature, 2020

According to Jeffery (2018), difficult working conditions are seen in the PGM sector as well. South Africa also hosts the deepest platinum mines at 2km below the surface (Biffi *et al*, 2006; Jeffery, 2018). Due to the geological conditions associated with the Bushveld Igneous Complex (BIC), platinum mines are also confronted with high underground temperatures as high as 70°C making working conditions difficult and expensive. As a result, productivity in the platinum sector declined by 49% between 1999 and 2014 (Baxter, 2016).

The industry is also dealing with the high cost of production. The Mineral Council South Africa (2021) highlights that mining costs have been increasing on average by 10% per year. The increase in costs is linked to rising electricity costs. In the case of the gold sector, electricity accounts for 25.7% of the total input costs (Mineral Council South

¹⁶ The objective of the Mine Health and Safety Act No. 29 of 1996 is to ensure the health and safety of mineworkers in South Africa. Section 54 of the Act deals with dangerous working conditions in mining operations. The Act gives the Inspector in the Department of Mineral Resources and Energy the power to decide if the mine should be closed (i.e., issue a Section 54 notice) or not after assessing the working conditions. According to Ryan (2016), the Chamber of Mines South Africa reported that Section 54 work stoppages resulted in a loss of R4.8 billion in 2015.

Africa, 2021). According to Moolman (2021), electricity tariffs increased by 753% between 2007 and 2021. Another challenge linked to electricity is the security of supply as the country is struggling to meet power demands. South Africa has been implementing loadshedding, where power is cut off for particular periods to reduce the load on the power system. This has had adverse impacts on the economy and its many sectors including the mining industry. There have been cases where several mining operations had to suspend activities because of power cuts (Seccombe, 2019; Mineral Council South Africa; 2019).

In 2019, the government signed the Carbon Tax Bill into law. The objective of the legislation is to implement tax requirements on carbon dioxide releases in the country. The mining industry is amongst the largest consumers of coal-generated electricity and this legislation is expected to increase the cost of production, further affecting the performance of the industry. The cost of compliance is estimated between ZAR90 million and ZAR1.8 billion per annum (Mineral Council South Africa, 2019).

The health and safety issues in the industry arise from difficult working conditions as noted above. While the mines' safety records have improved substantially with the implementation of the Mine Health and Safety Act (No. 29 of 1996), the industry reported an increase in fatalities in 2021 compared to 2020. The number of fatalities in 2021 was 74 compared to 60 in the previous year. According to Mineral Council South Africa (2021), the main causes of accidents are fall of ground, transportation, and general type activities. The gold and PGM sectors reported the highest number of fatalities in both 2021 and 2020.

At a policy level, the main concern is the stability (or lack thereof) of the policy and regulatory frameworks to provide a conducive environment for mineral-led

development. Industry stakeholders have been at loggerheads over the main legislative frameworks governing mining activities in South Africa, specifically the Mineral and Petroleum Resources Development Act (MPRDA) Amendment Bill. Since its release in 2013, the Bill has been in and out of parliament. The underlying concerns relate to the impact of the delayed finalisation of the MPRDA on the investment prospects in the country.

The Mining Charter has also brought contention in the industry. For the first time in the history of the country, mining companies and communities interdicted the enactment of Mining Charter III with the key issue being poor stakeholder consultation by the DMRE. The other areas of concern in the Charter related to the additional socio-economic targets that mining operations are required to meet. The other political issues that have dominated stakeholders' discussion and stirred pressure on the industry are labour demands and protest actions, land expropriation and nationalisation debates, and issues concerning transformation.

The other challenges facing the industry are environmental legacies and the consequences of poor mining closure. These legacies have given rise to numerous challenges and pressures including stringent environmental regulations, illegal mining, and conflicts with mining communities. Amongst the sources of conflict between communities and mining companies are the negative impacts of mining on the environment. Acid Mine Drainage (AMD), which continues to flow from abandoned mines and waste dumps is one of the legacies of past mining activities.

According to SAHRC (n.d), various mining communities are dealing with surface and groundwater pollution from AMD. The most affected communities are located in the following mineral fields: Witwatersrand Gold Fields, Mpumalanga Coal Fields,

KwaZulu-Natal Coal Fields, and the O’Kiep Copper District in the Northern Cape. According to Mujuru (2016), the impacts of AMD extend beyond environmental concerns. The poor management of AMD has social and economic implications as evidenced in Carletonville where residents had to be relocated because of the impacts of AMD. The other environmental challenges associated with the industry’s operations are land use management, mining in sensitive and protected areas, rehabilitation and closure, and impacts on water, land, and atmosphere, which spread to other livelihood options that communities are dependent on (SAHRC, 2016).

Given the challenges above, EY (2021) identified social license to operate (SLO) as the top risk facing mining operations. Defined as communities’ acceptance of mining activities, SLO is mostly a factor of impacts of mining on communities (i.e., both positive and negative) and how these are dealt with considering the needs of communities. In the case of South Africa, SLO is often tied to the environmental impacts of mining, access to basic services as well as economic opportunities and benefits. According to van Wyk (2018), the country has seen increased community protests in mining areas, and most of the protest action is linked to lack of job opportunities and poor service delivery. Poverty and unemployment are amongst the biggest issues in mining areas, with most communities still living in abject poverty (Government gazette, 2018). With the declining performance of large-scale mining operations, an increasing number of communities are turning to ASM for livelihoods.

Illegal mining is another concerning issue in the mining industry. Over the past decade, the country has seen an increase in illegal mining taking place in operating mines, concessions where there are active mining licenses, and in abandoned mines. These activities take place in various mineral commodities, but mostly gold, diamonds, coal,

and chrome across the country. According to the Mineral Council South Africa (2019), some of the activities are organised and supported by criminal syndicates. The direct impacts on the mining industry include safety and security concerns as the activities interface with operating mines, theft and damage of infrastructure, and economic loss because of illicit mining and trading (Mineral Council South Africa, 2019).

3.5. Outlook on the mining industry

In view of both the challenges and the current role played by the mining industry in the country, the debates on the future of the industry have been driven by the question “*Is South Africa’s mining industry a sunrise or sunset industry?*” A sunrise industry is described as an industry that is attractive to investors and has the potential to stimulate economic growth and increase employment levels. It is characterised by opportunities stemming from exploration, extraction of new mineral resources (i.e., green minerals), and introduction of innovative technologies and practices. A sunset industry, on the other hand, describes an industry that while still important to an economy, is declining and losing its competitiveness, the capacity to generate employment and profits, and is characterised by high environmental costs.

Because of the mixed performance of the mining industry and the socio-economic challenges in the country, there are divergent perspectives in terms of the potential of the industry in realising the country’s development priorities. Some stakeholders argued that mining is a sunrise industry and have supported this with evidence of the industry’s contribution to the country’s economy (i.e., as measured through FDI, export earnings, fixed investments etc.). Against these submissions, Mineral Council South Africa (2018) labelled the mining industry a “*flywheel*” of the country’s economy because of

the financial value accrued from exports, production, fixed investments, and employment.

In his keynote address at the Mining Indaba, President Cyril Ramaphosa (2019) also advanced that mining is a sunrise industry citing the level of investment raised by the industry (i.e., mining accounted for 15% of the total FDI). According to Ramaphosa (2019), mining has the potential to facilitate growth, competitiveness, and transformation (See President's Address at the Mining Indaba, 2019). The Minister of Mineral Resources, Gwede Mantashe (2019), also supported this view referring to an investment of R45 billion raised in 2018 and a further R110 billion with the potential of the industry to create 32 000 jobs (See Minister's Budget Speech, 2019).

Notwithstanding the contribution of mining to the economy; some stakeholders hold the view that mining is a sunset industry. These stakeholders argue at the back of the socioeconomic landscape of mining communities which is mostly characterised by abject poverty and limited economic opportunities. The standing view is also that the majority of South Africans are still not benefitting from mining operations. The leader of the Association of Mineworkers and Construction Union (AMCU), Joseph Mathunjwa (2019), echoed this asserting that the benefits of mining still accrue to multinational companies.

Speaking at the launch of the book *"The future of mining in South Africa: Sunrise or sunset"*, Gwede Mantashe (2018) spoke about *"pressure points"* in the industry and these include community demands and expectations, communities' attitudes towards mining, and environmental legacy of mining operations. The Minister (2018) advanced that mining will be a sunrise industry if all these challenges facing the industry are

addressed. The Minister (2018) is recorded saying, *“Mining is about people. When it is not about people, it collapses”* (See Campbell, 2018).

This *“people-centred”* perspective dominated the debates on the potential impacts of the fourth industrial revolution in the mining industry. With potential loss of employment, some stakeholders are struggling to embrace the prospects of Mining 4.0, which brings with it technology and innovation in the areas of artificial intelligence, robotics, the fusion of technologies, 3D printing, and the Internet of Things (Deloitte, 2018). The value propositions for moving towards a technological-intensive mining industry are the ability to exploit complex and low-grade deposits, improvements in efficiency and reliability of infrastructure, reduction in the cost of mining, improvements in business and value-adding processes and decision-making, as well improvements in safety and security in mining operations (Cawood, 2019).

Essentially, the adoption of technology has the potential to address the technical and operational challenges that the mining industry is facing thereby improving the productivity and profitability of mining operations. According to Mineral Council South Africa (2019), *“modernisation will help improve safety and health and facilitate the quest to zero harm”*. The benefits of modernisation include improvement in productivity, health and safety, and environmental stewardship. It is also expected to reduce the cost of mining and raise the skills level in the industry. The prevailing view is that increased productivity and profitability of mining operations will lead to higher contribution of the industry to government revenue. This will in turn see more socioeconomic development programmes that will contribute towards eradicating poverty and other social ills inherent to mining communities.

Because the thinking is still embedded in the traditional view of mining and development, which is based on the “*trickle down*” model, some stakeholders are finding it difficult to see the socio-economic benefits that will accrue to local communities should technology be adopted in the industry. Coming from the notion that mining operations failed to improve the lives of the majority of South Africans for over 150 years, the question that has been posed is *what will the industry do differently to ensure that it delivers on its socioeconomic responsibilities?*

In view of the above debates, the situation in the country has been translated into the divide between the macro and micro role of the mining industry and its contribution thereof. Table 3.1 captures the mining industry’s contribution to the NDP objectives and highlights the key issues (i.e., as have been discussed). From the table, it is seen that the industry is playing a significant role in the macroeconomic objectives of the NDP. The concern, in view of the NDP is at the local level. There remains a gap in terms of addressing the socio-economic challenges facing mining communities. As such, there is a need for diversification to expand the opportunities in the mining industry.

3.6. Potential role of ASM in view of the mining industry

According to Jeffrey, (2018)¹⁷, the ASM sector is among the levers on which the sustainability of the mining industry depends upon. This has been mostly looked at in

¹⁷ In the paper “*Sunset or sunrise for mining in South Africa*”, Jeffrey (2018) identifies sixteen (16) “driving forces” which underline the current landscape of the mining industry and have the potential to re-define the future of the industry and its contribution to the socioeconomic development of the country. The current areas of contestation include regulatory uncertainties surrounding the Mineral and Petroleum Resources Development Act (No.28 of 2002); the mixed transformation achievements of the Broad-Based Socio-Economic Empowerment Charter (e.g. Mining Charter); land and nationalisation debates; environmental legislation and health and safety considerations; labour relations and the relationship between mining operations and communities; infrastructure deficiencies; and potential impacts of mechanisation and industrial revolution to the agenda of the industry and the country; and illegal mining. Several of these challenges have been discussed.

terms of the negative impacts of ASM and how these affect large-scale mining. It is important to note that there is a cause-and-effect relationship between ASM and large-scale mining in the country. As such, there could be a complementary relationship between the two sectors.

From table 3.1, it is seen that the mining industry is lagging in several areas: increasing employment in mining communities, reducing the level of poverty in mining regions, expanding economic opportunities outside of mining, addressing transformation issues associated with mining, and addressing the environmental impacts of mining. The premise of the Thesis is that the ASM sector has the potential to contribute towards these intervention areas. This is in consideration of the characteristics of the sector and its role in communities. The benefits for the ASM sector as promoted by the Mineral and Mining Policy of South Africa (1998) include: its potential to increase the competitiveness of the mining industry as well as total employment; increase the profitability of the mining industry by exploiting deposits that are not suitable for large-scale mining operations; diversifying the industry's mineral portfolio and value chains; as well as contribution to the industry's transformation agenda.

Table 3:1: An assessment of the mining industry against the NDP's objectives

NDP goals	Current contribution of mining industry	Some of the key issues in the mining industry
Economy and employment	The mining industry's contribution in the following areas, GDP growth, employment (direct and indirect jobs), export earnings, taxes and royalties, FDI and private investments.	- The key challenges include a decline in employment and GDP contribution. - There is also a mismatch between available skills and modernisation requirements i.e., most of the workforce are low skilled with poor educational backgrounds (i.e., 48% of the workforce have between grade 10 and 12, and 16% of the workforce has between grade 4 and 9. - The contribution of mining to the socioeconomic development of communities is still an issue. While the industry has made considerable progress in the achievement of the Mining Charter, it is falling short in several objectives including ownership, procurement, HRD, and community development. - There are also gaps in the transformation agenda of the industry, specifically the participation of women. While the participation of women is above the Charter target, it is regarded as small at 15% participation.
Economy infrastructure	The industry's contribution includes fixed investments and government revenue that can be invested in public infrastructure. The industry has also implemented infrastructure projects as part of the SLP commitments in communities in which they operate and labour-sending areas. Mining companies have built roads, schools, clinics, etc.	- One of the challenges facing the industry concerning infrastructure development projects is the mismatch between implemented infrastructure projects and the needs of communities. - This results in issues of community ownership (or the lack thereof) leading to communities destroying the infrastructure.
Environmental sustainability	As part of the mining license application, mining operations conduct EIA and put aside financial provision for rehabilitation. Mining operations are also moving towards low-carbon technology seen through investments in cleaner methods of production, renewable energy projects, etc.	As mentioned, one of the sources of conflicts with communities is the negative impacts of mining activities on communities. The specific issues are: - Mine dumps and waste - Abandoned mines - Poor rehabilitation and closure
Integrated and inclusive rural economy	Most mining operations in South Africa are located in rural areas. Mining operations contribute to rural development and upliftment through SLP programmes. The other interventions that mining operations have initiated in rural communities are community trusts to address the needs of communities.	The key issues include: - Inequitable sharing of benefits (i.e., community trusts) - Traditional leaders and influence on community participation and benefits in mining. - Impacts of mining on other livelihood strategies - Overdependence of communities on mining income
Transforming human settlements	Through the Mining Charter, mining companies contribute towards housing and infrastructure projects.	- Housing for the mines' workforce remains a challenge with the industry still failing to meet the Charter requirements. - This is exacerbated by the influx of people in mining communities putting pressure on available resources. - There are issues of relocation and displacement of mining communities. - Unfair compensation and failure to comply with relocation guidelines.
Improving education, training, and innovation	The industry contributes towards Skills Levy and Human Resources Development. In 2018, this amounted to ZAR8 billion. These funds are used in the education and training of employees, and communities with a particular focus on women and youth. Mining operations also provide bursaries, learnerships, internships, etc. The investment is also directed at building infrastructure to support education and training.	- One of the challenges related to skills development programmes is the inability of the mining operations to absorb everyone that participated in the programmes. This often leads to protest action by the community. - There is also an issue with the low levels of skills in mining communities resulting in mines sourcing skills outside hosting communities. This often creates tension between locals and immigrants working in the mines. - There is also the lack of opportunities for retrenched mine workers who possess skills.
Promoting health	Through private investments, mining operations have built clinics and hospitals. These are normally restricted to mine employees and not used by hosting communities.	Linked to the impacts of mining on the environment, mining activities have negative impacts on public health. Amongst these, include the mine dumps that were left without rehabilitation.
Positioning South Africa in the world	South Africa ranks fifth position in the global mining industry in terms of the production value of metallic minerals and coal.	While South Africa still ranks in the top quartile of the Fraser Institute Investment Attractiveness Index, its performance is poor when assessed in terms of policy and regulation, and its operating environment. The latter has been compromised by growing community dissatisfaction resulting in community protests.

Source: Compiled from literature,

3.7. Chapter summary

The objective of the Chapter was to provide an overview of the mining industry and assess its contribution to the country's national development plan. The Chapter was also aimed at identifying entry points for the ASM sector vis-à-vis the role that it can play in boosting the contribution of the mining industry. The broad insight from the Chapter is that the mining industry remains a critical component of South Africa's economy and its development prospects. That said, the industry is struggling to meet some of the country's socioeconomic needs, particularly at the community level. The ASM sector has the potential to contribute towards some of the areas that need intervention, and these include boosting employment in mining communities, reducing levels of poverty, expanding economic opportunities outside of mining, addressing transformation challenges, and dealing with the environmental footprint left by historic mining operations.

CHAPTER 4: THE NEXUS BETWEEN ASM AND DEVELOPMENT

4.1. Introduction

With an understanding of mining, its role in development, and shortcomings thereof, Chapter 4 turns the attention to understanding the specific components that link ASM to development. The Chapter also provides insights into the aspects that need to be considered in ASM interventions. These two objectives feed into the overarching goals of the Thesis (i.e., establish the role of ASM in development and develop a strategy for the sector, respectively). When ASM *first* made its debut in the international development agenda in the 1970s, it was in the context of the potential role of the sector in national development (United Nations, 1972). This period coincided with the reconfiguration of the concept of development, which saw the shift from traditional economic models to understanding the persistent challenges of poverty and unemployment in developing countries.

Amongst the outcomes of this enquiry was the revelation of the existence of the informal sector, which presented opportunities for addressing unemployment and poverty challenges at the local level. By virtue of ASM appearing in the development circles during that time, the envisioned role of the sector was extended to poverty reduction. Since then, proponents of the sector have been building evidence to prove that ASM has the potential to contribute towards the attainment of development priorities. While there is growing evidence supporting this submission, the benefits of the sector are yet to be *fully* leveraged by policymakers. Scholars have attributed this to the heavy focus on the negative impacts of ASM.

The Chapter supports the argument that advocates for a balanced assessment of both positive and negative impacts of the sector to establish the role of the sector in broader development agendas. The Chapter has several sections, with the first part providing a historical account that connects ASM to development showing that the sector has long-established ties with societal needs. Globally, the sector's activities continue to grow expanding their links to development priorities. In the second part of the discussion, the Chapter pulls literature together to understand the drivers underpinning the proliferation of ASM activities. The Chapter also turns attention to understanding the characteristics of the sector and the contexts in which it exists. The last part of the discussion provides a broad overview of formalisation efforts that have been implemented in the sector to identify gaps and areas of intervention.

4.2. Historical account of ASM

Mining has a distinctive history across the globe. However, for most African countries, the genealogy of mining is located in their pre-colonial history. According to D'Souza (2002), most of the historical mining activities fall under the category of ASM. This is because of the methods and technologies that were used to mine and process the different types of minerals. Literature traces the history of mining in Africa to early civilisations in Egypt and Nubia in the period 4000BC (Klemm *et al*, 2001; D'Souza, 2002; Habashi, 2009; Klemm and Klemm, 2013; Chirikure, 2018). There is also evidence of mining and metallurgy conducted by old Empires and African kingdoms across the continent (D'Souza, 2002).

The earlier history of gold is also linked to the Akan population on the Gold Coast (i.e., currently known as Ghana). According to Ababio (2013), gold mining was among the important activities in the economies of most Akan states. In his account of the history

of traditional gold mining in Ghana, Ababio (2013) noted that the goldfields in Akan served as an important source of gold supply to the Trans-Saharan traders as well as the European market before and after colonisation.

In Southern Africa, indigenous mining activities, which involved the exploitation of stone material and pigments minerals such as haematite, and specularite are traced to 40,000 BC (Miller, 1995; Hammer *et al*, 1999), while the history of metallic production (i.e., that is the exploitation of gold, copper, and tin) is found in later periods. Miller *et al* (2000) and Hammel *et al* (1999) located the exploitation of gold and other metals to 1000 and 2000 years ago. This is based on the archaeological evidence of mining and metallurgy that placed the production and the supply of metals during those times (See Miller, 1995; Hammer *et al*, 1999).

Several scholars have highlighted the efficiency of mining and metallurgy during ancient times with evidence of the indigenous population being involved in all stages of the mining value chain i.e., mining, processing, beneficiation, and marketing of mineral products (See Miller *et al*, 2000; Ababio, 2013). The primary minerals exploited during those times included building materials, gold, copper, and iron. Mining was conducted both on the surface and underground, with placer deposits being the easiest to work with. According to Miller *et al* (2000), the scale of pre-colonial mining was considerable. As noted by UNECA and AU (2011), more than 4,000 ancient gold mining sites were found in Southern Africa alone.

Placer deposits were earlier sources of gold in Egypt and accounted for the majority of the gold that was produced. Habashi (2009) estimated the gold production to have been 40 tonnes of gold per year in Egypt. In studying the geology of the Arabian-Nubian shield (i.e., geological complex hosting gold deposits), Klemm *et al* (2001) referred to

the evidence of 250 gold mining sites that were exploited at different periods in ancient Egypt. Based on the evidence from these sites, Klemm *et al* (2001) estimated that between 400,000 and 600,000 tonnes of quartz ore were extracted from trenches and underground operations during Pharaonic times (i.e., that is the period between 3200 BC and 3101 BC).

At a grade of 10 grams per tonne, the gold production coming from these sites was estimated to have been between four and six tonnes (Klemm *et al*, 2001). The gold production from the Akan state in Ghana was estimated to have been, on average 1.2 tonnes of gold per year with a labour force of between 40,000 and 50,000 people (Habashi, 2009). Ababio (2013) highlighted that while the methods and equipment used were simple, they were found to be effective and organised. To this end, Ababio (2013) argued that the evidence of considerable production outputs and participation across the whole mining value chain challenges the view that Africans struggled with mining and metallurgy (Ababio, 2013).

In showing the importance of mining and metallurgy in pre-colonial Africa, UNECA and AU (2011) submitted that the quality of the iron products produced on the continent exceeded those imported from Europe. According to Chirikure (2015), the production of metals in pre-colonial Africa ranks amongst humanity's significant sociocultural and technological developments. This is supported by Steel (1975) who noted that *"pre-European metalworkers are worthy of respect for the results they achieved with primitive methods"* (Cited by Chirikure, 2015).

In view of the above, it is seen that mining formed a crucial part of the economies of indigenous populations across the African continent. According to D'Souza (2002), the exploitation and trading of minerals were an integral part of the basic economies of

indigenous populations in Egypt, Ghana, Mali and Zimbabwe. There are numerous historical accounts in literature that link mining to some of the richest Empires and Kingdoms on the continent. An example is the people of Mapungwe in Southern Africa who acquired wealth from gold mining and trading with Arabia, China, and India (South African History Online, 2019). D'Souza (2002) also noted the wealth acquired by various population groups across the continent including the kingdoms of Kongo, Kilwa, Luba, Buganda, Kanem, Borno and Zulu situated in the history of Angola, Tanzania, Democratic Republic of Congo, Nigeria, Ghana, and Southern Africa. For the Akan population, ancient mining created a class of wealthy miners (Ababio, 2013).

Chirikure (2015) identified four elements defining the link between mining and dimensions of ancient society, and these encompass the role that mining played during the pre-colonial period. The possession of metal products denoted wealth accumulation, power, luxury, and social differentiation. Metals were also used as symbols to mark ideologies, beliefs, and religion. According to Chirikure (2015), mining and trading created a platform where different cultures and populations came into contact through internal trade as well as trading that extended beyond the borders of the continent in Arabia and India.

Through these interactions, knowledge and technologies were transferred between populations. The minerals and products were also used for domestic purposes. They were used as utilitarian tools and to expand territories (Chirikure, 2015). Numerous skills were also acquired from ancient mining and metallurgy. Ababio (2013) highlighted that mining created a pool of goldsmiths capable of producing jewellery and other high-end products for the wealthy.

Using the example of iron production, UNECA and AU (2011) made note of the levels of skills that were required in building furnaces, producing charcoal, smelting, and producing final goods. According to UNECA and AU (2011), iron production was not an enclave activity and hence it created opportunities for communities including women. In terms of the participation of women, Brook *et al* (2011) and Ababio (2013), provided evidence of women being involved in the panning of gold along rivers in Akan. Even though there existed cultural beliefs and norms that were against the participation of women in mining, Chirikure (2015) pointed to records of women being successful in mining. There is evidence that shows women playing leading roles in gold mining in Ghana, iron mining in Kenya and Zimbabwe, and copper mining in the DRC (Chirikure, 2015).

While there are positive links between mining and society, the history of ancient mining is not without negatives. This other side of mining is not sufficiently studied in literature. Nonetheless, Chirikure (2015) identified socio-political inequalities as a dominant feature of ancient mining. This was underpinned by socio-economic gaps between individuals and across population groups. According to Chirikure (2015), the trading of gold played a key role in the rise and fall of empires. The history of ancient mining is also linked to slavery and inhumane practices. In studying the history of slaves and the slave trade, Stanton (2018) also highlighted that labour in ancient civilisations comprised of slaves.

While the history of mining and the social, economic, and political complexities surrounding its activities differ across regions, three pivotal periods can be located in the timeline of ASM in sub-Saharan Africa, and these can be aggregated into pre-colonial, colonial, and modern mining periods. The pre-colonial history described

above confirms that ASM has a long history that pre-dates large-scale mining. History shows that ASM was an integral part of indigenous economies and influenced socioeconomic and political relationships between individuals and population groups. The other findings relate to the extent and scope of ASM with evidence of the exploitation of a diverse portfolio of minerals and production outputs that were considerable.

While there are no records of the number of people that engaged in ASM activities during those times, literature suggests that the size of the sector was considerable with evidence of a footprint of mining activities found in many regions across the continent. According to Ababio (2013), the exploitation and trading of minerals were among the factors that attracted Europeans to Africa.

The second period in the ASM timeline is marked by the colonisation of most countries on the continent. The dominant view coming from literature is that colonisation had the greatest impact and influence on social, economic, and political landscapes seen in various countries today. The consequences of colonisation reconfigured livelihood strategies and the ways of living of indigenous people. This period saw a decline in indigenous mining activities. This was noted by UNECA and AU (2011).

The pre-colonial patterns of production and consumption of minerals – where these activities were firmly located and integrated in the local economy – were radically altered and replaced by a colonially induced pattern, in which foreign-owned mining enclaves dominated most colonial African economies.

In the case of Southern Africa, gold production was adversely affected by wars and policies imposed by the colonial regimes (Miller *et al*, 2000). The same happened in Akan with the decline in gold production attributed to the demonetisation of gold as

currency and European imperialism (Ababio, 2013). There is abundant literature on the impacts of colonial mining on indigenous communities with evidence of displacements, livelihood destruction, labour and employment systems, and environmental impacts. Literature also underpins the contraction of ASM to the policies that excluded indigenous people and gave preference to foreign nationals coming into the continent. In the case of Ghana, the British regime banned and criminalised indigenous mining activities (Ababio, 2013). While there are no estimates to place the decline of the sector into context, literature reveals that most of the indigenous population abandoned ASM operations to work in foreign-owned mines as labourers (UNECA and AU, 2011).

Most countries in sub-Saharan Africa gained independence between the 1950s and 1960s. During this period, mining continued on a small-scale (D'Souza, 2002). According to Kumar (1990), this is because mining investments before the 1980s were concentrated in Canada, Australia, and Latin America (See also World Bank, 1992). Sub-Saharan Africa was deemed unattractive because of political instabilities and policies that were considered unfavourable to foreign investments. According to Nyandoro and Dube (2018), at the advent of independence, the income levels of most African countries exceeded that of Asian countries and were comparable with countries in Latin America. However, since then, the economies of most African countries deteriorated failing to meet the demands for employment and poverty eradication (Kumar, 1990; Nyandoro and Dube, 2018).

Further, most African countries struggled to service their debts. The macro-level issues faced at the time included decreased demand for minerals, declining mineral prices, falling investments, and widespread drought (D'Souza, 2002). To stimulate the economies of struggling countries, the World Bank and the International Monetary

Fund (IMF) introduced Structural Adjustment Programmes (SAPs), which were loan packages designed to assist countries to stimulate economic activities to meet debt requirements and domestic priorities (Hilson and Potter, 2005).

At the core of the design of SAPs were preconditions those countries needed to meet to qualify for financial assistance and these were underpinned by the objectives of creating an investor-friendly environment. According to Hilson and McQuilken (2014), between 1980 and 1990, 37 countries in sub-Saharan Africa had implemented over 160 programmes, making the region the primary beneficiary of the loan packages (See Hilson and Potter, 2005). The perspectives on the impacts of SAPs on developmental outcomes are mixed. On one hand, scholars highlight positive evidence showing the success of SAPs in stimulating and growing economies. On the other hand, scholars have alluded to the adverse impacts of SAPs on poverty, inequality, and unemployment. However, the dominant view is that the consequences of SAPs exceeded the gains as leveraged by different countries. Because SAPs were embedded in national economies and influenced decision-making, they interfaced with all sectors of the economy including those located at grassroots levels. To this end, there is extensive literature on the direct and indirect impacts of SAPs on ASM in sub-Saharan Africa. The implementation of SAPs has been marked as important to the development trajectory of ASM, specifically in terms of its support towards large-scale mining and consequently its link to the growth of the ASM between the 1980s and 1990s. The number of people engaging in ASM activities in sub-Saharan Africa was estimated to be 2 million in 1999. This figure increased to 8 million in 2011 (IGF, 2017). It is estimated that sub-Saharan Africa accounts for 30% of the global ASM workforce, which equates to 13 million people.

4.3. Explaining the proliferation of ASM

While scholars have attempted to explain the ASM phenomenon through particular lenses, it is increasingly recognised that the growth of the sector can be linked to a host of factors. The failure to devise a global definition for ASM has led to scholars acknowledging that the sector's activities take place in various contexts shaped by different historical, cultural, social, economic, and political circumstances (Dreschler, 2001). Treating the sector as a homogenous activity has been identified as a cause of the failure of *most* policy responses and interventions.

There is emerging research on the methodologies employed to understand the different dimensions of ASM holistically. This scholarly work is underpinned by the observation that existing literature has tended to focus on the individual facets of the sector instead of the multiple dimensions that underpin the ASM phenomenon (Musah-Surugu *et al*, 2017; Ferring *et al*; 2016). Musah-Surugu *et al* (2017) argued that the current characterisation of the sector (i.e., the poverty-driven narrative) is inadequate to explain why people engage in ASM activities. It is submitted that emphasising a particular perspective in explaining ASM phenomenon has limited the success of policy interventions seen in the sector (Musah-Surugu *et al*, 2017). Ferring *et al* (2016) also raised concerns about the limitations imposed by dominant characterisations promoted in the sector. Their standing view is that while the heterogeneity of the sector is acknowledged, scholars have tended to *force* the variability of the sector's activities into certain characteristics.

The criticism coming from Ferring *et al* (2016) was that the spectrum of activities seen in the sector is absorbed into the popular narratives that categorise ASM as a poverty-driven, labour-intensive activity that is undertaken by uneducated people in rural areas

of sub-Saharan Africa. While this description *may* hold for the majority of ASM activities, Ferring *et al* (2016) cautioned against generalisation arguing that it has the potential to constrain ASM to particular policy responses and interventions thereby limiting the sector's discourse and its role in broader development issues.

While the dimensions of ASM have been studied in detail in the past four decades, there is a need for a framework that can capture the diversity present in the sector. As noted by Ferring *et al* (2016), capturing the *unique* dimensions of the sector may open up the ASM discourse creating more entry points for the sector in mainstream development. To this end, Musah-Surugu *et al* (2017) propose the multi-complex perspective approach as a framework for unpacking the multiple factors that drive people into ASM in sub-Saharan Africa.

Numerous methodologies exist in literature that are used to study complex problems. Grounded within complexity theory, these methods provide an understanding of systems and the connections between variables leading to a broader comprehension of collective behaviour (Sammur-Bonnici, 2015). Complex problems are defined as problems whose diagnosis is underpinned by multiple factors and perspectives which are sometimes contradictory leading to multiple possible solutions. Responding to these problems requires holistic approaches and multi-stakeholder inputs (Stuart, 2014).

System dynamics is amongst the popular frameworks used to analyse and solve complex problems. The methodology was developed by Forrester in the mid-1950s and among the *first* applications was in analysing managerial problems (Forrester, 1993). Its application has since been tested in understanding behaviour in environmental change, politics, economic behaviour, medicine, and engineering. According to Forrester (1993), the approach provides a common foundation to dismantling and

putting together elements that underlie a particular behaviour. System dynamics is centred on the idea that all complex problems comprise of interconnected relationships (Schwaninger, 2009). To understand the problem, one must identify the dimensions of the problem and the relationships between them.

Given its multifaceted nature, the ASM phenomenon can be classified as a complex problem. In support of the need for holistic approaches to study the ASM phenomenon, figure 4.1 attempts to unbundle the ASM system to identify the variables that drive the proliferation of its activities in sub-Saharan Africa. The variables and relationships between them are mapped using the causal loop diagram, which is a supporting tool that assists with the visualisation of the system.

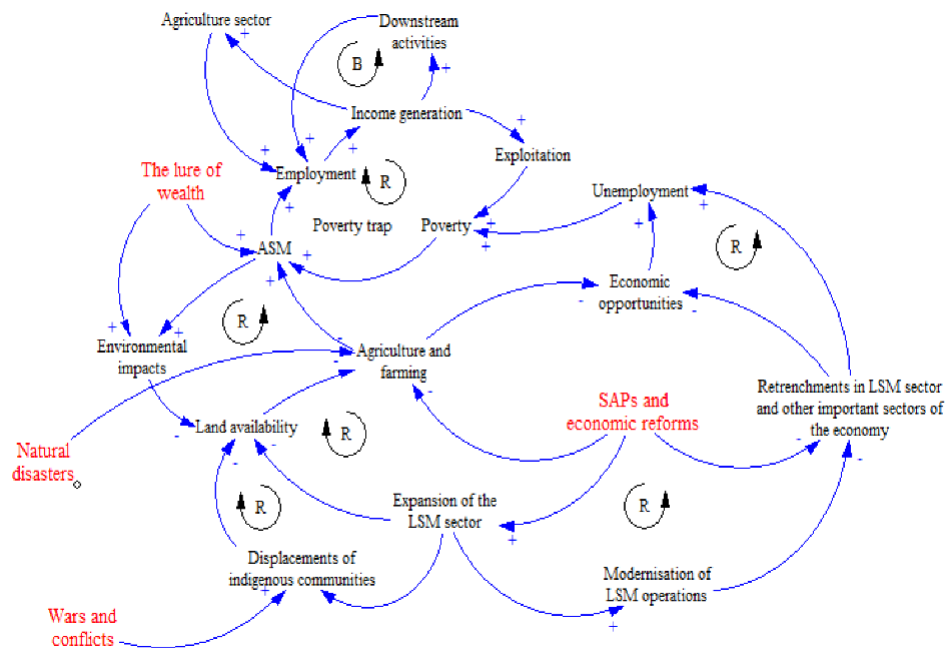


Figure 4:1: Causal loop diagram showing the relationship between ASM components

Source: Author's own interpretation, 2020

In the figure, the arrows show the relationship or the “*causal influences*” between the variables (Mutanga, 2018; Kirkwood, 2017). The positive and negative connotations depict the type of relationship between the variables (i.e., the positive sign denotes a direct relationship, and the negative sign shows an inverse relationship). The R and B in the figure illustrate the patterns of behaviour or the “*collective behaviour*” of the variables. The “*reinforcing loop*” denoted by R shows a pattern where the resulting behaviour perpetuates. This behaviour is associated with accelerating growth, snowballing effects, and destabilising characteristics (Wardman, 2018).

The “*balancing loop*” depicted by B shows a pattern that comprises of variables that support each other to reach a particular goal. It is also known as “*goal-seeking*” which attempts to move the system from the current state to a desired state. According to Wardman (2018), the structure of “*balancing loop*” comprises of the gap between the current and desired levels. The associated patterns of behaviour exhibit stabilising characteristics. For every system, desired level must be defined to identify suitable policy and intervention options.

Reverting to figure 4.1, at the first level, the system shows the macro factors that have been identified to underpin the growth of ASM activities. At the second level, the system captures the causal effects between the broad factors and key components of the economies in the region. The third level captures the snowballing effects flowing from national to grassroots levels. In the last level are the “drivers”, which underpin the proliferation of ASM activities. While envisioned as levels, the structure and relationships between variables are fluid.

Literature attributes the upsurge of ASM activities across sub-Saharan Africa to *broadly* the implementation of SAPs and other economic reforms, wars and conflicts, natural

disasters, and the “*lure of wealth*” (See Verbrugge, 2016; Banchirigah, 2006; Hilson and Potter, 2005; Hilson, 2013; Hilson and McQuilken, 2014; Mkodzongi and Spiegel, 2018). These four dimensions are at the first level and constitute as root causes of the snowballing effects seen in the region leading to the growth of ASM activities.

According to Kamlongera (2013), the link between SAPs and ASM is underpinned by the impacts of adjustment programmes on the socio-economic landscape of recipient countries. With the agricultural sector being a pillar of most countries in sub-Saharan Africa, it had *first-hand* interaction with the implementation of SAPs. To this end, there is extensive literature that studies the impact of SAPs on the agricultural sector in the region. According to Dasgupta (1997), SAPs were intended to benefit the agricultural sector because of the *policy bias* towards the sector’s activities in the region.

The relationship between SAPs and agriculture is regarded as mixed. It has been submitted that SAPs benefited commercial farmers resulting in increased productivity and opportunities in the market. The other school of thought has submitted that SAPs had devastating impacts on the overall performance of the agricultural sector (See Kamlongera, 2013; Dasgupta, 1997). According to Morgan and Solarz (1994), the agricultural crisis in the region developed in the 1970s and intensified in the 1980s after the implementation of SAPs. The consequences of SAPs hit rural economies hard. As raised by Dasgupta (1997), the conditions that underpinned SAPs created bottlenecks for small farmers. While the sector experienced higher prices for their products, smallholder farmers struggled to meet production requirements because of the withdrawal of government support tied to reduced public expenditure, as a precondition of SAPs.

It is submitted that SAPs destroyed the subsistence economy, which mainly comprised of smallholder farming (See Hilson and Potter, 2005; Kamlongera, 2013). According to Morgan and Solarz (1994), SAPs adversely affected the agricultural sector with the imposition of policies that led to the dismantling of government support programmes leaving the sector without subsidies. This was evidenced in Ghana where the government ceased subsidies for vital inputs (Hilson, 2010).

The viability of agriculture was further affected by the price of raw materials, competition from imports, land tenure challenges, wars and conflicts, and natural disasters experienced in the region (See Commander, 1988; Banchirigah and Hilson, 2010; Hilson, 2013). Literature links the land tenure challenges to the expansion of the large-scale mining industry in the region. Having linked the poor performance of mining to policies that were unfavourable to foreign investments, the period in 1990 saw many countries overhauling their mining legislation to align with the conditions of SAPs (Jönsson and Fold, 2011).

Taking from the World Bank's "*Strategy for African Mining*", mining regimes were designed at the back of an envisioned dual economy consisting of large-scale mining operations owned by foreign investors and ASM activities led by indigenous people (Hilson and McQuilken, 2014). The perceived benefits of the "new era" of mining encompassed FDI, government revenue, employment, and reduced rural-urban migration (Jönsson and Fold, 2011). The impacts of SAPs as manifested through large-scale mining expansion are discussed from two perspectives in literature (i.e., the positives and negatives).

Firstly, it is acknowledged that SAPs successfully expanded the mining industry enabling countries to achieve significant increases in mineral production outputs.

Amongst the popularly cited case studies is that of Ghana where a total of USD4 billion in private investment was raised between 1983 and 1998 for mineral exploration, mine development, and rehabilitation of existing mines (Aryee, 2001). According to Mineral Commission (1999) cited in Aryee (2001), more than 200 companies were prospecting for gold with 23 companies granted mining licenses in 1998. The Ghanaian mining industry achieved a 700% increase in gold production over a period of 20 years (Hilson, 2009). Positive results were also recorded in Tanzania with gold production output increasing from 2 tonnes to 50 tonnes per year between 1998 and 2005. Hilson (2009) also provided Mali as an example with gold production increasing tenfold from 1994 to 2002.

In studying these impressive results, scholars point to the minimal effect of these achievements to the overall performance of most economies, with countries achieving Gross Domestic Product that was either negative or below the target (Weber-Fahr, 2002 cited in Banchirigah, 2006). The expansion of large-scale mining has also been negatively correlated to the socioeconomic priorities of the region (i.e., this evidence has underpinned the Resource Curse Theory). The negative impacts of large-scale mining expansion have also been discussed in terms of the agricultural sector in the region.

Amongst the conditions that recipient countries needed to meet was the allocation of large tracts of land to large-scale mining expansion. This resulted in communities being displaced and land for agriculture being locked in mining concessions (Hilson, 2009). To put this into context, Hilson (2009) provided an example of Ghana where between 30% and 40% of the land was under the ownership of large-scale mining companies. According to Hilson (2009), 400,000 people were displaced as a result of mining

expansion in Tanzania. The direct impacts of SAPs combined with the effects of large-scale mining expansion on land availability and the displacement of rural communities affected the prospects of agriculture as the main livelihood strategy in the region leaving most of the population without income-generating activities.

The potential of the agricultural sector was also affected by natural disasters experienced in the region. According to the Food and Agriculture Organisation (FAO) (2015), more than 363 million people in the region were affected by drought events between 1980 and 2014. The region lost more than USD 30 billion in crop and livestock production as a result of drought between 1991 and 2013. According to FAO (2015), this translated to a 3.5% loss in agricultural value-added growth after each drought. During this period, natural disasters destroyed agricultural assets and infrastructure and disrupted production cycles and trade flows leading to the loss of livelihoods for millions of people in the region (FAO, 2017).

In some countries, the situation was worsened by wars and conflicts. According to D'Souza (2002), 60 % of the population on the continent had been affected by armed conflicts. Since 1963, the continent has experienced more than 25 armed conflicts (D'Souza, 2002). The associated consequences of wars include displacements, violence, and constrained travel leading to the deterioration of agricultural markets and trade opportunities (Kelly, 2014).

The consequences of SAPs extended outside the agricultural sector. Amongst the expectations levelled toward the expansion of the large-scale mining industry was that it would provide employment absorbing the people left without economic opportunities as a result of SAPs. Banchirigah (2006) submitted that the large-scale mining industry failed to create the expected job opportunities and in turn, some operations retrenched

their workers, further increasing the levels of unemployment and poverty in the region. More job losses were reported in the public sector. According to Banchirigah (2006) and Hilson and Potter (2005) more than 40,000 civil servants in Ghana and Tanzania were retrenched.

Broadly, the lack of economic opportunities which left people unemployed and in poverty resulted in large scores of people seeking alternative livelihoods. This led to the burgeoning of the informal sector in urban areas. For rural communities, complementary livelihood opportunities were found in non-farm activities (Banchirigah and Hilson, 2010). This period saw smallholder farmers diversifying their livelihood activities. There is extensive literature on the diversification of rural economies and livelihoods (See Loison, 2015; Bryceson, 1999; 2002; 2004; Barrett *et al*, 2001; Nagler and Naude, 2017; Niehof, 2004; Haggblade *et al*, 1989; Smith *et al*, 2001; FAO, 2015a).

At the core of the literature is understanding the primary drivers of diversification and movement to non-farm activities. These factors have been captured in the “pull and push” framework. Explained in the context of the process of *deagrarianisation*, scholars allude to the increasing importance of non-farm activities in sub-Saharan Africa. It is noted that non-farm activities account for about 40% of the average household income in the region (Reardon, n.d).

While *often* not captured as part of the rural non-farm activities, there is evidence showing that ASM has become an integral part of rural economies in the region (Hilson, 2016). The low barriers of entry associated with ASM have resulted in the sector absorbing millions of rural dwellers in the region (Banchirigah and Hilson, 2010; Jønsson and Bryceson, 2009). This evidence has been used to link ASM expansion to agricultural poverty, which is defined as the “*hardships induced by over-dependency in*

farming for survival” (Hilson and Garforth, 2012). While the agricultural sector remains the mainstay of the region employing half of the total workforce, its contribution to GDP has been declining averaging 15 % in *most* countries except for Botswana and South Africa where the GDP contribution of the agricultural sector is less than 3 % (OECD and FAO, 2016).

In view of the socioeconomic realities of the region, the agricultural sector is anticipated to take strain at the back of population growth and food security challenges (New Partnership for Africa’s Development, 2013). While global poverty levels declined significantly since the 1990s, sub-Saharan Africa made less strides with poverty levels declining from 55 to 42 % between 1995 and 2015 (i.e., this compares to a percentage drop of between 60 and 70 % in Latin America and the Caribbean, and South Asia) (World Bank data). According to the World Bank (2020a), the progress made in addressing poverty is expected to regress because of the SARS-CoV pandemic. The World Bank (2020a) predicts that between 40 and 60 million people will fall into extreme poverty in 2020.

The most affected will be the populations in sub-Saharan Africa where 40 % of the region already lives in extreme poverty. The situation is expected to be worsened by the impacts of climate change on the agricultural sector. The extreme weather conditions, droughts and floods, and variability in the rainfall patterns are expected to exacerbate job insecurity, low remunerations, poor working conditions, and levels of poverty associated with vulnerable employment in the agricultural sector (See Olsen, 2009).

In assessing the broad impacts of climate change, International Labour Organisation (ILO) (2019) highlighted the potential economic, social, and health impacts of heat stress resulting from a temperature rise. According to the ILO (2019), heat stress is

expected to have adverse impacts on labour productivity and decent work with greater effects experienced by the agriculture and construction sectors. While the number of people working in the agricultural sector is expected to remain high, its total share is projected to decline from 55 % in 1995 to 48 % in 2030. This projection is based on the productivity losses as a result of heat-induced impacts (See ILO, 2019).

The realities surrounding the agricultural sector are expected to continue to drive the expansion of ASM activities in the foreseeable future. Against the aspects that were discussed and the possible link between the agricultural sector and ASM, four possible scenarios can be mapped, and these are presented in figure 4.2. The scenarios/quadrants are mapped using the mathematical principle underpinning the relationship between independent and dependent variables. In the figure, it is assumed that ASM is dependent on the agricultural sector. The four scenarios linking agriculture and ASM are scenario A (“Accelerating growth”), scenario B (“Complementary relationship”), scenario C (“goal-seeking relationship”), and scenario D (“A threatening future”).

The first scenario (i.e., Scenario A) highlights the prevailing trajectory followed by the sector where the decline in the agricultural sector has fuelled the expansion of the ASM sector. In terms of future projections, scenario A is expected to persist given the realities surrounding the agricultural sector. As opportunities in the agricultural sector continue to diminish, ASM activities are expected to continue to serve as a safety net providing economic relief to destitute populations. This scenario anticipates large scores of people entering the ASM sector in search of livelihoods.

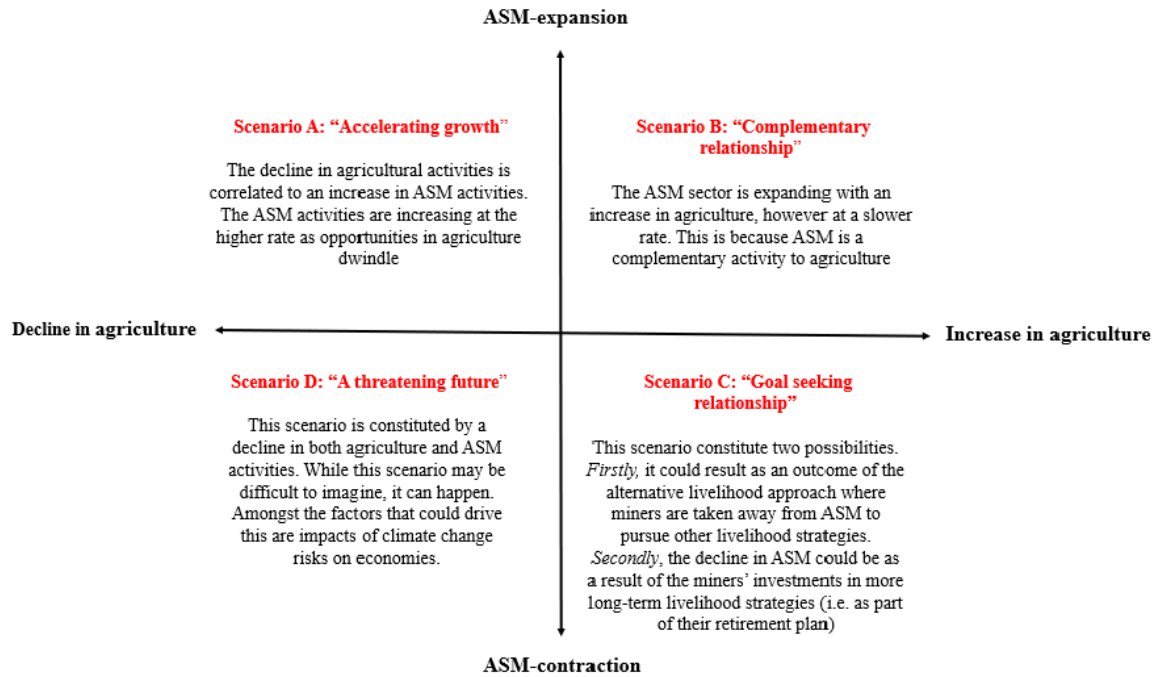


Figure 4:2: Scenarios mapping the relationship between ASM and agriculture

Source: Author’s own interpretation, 2020

Scenario B is placed in the context where ASM and agriculture are complementary to each other. Even though there may be an increase in the viability of the agricultural sector, there will still be a need for farmers to diversify their livelihoods because of the seasonality of farming activities and the associated incomes. While ASM activities are increasing, the rate will be slower because the sector’s activities will be playing a more *supporting role* as opposed to being the sole livelihood strategy. Several scholars are promoting this scenario as the best route in leveraging the potential of ASM and increasing its role in economic development (See Hilson and Maconachie, 2020).

Scenario C comprises of two possibilities. The contraction of ASM is visualised in the context of the reduction in the number of people participating in the sector. In figure 4.1, this scenario is depicted by the “balancing loop” pattern/behaviour. This captures a scenario where ASM provides employment allowing operators to generate income that

is sufficient to support families as well as allow for investments towards *more* safe and sustainable livelihood activities, which will see miners leaving the sector. This scenario is linked to the narrative that ASM's role in development extends beyond the sector being a survival activity or *safety net* for poor communities. It has been argued that the sector has the potential to improve the standard of living of operators and their families, hence playing a broader role in development.

Linking this to agriculture, there is evidence that shows that while agricultural poverty may drive people into ASM, agriculture is also perceived as an exit strategy. Literature has captured case studies where miners invest portions of their earnings into agriculture (IGF, 2019). Within this context, miners invest their income into agriculture thereby increasing the viability of the associated activities resulting in them ultimately leaving the ASM sector. In the context of mineral-led development, this is a desired outcome where mining serves as a springboard for other sectors, contributing towards building sustainable, long-term livelihood options for people.

Scenario C can also be an outcome of the “alternative livelihood” approach. Several scholars submit that while ASM provides economic relief, it does not eradicate poverty. Labonne (2002) argued that ASM is a temporary measure with little potential for long-term poverty reduction. In view of the nature of ASM, Jönsson and Fold (2011) noted that while the income generated from ASM may be high, these earnings are absorbed by the risks surrounding the sector. This school of thought recommends the establishment of livelihood programmes that will move people away from the sector's activities (Gyan-Buffour, 2003; Labonne, 2002). Over the past two decades, the sector has seen the implementation of alternative livelihood programmes. Some of the popular projects captured in literature included vegetable farming, snail cultivation, and grass

cutter rearing in Ghana (See Banchirigah, 2008). Most of these have been dominated by agricultural projects.

Scenario D has been given the title “*a threatening future*”. This scenario paints a bleak picture for both the agricultural and ASM sectors. While there are facets in literature that suggest the possibility of this future, this scenario is yet to be looked at. For the agricultural sector, there have been some assessments in terms of the potential impacts of climate change on the sector’s activities and its role in development. As highlighted above, the ILO (2019) has made some projections in terms of the impact of heat stress on the agricultural sector. The conclusion was that the sector’s share of total employment will decline from 55% in 1995 to 48% in 2030. The studies that link mining to climate change have mostly been inclined towards the contribution of mining to climate change (i.e., contribution to greenhouse emissions). The reverse relationship has not been explored sufficiently in terms of the risks posed by climate change on mining activities.

However, as raised by ILO (2019), climate change is expected to have devastating impacts on subsistence activities conducted in precarious conditions. Scenario D captures a situation where ASM activities are adversely affected by climate change risks threatening the productivity and the role of the sector in local economies. The other risks that can lead to the contraction of both the agricultural and ASM sectors are wars and armed conflicts as seen in some regions in Africa.

Another aspect that would lead to the decline of ASM activities is the availability of mineral resources. On the basis of exploiting a finite resource, the growth of ASM has a timeline. While this is beyond the scope of this research, there is a need for research that models the “*absorptive capacity*” of ASM. In the context of environmental

management, this is defined as the amount of waste material that can be absorbed by the environment without causing damage to the environment. This is also explained in terms of the “*environmental limit*” which is a point at which the environment exceeds its ability to provide essential services. Bringing this back to ASM and its prospects, the “*absorptive capacity*” of ASM comes into play when considering the future role of ASM in economic development.

Within this context and the definition of scenario D, ASM contraction is defined in terms of the income generated in the sector and the subsequent role of ASM in development. There is literature suggesting that ASM has reached its peak in some locations. This is in view of the low income generated from ASM activities which is attributed to over-participation in the sector. This is also amongst the factors attributed to the poverty trap that characterises most ASM activities (Gyan-Buffour, 2003).

In view of climate change risks, the uncertainty of ASM, and low incomes (as a result of saturation in the sector), scenario D emerges. This scenario will see populations leaving the subsistence economy with abject poverty. The takeaway from this possibility is a re-emphasis on the limited role that primary activities can play in economic development and hence a recommendation to build economic activities that operate at secondary and tertiary levels.

Another scenario that is outside the ASM-agriculture nexus, that has an impact on the future of the ASM sector is its graduation to medium-sized operations. The transition of ASM to medium-scale operations has been modelled as the potential outcome of formalisation. It entails addressing the bottlenecks in the sector to increase productivity and scale of operations by creating an environment that offers access to funding, skills, and training, improved market conditions and favourable regulatory frameworks. There

is recent literature that interrogates the emerging relationship between ASM and medium-scale operations both as an opportunity and risk to the sustainability of the ASM sector (Pedersen *et al*, 2019). In the case of Tanzania, medium-scale operations are creating platforms for ASM operators to access capital, and expertise needed to support the transition to increased scales of production. The downside of these interactions is marked as the potential takeover of ASM operations (Pedersen *et al*, 2019).

4.4. Building the case for ASM

4.4.1. ASM and broader development agenda

While there continues to be a battle between the positive and negative impacts of ASM (i.e., scholars arguing that the negative characteristics of the sector are accentuated more than the positive benefits), there is increasing recognition that both ASM externalities influence the broader developmental outcomes. As such, all dimensions of ASM must be considered when building the case for the subsector. Since the debut of ASM in the international development space, it has interfaced with several development agendas (i.e., at global, continental, and regional levels), which have influenced its trajectory and the lenses through which its activities have been interpreted.

In tracing the development path of the sector, connections can be drawn with several policy recommendations and/or *visions*, for example, the United Nations *Small-scale Mining in Developing Countries* report in 1972, Sustainable Development as promoted in the Brundtland Report in 1987, the World Bank's *Strategy for African Mining* report in 1992, the Millennium Development Goals (MDGs) in 2000 and the United Nations' SDGs in 2015, and many other landmark international agendas. The ASM sector also continues to feature in continental development frameworks, examples include Africa's

Agenda 2063, AMV and its supporting instruments, and others. There are also records of ASM-specific *visions* aimed at facilitating the transformation of the sector's activities, an example being the Yaoundé Vision on ASM.

The SDGs are the current global blueprint aimed at eliminating all dimensions of poverty by 2030. This includes eradicating extreme poverty measured as people living under USD1.25 per day, providing access to the social protection system, ensuring equal rights and access to economic resources, and building the resilience of the poor against economic stresses and shocks (United Nations, 2015). The targets that support the SDGs are informed by the challenges as experienced in various countries. Table 4.1 provides a summary of the SDGs and associated targets.

Within the four-tier framework of development, the SDGs are a manifestation of continental, national, and local development priorities. In Africa, these priorities align with the intervention areas identified in the continent's Agenda 2063. This is a development strategy that aims to move the continent towards positive socio-economic development. It was adopted in 2013 and has an implementation period of 50 years which is tied to the goal of working towards “*a prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in the international arena*” (Africa Union, 2015;12).

Table 4:1: A summary of the SDGs and broad objectives

SDGs	Description
SDG 1: No poverty	This goal aims to end all forms of poverty and interventions include the implementation of social protection systems, providing access to basic services and economic opportunities, and reducing exposure and vulnerability of the poor to shocks and disasters.
SDG 2: Zero hunger	This goal aims to ensure access to nutritious and adequate food. The interventions include increasing the viability of agriculture and the income of smallholder farmers and ensuring sustainable food production systems adaptable to climate change risks.
SDG 3: Ensure healthy lives and promote well-being	This goal aims to reduce global mortality rates and preventable deaths, epidemics of HIV/AIDS, TB, and malaria. It also aims to reduce substance abuse and addictions and providing access to essential health services.
SDG 4: Inclusive and equitable quality education	This goal supports the completion of primary and secondary education, providing access to post-school education and training, and removing disparities in education systems.
SDG 5: Gender equality and empowerment	This goal is underpinned by ending all forms of discrimination, violence, and harmful practices against women and children. The goal also promotes women's participation and access to opportunities across all sectors of the economy.
SDG 6: Clean water and sanitation	This includes access to safe and affordable water and sanitation. This goal is underpinned by reducing pollution and increasing water efficiency and use.
SDG 7: Affordable, reliable, and sustainable energy	This goal aims to expand access to energy including increasing the share of renewable energy in the total energy mix. The goal also aims to increase energy efficiency.
SDG 8: Decent work and economic growth	Underpinned by maintaining per capita income at 7% of the GDP and reducing youth unemployment, the interventions surrounding this goal include diversification, and the development of strategies aimed at supporting productive sectors.
SDG 9: Industry, innovation, and infrastructure	This goal encompasses infrastructure needed to support economic development, employment, and increasing the productivity of key economic sectors.
SDG 10: Reduced inequality	The objectives of this goal are to increase the income of the bottom 40% of the population. This is to be achieved through strategies that are socially inclusive and provides access to opportunities across all demographics.
SDG 11: Sustainable cities and communities	This encompasses providing access to safe and affordable housing and basic services and building resilient communities that can survive economic stresses and shocks.
SDG 12: Responsible consumption and productive systems	This goal is underlined by the efficient use of natural resources and reducing pollution using sustainable practices and processes.
SDG 13: Climate change	This goal aims to increase economies' adaptive capacity to climate change risks and natural disasters. This is to be facilitated by the integration of climate change in policies, capacity-building, and financial planning.
SDG 14: Life below water	The primary objective of the goal is to reduce water pollution from all sources and reduce the over-use of water resources.
SDG 15: Life on land	This goal encompasses the conservation, restoration, and sustainable management of land resources and providing equitable access to these resources.
SDG 16: Peace, justice, and strong institutions	This broadly includes reducing all forms of violence, abuse, and exploitation. The goal aims to promote Rule of law – ensuring access to justice, reducing illicit activities, and ensuring broad participation and representation.
SDG 17: Partnerships for the goals	The achievement of SDGs will require collaboration both vertically and horizontally across all spheres and all levels.

Source: Compiled from United Nations, 2015

Agenda 2063 is supported by seven aspirations, amongst which encompass fostering economic growth that is inclusive and characterised by sustainable development. This

touches on several objectives including increasing the standard of living, as well as education levels amongst the continent's citizens. It also includes the transformation of economies and ensuring environmental sustainability and community resilience. These various objectives are to be achieved by increasing incomes, creating decent employment opportunities, eradicating poverty, and hunger, and working towards economic diversification and other intervention areas (Africa Union, 2015).

There are clear links between SDGs and priority areas set out in Agenda 2063. As such, the role that the ASM sector plays on the continent will translate to the attainment of the SDGs. Several studies have mapped the links between ASM and the various targets supporting the SDGs. The overall conclusion is that the sector has links, with all SDGs. More so, its contribution towards the SDGs depends on the level at which the benefits associated with the sector's activities are leveraged and the negative impacts addressed.

Broadly, ASM is said to have strong connections with the following SDGs: SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (health and well-being), SDG 8 (decent jobs and economic growth), SDG 5 (gender quality), SDG 15 (impacts on land), SDG 16 (impacts on water), SDG 12 (responsible consumption and productive systems) and SDG 13 (climate change). Broadly, these SDGs fall under the areas of economic development, poverty alleviation and improved well-being, broad-based empowerment, and environmental stewardship. All of these aspects are key focus areas in the continent's development agendas (i.e., Agenda 2063) which recognise the socio-economic role that the ASM sector can play on the continent.

4.4.2. ASM positive externalities

As alluded to above, proponents of the sector have been building an evidence base to prove that ASM plays a considerable role in development. While there remain data

deficiencies, there is growing evidence within countries showing a positive relationship between ASM and development indicators. Table 4.2 captures the contribution of ASM as collected in four countries in sub-Saharan Africa.

Table 4.2: Contribution of ASM to the national and local economy

Indicators	Kenya	Uganda	Rwanda	Ethiopia
Major minerals exploited	Gold and gemstones	Clay and gold	Tin, Tungsten, and Tantalum (3Ts)	Gold
Contribution to national production output	ASM produces 60% of the country's gemstones. ASM produced 80 tonnes of precious, semi-precious, and industrial minerals in the country in 2013. The gold production is estimated at 5.2 tonnes annually.	8 billion bricks produced and generate USD 500 million per year. Gold production output is 2 tonnes per year.	All 3Ts production is from ASM operations, production estimated between 2000t and 2500t.	ASM production is between 6 and 8 tonnes per year. This amounts to USD 300 million.
Export earnings	The value of the gold production is estimated at USD 224 million. The national market value of gemstones for 10,000 miners estimated at USD120 million.	Total value of ASM of clay bricks and gold to be USD 58 million per year.	Tantalum contributed USD110 million to exports in 2014. This amounted to 19% of the total exports.	No data was found
GDP contribution	ASM sector contribute 0.8% to GDP. This includes the contribution of ASM gold production 0.35%.	ASM contributed 3.2% to GDP in 2008. If formalised, it is estimated that ASM will increase GDP by 2%.	ASM contributed 1.2% to GDP in 2011. This amounted to USD 228 million.	Mining contributes 10% to GDP of which two-thirds is from ASM operations.
Government revenue	Local spent on VAT-taxed goods and services estimated at USD1.6 million in Taita-Taveta Country.	VAT contribution from clay mining and brick making estimated at USD 15 million per year.	No data was found	No data found
Royalties and taxes	Proposed royalties' range between 2% – 8% for industrial minerals to precious stones. USD 96,000 royalties paid from exports.	Under current legislation royalties range from 3% to 5% of gross value and USD 0.80 per tonne of coal.	ASM contributes 8.1% to taxes – these includes royalties (4.1% of the export value) and personal taxes (4.1% of wages). The miners also pay 8% towards social security.	Royalties range between 3% and 6%. In SNNPR, 13 million Birr were collected in royalties. This equated to USD 390,000. This amounted to only 36% of the potential royalties.
Local expenditure	ASM injects an estimated USD 37 million in Migori county annually. This has created 38,000 non-mining jobs.	Local spend estimated at USD 500 million and USD 15 million for clay/bricks and gold. This has translated to 750,000 jobs.	ASM contributed USD 39.5 million in 2015.	No data was found
Employment	Total employment estimated at 140,000 where 70,000 are employed in industrial minerals and construction material, 40,000 in ASGM and 30,000 in gemstone.	Total employment estimated at 300,000 including 90,000 clay miners and brick makers, and 40,000 gold miners.	There are 65,000 people engaged in ASM.	ASM employs 1.26 million people.
Personal income	Extraction workers in ASGM paid USD 78 per month. In gemstones, miners receive on average USD 150 per month.	ASGM operators make USD 770 annually.	Salaries range between USD 1 to 2.50 per day per miner.	Income estimated between 4,800 and 10,800 Birr (i.e., this is between USD 144 and 324) annually.
Women participation %	Differs across sites but ranges between 15% and 38%	Half of the ASM workforce are women. In some sites, women account 80% of the total workforce.	About 19% of the sub-contractors.	Women account for between 20% and 70% of the total workforce.
Dependents	800,000 people depend on ASM.	5 million people depend on ASM.	170,000 people depend on ASM.	7.5 million people depend on ASM.
% of the total population	About 1.7 % of the total population depends on ASM activities.	12% of the population depends on ASM activities	This equates to 1.5% of the total population.	7% of the population depends on ASM.

Extracted from: Barreto *et al*, 2018: 2018a: 2018b: 2018c & Ethiopia EITI, 2016

The positive impacts of the sector include contribution to total mineral production, foreign and export earnings, GDP contribution, and government revenue. Globally, ASM accounts for 20% of gold, and diamond supply and 80 % of the supply of coloured gemstones. The ASM gold production is estimated between 380 and 450 tonnes, with a value of USD 16 billion per year (Barreto *et al*, 2018). The sector is also a major producer of 3Ts (tin, tungsten, and tantalum) accounting for 25% of tin and 26% of tantalum global production (IGF, 2017; Barreto *et al*, 2018). In sub-Saharan Africa, ASM contribution is captured as 18% of gold and 15% to 20% of diamonds (Hilson and Maconachie, 2019). According to Nkulu *et al* (2018), half of the world's cobalt supply comes from the Katanga Copperbelt in the Democratic Republic of Congo, where between 15% and 20% of the production emanates from ASM operations.

Rwanda provides a glimpse into the extent of contribution that the ASM sector can make to the national economy. With the majority of ASM activities taking place within the legal framework, the sector contributed 1.2% to the country's GDP in 2011. According to Barreto *et al* (2018a), the 3T production is produced from ASM licenses. The production of tantalum accounted for 19% of the total exports in 2014, contributing USD 110 million to export earnings. The sector also contributes to government revenue through taxes and royalties and currently these amount to 8.1% of export value and miners' taxes. At present, the ASM sector employs 65,000 people and supports 170,000 people, equating to 1.5% of the total population (i.e., the population is 12.3 million).

The ASM sector's contribution in Kenya, Uganda, and Ethiopia is also considerable. While Kenya does not have a developed mining economy as seen in other African countries, the ASM sector accounts for 60 % of the gemstone production and is estimated to produce 5.2 tonnes of gold annually. The value of the gemstones and gold

is estimated at USD 120 million (for 10,000 miners) and USD 224 million respectively. In Ethiopia, the ASM sector produces between 6 and 8 tonnes of gold with potential earnings of USD 300 million per annum (Ethiopia EITI, 2016).

The recognition of ASM is *often* opposed by the argument that the sector does not contribute to government revenue. While a significant percentage of government revenue is lost through illicit mining and trading, the ASM sector makes an indirect contribution to government fiscus through Value Added Tax (VAT). This is collected through the purchase of equipment and supplies, and fuel consumption. The consumers tax in Africa ranges between 12 % in Botswana and 20 % in Madagascar in the region (See PWC, 2017). In Taita-Taveta County in Kenya, ASM is estimated to contribute USD 1.6 million to VAT annually.

While there is a narrative that the ASM sector is dominated by high-value and easily marketable minerals such as gold, diamonds, and gemstones, there is a considerable number of ASM operators that exploit industrial minerals and construction materials across the region (United Nations Development Programme, 2016). Following the economic crisis in 2008, there has been increased attention toward the diversification of mineral portfolios to cushion mineral-dependent countries against the effects of falling commodity prices and global demand.

One of the objectives of the AMV is to diversify the continent's mining industry by supporting the exploitation of high-value minerals and low-value industrial minerals at both commercial and small-scale levels (See AU, 2009). In Uganda, clay mining and brickmaking are making a visible contribution to the national economy. It is estimated that ASM operations produce 8 billion bricks per year generating USD 500 million. The

VAT contribution of clay mining and brickmaking is estimated at USD 15 million per year (Barreto *et al*, 2018).

Because the ASM sector is dominated by locals and migrants who reside in local communities, the sector contributes significantly to local economies. In Rwanda, it is estimated that the ASM sector injected USD 39.5 million into the local economy in 2015 (Barreto *et al*, 2018). Based on the data collected in Migori County in Kenya, Barreto *et al* (2018) estimated that the sector contributes USD 37 million annually to the local economy. This has translated to the creation of 38,000 non-mining jobs from the establishment of local businesses including shops, restaurants, and hotels.

The ASM operations also make a significant contribution to local economies in Uganda. With an estimated local spending of USD 500 million and USD 15 million from brickmaking and ASGM per year, the sector has contributed towards the creation of 750,000 jobs (Barreto *et al*, 2018c). Adding these to the direct jobs in the mining value chain, the ASM sector employs more than 1 million people. Based on the household size of 5 people, the sector supports a total of 5 million people, and this equates to 12 % of the country's total population (i.e., the total population is 43 million).

There are also estimates of ASM local spending in the Central Africa Republic and Liberia of USD 144.7 million and USD 13.5 million per year, respectively. The ASM sector in the two countries employs 400,000 and 100,000 people, respectively (IGF, 2017). Globally, the ASM sector employs over 40 million people with a 150 million population dependent on the sector's activities (IGF, 2017). As alluded to above, the current estimate for sub-Saharan Africa is 13 million people estimated in 40 countries. This far exceeds employment in large-scale mining which accounts for between 1 and 2 % of the total employment in mineral economies (Barreto *et al*, 2018). The DRC

employs the largest ASM workforce in Africa estimated at 2 million people. According to Hayes and Perks (2012), ASM supports between 16 and 20 % of the country's population.

The ASM sector in Ethiopia also employs more than 1.2 million people. With an average household dependency ratio of 6, the sector supports 7.5 million people, and this translates to 7 % of the total population. The employment benefits of ASM extend beyond those directly involved in the extraction of minerals. ASM activities offer employment opportunities across all stages of the value chain from prospecting to marketing and distribution. As captured by Hilson (2013), for every job created in ASM, six additional jobs are created in ancillary activities. This is because of the linkages that the ASM sector has with other sectors of the economy and the ability to attract and stimulate new businesses. In most locations, ASM operations are surrounded by upstream and downstream industries offering inputs and raw materials into ASM production chains, and transport and distribution facilities connecting miners to the end markets.

Within the sector, the division of labour is clearly defined, and this underpins the distribution of benefits in the sector (Chipangura, 2019; Tschakert, 2009). The different role players in the sector include miners, transporters, crushers, millers, sluicers, processors (i.e., using mercury to amalgamate the gold or those working in cyanide processing plants) as well as mine owners, landowners, and buyers. The working structure and role players differ according to the mineral being exploited, the size of the operation, and the structure of the value chain and its supply networks. In the case of Taita-Taveta in Kenya, where gemstones are mined, the ASM supply chain comprises of traders who buy and sell the minerals, landowners who own the land, cooperatives

who have mineral rights, pit owners or sponsors who finance the operations and the miners (Barreto *et al*, 2018b). The income generated in the operation is distributed amongst the four key players.

According to Barreto *et al* (2018), the annual gemstone production which is estimated at USD 120 million is distributed as follows: traders receive roughly USD 60 million, and the landowners and cooperatives, pit owners and miners (i.e., based on 10,000 miners) receive USD 20 million. This comes to USD 2,000 per miner per annum (i.e., if they receive the same remuneration). This income generated from ASM compares with the Gross National Income (GNI) per capita of USD 1,520 in Sub-Saharan Africa in 2018 (World Bank data, 2018). While the income generated by ASM operators differs across locations depending on the mineral being exploited, the supply and demand patterns, the structure of the end-markets, organisation, and division of labour in the ASM value chain, there is evidence suggesting that ASM operators earn higher incomes compared to other subsistence sectors in local economies.

According to AU (2009), miners earn ten times more than farmers in various locations. In Cameroon, Bakia (2014) estimated that ASM generates five times more revenue than most rural livelihood activities. Based on the data collected in Karamoja Region in Uganda, Barreto *et al* (2018) estimated that gold miners generate, on average, an annual income of USD 770. This compares to the country's GNI per capita of USD 670 (See World Bank data, 2018). In Cameroon, gold and diamond miners earn about USD 3.1 per day, which is three times higher than those working in other sectors (ILO *et al*, 2011).

Because of the *relatively* high incomes, miners are found investing in additional sources of income providing wider benefits to communities. As noted by the AU (2009), ASM

operators invest surplus income in shops, taxis, bars, guesthouses, and farming thereby creating diversified economies and long-term sources of livelihood (Pedro, 2004). The income generated by the miners also increases purchasing power in local communities creating opportunities for existing businesses (Pedro, 2004; AU, 2009, Verbrugge, 2016; O’Faircheallaigh and Corbett, 2016). As noted by Verbrugge (2016) and O’Faircheallaigh and Corbett, (2016), the high revenues from ASM can be correlated to increased demand for agricultural products, consumption goods and other services in communities including catering, transport, security, and sex work.

To this end, ASM creates opportunities for large numbers of people outside mining activities. There exist strong links between ASM and agriculture in the region (Hilson, 2016). Many rural communities have “branched out” to ASM to supplement their farming income (Hilson, 2016; Hilson and McQuilken, 2014; Dondeyne and Ndunguru, 2014; Banchirigah and Hilson, 2010). In studying this movement, several scholars identify a beneficial relationship between the two sectors, where ASM is supporting the process of re-agrarianization (See Verbrugge, 2016). The revenues generated from ASM are used to support farming households during the off-season. ASM income is also used to purchase inputs (i.e., fertilizers, seeds, pesticides, implements, etc) needed to increase the productivity of farming (Kelly, 2014; Hilson and Maconachie, 2020).

Verbrugge (2016) also identified a relationship where farmers lease out their land to artisanal miners in exchange for royalties or *some* payment. Within the ASM-agriculture literature, scholars identify two categories of farmers. Some farmers engage in ASM because of the seasonality of farming activities and hence the need for additional income to be able to meet household necessities. The other group of farmers are those with resources, and venture into ASM to increase wealth and their social status

(Kelly, 2014). These two categories mark the extreme ends of the push and pull continuum, which is used to explain why people engage in the ASM sector.

Within the broader framework of livelihood diversification, Maclin *et al* (2017) highlighted desperation and the desire to escape poverty as examples of push factors, while the pull factors are linked to motivations converging toward the desire for greater economic returns. Bakia (2014) aggregated the latter as “self-sustaining” objectives. In view of the evidence that supports the “pull” narrative, the potential of ASM has been elevated from being an “economic relief” and “safety net” to being a platform for creating wealth and improving the standard of living of the miners and their families (Hilson, 2016). Broadly, there is evidence showing miners accumulating wealth and investing in more “sustainable” sources of income. To this possibility, ASM is increasingly being seen as a long-term livelihood strategy that offers prospects of escaping poverty and improving the standard of living (Geenen, 2013; Maclin *et al*, 2017).

Because of the low barriers to entry to the sector, an increasing number of women are participating in the sector and its linked activities. According to Hayes and Perks (2012), most women are driven into ASM because of decreased livelihood opportunities in traditional sectors. More so, the burden on women has increased as most of them are breadwinners in their families. Based on research conducted in the DRC, Hayes and Perks (2012) found that 70 % of women working in ASM are breadwinners. Within this context, ASM provides opportunities for women empowerment and poverty alleviation in the country. The percentage of women differs across locations with as high as 75 % participation reported in some countries (i.e., see Guinea) (IGF, 2017). In the DRC, women account for 50 % of the ASM workforce (Hayes and Perks, 2012).

With youth unemployment reported as high as 80 % in some countries (i.e., see Ghana and Mozambique), Hilson and Osei (2011) identified ASM as a potential avenue to address the youth unemployment crisis in the region. Accordingly, Hilson and Osei (2011) noted that while it is not a long-term solution, ASM has the potential to provide “short-term relief” and stability for the youth and their families in the region. In the case of Sierra Leone, Kelly (2014) noted that young people have chosen ASM over farming. This is because the conflict in Sierra Leone has left young people with no property rights and inheritance diminishing any prospects of agriculture (Kelly, 2014). The movement of youth into ASM is evident in numerous other countries in the region and this is also linked to the lack of education and skills among the youth.

According to Hilson and Osei (2011), more than 50 % of the youth in the region are illiterate. In the absence of economic activities that can absorb them, ASM is the only sector that can accommodate those without education and formally recognised skills, those who have been made redundant in the various sectors, and those with few or no economic opportunities (Bakia, 2014; O’Faircheallaigh and Corbett, 2016; Maclin *et al*, 2017; Mondlane and Shoko, 2003). Because of the relatively high income, ASM has become a primary source of income, and this has resulted in most people staying in the sector for longer periods. As noted by Hilson (2010), the incentives for staying in ASM include stable employment, consistent and regular income, and its ability to provide immediate debt relief. The other benefits of ASM include social mobility, improvement in the standard of living, and social cohesion.

The latter relates to the established structures and relationships *often* found in the sector (Chipangura, 2019). In most localities, ASM is surrounded by strong community networks characterised by the spirit of working together and protecting each other. This

feature is highlighted by Chipangura (2019) where miners regard themselves as “one big family” coming together to escape poverty. In the case of the DRC where conflict is still ongoing, Hayes and Perks (2012) identified some of the benefits of ASM as peace and stabilisation, particularly in terms of the role of women in both the sector and broadly in communities as principal breadwinners. ASM is also identified as a platform that fosters social mobility allowing miners to improve their social status and living standards (Verbrugge, 2016).

In summary, ASM contributes considerably to local and national economies touching on various aspects of development priorities. There is evidence supporting the argument of an increased role of ASM beyond it being a survival activity and a “safety net” against economic hardships. ASM has the potential to support wealth creation and foster the establishment of long-term sustainable livelihood strategies for local communities. While the sector’s contribution is evident many of these benefits are affected by the negative impacts of the sector. As a result, few net benefits accrue to miners, local communities, and governments (Geenen, 2012; Salo *et al*, 2016).

4.4.3. ASM negative externalities

The standing view is that eliminating the negative consequences associated with the sector is the key to ensuring that ASM plays an increased role in mainstream development (AU, 2009). To this effect, donor and government interventions implemented in the sector have been inclined towards mitigating the negative impacts of the sector and these can be broadly categorised as environmental, social and economic consequences (Childs, 2008; Verbrugge and Besmanos, 2016; Maconachie and Hilson, 2011; Henstchel *et al*, 2003).

Of the three areas of concern, significant attention has been directed to the relationship between ASM and the environment. This is because of the extent of the impacts and the risks of greater spread affecting millions of livelihoods. In comparing the environmental impacts of ASM and large-scale mining, some scholars submit that the footprint of ASM is comparable with, and even exceeds the impacts of industrial mining (Henstchel *et al*, 2003; Olivieri, 2019; Carstens, 2017). Davidson (1993) identified rush-type ASM activities as having significant direct impacts on the environment because of the concentration of activities and the ad hoc nature of the operations.

Henstchel *et al* (2003) and Carstens, (2017) attributed the high environmental costs to the clustered nature of ASM, poor environmental management practices, lack of enforcement, and the inaccessibility of the sites. The scale of the impacts also depends on other various factors including the mineral being exploited, mining and processing techniques used, location of the operations, surrounding land-use activities, the number of people working in the same location, knowledge and awareness of environmental protection, and level of rehabilitation (i.e., if any) (Heath, 2005; Carstens, 2017; Ingram *et al*, 2011).

Broadly, the environmental impacts of ASM include land degradation, deforestation, landscape changes, pollution of water resources and soil, loss of biodiversity, damage to riverbeds, soil erosion, and siltation, and overuse of resources (Henstchel *et al*, 2003; Carstens, 2017; Heath, 2005; Ingram *et al*, 2011; Buss *et al*, 2019; O’Faircheallaigh and Corbett, 2016; Salo *et al*, 2016; Verbrugge and Besmanos, 2016; Buss *et al*, 2019). Literature identifies land degradation, deforestation, and pollution as the main impacts of ASM on the environment (Hilson, 2002; IGF, 2017; Tschakert, 2009). In consolidating the perceptions of communities on the impacts of ASM in Tanzania,

Kitula (2006) identified the key concerns as land degradation and collapse of houses, mercury pollution, uncontrolled digging and abandoned pits, and deforestation.

ASM activities take place on the surface and underground, and this *mainly* depends on the depth of the deposit. In Geita District in Tanzania, the exploitation of minerals involves the use of underground mining methods and explosives to fragment the mineralised rocks. The depth of the shafts ranges from 10 and 100 metres (Kitula, 2006). Because of the use of explosives, surrounding communities have reported increased collapses of their houses and local infrastructure. The number of operations differs in various villages, and it is estimated that the number of ASM pits ranges between 100 and 1000. In Mugusu village, Kitula (2006) found 850 mining pits with about 230 mining sites being non-operational. The scale of mining in the area has degraded the land affecting agriculture and other livelihood activities.

Over the years, there have been increased concerns on the impact of ASM on forest systems. To this effect, deforestation has been identified as the main impact of ASM (Espejo *et al*, 2018; Profor, 2020; World Bank and Profor, 2019; Hirons, 2013; Boadi *et al*, 2016). While the scale of deforestation caused by ASM activities is small compared to the effects of logging and agriculture, the footprint of ASM is increasing with the intensification of its activities (Hirons, 2011; World Bank 2019a).

Further, the effects of ASM on deforestation are exacerbated by the growing link between ASM and agriculture, in which the two activities are conducted side-by-side. The World Bank (2019a) noted that the co-existence of ASM and agriculture adds to potential forestry loss. The impacts of ASM on deforestation are evident in numerous countries in Latin America and sub-Saharan Africa. According to Profor (2020),

deforestation is a growing challenge in Suriname in South America, where mining activities are responsible for 73% of total deforestation.

Espejo *et al* (2018) studied the extent of deforestation caused by artisanal gold mining in the Peruvian Amazon in the period 1984 and 2017. The main finding of the study was that ASM caused 100,000 hectares of deforestation. This has had a significant impact on biodiversity and ecosystem services, defaunation, pollution, and soil contamination (Espejo *et al*, 2018). In sub-Saharan Africa, numerous studies have mapped the extent of deforestation caused by ASM activities in Ghana. According to Hirons (2013), the environmental costs of mining in Ghana are estimated at 10% of the country's GDP. Boadi *et al* (2016) submitted that ASM activities taking place in the Offin Shelterbelt Forest Reserve degraded 2.5 km² (i.e., about 4.4 % of the reserve) within five years of operation.

The effects of deforestation have extended to surrounding cocoa farmers and water resources reducing farming activities from 90% to 70% (Boadi *et al*, 2016). The immediate consequences of land degradation and deforestation include loss of arable land, destruction of habitats and ecosystem services, loss of biodiversity, increased soil erosion and vulnerability to climate change risks and the disruption of the carbon cycle (Hirons, 2013; Mhangara *et al*, 2020). The secondary impacts of these consequences include reduced productivity of farming and other agricultural activities affecting production systems and food security. The livelihoods of communities are also directly affected by loss of ecosystem services as most depend on forests for food, medicine, and other inputs to support livelihood activities (Kitula, 2006; IGF, 2017).

The environmental impacts of ASM are exacerbated by the use of chemicals during processing. In particular, the use of mercury during the gold amalgamation process.

With artisanal gold mining accounting for 50% of the total ASM workforce, mercury use in the sector accounts for 37% of global emissions (Espejo *et al*, 2018). This equates to an estimated at 727 tonnes per year. In 2011, the sector used an estimated 1,400 tonnes of mercury (IGF, 2017). In Sub-Saharan Africa, Burkina Faso is the main contributor in terms of the release of mercury from ASM operations with estimates of 35 tonnes per year (IGF, 2017).

The use of mercury has wide consequences on the environment and health and safety of the miners and surrounding communities. Mercury pollutes the land, water resources, and air resulting in downstream consequences. The health effects of mercury on humans include acute intoxication, seizures, mental disturbance, and brain damage and have serious implications on women (Kitula, 2006; IGF, 2017). The other Occupational, Health, and Safety (OSH) risks that miners are exposed to include exposure to dust and other toxic material and the effects of noise, vibration, poor ventilation and working in hot and humid environments (Henstchel *et al*, 2003). The poor working conditions and practices have led to many accidents including rock falls, subsidence, and explosions (Johnson, 2016).

The extent of the health and environmental impacts is also exacerbated by the social and economic factors found in the sector. While ASM plays an important role in communities, it has been marked as a source of indecent employment. The ILO defines decent employment as work that is productive and offers fair income as well as job security and social protection with the rights of workers respected (ILO, 1999). Within this characterisation, there are equal opportunities for men and women. According to South Africa's Department of Economic and Social Affairs Poverty (2007), working

towards creating decent jobs is important for poverty alleviation as well as sustainable development.

The quality of employment is also essential for economic growth and most importantly, the improvement of living standards. The ASM sector is characterised by aspects that diminish its role in socio-economic development. According to IGF (2020), these aspects are often overlooked because of the livelihood opportunities that are leveraged from the sector. ASM activities are characterised by high social ills as well as safety and health costs and these result from precarious working conditions, poor health and safety practices, child labour, sexual exploitation, and tax evasion (Salo *et al*, 2016).

Maconachie and Hilson (2011) highlighted criminal associations, money laundering, and illicit financial trading as among the key challenges facing the sector. O’Faircheallaigh and Corbett (2016) identified the negative social impacts of ASM as child labour, the large influx of people, alcohol and drug abuse, gender discrimination, gender-based violence as well as marginalisation and exploitation of the miners by middlemen and buyers, who receive a larger portion of the earnings. Illegal taxing and control of ASM by armed groups and intimidation by police and enforcement agencies have also been attached to the ASM sector (Kelly, 2014).

There is also extensive literature on the social impacts of ASM. For example, the literature on ASM and child labour unpacks the involvement and participation of children in the sector, the cultural and societal arguments surrounding child labour, underlying household structures or the lack therefore (i.e., household fragmentation), as well as human rights perspectives and policy responses in terms of the ILO programme on the Elimination of Child Labour (See O’Driscoll, 2017; Potter and Lupilya, 2016; Henstchel *et al*, 2003). The literature on ASM and gender broadly provides perspectives

of women engaged in ASM and discusses the participation and remuneration patterns, impacts of ASM value chains on women's incomes, health and their families, cultural and institutional challenges affecting participation, the lack of access of and control land and other productive resources, gender inequality, discrimination, and violence (Hayes and Perks, 2012; Yakovleva, 2017; IGF, 2018; Moretti, 2006; Buss *et al*, 2019).

The other concerning aspect associated with the sector is the criminality associated, and/or supported by the sector's activities. Extensive work has been done to understand the associations between ASM and human trafficking, sex work and forced prostitution, debt bondage, forced labour, the political economy of ASM and illicit financial flows (IFF), and the sources, causes, and impacts of IFF on the role of ASM in local economies (Kelly, 2014; Cortés-McPherson, 2019; Hunter, 2020; Centre for Natural Resource Governance, 2013).

Given the complexities surrounding the sector and the nature of its activities, it remains difficult to measure and quantify the net impacts of ASM considering the positive and negative outcomes. However, the prevailing perception is that the negative impacts outweigh the positive benefits (AU, 2009). This is reinforced not only by the *visible* environment, social, health, and safety characteristics of the sector's activities but also evidence of the majority of the miners and communities still living in abject poverty. Fisher *et al* (2009) noted that improvement in livelihood security from ASM is not clear cut with evidence alluding to the potential of the sector to reduce poverty on one hand, and realities proving the potential of ASM to aggravate poverty on the other. To this end, there is a lack of understanding of poverty dynamics associated with the sector's activities.

While the employment statistics and positive associations between the sector and other development priorities paint a positive picture, the concern is that the majority of ASM activities are characterised by insecurities and low remuneration keeping the miners below the poverty line. This then begs the question: *does ASM alleviate poverty?* This is a relevant question in the context of sub-Saharan Africa where ASM activities have grown employing more than 13 million people and yet most of them survive on 1 USD per day (Maconachie, 2009). Coming from the “*Alternative Livelihood*” perspective, several scholars submit that while ASM continues to provide economic relief during difficult times, there is a gap between the sector’s contribution and the broader poverty objectives, which aim to improve the living standards of the population.

These arguments are located within the poverty trap characterisation, which captures the poverty-aggravating effects of ASM. Childs (2008) described ASM as a poverty-driven activity that is self-perpetuating. Within this construct, there exists a connection between the proliferation of ASM activities and competition for limited resources which results in low productivity and marginal incomes. This phenomenon is also characterised by adverse impacts on the environment and the health and safety of the miners further reducing productivity and potential economic gains in the sector. These connected outcomes have constrained most ASM to hand-to-mouth operations reducing the prospects of the sector in poverty alleviation.

To this end, Labonne (2002) labelled ASM a temporary measure with little potential for long-term poverty reduction. It is merely a survival activity characterised by negative social, environmental, and health impacts pushing people further into poverty (Labonne, 2002). Tschakert (2009) submitted that the vicious cycle of poverty and vulnerability weakens the sector’s potential as a viable livelihood strategy. In view of

the nature of ASM, Jønsson and Fold (2011) noted that while the income generated from ASM may be high, these earnings are absorbed by the risks surrounding the sector. Geenen (2012) submitted that ASM has generated few benefits for miners and communities. Garrett and Mitchell (2008) also made the same observation that the significant revenue generated in the sector does not benefit ASM communities instead it is enjoyed by armed groups through the initiation of illegal taxes.

Amongst the key socioeconomic risks attributed to the marginal incomes are exploitation and marginalisation, which are instituted by buyers and those at the upper end of the ASM value chain (O’Faircheallaigh and Corbett, 2016; Buss *et al*, 2019). As noted by Maconachie and Hilson (2011), ASM is a “*self-perpetuating cycle of poverty in which miners at the bottom of the production chain are found to be concerns of human rights activities*”.

Against this view, Maconachie and Hilson (2011) declared ASM as an “*accelerator of marginalisation*” where *mostly* the elites benefit from the sector’s activities. The high incomes generated by the miners are often eroded by the power structures and arrangements in the sector leaving the miners with earnings *insufficient* to cover necessities and invest in other economic opportunities to increase their chances of escaping poverty (Ingram *et al*, 2011). This is noted by Kelly (2014) and Hilson (2012) who submitted that exploitation in the sector results in debt among the miners. This then prevents them from investing in additional sources of livelihood thereby increasing their dependency on ASM.

According to Kelly (2014), the most affected by exploitation are women and youth. While the participation of women in ASM is considerable, in analysing the distribution of income amongst various role players, Barreto *et al* (2018) noted that women’s

involvement does not match the benefits that accrue to them. In a case study in Uganda where the participation of women ranges between 50 and 80 %, it was found that women received only an 8 % share of the income. The same finding was highlighted in the case of Kenya where women accounted for 38 % of the workforce and received 11 % of the revenue share (Barreto *et al*, 2018).

In view of these realities, Kelly (2014) labelled ASM predatory and inequitable. Women are disenfranchised with limited opportunities to gain experience in the sector and to participate in formalisation efforts (Moretti, 2006). With most women being breadwinners and playing increased economic roles in households, the discriminatory and exploitative nature of the sector continues to diminish the prospects of the sector in alleviating gendered poverty. The power structures in ASM also disempower the youth binding them to debt (Kelly, 2014). In assessing the shortcomings of alternative livelihood projects, Banchirigah (2008) noted that most of these programmes fail because of the miners' debts to buyers and hence continuous participation in ASM is seen as the only escape route (Hilson, 2012).

Amongst the interventions imposed by governments to manage ASM include temporary bans on the sector's activities. Several scholars have alluded to the implications of these enforcement measures on the miners and the broader community. The standing perspective is that banning ASM has devastating impacts on the livelihoods of the miners as well as those that depend on the sector's activities, both directly and indirectly. In some locations, these effects spread to communities where ASM activities are taking place (Kelly, 2014; Zolnikov, 2020). While the evidence of the extent of the impacts and the dependency of other income-generating activities on ASM reinforces the importance of the sector in local economic development, the other finding that is

revealed relates to the ability of ASM (or lack thereof) to provide extended support to the miners and sustain livelihoods for *longer* periods.

Effectively, this situation shows the shortcomings of the sector in contributing toward long-term poverty reduction. The other context that is exposing these deficiencies is the current Covid-19 pandemic, which saw many economic sectors halted including ASM activities. The productivity in the sector and the lower incomes increased the vulnerability of the miners, with the majority struggling to sustain their livelihoods and regressing into poverty. With the expected job losses in the formal sector as a result of Covid-19, scholars anticipate further intensification of ASM activities in the region.

As alluded to above, an increase in the absorptive capacity of ASM may lead to increased competition, low production outputs, low incomes, and high social and environmental costs further embedding miners and communities in poverty. To this end, it is important to create an environment where miners can leverage maximum benefits from ASM enabling them to diversify their sources of income. This view is captured in figure 4.1 as the balancing loop aiming to move ASM to a level where it facilitates the establishment of long-term *sustainable* economic sectors that will sustain livelihoods, even during difficult times.

4.5. ASM development gaps

Having discussed both the positive and negative impacts of ASM and the implications on broader developmental outcomes, governments, and donors have implemented a series of interventions primarily aimed at managing the sector's activities. These interventions have been implemented under the umbrella of formalisation, which has been promoted as a platform to address the challenges facing the sector (Geenen, 2012; Siegel and Veiga, 2009; Verbrugge and Besmanos, 2016; Siwale and Siwale, 2017;

Buss *et al*, 2019). While there is a consensus that the solution to ASM challenges lies within formalisation, there is no common meaning of the concept (Siegel and Veiga, 2009). The formalisation *framework* is underpinned by several proposals and continues to evolve as the needs of the sector change.

Broadly, formalisation aims to transform the sector's activities into *recognised* formal operations. Within the broader literature of informality, Hilson (2013) defined informal activities as trades and services that take place outside taxation systems and broader regulatory frameworks. The latter has underpinned formalisation with most countries developing legislation and promoting it as tools to transform the sector. For most governments, formalisation was largely interpreted as legalisation and acquiring of mining titles (Geenen, 2012). As a result, ASM as a category of mining has increasingly been recognised in most countries' mining regimes. According to Collins and Lawson (2014), with the promotion of formalisation in the 1990s, about 36 countries committed to legalise the sector. The expectation was that miners will obtain the necessary licenses to operate within the law, and this will provide a working solution to managing and supporting the ASM sector.

With the implementation of legislation, it was established that the issuing of mining licenses alone was not an all-encompassing solution to addressing the challenges associated with the sector. At the base, a considerable number of those working in the sector were struggling to obtain mining licenses. In light of this, formalisation of the ASM sector was extended to include various interventions as informed by needs in the sector. These areas include the establishment of institutional mechanisms, provision of extension services and targeted support programmes, as well as enforcement measures to curb illegal mining activities.

With a growing evidence base on the sector, the objectives of formalisation have centred around developing appropriate policies and legislation to support the growth of the sector, establishing stakeholder collaborations to address conflicts, exploitation and ensure the co-existence of ASM with other sectors in the economy, providing access to land and minerals (and other inputs), reducing the negative impacts of ASM on the environment and in communities, and ensuring that ASM plays an increased role in socio-economic development.

Overall, the performance of formalisation efforts has been mixed. Noticeable improvements have been made in the following areas: developing legislation that recognises ASM activities, providing access to licensing and registration, increasing access to mining titles and security of tenure, allocating land and mineral resources through the designation of ASM zones, and the implementation of support programmes aimed at improving working conditions, increasing productivity, reducing health and safety and environmental impacts, increasing economic opportunities and earnings in the sector to improve livelihoods. Examples include projects aimed at eliminating child labour; gender-specific programmes; and fair trade and certification programmes aimed at eliminating illicit activities within the ASM value chains and linking operators to markets to maximise their benefits from ASM (Bakia, 2014; Childs, 2008; Dondeyne and Ndunguru, 2014).

Some of the success factors extracted from formalisation efforts include mining policy and legislation that are in tune with the needs of the sector and take into account profile of the miners. This is seen with the implementation of simplified licensing systems where licenses are handled at district levels (Economic Commission for Africa (ECA), 2002). Tanzania is amongst the countries that have decentralised its licensing system

and according to Mutagwaba *et al* (2018), through this intervention, the number of licenses issued to ASM operators increased from 35 in 1999 to 9,829 in 2013. As noted by ECA (2002), another benefit of decentralising mineral rights is that it creates a platform for curbing illegal mining activities and the case of Zimbabwe has been cited in this regard.

Another strategy that has been promoted as a best practice is the designation of ASM areas. According to ECA (2002), this strategy has been catered for in some countries' legislation including Tanzania, Ghana, DRC, Mali, and Guinea. The allocation of ASM-specific areas is supported by the need to improve access to mineral rights, address conflicts between ASM and large-scale mining over mining land, and improve ASM support and management (Mutagwaba, 2017; Corbett *et al*, 2017). In the case of Tanzania, about 2,438 km² of land was allocated to ASM operations and 8,800 licenses were subsequently issued. In the case of Ghana, 150 areas covering a total area of 5,400 km² were marked as ASM designated areas (Mutagwaba, 2017).

The other successful projects implemented in the ASM sector encompass providing access to technology and technical assistance to improve productivity and practices used to mine and process minerals¹⁸. Numerous other projects have been implemented with records of success particularly in the areas of legalising ASM operations, improving the livelihoods of the miners and their families, improving working conditions, promoting

¹⁸ A widely cited example is the establishment of the Shamva Mining Centre in Zimbabwe. This project was a collaboration between several stakeholders including the government of Zimbabwe, the miner's association, several donors, and others. The aim of the project was to provide a processing facility to the miners with overarching goals being to increase production outputs and incomes, as well as improving health and safety associated with their work. According to the Minerals, Mining and Sustainable Development (MMSD) Report (2002), the facility was designed to cater to about 43 miners within a 50 km radius. Upon operating, more than 200 miners sought the services of the facility. Amongst the achievements of the projects was an increase in production outputs from 9 tonnes to 57 tonnes per day (MMSD Report, 2002). These were attributed to several factors including providing a service that was aligned with the needs of the miners and providing access to markets. The involvement of multiple stakeholders also contributed to the success of the projects.

responsible practices, and providing necessary support and services to the miners ensuring increased productivity and income that is generated from ASM activities. Notwithstanding these positive outcomes, the shared analysis is that most interventions have not been successful in *fully* transforming the sector. This is based on the concern that between 70 and 80% of ASM activities continue to take place outside associated legal frameworks (IGF, 2017).

Most of the efforts seen in the sector have been met with numerous challenges which have been tied to the following shortcomings: recognition of the sector, requirements and provisions of legislation, design and implementation of support programmes, and failure to take ASM context into account. O’Faircheallaigh and Corbett (2016), identified inconsistencies between policy rhetoric, legislation, and policy practice as the main cause of limited progress in the sector. It has been raised that the objectives set out at the strategy level are often disconnected from the issues on the ground. Likewise, the challenges facing the sector do not feedback to legislation and broader policy objectives, which are supposed to connect ASM to other sectors of the economy.

This is attributed to the failure of governments and donors to *fully* recognise ASM and the role it plays in broader development priorities. The standing view amongst scholars is that the ASM sector is disconnected from the broader development agendas (Hilson and McQuilken, 2014; Hilson, 2016; Hilson and Maconachie, 2020; AU, 2009). This assertion has been raised in view of the sector’s landscape and the extent of coverage in development policies and interventions.

The concern is that while there is compelling evidence of the sector’s role in poverty reduction, the majority of ASM activities still operate informally making the sector unattractive to policymakers. The poor recognition of the sector is reinforced by

evidence of unsatisfactory coverage in poverty reduction strategies as well as national and international development agendas (Fisher et al, 2009; Labonne, 2014). This was highlighted by the AU (2009) when discussing the complex profile of ASM:

Despite its positive impacts, the ASM sector is beset with problems of sustainability. The sector has been neglected both locally and in the international development agenda and it does not feature in most national and local poverty alleviation strategies (See AU, 2009:27).

Having identified this gap, Hilson and McQuilken (2014) submitted that ASM has remained foreign to local economic development planning and interventions. This is despite the implementation of a series of formalisation efforts aimed at transforming the sector and maximising its potential for poverty alleviation. To this end, Hilson and Maconachie (2020) noted that while there is seemingly support for ASM globally, the reality on the ground suggests otherwise with donors and governments still unwilling to include the sector in rural development and poverty alleviation programmes.

This observation extends to international development agendas with Hilson and Maconachie (2020) arguing that much like the Millennium Development Goals, the SDGs were designed without considering ASM. This argument is made in view of the SDG Atlas developed by the Columbia Centre on Sustainable Investment (CCSI) in collaboration with the United Nations Development Programme (UNDP), the UN Sustainable Development Solutions Network (SDSN) and the World Economic Forum (WEF) in 2016. Underpinned by the role of mining in development, the Atlas maps the linkages between mining and the SDGs. Given the growing importance of ASM in developing countries, expectations were that the Atlas will afford *sufficient* coverage to the ASM sector. Not only did the Atlas fail to feature ASM as expected, but the sector's

activities were discussed in view of large-scale mining further reinforcing the argument that ASM is excluded from mainstream development because of the policy bias towards large-scale mining operations.

Recognising the importance of the SDGs, Hilson and Maconachie (2020) highlighted that the Atlas was crucial in displaying the role of ASM in the development priorities of poor regions across the world. In contrast, the Atlas isolated ASM from the extractive industry and broader development priorities. The failure to incorporate ASM in broader development agendas has resulted in the implementation of *ad hoc* and unstructured policy responses and interventions further constraining the role of ASM in local economic development (Hilson and Maconachie, 2020).

More so, several scholars link this persistent informality to the legislative requirements imposed on the sector's activities. According to Hilson (2016), applicable legalisation has confined the sector's activities to the informal sector. This is because *most* legislative frameworks are found to be bureaucratic, costly, and inaccessible. O'Faircheallaigh and Corbett (2016), also characterised ASM policy responses as incoherent, misdirected, counterproductive, and ineffective. This is because most responses are steered towards legalising the sectors' activities and often ignore other dimensions that have a direct influence on acquiring mining titles.

According to Salo *et al*, (2016), earlier formalisation efforts assumed that property rights would enable the miners to derive value from their assets. For instance, among the benefits of formalisation is access to funding to support miners' activities. In assessing this against the case of Kenya, Musembi (2007) noted that of the 118 license holders, only two were able to secure funding using their mining title as collateral. In evidence of this, it has been submitted that possession of a mining license is not

adequate to support the application for financing. According to Gilbert (2002), lenders assess applications based on the ability to pay, the level of risks as well as the viability of projects. All these aspects remain gaps in most ASM operations.

The failure of formalisation is also linked to the large-scale mining bias, which is still embedded in mining policies and legislation. According to Hilson (2016), the policy environment is still promoting the traditional models of economic development, which are tied to export-led strategies and the expansion of industrial mining. Based on the ‘first come first serve’ approach, it is argued that governments are prioritising the interests of large-scale operations. This is linked to the lack of access to mineral rights as most of the mineral lands are located within the concessions of large-scale operations.

Siwale and Siwale (2017) argued that governments’ motives toward ASM are underhanded. In studying the performance of formalisation efforts in Zambia, Siwale and Siwale (2017) submitted that formalisation efforts are used as a tool to control the ASM sector and protect the interests of large-scale mining players. To this effect, Geenen (2012) described formalisation as a “standardised framework that is controlled by a central system”. According to Salo *et al* (2016), formalisation takes the form of a “*stepwise procedure*” where failure to meet the requirements of one activity prevents the miners from pursuing other objectives.

In addition to pointing out the deficiencies of legislation governing ASM activities, Van Bockstael (2014) argued poor legislation is exacerbated by the lack of government capacity to provide access, monitor, and enforce. According to Mutagwaba (2017), while the allocation of designated zones in Tanzania and Ghana has made inroads in supporting the development of the ASM sector, limited resources to manage and enforce

the law have stalled the progress made. Of the 8,800 licenses that were issued, only 626 (i.e., about 7%) are active due to the lack of geological data on the allocated sites.

Linked to legislation and regulatory instruments, the support programmes implemented in the sector are found to be inappropriate and inefficient because of the top-down approaches (Bakia, 2014). As noted by Verbrugge and Besmanos (2016), most interventions fail to capture and address the needs and concerns of the informal workforce. Tschakert (2009) submitted that the support programmes aimed at addressing the challenges in the sector are misguided and inclined to the needs of those at the upper end on the spectrum thereby excluding those at the bottom. Childs (2008) connected the failure of donor-supported programmes to the inclination toward technical aspects of the sector, ignoring the livelihood challenges in the sector. Verbrugge and Besmanos (2016) raised the inadequacy of formalisation efforts in incorporating complex organisational arrangements inherent in the sector and providing targeted interventions to address the main issues binding ASM to unfair practices.

It has also been raised that most of the support programmes have been inclined toward mitigating the social and environmental impacts of the sector (Maconachie and Hilson, 2011). To this end, many of the dimensions of ASM have been neglected in formalisation interventions. For example, Maconachie and Hilson (2011) identified livelihood challenges and constraints inherent in the sector as a gap. Bakia (2014) attributed the failure of formalisation efforts to the poor understanding of the demography of the target populations. Because of these deficiencies, the dominant perspective is that formalisation efforts have failed to improve the livelihoods of the miners and address the challenges that constrain the sector's activities to the subsistence

level. Bakia (2014) highlighted that the interventions seen in the sector have failed to improve productivity and raise the standard of living of the miners.

Spiegel (2009) argued that the policy and ASM interventions implemented in the sector have weakened the sector's productivity and created secondary problems. These have affected the miners' ability to generate income and support their families. Geenen (2012a) argued that the enforcement measures seen in the sector have compounded rather than addressed the challenges in ASM specifically those that relate to conflicts, illegality, poverty, and state control. In assessing the impacts of donor programmes in eradicating illicit financial flows, Kelly (2014) argued most of these initiatives have negatively affected the livelihoods of the miners leaving them in the same precarious working conditions.

With formalisation still at the centre of addressing the challenges facing ASM and enhancing the benefits to the miners and communities, the broad recommendations include the need to integrate ASM in overarching agendas including rural development strategies and poverty reduction strategies. Dondeyne and Ndunguru (2014) identified decentralisation and democratisation of ASM policies in the context of rural development as possible solutions to ensuring that the livelihood dimensions of the sector's activities are captured. In understanding informality in ASM, Van Bockstael (2014) highlighted that "informality" does not mean that the sector is not regulated. There are facets of legality found in the sector as instituted through payments of informal taxes, and informal agreements with landowners, buyers, and traders. Within this context, Van Bockstael (2014) introduced the concept of "locally grounded formalisation" which incorporates the existing structures and practices into the broader formalisation responses.

Based on De Soto's theory of extralegality, Siegel and Veiga (2009) highlighted the need to embrace existing customary practices and informal rules developed by the miners in mainstream formalisation efforts. Mutemeri *et al* (2016) emphasised the need to establish relations with miners' associations and cooperatives and build their capacity to regulate the spaces in which ASM activities take place. Given the spectrum of role players in the sector, there is a need for the policy formulation process to be inclusive, participatory, and driven by bottom-up and hands-on approaches. Child (2008) proposed Fair Trade as a framework for addressing the challenges in ASM because it places partnership and participation at the core of interventions. It is also important for ASM interventions to be locally grounded and be driven by local contexts because this is where complete knowledge and the realities of the sector exist (Childs, 2008).

4.6. Chapter summary

The objective of the Chapter was to build an understanding of the relationship between ASM and development. In laying the foundation for the discussion, the Chapter provided a historical account of the ASM sector, and the insights from the discussion supported the argument that the sector has long-established ties with society and its development. The Chapter also discussed factors that were driving the expansion of the ASM sector and prevailing realities suggest that the sector's activities will continue to increase so as its importance both as an opportunity (i.e., given the benefits and positive impacts leveraged from the sector) as well as a risk (i.e., given the negative impacts associated with the sector's activities). In view of the impacts of both and in considering the socio-economic landscape of most African countries, there is a need to close the gap between ASM realities and interventions that are implemented in the sector.

CHAPTER 5: THE ASM SECTOR IN SOUTH AFRICA

5.1. Introduction

The objective of this Chapter is to understand the developmental trajectory of the ASM sector in consideration of South Africa's socio-economic landscape and issues. Compared to most mineral economies in Africa, ASM in South Africa has remained relatively small in terms of the number of people engaged in its activities¹⁹. This is despite the recognition of the sector's activities by the government as an avenue to redress past injustices and increase the participation and benefits of historically disadvantaged South Africans (HDSAs) in the mining industry. However, in the last decade, the landscape of the sector has changed with the country experiencing an unprecedented growth of ASM activities.

This has been driven *mostly* by the lack of economic opportunities as seen through rising unemployment and poverty levels in the country²⁰. The proliferation of ASM activities has also been linked to the loss of livelihoods as a result of the declining performance of large-scale mining operations, *particularly* in mining communities and areas that are dependent on mining. The rise in ASM activities has also been linked to how the government has managed the sector's activities and the shortcomings thereof.

While there seems to be a common understanding in terms of the factors driving the proliferation of ASM in South Africa, industry stakeholders are at odds with regard to

¹⁹ While the available figures are outdated, it is estimated that the ASM sector in South Africa employs between 20,000 and 30,000 people – this compares to more than 500,000 people in Zimbabwe, Tanzania, and the Democratic Republic of Congo in the SADC region (See IGF, 2011; Ledwaba, 2017).

²⁰ As indicated in Chapter 2, the unemployment rate in the country increases from 16.9 percent in 1994 to 35.3 percent in 2021. While there are noticeable improvements in poverty levels, a regression was recorded in 2015, with poverty rates increasing.

how the sector's activities should be managed. On one end, stakeholders are calling for the criminalisation of ASM, while the other extreme is advocating for the decriminalisation of the sector. While there are merits to both arguments, much of the debate has been confined to the current practices in the sector and does not extend to understanding the ASM phenomenon in the context of the country's socioeconomic issues and its development priorities as captured in the National Development Plan.

Against this background, the Chapter embeds ASM within the socioeconomic history of the country to understand the contexts that shaped ASM. The historical account considers the evolution of ASM from colonisation, through the post-1994 agenda and the emergence of the *zama-zama* phenomenon. The Chapter also provides an assessment of stakeholders' debates to understand the relationship between ASM and South Africa's developmental context as viewed through different lenses. This comes in with the aim of capturing the positive and negative aspects of the sector that need to be interrogated when establishing the role of ASM in the country.

5.2. South Africa's colonial history and ASM development

The following discussion looks at the country's historical account alongside the ASM sector to understand the development path that the sector has taken as affecting its landscape and the issues in the sector.

5.2.1. The fall of indigenous mining

The genealogy of ASM can be located in the pre-colonial history of *most* countries on the African continent. This is the case in South Africa with evidence of ASM traced back to the late Stone Age (Dart and Beaumont, 1969). ASM was an integral part of livelihood strategies employed by indigenous communities in the country and it contributed towards wealth accumulation and connected various community groups

through trade relationships. According to Miller (1995), indigenous mining in South Africa continued until the 19th century. While exploration and geological assessments started during the Dutch era (in the 1650s), commercial mining only commenced in the 1850s when the viability of copper deposits in Namaqualand was established (Davenport, 2009). This was a defining period for the participation of indigenous people in mining activities.

Firstly, indigenous mining was negatively affected by land disposessions that destroyed livelihood strategies. *Secondly*, the process of land removals was intensified by mineral discoveries which further displaced indigenous communities (Davenport, 2009). Amongst the earliest land disposessions linked to mineral exploitation was in Namaqualand prior to the exploitation of copper deposits. To gain control of the land, the British government annexed Namaqualand and surrounding areas – displacing indigenous communities and preventing them access to natural resources. According to Bregman (2010), customary rights and aboriginal practices relating to the land usage and other forms of customs were not considered during the process of land disposessions.

A landmark case found in literature on historical land disposessions of indigenous communities is the *Richtersveld vs Alexkor Ltd case*, which was settled in the Constitutional Court in 2001 (Gildenhuys, 2015). Under the Restitution of Land Rights Act (No. 22) of 1994, the Richtersveld community submitted a claim for the restoration of their ancestral land which was dispossessed in 1925 after the discovery of diamonds in Namaqualand (Rungan, 2012). In their submissions, the community noted the negative impacts of the dispossession on their livelihood activities and their subsequent exclusion from the ownership of mineral rights, which were granted to Alexkor, a state-

owned mining company. The final verdict as reached by the Constitutional Court was that:

“The Richtersveld community was entitled to restitution of the ownership of the subject land (including its minerals and precious stones) and to the exclusive beneficial use and occupation thereof” (Gildenhuys, 2005; Rungan, 2012).

In response to this judgement, the University of the Witwatersrand and Centre for Environmental Rights (2011) noted that the *“dispossession of land includes dispossession of rights to the mineral resources of the land”*. This means that through the exclusion from the ownership of land, indigenous people were removed from direct participation and benefits from mining. In studying the Richtersveld case, Rungan (2012) confirmed this, highlighting that the community did not benefit from the exploitation of diamonds found on their land.

Two key issues worth noting which will be elaborated on later – are the exclusion of indigenous people from ownership of mineral rights and the benefits generated by mining operations. Broadly, these issues remain at the crux of challenges facing mining-affected communities in South Africa and have also been linked to the growth of ASM activities as seen in the country.

Mining legislation also played a significant role in the exclusion of indigenous people from ownership of mineral rights. As the potential for mining became imminent, various pieces of legislation were introduced to manage mining activities and to ensure that governments benefitted from the exploitation of minerals. Amongst the *first* pieces of legislation introduced by the British government was the Mineral Lease Regulation to administer copper mining in Namaqualand. According to Davenport (2009), the regulations implemented by government promoted the principle that the *“owner of the*

land had the prima facie right to all minerals below the surface and thus, individuals had the right to rent from government to exploit these minerals”. While the opportunity to exploit minerals was extended to “individuals,” Davenport (2009) noted that these regulations failed to acknowledge the rights of indigenous communities who had lived in the area for centuries. In turn, Davenport (2009) confirmed that communities were denied access to areas with good grazing and water resources because of prospecting work that was undertaken.

Broadly, mineral ownership was defined according to the different categories of land, and these include, private land, state land, alienated State land and trust land (Cawood and Minnitt, 1998; Chitsike, 1998). In terms of the Roman-Dutch Law (i.e., the law which governed property rights), private landowners were given the exclusive rights to both the land and mineral resources. Effectively, there was no separation between land and minerals (or the “fruits of land”). With state land, mineral rights were owned by the state, however, could be leased to third parties. On land categorised as ‘alienated’, surface rights were owned privately while mineral rights belonged to the state. Trust land was land allocated to indigenous people to become self-regulating territories.

According to Cawood and Minnitt (1998), while indigenous people could acquire and own land in terms of the South African Development Trust Act (No. 18) of 1936, the ownership of mineral rights was vested in the State. Indigenous communities were not allowed to negotiate and/or enter into mineral lease agreements. Mineral ownership in tribal lands was held in trusts controlled by traditional authorities and the state. According to Van der Schyff (2012), the apartheid legislation prohibited indigenous people from acquiring and exploiting mineral deposits.

Essentially, indigenous communities that lived in mineral-rich land did not have a claim to the minerals (Van der Schyff, n.d). The ownership of land and mineral rights was underpinned by the “*privilege of exclusivity*” and advanced the interests of governments, private landowners, and investors. Indigenous people continued to be excluded from mineral rights despite the provisions for land ownership in self-regulating territories and the transfer of mineral rights to a third party in private and state lands (Cawood and Minnitt, 1998).

It is important to note that colonial mining also fell under the category of ASM (i.e., based on tools used, level of mechanisation, etc.). This means that even after the exclusion of indigenous people, mining activities continued on a small-scale basis – although with an increased number of workforce as indigenous people were forced to work as labourers in the mines. This is important to note in the history of mining because, until the 1870s, the government supported ASM activities. This was seen in the diamonds’ fields in Kimberley. Interestingly, unlike in other parts of the country, indigenous people were allowed to own, and work claims in the diamond fields (Davenport, 2009).

This was despite protests from White diggers who called for the introduction of discriminatory laws to exclude Black diggers. As noted by Davenport (2009), the British government remained firm and continued to grant Black diggers claim licenses. According to Nel (2018), while the diamond fields were governed by the government, the regulations were aligned to what miners called the “*Diggers Democracy*” – a self-instituted rule amongst the diggers that afforded everyone the right to mine. The “*Diggers Democracy*” was based on the doctrine that opposed the concentration of ownership and maintained the barriers of entry as low as possible to allow participation

of those who wish to try their luck. In keeping with the rules of the miners, government limited the number of claims to a maximum of two per digger (Davenport, 2009).

5.2.2. The emergence of large-scale mining

Davenport (2009) noted that the participation of Black diggers continued until early 1870s. This period re-defined the structure of the mining industry and paved way for the establishment of large-scale mining. The transition from ASM to industrial mining was necessitated by increasing difficulties in working conditions and the exploitation of diamonds at greater depths. According to Nel (2018), as the depth of mining increased, it became difficult to access the deposit using rudimentary tools. Mining was *further* complicated by the unsafe working conditions created by multiple claims being worked at different levels within the pit.

As conditions worsened, production outputs and royalties accruing to governments were affected. This resulted in government supporting the move to “company mining” in 1874, which saw the consolidation of individual claims. This was another defining period in the mining industry as it provided an environment in which monopolistic structure of mining was forged and capital mining was set to define the future of the mining industry in South Africa.

According to Davenport (2009), during that time comments such as “the future of mining lay in capitalism” were made. Davenport (2009) noted that “company mining” was based on the principle of eliminating competition. By the end of the 1879, the number of claimholders had decreased from 1,600 recorded in 1872 to 130 after the process of amalgamation (Davenport, 2009). The envisaged benefits of company mining included (1) mines could be worked economically and profitably, (2) company

mining was expected to eradicate illicit diamond mining, and (3) company mining was expected to regulate the supply of diamonds linking the country to global markets.

Against these benefits, large-scale mining and capital investments were identified as viable solutions to ensure the longevity of the mining industry. This decision formed the foundation on which future mining ventures were supported (Davenport, 2009). According to the Legal Resource Centre (LRC) (2016), the shift in the structure of the mining industry created an environment that was biased towards large-scale mining and the “*pursuit of high returns for shareholders*”. During apartheid, people of colour, women, and junior as well as small-scale mining operations were excluded from participating in the mining industry (Solomon, 2012; Fekir, 2015; Ledwaba and Nhlengetwa, 2016; Ledwaba and Mutemeri, 2018). As such, the development of the ASM sector was affected as activities were *deemed* illegal (Mutemeri and Petersen, 2002; Solomon, 2012).

In analysing the landscape of the mining industry in 1994, the Reconstruction and Development Programme (1994) found that the mining industry was characterised by the concentration of power in the minority of the population. The structure of the mining industry was dominated by white and corporate ownership (See RDP, 1994). The other structural challenges that the post-apartheid government inherited were the lack of skills and education, and high levels of unemployment amongst mineworkers (Government gazette, 1994). This was primarily caused by the move to increase the capital intensity of mining operations (Chitsike, 1998). According to Terreblance (2002), the employment of unskilled labour in the mines declined by 37 % between 1970 and 1995. The employment levels in the mining industry were also negatively affected by the downscaling in the gold mining industry because of low gold prices and increasing

depth of mining rendering gold mining costly (Government gazette, 1998). The migrant labour system and its impacts on the fabric of black families and the exclusion of women in the mining industry were also among the key issues for consideration in the post-1994 mining agenda.

5.3. The post-1994 agenda and ASM development

5.3.1. Recognising the ASM sector

Against the landscape of the mining industry as noted above, the government through the RDP (1994) aimed to “*develop South Africa’s mineral wealth to its full potential and to the maximum benefit of the entire population*” (Government gazette, 1994). This overarching objective was in keeping with the African National Congress (ANC)’s Freedom Charter which promoted the principle of shared mineral wealth (Solomon, 2012). The RDP identified numerous strategic objectives that needed to be advanced to attain the post-1994 mining agenda and these included the transfer of mineral ownership to the state, management and marketing of mineral exports, value addition and beneficiation, democratisation of the mining industry, reskilling and training, improved wages and employment conditions, environmental management, and the development of the ASM sector (Government gazette, 1994; Solomon, 2012).

In terms of the development of the ASM sector, the RDP encouraged the government to support the sector and increase opportunities and participation through financial and technical assistance and providing access to mineral rights. The policy proposal in the RDP further stated that the development of the ASM sector should be in accordance with the environmental, health and safety standards (Government gazette, 1994).

The recognition of the ASM sector in the post-1994 agenda was in view of numerous benefits that the sector can offer. These include the potential of the sector to contribute

towards addressing the disparities in ownership patterns in the mining industry. As noted by Ledwaba (2017), this was to be achieved through the empowerment of previously excluded communities, the provision of skills and the re-stimulation of entrepreneurship in the country. The Minister of Mineral Resources during that time, Phumzile Mlambo-Ngcuka, highlighted the importance of ASM in the transformation agenda of the mining industry, specifically with regards to opening the industry to HDSAs and women.

The participation of women in ASM was also highlighted by Ranchod (2001), who identified the sector as a potential avenue to integrate women into the mining industry. In recognition of the historical links between women and indigenous mining, Ranchod (2001) highlighted the benefits that the sector can provide, in particular, women empowerment and alleviation of poverty in female-headed households. The sector was also identified as a platform to create employment, alleviate rural poverty, and open the industry for the participation of women (National Steering Committee, 2000; Dekker *et al*, 2011; Fakir, 2015; Matamba, 2016). According to Chitsike (1998), the development of ASM also offered employment opportunities to retrenched mine workers, specifically from the gold and diamond sectors. The sector was also seen as a solution to eradicate illegal mining, and violence in the country which was widespread at the time because of the lack of economic opportunities (Chitsike, 1998).

At a macro-level, the sector was recognised as having the potential to contribute to national mineral production through mineral diversification and the exploitation of deposits *deemed* uneconomical for large-scale exploitation. The availability of mineral opportunities to support the development of the ASM was also extended to large-scale mining operations which were nearing closure because of declining commodity prices

(Matamba, 2016). Against the envisaged contribution of the sector to the country, the policy objective as captured in the White Paper: A Minerals and Mining Policy for South Africa states that the government must:

“Encourage and facilitate the sustainable development of small-scale mining in order to ensure the optimal exploitation of small mineral deposits and to enable this sector to make a positive contribution to the national, provincial and local economy” (DME, 1998:25).

To fulfil this objective, the government identified four areas of interventions that needed to be prioritised, and these were: access to mineral rights, access to finance and technology, issues on regulation and administration, and the requirements with respect to environmental stewardship. These priority areas were informed by challenges facing the sector.

According to Dreschler (2001), at the dawn of democracy, it was found that ASM activities occurred at a sizeable scale in the country. This was captured by Franz (2003) as well, that a thriving ASM sector existed in the country despite legal measures instituted to prevent indigenous people from owning operations. As noted by Dreschler (2001), most people were driven into ASM by rising poverty and unemployment levels as seen in the period leading to the democratic era.

In studying the landscape of ASM post-democracy, Mutemeri and Petersen (2002) placed the number of people involved in the sector at 20,000 with activities spread across the country in Western Cape, Free State, Northern Cape, North West, and KwaZulu Natal provinces (See also Dreschler, 2001; Franz, 2003). In effect, the development of the sector was already supported by an existing footprint of ASM

activities which even though they took place at the subsistence level, they had the potential to contribute to the government's post-1994 mining agenda.

5.3.2. Establishing ASM support

The policy requirements as advanced in the mining policy were addressed through various platforms. *Firstly*, the need to access mineral rights and the and was addressed by the Minerals and Petroleum Resources Development Act (No. 28) of 2002 (i.e., the new mining legislation that came into effect in 2004). In recognising the State as the custodian of the minerals and petroleum resources, the MPRDA is founded on the principles of providing equitable access and ensuring sustainable development of mining operations (Cawood, 2004). The objectives of the Act that resonate with the SSM policy requirements include (1) the promotion of equitable access to the nation's minerals and petroleum resources, (2) the expansion of the mining industry to include historically disadvantaged persons, including women to participate and share in the country's mineral wealth, and (3) the need to create employment and improve the standard of living of South Africans (Government gazette, 2002).

These objectives as captured in the MPRDA led to the recognition of all forms of mining including ASM. This means that, under the Act, anyone wishing to participate in mining activities can apply in terms of section 22 and 27 of the Act, which provide the requirements on the application of mining licenses (See MPRDA, 2002).

The inclusion of ASM in the legislation was reinforced by a series of interventions linked to the policy requirements. Broadly, in fulfilling section 1.4.4.2. (Clause vii) of the Mining Policy, the government facilitated the establishment of institutional mechanisms aimed at supporting the development of the ASM sector. These

mechanisms comprised of several support programmes implemented by the government in collaboration with several state-owned enterprises.

Some of these programmes included the National Steering Committee (NSC) of Service Providers established as an implementation body of the National Small Scale Development Framework (i.e., a mechanism established to develop the sector²¹) (Chitsike, 1998; Mutemeri and Petersen, 2002; Dreschler, 2001; Solomon, 2012; Franz, 2003; Ledwaba and Mutemeri, 2018). The NSC was created in 2000, two years after the release of the Mining Policy. The primary objective of the NSC was to streamline institutional support to ensure that the financial, technical, and organisational challenges in ASM operations were addressed through the collaboration of expert organisations.

The Department of Mineral Resources and Energy (i.e., then the Department of Minerals and Energy) established an SSM directorate within the department to lead interventions in the sector. There was also the Small-Scale Mining Board (SSMB) which took over the responsibilities of the NSC in 2006. As noted, numerous interventions that were implemented were a collaboration between government and allied institutions including Mintek, Council for Geosciences, Mining Qualification Authority (MQA), and others (Mutemeri and Petersen, 2002; Ledwaba and Mutemeri, 2017; Ledwaba, 2017; Ledwaba and Mutemeri, 2018). Other interventions were implemented by large-scale mining companies.

There are examples in literature of mineral lease and supply agreements entered into by large-scale mining operations (i.e., the case of Samancor and De Beers in the Northern

²¹ The National Steering Committee comprised of various institutions including DME, Council for Geosciences, CSIR's Miningtek, Mintek, Mining Qualification Authority, and financial institutions including the IDC, Ntsika, and others. The primary role of the committee was to provide technical and financial assistance through the development of business plans and feasibility studies. The roles of the different institutions were linked to their mandates and objectives as state-owned enterprises. For example, Mintek as a science council with core focus on mineral processing was tasked with developing technologies to improve processing in the sector. The Mining Qualification Authority (i.e., as a SETA for the mining industry) assisted miners with skills and training. The financial institution (i.e., IDC and Ntsika) provided financial assistance as well as capacity building (Drescher, 2001).

Cape) in support of the development of the sector (Dreschler, 2001; Franz, 2003). Various stakeholders at provincial and local levels also extended assistance toward the sector.

According to Mutemeri and Petersen (2002), the attitude towards the development of the ASM sector was positive during the earliest years of democracy. This was seen in the level of interventions and collective support emanating from various stakeholders. The introduction of the *new* mining regime increased interest and participation in the sector. As reported by the Department of Mineral Resources (2011), a total of 103 and 141 mining permits were granted in 2005 and 2006, respectively. By the end of 2010, the number of mining permits had reached 1,030 (Mine Health and Safety Council, 2011).

In addition, several aspirant and existing operations were supported through the various programmes. According to Matamba (2016), a total of 171 projects were supported through the SSMB programme and these covered both mining and beneficiation projects. The support provided by state-owned institutions was also sizeable with the Council for Geosciences reporting to have been receiving more than 400 requests on an annual basis from aspirant and existing miners seeking assistance with mineral deposits evaluations, the compilation of documents for the application of mining permits, geological reports, borehole core log information and analysis (Matamba, 2016).

Mintek through its Small-Scale Mining and Beneficiation Division (SSMBD) established a training school to address the lack of skills and training in the sector. Through funding, mostly from the Mining Qualification Authority (MQA)²², the

²² The MQA is a sector education and training authority (i.e., SETA) for the mining and minerals industry. It is responsible for skills and training in the mining industry. Part of its programmes is the

training school provided both theoretical and practical training in different aspects of the mining value chain. In 2004, through funding from the Department of Labour, Mintek trained 700 prospective miners²³. By the end of 2015, Mintek had trained over 3,000 miners across the country (Per. Comm, 2016). According to Legoale (2014), the training programmes implemented by Mintek prioritised women and the youth, and of those trained, women accounted for more than 50% of the participants. More so, a large percentage (i.e., more than 30 %) of the participants were aged between 20 and 29 years (Legoale, 2014).

5.3.3. Assessing the impacts of ASM support

Positive impacts and contribution to the country's objectives

In reviewing the impacts of the institutional framework and supporting mechanisms on the development of the sector, it was found that the overall results are rather mixed. When viewed in terms of the policy requirements, it was found that the various interventions made noticeable progress in terms of increasing the participation of previously excluded South Africans in the mining industry specifically women and the youth. It was also established that the bulk of the targeted projects (i.e., supported through the SSMB programme) was implemented in rural areas, mostly poverty-stricken communities. This was in keeping with the role of the sector in alleviating rural poverty. A positive contribution was also made in skills development and training through interventions led by Mintek and the Mining Qualification Authority (Ledwaba and Mutemeri, 2018).

Small Scale Mining Support project which was established to facilitate the training of small scale miners through a recognised skills programme. Available: <https://mqa.org.za/small-scale-mining-support-project/>. [Accessed 07 August 2022].

²³ Available: <https://www.mintek.co.za/technical-divisions/small-scale-mining-beneficiation/ssmb-training-school/>. [Accessed 23 July 2020].

The other challenges identified in the sector (i.e., lack of access to finance, markets, technology, information, etc.) were addressed through government-led programmes that brought together various stakeholders with expertise in different aspects of the mining value chain. For example, the SSMB programme was designed such that SSM projects were taken through the different stages of the mining value chain to establish viability and ensure that they operate profitably and within the standards of environment, health, and safety.

According to Kwata (2016), several projects that received assistance from the various government's programmes are still in operation. Most of these projects are exploiting industrial minerals and construction materials. From the impact assessment done by the DMRE, it was found that some of the operations had grown into medium-scale operations (i.e., for example, Mzitlava Quarries in the Eastern Cape), some operations employ more than 200 people, with mineral production ranging between 500 and 1000 tonnes per month (Kwata, 2016).

Negative impacts and shortcomings of the sector

While there are pockets of success, the dominant assessment is that the various programmes failed to deliver on the sector's objectives as set out in the Mining Policy at a scale that was envisaged. This was attributed to the amount of resources and budget made available to implement these programmes. According to Dreschler (2001), the development of the sector required significant amounts of resources, which were often not there because of competing socioeconomic priorities in the country. As a result, the budget allocation towards the sector was constrained (Dreschler, 2001). For example, in the first year of implementation, the NSC programme received a budget of R5.4

million and this amount supported only five pilot projects (Dreschler, 2001; Solomon, 2012).

According to Franz (2003), the level of resources afforded to ASM was also influenced by scepticism regarding the “*usefulness*” or viability of the ASM sector. The impact of the various projects and contributions thereof have also been linked to the skewed focus on the “semi-formal” operations. According to Chitsike (1998), while the government recognised that there is a spectrum of ASM activities, support was inclined towards SSM operations as opposed to artisanal and subsistence mining. Evidence of this was the application requirements for support through the NSC programme, which were based on whether the operation has formed a legal entity, the existence of a permit, information on the ore deposit, whether mining was taking place and whether the environmental requirements were adhered to. Some of these requirements were above the reach of artisanal operations.

At a broader level, the limited progress made in the sector was attributed to the MPRDA and its shortcomings. Amongst the criticism raised were that the MPRDA is biased toward large-scale mining and that the requirements in terms of entering the mining industry are beyond the capacity of those that are involved in ASM. During the formulation of the mining legislation, Dreschler (2001) raised concerns regarding the costs associated with environmental obligations and licensing requirements. These were found to be burdensome with the potential consequence of non-registration and illegal mining. Specifically, Dreschler (2001) was concerned with the requirements of Environmental Impact Assessments (EIA) which were required as part of mining license application.

In keeping with the policy objective of subjecting all categories of mining to the same standards of environmental management, the MPRDA maintained those requirements. This has been identified as a bottleneck in the development of the sector as the majority of those that engage in the sector's activities cannot meet environmental obligations (Hoadley and Limpitlaw, 2004). The other issue that was raised is the financial provision required for rehabilitation, which can range from R10, 000 to R200, 000 depending on the type of mineral commodity being exploited and where the mining operation is taking place.

The other issues raised relate to the use of the online system to lodge applications for mining licenses, the capacity of the DMRE to assist, and the provisions of the mining permits (See Debrah *et al*, 2014; Ledwaba and Nhlengetwa, 2016; Legal Resource Centre, 2016; Ledwaba, 2017; Ledwaba and Mutemeri, 2018). These shortcomings have been linked to instituting legal requirements that have been scaled down from large-scale mining; failure to differentiate between ASM and large-scale mining in the implementation of legislation; failure to recognise the existence of a spectrum of ASM activities; and failure to appreciate or take into consideration socio-economic statuses of the majority of the people participating in the sector who have been driven into ASM by poverty and lack of economic opportunities (Hoadley and Limpitlaw, 2004; Debrah *et al*, 2014; Ledwaba and Nhlengetwa, 2016).

These challenges have skewed the landscape of the ASM sector in that the majority of the mining permit holders (i.e., mining permits are used as a proxy to determine the size of the sector) are entrepreneurs with the necessary financial resources, rather than disadvantaged and poor communities who were envisaged to dominate the sector (Ledwaba, 2017). A point of response from the government regarding the question on

the mining permit holders has been that the requirements of mining permits are less costly compared to mining rights and hence it accommodates the needs of the miners. Debrah *et al* (2014) maintain that most of the sector is excluded because of the lack of financial resources, skills, and capacity to meet these obligations.

To this end, several scholars have taken the position that the MPRDA as a regulatory tool is falling short in facilitating the development of the ASM sector in accordance with the objectives promoted by the Mining Policy. The same conclusion was reached by the South African Human Rights Commission (2015) that while the MPRDA provides for mining permits, in practice this has not promoted legal ASM in the country.

Several scholars have also criticised the shortcomings of the legislation in terms of linking ASM to the transformation agenda of the mining industry. This was raised by Franz (2003) that the government failed to connect ASM to the broader objectives of Black Economic Empowerment and Transformation. This is seen in the exclusion of ASM in the objectives of the Mining Charter despite being recognised as an avenue for redressing apartheid injustices and contributing towards the re-balancing of the ownership patterns in the mining industry.

The consequences of this are that ASM interventions are found to be separated from broader socio-economic initiatives. The other gap identified by Hoadley and Limpitlaw (2004) is related to the disconnect between ASM and local economic development. In studying the extent to which local stakeholders are empowered to develop the sector, Hoadley and Limpitlaw (2004) found that there is low involvement of local municipalities in ASM and that the sector's activities are seldom included in integrated development plans, which contain key economic activities for poverty alleviation in communities. With ASM being excluded from local economic development, the ASM

sector is left without support at the grassroots level. The consequences of this included the limited impact of the sector on poverty alleviation leading to stakeholders questioning the importance of the sector in the country. With the limited impact of the sector, as alluded, the size of the sector remained small until *some* ten years ago.

5.4. Zama-Zama mining phenomenon

In the last decade, the country has seen a sharp increase in the number of ASM activities taking place across the country. Popularly known as *zama-zama* mining, these activities have re-invigorated the attention towards the ASM sector leading to mixed perspectives in terms of how the sector's activities should be managed (Ledwaba and Mutemeri, 2018). This stems from the characteristics of *zama-zama* (i.e., as labelled by various stakeholders) and how these compare to “traditional” ASM activities (i.e., as known by various stakeholders).

Several attempts have been made to characterise the *zama-zama* mining phenomenon. As noted in the definitions (i.e., page viii), *zama-zama* is a local term that means “*trying to make a living*”. Moving from what the term means, it has been defined based on the contexts in which the activities are found to take place. Several of the definitions found in literature defines *zama-zama* mining using the illegal-informal continuum. In the broader context of ASM, this characterisation is *often* used to establish the legitimacy of different ASM activities outside of the government's statutory requirements. It draws from several factors including where the activities are taking place, if the social license to operate has been granted by local stakeholders, and the role of the activities in relation to the socioeconomic and political imperatives of particular locations (Ledwaba *et al*, 2019).

Nhlengetwa (2016) characterised *zama-zama* mining as illegal ASM on the basis that it encompasses activities that take place on mining land that is under mineral rights ownership. The argument by Nhlengetwa (2016) and Nhlengetwa and Hein (2014) is that these activities *invade* or trespass on the concessions of large-scale mining operations. The illegality of *zama-zama* mining activities has also been tied to the possession of unwrought gold, which is prohibited in terms of section 4 of the Precious Metals Act (No. 37) of 1995.

On the other end, “informal” ASM (as described by Nhlengetwa, 2016) includes a group of activities undertaken by communities in rural areas where the chiefs or traditional authorities have granted permission to mine. On this basis, it is argued that mining is taking place within customary rules and that there is no invasion or trespassing of land as permission has been granted. Nhlengetwa (2016), also raised that informal ASM activities are recognised by the DMRE and are often targets of ASM formalisation in the country.

Another characterisation of *zama-zama* mining that has been advanced equates it to criminal mining. This has been raised in terms of the link that some activities have with criminal syndicates and related criminal activities. The characterisation of *zama-zama* mining as criminal ASM has also been connected to where mining is taking place, which is predominantly in disused shafts and operational mines (Debrah *et al*, 2014).

While the above characterisations provide insights into the factors that need to be looked at when interrogating the landscape of the activities; *zama-zama* mining as a level of mining falls within the broad definition of the ASM (i.e., mining activities conducted using rudimentary tools, low levels of technology and are labour intensive) (See Mutemeri *et al*, 2016). As is the case in other countries, most of these activities are

illegal, and this is in accordance with the requirements of the MPRDA. The activities are taking place on both surface and underground, and exploit a range of minerals including gold, diamonds, coal, chrome, and industrial minerals and construction materials. The activities are found in all nine provinces where mineral deposits are found.

5.5. Drivers of the ASM sector

The increase in the number of ASM activities can be attributed to several factors. These converge towards the socioeconomic challenges in the country as well as in neighbouring countries, the performance and characteristics of large-scale mining, and the consequences of the historical legacies of mining. These aspects are elaborated on below.

Socio-economic challenges in the country

While South Africa has made significant progress in redressing the discriminatory practices instituted by the colonial and apartheid regimes, the triple challenges of unemployment, poverty, and inequality remain inherent in the socioeconomic landscape of the country. The high levels of unemployment are underpinned by the lack of economic opportunities and the inability of the labour market to absorb most of the working-age population. As noted by the Mineral Council South Africa (2019), the surge in ASM activities is driven by increasing unemployment and poverty levels in the country.

It is found that the absence of income generating activities has pushed people into ASM and this is seen in both rural and urban areas. The latter is amongst the defining characteristic of ASM in South Africa where activities are taking place in cities and major towns with historical connections to mining (Jinnah *et al*, 2017). According to

Munakamwe (2017), *zama-zama* mining is an urban phenomenon where people are pushed into the sector by urban poverty and the lack of opportunities. South Africa is amongst the *most* urbanised countries in Africa with 66 % of the population living in urban areas. According to Rogerson *et al* (2014), the rate at which urbanisation is taking place in the country far exceeds the levels of economic growth. Consequently, urban areas are becoming reservoirs of a poor and unemployed population. Rogerson *et al* (2014) noted that the geography of poverty is shifting to cities as economic opportunities become scarce.

This is evident in Gauteng province, which is home to the largest percentage of the country's population. A total of 15.2 million people is living in the province (i.e., that is about 25% of the national population). Amongst key challenges facing the province is rising unemployment levels. As reported by Statistics South Africa (2020), the official unemployment rate in Gauteng increased from 28.8 % in 2019 to 33.6 % in the first quarter of 2021 (Statistics South Africa, 2022). The lack of income-earning opportunities has pushed people into *zama-zama* mining and currently a high number of ASM activities are found in the province (South African Human Rights Commission, 2015).

Foreign nationals and their socio-economic struggles

The proliferation of ASM in urban areas is also linked to the increasing percentage of migrants travelling into the country in search of opportunities. This is another important feature of ASM in the country in that a significant percentage of the miners are foreign nationals from Zimbabwe, Lesotho, and Mozambique. According to Martin (2019), the increase in ASM can be linked to the socio-economic challenges and political instabilities seen in neighbouring countries in the Southern African Development

Community (SADC) region. For example, the challenges of economic stagnation, poverty and unemployment and food insecurity have pushed Zimbabwe nationals into South Africa in search of economic opportunities (Martin, 2019).

More so, Mozambique is faced with the challenges of poverty and unemployment. According to Bertelsmann Stiftung (2022), about 46% of the country's population live below the poverty line (i.e., measured in terms of the poverty line of USD 0.65 per day). The level of poverty is not only a measure of household income but also considers food insecurity which has been worsened by recurrent natural disasters in the country. With Mozambique being a low-income country, the majority of its population depend on informal economy, mostly subsistence agriculture.

A large share of the population also depends on remittances from family members working in neighbouring countries. According to De Vletter (2007) migration is a preferred employment option for most Mozambicans, with some regarding it as the only means of survival. South Africa remains a preferred destination for most Mozambicans, and this is despite the decrease in the labour supply and demand agreements *particularly* in the mining industry. According to Muanamoha (2008), South Africa continues to attract undocumented migrants from neighbouring countries in the SADC (i.e., Southern African Development Community) region.

Amongst the key development challenges in Lesotho include high unemployment and poverty levels, political instability, and over-reliance on South Africa for remittances (Crush, *et al* 2010; Hapazari, 2019). The unemployment and poverty levels in Lesotho are reported at 28 % and 57 % respectively (Damane and Sekantsi, 2018). According to Crush *et al* (2010), Lesotho is amongst the major migration-dependent countries in the world with 25 % of its Gross Domestic Product constituted by migration remittances in

2016. Like Mozambique, the migration patterns in Lesotho are traced to South Africa as young men and women seek opportunities in the country (Crush *et al*, 2010).

Munakamwe (2017) submitted that the shortage of economic opportunities experienced by South Africans is most severe amongst foreign nationals because of the lack of documentation needed to access the labour market. Munakamwe (2017) linked this to the bureaucratic immigration policies, which makes it difficult for foreign nations to enter the formal labour market. Therefore, foreign nationals have resorted to work in the ASM sector. To this end, Munakamwe (2017) connected the proliferation of *zama-zama* mining to economic exclusion and inequalities still entrenched in the labour market and participation in the economy (Munakamwe, 2017). The same analysis is shared by Martin (2019), who submitted that *zama-zama* mining is a direct by-product of the socio-economic challenges in various countries. To this effect, Jinnah *et al* (2017) highlighted that ASM is a livelihood strategy driven by the marginalisation of cross-border migrants in post-apartheid South Africa.

The high number of foreign nationals in ASM is also linked to the declining performance of large-scale mining operations and the transformation of labour in the mining industry. The latter is often discussed in terms of the post-1994 agenda which promoted the increase in the participation of South Africans in the mining industry. The implementation of this strategic objective combined with operational challenges resulted in a significant reduction in the number of foreign nationals employed in the formal large-scale mining sector.

The number of foreign nationals decreased from 260,000 in the 1970 to about 45,000 in 2020 (Coderre-Proulx *et al*, 2016; Mineral Council South Africa, 2020). Lesotho and Mozambique were the most affected as the major labour sending countries. According

to Crush *et al* (2010), the number of Lesotho nationals working in the mines declined from 100,000 in 1990 to 46,000 in 2006. Mensah and Naidoo (2011) submitted that the retrenchments seen in the mining industry have had adverse impacts on the economies of labour sending areas as well as the survival of households who have been dependent on remittances from mining.

This is also echoed by Martin (2019), who noted the implications of downscaling on both labour-sending areas in South Africa and neighbouring countries. This is because remittances from mine workers have played a considerable role in providing household income for many years (Crush, *et al* 2010; Martin, 2019). In the case of Lesotho, Mensah and Naidoo (2011) attributed increasing poverty amongst households in Lesotho to retrenchments in the South African mining industry. Crush *et al* (2010) further highlighted that the loss of remittances has affected the agricultural sector which historically has been supplemented by income from mining.

Limitations of mining skills

Amongst the features of the mining industry is the lack of skills outside of mining and low levels of education. According to Morojele and Maphosa (2013), the lack of additional skills and low levels of education have made it difficult for most retrenched mine workers to access other opportunities in the formal labour market. Martin (2019) paints a picture of the realities of retrenched mine workers, which encompasses skills and knowledge limited to mining, the lack of employment opportunities, and socio-political crises prevailing in neighbouring countries. These realities have created a situation where alternative livelihood options are limited. For most miners, the only avenue is to use the skills and experience that they have obtained working in the mines

to make a living. This has been the case where retrenched mineworkers would remain in mining communities (and hostels) to work in old mining sites (Van Wyk, 2017).

The Chamber of Mines (now known as the Mineral Council South Africa) (2006) highlighted evidence supporting the link between the participation of retrenched mine workers in ASM and the skills and knowledge that they have. With the retrenched mineworkers being familiar with the underground working environment, this motivates them to move to ASM (South Africa Human Rights Commission, 2016).

The number of ex-mine workers in ASM continues to increase alongside retrenchments in the mining industry. As alluded to above, the mining industry lost more than 150,000 jobs between 1994 and 2018. Specifically in the gold sector, the proliferation of ASM activities has been sustained by the price of gold (Mkhize, 2017). In the last 20 years, the price of gold has increased from USD250 per ounce to USD1, 900 per ounce. According to Mineral Council South Africa (2019), artisanal gold mining has remained profitable even when the gold price declined between 2011 and 2015.

The landscape of mining affected communities

In the preamble of the current Mining Charter, the Minister of Mineral Resources highlighted that while the mining industry has made considerable progress in eradicating apartheid legacies, most mining-affected communities are still subjected to high levels of poverty. This is despite the implementation of legislation aimed at ensuring that mining operations contribute to the local economic development of communities. In a study conducted by ActionAid South Africa (2018), most of the participants (i.e., over 79 %) indicated that their communities have not benefitted from mining operations.

This is in line with the key findings of the South Africa Human Rights Commission (2016) that while mining operations contribute to communities through commitments made through social and labour plans as well as corporate social responsibility initiatives; the overall benefits to communities have been limited. When asked about the benefits that they need from mining operations, the majority of the participants (i.e., about 39 %) alluded to employment, skills development, and livelihood options. The absence of these benefits from large-scale mining has led to community members seeking opportunities in *zama-zama* mining (Ledwaba *et al*, 2019). Mining activities in these areas are found to take place in shafts that have been placed on care and maintenance as well as in concessions that are yet to be exploited.

Historical legacies of mining

The rise in ASM activities in the country has also been linked to the historical legacies of the colonial and apartheid regimes *specifically* in terms of the failure of past legislation to safeguard the environment and ensure that mine closure is done according to the environmental and health and safety objectives. According to Nhlengetwa and Hein (2015), the decommissioning of shafts was not done as per the requirements of the mine closure legislation leading to shafts, access portals, ventilation shafts, slimes dams, waste dumps and tailings dumps that were left unrehabilitated. In addition to these practices being sources of environmental, health and safety hazards, abandoned workings have provided opportunities for *zama-zama* mining (Nhlengetwa and Hein, 2015). Miners can access old workings and exploit reserves that are available using ASM methods.

As noted by Watson and Olalde (2019), evidence of poor mine closure is seen in the number of abandoned mines, which are estimated to exceed 6,000 across the country

(Department of Mineral Resources, 2009). Jinnah *et al* (2017) also attributed the growth of the sector to poor rehabilitation and decommissioning of the old mine infrastructure. Van Wyk (2016) noted that these old mining infrastructures have been converted to informal settlements providing housing to migrants as well as opportunities for income generated from scrap metal and remnant economic minerals found underground.

In summary, the main driver underpinning the expansion of the ASM sector is the lack of economic opportunities in the country. The number of people engaging in the sector's activities is expected to increase as the level of unemployment continues to rise. The socio-economic challenges in the country have been worsened by the COVID-19 pandemic. A survey completed through the National Income Dynamics Study - Coronavirus Rapid Mobile Survey (NIDS-CRAM) found that 3 million people lost their jobs during the lockdown. The *most* affected were women, unskilled workers, and those at the bottom half of the income distribution (Jain *et al*, 2020). More job losses are expected as economic activities continue to be subjected to restrictions to prevent the spread of the virus. The country's economic performance is also deteriorating with its GDP in the first quarter of 2020 declining by 2 % (Statistics South Africa, 2020).

The mining industry was the largest contributor to the poor GDP performance i.e., it declined by 21.5 % (Statistics South Africa, 2020; DMRE, 2020). On 21 July 2020, the Department of Minerals Resources and Energy delivered its budget vote for 2020. According to the DMRE (2020), the performance of the mining industry has been on a downward trend even before the lockdown restrictions with several mines placed on care and maintenance leading to job losses. As economic conditions deteriorate, several mining operations have issued notices for retrenchments in terms of section 186 of the Labour Relations Act (No. 66) of 1995. According to Visser (2020), Solidarity (a trade

union) has received notices of retrenchments which if approved will result in 2,488 mineworkers losing their jobs. In the budget speech, the Minister acknowledges that *some* retrenchments will be difficult to prevent and as such there is a need to investigate opportunities for retrenched mineworkers to re-enter the labour market.

As part of the government's Recovery Plan for the Mining and Energy Sector, the DMRE has identified several areas with the potential to "*restore business confidence, stimulate investments as well as safeguard and create jobs*". Amongst the targeted programmes is the implementation of the ASM framework, which aims to provide technical and regulatory support to ASM projects. According to the Minister, the department has allocated a budget of ZAR38 million towards rehabilitation, exploration and the capitalisation of small-scale mining projects (See budget speech, 2020). Although there is a mention of community-based projects, it is not clear which ASM activities will be supported. This is raised in view of differing perspectives amongst industry stakeholders on which ASM activities should be supported, and which ones should be eradicated.

5.6. Stakeholder perspectives and debates

Broadly, the stakeholders' perspectives on ASM in the country can be divided between calls for criminalisation and decriminalisation. Criminalisation is defined as a process where particular behaviour or activity is turned into a criminal offence by making it illegal²⁴. McNamara *et al* (2018), described criminalisation as the characterisation of conduct as harmful or carrying a risk of harm. It is usually dealt with the enforcement of criminal offences and penalties instituted by police and state agencies with coercive powers to prevent the crime (McNamara *et al*, 2018). Decriminalisation is described as

²⁴ See Oxford dictionary.

a process where statutory requirements *classifying* particular activities as illegal are repealed or amended thereby allowing the said activities to be carried out without any criminal penalties. According to the European Monitoring Centre for Drugs and Drug Addiction (2001), decriminalisation removes the status of criminal law from the activities to which it is applied.

In the context of South Africa, the criminalisation of ASM is linked to the statutory requirements for conducting mining activities in the country. Section 5 (4) of the MPRDA stipulates that *“no person may prospect for or remove, mine, conduct technical co-operation operation, reconnaissance operations, explore for and produce any mineral or petroleum or commence with any work incidental thereto on an area without”* an approved environmental management plan, appropriate license, and consultation with the landowner or lawful occupier of the land. In terms of the Act, conducting mining activities without the appropriate license is considered illegal and a criminal offence (i.e., Section 98 of the Act). The penalties outlined in the Act include a fine not exceeding ZAR100, 000 or imprisonment not exceeding two years or both the fine and prison sentence (i.e., Section 99 of the MPRDA).

ASM activities particularly those exploiting precious metals are also deemed illegal in terms of the Precious Metals Act (No. 37) of 2005. Section 4 of the Act states that *“no person may acquire, possess or dispose of, either as principal or as agent, any unwrought precious metal unless”* unless they possess a refining licence, a certificate from the Minister, a beneficiation licence or are authorised dealers and/or producers who have won or recovered the unwrought precious metals. Because the majority of the ASM operators do not possess the above licences, they are found to be contravening the Act and can be found guilty in terms of Section 20 of the Act.

The other criminal offences attached to ASM activities are in terms of the Immigration Act (No. 13) of 2002, Criminal Procedure Act (No. 51) of 1977, Trespass Act (No. 6) of 1959, and other laws governing related criminal activities. The Immigration Act is applied because it has been found that the majority of those arrested are illegal immigrants. According to the Mineral Council South Africa (2019), about 90 % of the illegal miners are undocumented immigrants from Lesotho, Mozambique, and Zimbabwe. The Criminal Procedure Act has been used to prosecute illegal miners for related criminal activities which may include murders, assault, damage to property, and others.

In the case *Mugota vs S* (Case No. A244/2013) presented in the High Court in the Free State Province, an artisanal miner was found guilty on charges of trespassing on the mine property, being an illegal immigrant and contravening the Immigration Act, and attempted theft of gold-bearing material (Southern African Legal Information Institute, 2014). The miner was given a penalty of R 20, 000 or two years imprisonment, R 3,000 or 30 days imprisonment, and R 1,000 or four months imprisonment for the three charges, respectively.

On 15 March 2017, the Virginia High Court in the Free State Province found twenty-two (22) artisanal miners guilty on 577 charges and these included racketeering, money laundering, and the contravention of the Precious Metals Act, Criminal Procedure Act, Trespass Act, and Immigration Act. The miners were also found guilty of mineral theft worth R120 million. The guilty verdict carried imprisonment of between 3 and 25 years (South African Police Service and Hawks, 2017).

In the case *De Beers Consolidated Mines (Pty) Ltd vs artisanal miners* in Kimberley heard in the High Court in 2018, the charges brought forward by the mine included

entering the mine properties, illegally mining, and removing material from the properties and other related crimes including intimidation, trespassing, cable theft, and malicious damage to property (See South African Legal Information Institute, 2018). In their defence, the artisanal miners accepted the unlawfulness of their activities, however, submitted that they were pushed into illegal mining by the lack of economic opportunities and the need for survival.

The miners further raised that they were exploiting abandoned mineral deposits and were not disrupting the current operations of De Beers. The miners further noted that they were in the process of regularising their activities with the DMRE, which will enable them to work within the boundaries of the law. It was against this context that *some* of the charges were dropped to support the formalisation of ASM activities in the area. Ekapa Mining released 400 hectares of its mining area. This led to the miners being granted mining permits in 2018 (Khumalo, 2018). In the case of Kimberley, the call to decriminalise ASM was made in view of role of the sector in easing the socioeconomic challenges in the country.

From a legal perspective, as has been noted, the dominant perspective on the MPRDA and ASM is that current legislation has failed to recognise ASM and put in place mechanisms that will enable the miners to meet the requirements of licensing, environment, health, and safety so that they can work within the law. Several scholars have also identified gaps in the legal frameworks used to criminalise ASM activities (i.e., as highlighted above). Thornton (2014) submitted that the legislation used to characterise ASM as illegal is not clear. Regarding the trespassing charges, Thornton (2014) highlighted that mine properties are *usually* unfenced with travelling pathways used by everyone in the community.

To this effect, all community members should be charged with trespassing. Thornton (2014) also argued that the gold-bearing material used to charge the miners with possession of unwrought gold is dust and dirt. This means that the arrests are made on assumption that the soil contains gold (Thornton, 2014). Amongst the submissions made with regard to the theft of gold is that of Munakamwe (2015) who it is argued that artisanal miners are exploiting mineral scraps left behind by large-scale operations. In effect, they are not stealing from anyone. Thornton (2014) also dismissed the notion of stealing and asserted that the miners are exploiting deposits that have been abandoned and inaccessible to large-scale mining operations.

The picture painted by those calling for the decriminalisation of the sector's activities is that the miners are simply eking out a living with no intention of committing a crime. This was used in appealing sentencing in the *Mugota vs State* case where the defence argued that the miner was a first-time offender, a breadwinner at home supporting three children and a wife, and an asylum seeker who fled Zimbabwe in 2008 (See SAFLII, 2014). It is argued that this is the *dominant* profile of most artisanal miners, contrary to the view that most miners are part of criminal syndicates and underground gangs (See Oxfam, 2017).

Martin (2019) argued that the criminality in ASM is led by syndicates and not miners working at the mine sites. According to Van Wyk (2017), the criminality found in ASM is instituted by syndicates who purchase the gold. To maintain production levels, they have introduced guns in the sector to control the sites and limit competition. It has been raised that most of the miners are young people making a living for themselves (Thornton, 2014; Nhlengetwa and Hein, 2015). Oxfam (2017) submitted that most

artisanal miners are breadwinners pushed into mining by current socio-economic challenges.

In line with the reports from the Mineral Council South Africa (2019), it is acknowledged that a significant number of artisanal miners are undocumented immigrants, however, it is submitted that some of them were brought to the country under false communication that they will be working in large-scale mining operations. Van Wyk (2017) also noted that *zama-zama* miners are ex-mine workers that were left without means to return home and this led to them finding residence in abandoned mine properties and mining illegally to make a living. Based on this characterisation, Jinnah *et al* (2017) submitted that most of the miners fall under the category of those who are marginalised and without economic opportunities.

Based on the circumstances in which most ASM activities are taking place, the proposal to decriminalise ASM activities has been made in view of the opportunities presented by the sector, which include job creation, poverty alleviation, increasing entrepreneurship in local economies, opportunities for women, youth and cross-border migrants, contribution to rural and urban economies and the re-integration of retrenched mineworkers in the labour market. Ledwaba *et al* (2019) identified ASM as having the potential to create employment in the country. Based on the current estimates that there 30,000 artisanal miners in the country, Martin (2019) highlighted that with a dependency ratio of 1:8, more than 200,000 will be negatively affected if ASM activities are to be criminalised. Martin (2019) argued that the eradication of ASM will exacerbate the effects of unemployment and poverty and may lead to an increase in crime in communities.

In its calls for ASM to be decriminalised, Oxfam (2017) highlighted the contribution of the sector to household income, job creation, and livelihood of the majority that is poor and unemployed. In the submission to the South African Human Rights Commission, the DMR (2015) alluded to opportunities for ASM to complement large-scale mining, specifically in addressing issues of poverty and unemployment. According to Thornton (2014), ASM contributes to employment and entrepreneurship in the communities in which they are operating, which was a feature lost during apartheid.

Mkhize (2017) noted that the sector has the potential to benefit local economies as well as the economies of neighbouring countries through remittances (i.e., as discussed above). The participation of women is also highlighted as a key contribution of ASM given the challenges facing women in the country. From key informant interviews with female miners in Kimberley, Valiani and Ndebele (2018) highlighted that ASM provides an exit strategy for women who are struggling with unemployment and are largely involved in unpaid work. In looking at artisanal gold mining in Johannesburg, Jinnah *et al* (2017) highlighted that women participating in ASM activities have been able to become independent and provide for themselves and their families.

The benefits of ASM have also been discussed at a macro level. Ledwaba *et al* (2019) identified the potential contribution of ASM to government revenue through taxes and royalties. A common assumption has been that the majority of ASM activities take place outside the legal framework to avoid taxes. Jinnah *et al* (2017) indicated that miners are prepared to pay tax if their activities are integrated into the regulatory framework. Amongst the key challenges experienced on the ground are police harassment and bribery. In the study conducted by Ledwaba *et al* (2019), the miners indicated that they are currently paying *informal* taxes to the police and criminal syndicates who refuse

them access to the workings. They are willing to direct these payments to the government if legalised. Against the potential benefits of the sector, Mkhize (2017) has labelled ASM criminalisation as an easy route that fails to come to terms with the realities in the country, which are growing poverty and unemployment levels, poor service delivery in local communities and the political instability in neighbouring countries.

As is the case in most countries on the continent, the ASM sector in South Africa is also surrounded by troubling characteristics. Several concerns have been raised on the adverse impacts of ASM on government revenue through loss in taxes and royalties, the profitability of large-scale mining operations, health and safety risks imposed on employees working for large-scale mining operations, and the broader impacts on communities and the miners themselves. The arguments raised by those who support the criminalisation of the ASM sector also include the association of ASM with criminal activities making ASM operations dangerous and territories of high-level crimes.

According to the Mineral Council South Africa (2019), the country loses R21 billion of potential sales, taxes, and royalties per year from illegal mining. Martin (2019) noted that South Africa is the largest source of illicit gold on the continent with production valued at R14 billion per year. According to the Mineral Council South Africa (2019), the bulk of the revenue generated from illegal mining is enjoyed by crime bosses who have integrated ASM activities into a network of organised crime.

Some of the activities have been linked to criminal activities including murders, money laundering, human trafficking, sex work, and theft (Ledwaba and Modiba, 2018). According to Solidarity (2009), illegal mining *often* contributes to other serious crimes in communities, including murder and attempted murder. In May 2019, a young couple

was allegedly killed by illegal miners in Benoni in the Gauteng Province (Daniel, 2019). The Gauteng and the Free State provinces have recorded increases in murders and attempted murders, and this has been linked to illegal mining. As reported by the South Africa Police Service (SAPS) (2019), illegal mining was the cause of 62 murders, 79 attempted murders, and 37 assault² in 2018/2019 reporting year. Most of the cases are in the Free State Province followed by Gauteng Province. According to the NCSMT (2015), murders and robberies in the Free State goldfields have been taking place since 2009 and remain a challenge for law enforcement (See SAHRC, 2015).

The crimes committed extend not only to communities but also to the miners themselves. There have been several concerns about the dangerous environments in which ASM activities are taking place. Solidarity (2009) characterised ASM sites as “*war zones*” as some miners take firearms underground. A study conducted by Johnson (2016), found that more than 300 miners lost their lives between 2012 and 2015. The main cause of the fatalities was found to be turf wars and murders. According to Sibanye Stillwater (2019), miners have been found to set ambushes for rival groups as well as employees working for large-scale operations.

The safety in large-scale mining operations has also been negatively affected because of the intrusion of illegal miners in operating shafts (Ledwaba and Modiba, 2018). In September 2019, four illegal miners were found guilty of murdering a mine manager at Harmony Gold Mine in Welkom in the Free State Province in 2017 (Van Der Walt and, 2019). Illegal mining has also been linked to the theft of copper cables, explosives, and diesel from the mines and other local industries (Directorate for Priority Crime Investigation, 2017; Sibanye, 2019a). In July 2019, the City of Johannesburg raised

concerns about the impact of ASM on water supply, underground gas pipes, roads, and important infrastructure (African News Agency, 2019).

The other negative impacts of ASM include land degradation and pollution resulting from poor mining practices and the use of mercury (Sibanye Stillwater, 2019). The Mineral Council South Africa (2019) raised concerns about water wastage which has negative effects on communities, given the water challenges in South Africa. In several locations in Gauteng, it was found that illegal miners use fresh water to process the gold (Chernick, 2016). The other concerns raised towards the sector include drug and alcohol abuse, sex work, teenage pregnancy, and human rights abuses (Sibanye Stillwater, 2019a).

In summary, while both positions present indispensable arguments, industry stakeholders have not been able to find a middle ground. This is despite a broad understanding of the factors that underpin the proliferation of ASM activities, which also affects the priority areas of *most* stakeholders. Further, it is found that the existing diagnosis of the sector's activities falls short of establishing the interconnectedness of the key issues and how they have moulded the ASM landscape in the country. Amongst the key findings of the investigative hearings conducted by the South African Human Rights Commission (2015) is that the challenges and complexities associated with the management of the sector emanate from the limited understanding of ASM in the country. This is needed to build trust and networks in the sector and also provide the foundation for engagements on how to manage the sector's activities considering both the positive and negative characteristics of the sector.

5.7. ASM interventions and shortcomings

Based on the current landscape of ASM, the DMRE has adopted a three-pronged approach that is centred on curbing illegal mining in the country. This approach has been translated into three objectives namely: legitimising mining activities through licensing, the rehabilitation of derelict and ownerless mines, and enforcement (DMR, 2016). The *first* objective is based on the premise that the MPRDA recognises all types of mining activities and hence aspirant and existing miners can apply for licenses. In their annual reports, the DMRE provides data on mining permits issued to “*HDSA controlled entities*”. From the statistics extracted from the reports, it is seen that the number of mining permits has been increasing. In 2013, the department issued 102 mining permits. This increased to 178 permits in 2018. The total number of permits issued in the six years comes to 1,054 (DMR, 2018).

Historically Disadvantaged South African is defined as “*any person, category of persons or community, disadvantaged by unfair discrimination before the Constitution took effect*” (See MPRDA, 2002). While the data suggests that disadvantaged South Africans can enter and participate in the mining industry, a disparity often pointed out is that mining permits can be granted to anyone. As alluded to above, an increasing number of entrepreneurs are opting for mining permits because they allow them to enter the mining industry faster as opposed to mining rights which can take years to be granted. As such, mining permits cannot be used as a proxy to determine the level of inclusion of disadvantaged South Africans.

In its attempt to show the adequacy of the MPRDA as a regulatory instrument supporting the development of the ASM sector, the department issued two mining permits to two cooperatives of artisanal miners in Kimberley. It is important to note that

this was made possible by the collaboration between various stakeholders, where *similarly* to the past programmes, the miners were provided with the technical and financial assistance needed to meet the requirements of licensing. This re-emphasises the point that the statutory requirements in the MPRDA are beyond the reach of *most* miners and hence it has been argued that the legal framework also in turn contributes to illegal mining in the country. To this effect, Jinnah *et al* (2017) submitted that the dangerous and precarious conditions found in ASM are exacerbated by the restrictions found in current legislation governing mining activities.

According to Mkhize (2017), the MPRDA *still* ignores the realities on the ground and the bottlenecks in terms of the development of the sector. *Specifically*, current responses overlook the socio-economic characteristics of the communities who participate in ASM, the role played by criminals and associated networks in the sector, and the broad economic prospects of ASM should the sector be formalised.

On 21 July 2020, the DMRE acknowledged that the “*MPRDA does not define ASM concepts and does not sufficiently cater for the artisanal mining industry. Small scale miners are virtually treated the same as large scale miners in terms of environmental, water use, health and safety and financial provisioning requirements*”. In view of these shortcomings, the department has developed an ASM Policy (See South African Government, 2020). The expectation is that the policy will recognise the spectrum of ASM activities in the country and consider the contexts that push people into the sector.

The *second* intervention that has been implemented by the government is the rehabilitation of derelict and ownerless mines (D&O). These are defined as “*mines whose owners or mining rights or lease holders have abandoned and are not operating nor maintaining to mitigate and manage their associated safety, health and*

environmental impacts and can no longer be traced” (See DMR, 2009). As alluded, there are more than 6,000 derelict and ownerless mines across the country (DMR, 2010). The main commodities found on these sites are asbestos, gold and uranium, coal, copper, and pegmatite minerals (DMR, 2009; Mhlongo and Amponsah-Dacosta, 2016). Broadly, the rehabilitation programme includes building and maintaining a mining database, specialist studies on the D&O mines, and rehabilitation of mines, and closure of dangerous mine openings (DMR, 2016; Council for Geoscience website). The department has identified areas which are classified as high-risk sites, and these include asbestos sites and the openings, trenches, and shafts in Gauteng (DMR, 2010). The department has identified about 900 open shafts in three provinces and 244 of these are found in Johannesburg.

The risk assessment considers risks to public health and safety, as well as environmental impacts (i.e., impacts to surface water, ground water, air quality and land availability) (See DMR, 2009; DMR, 2010). In the 2018/2019 financial year, the DMRE reported that it has rehabilitated 27 asbestos mines and sealed off 268 mine openings. The latter is also part of the government’s strategy to curb illegal mining by blocking access to underground workings (See budget speech, 2019).

A broad assessment from the department is that the D&O challenge is larger than initially determined (DMR, 2010). According to the DMRE (2019), the estimated cost for closing D&O mines is R48.7 billion (i.e., as of 2019). One of the biggest challenge that is slowing progress is the high cost of rehabilitation (Mhlongo and Amponsah-Dacosta, 2016). On average, a budget of R120 million is allocated to the D&O project every year.

In terms of curbing illegal mining, the programme has been met with several challenges. According to Mhlongo and Amponsah-Dacosta (2015), abandoned mines have become hot spots for ASM activities. Mhlongo *et al* (2019) attributed this to the socioeconomic struggles in mining communities, which have not been addressed by the rehabilitation programme. While the D&O projects create jobs for communities, these are usually not enough to absorb a large number of unemployed people in the community. More so, the job opportunities are *usually* contracts providing temporary relief to communities. According to the DMR (2016), about 200 people were employed during the implementation of rehabilitation projects between 2015 and 2016. Because of the lack of opportunities, the artisanal miners are found to re-open the sealed shafts to access underground workings.

In a study conducted in Giyani where several shafts were closed, Mhlongo *et al* (2019) found that the majority of the shafts were re-opened again by artisanal miners. In addition, the miners were found digging excavations around the shafts creating alternative access to the workings. This has had negative impacts on the rehabilitation efforts as the department is forced to go back to close the shafts. This was also a finding of the Hawks (2017) where it alluded to the interconnectedness of the underground mine infrastructure in Gauteng and noting that artisanal miners can use several access points to reach their workings. To this effect, the interlinked tunnels running between the East and West Rand in Gauteng limit the impacts of the rehabilitation efforts (SAPS and Hawks, 2017).

Another concern raised by Mhlongo *et al* (2019) was the increase in the environmental, health, and safety risks resulting from ASM activities taking place around abandoned mining sites. It is found that ASM exacerbates environmental degradation and pollution,

further increasing risks to communities (Mhlongo *et al*, 2019). Because a significant percentage of ASM activities take place in abandoned mining sites, several calls have been made to the government to identify sites that can be allocated to ASM (Ledwaba *et al*, 2019). According to Rupprecht and Pieters (2018), abandoned gold mines in the country offer opportunities for the small-scale mining industry. This is because that majority of the abandoned gold mines still have significant amounts of mineral reserves that could sustain ASM for the next ten years.

Rupprecht and Pieters (2018) estimated that a single shaft producing 12,000 tonnes per month at a head grade of 4.5 grams per ton can create between 200 to 300 jobs in the community. There are technical issues that would need to be taken into consideration when selecting these sites. These include health and safety and ventilation requirements and the technical and financial support that will be required.

There have also been calls to the government to make the mine dumps available as a considerable percentage of ASM activities also take place on the dumps. Amongst the challenges relating to historical mine dumps is that they do not fall within the jurisdiction of the MPRDA. This was the verdict in the *De Beers Consolidated Mines vs Ataqua Mining (Pty) Ltd vs others* case where it was determined that the mine dumps created before the introduction of the MPRDA fall outside its statutory requirements (SAFLII, 2007). This means that the department cannot issue mining licenses for the re-processing of dumps.

The ownership of these historical dumps lies with common law owners who have the right to re-process them without authorisation from the DMRE. However, they are required to adhere to the requirements in the Precious Metal Act and the National Environmental Act (Leyden and Mametse, 2020). This has complicated matters as the

decision to make dumps available for ASM lies with the owners. In October 2019, Petra Diamond launched the ASM initiative in the Free State, where it made available its mine dumps for ASM (Mining Technology, 2019). While this is one case, the expectation is that it will encourage other mining companies to release assets that they are not exploiting.

The *third* intervention employed to deal with illegal mining is policing and enforcement. This is led by the South African Police Service, Hawks, and other law enforcement agencies including immigration, border control and prosecution authorities (DMR, 2016). The main areas of intervention include conducting compliance audits and inspection of licenses, policing, raids, and disruption operations, and entering into multilateral agreements with other countries known to be connected to illicit minerals (SAPS and Hawks, 2017).

To date, many arrests continue to be made. Between 2013 and 2017, a total of 3,751 arrests were made, *mostly* in the Free State and Gauteng provinces (Directorate for Priority Crime Investigations, 2017). During these raids, mining and processing equipment and Run-of-Mine (ROM) (i.e., ore-bearing material) are also seized. As alluded to above, most of the illegal miners are charged with illegal immigration, trespassing, illegal mining, and being in possession of ROM (See Sibanye Stillwater, 2019).

The broad assessment from the police is that while they have made considerable progress as seen through an increasing number of arrests; illegal mining persists across the country. The key challenges highlighted by law enforcement are corruption in the criminal justice system, the oversupply of illegal immigrants who participate in illegal mining, the challenges with the D&O projects, and unemployment and dependence on

community members of each other (SAPS and Hawks, 2017). In view of the challenges facing law enforcement, the DMRE is considering the establishment of a special investigating unit to look into illegal mining and trading, and ways to manage its activities (See submissions by DMRE, 2020).

The *other* interventions implemented to curb illegal mining have been championed by mining companies. Amongst the companies that are *most* affected companies are Harmony Gold Mining Company and Sibanye Stillwater, both have identified illegal mining as a risk to their mining operations (Harmony Gold Mining, 2019; Sibanye Stillwater, 2019a). In the case of Sibanye Stillwater, illegal mining activities are found in their gold and platinum operations. The main initiatives employed by the two mining companies include infrastructure and security upgrades, tactical security searches underground, engagements with stakeholders and community awareness campaigns, and stricter security measures enforced in operations (Harmony Gold Mining, 2019; Sibanye Stillwater, 2019a). According to Martin (2019), mining companies have spent R366 million on security upgrades since 2003. These are primarily aimed at blocking access to operating shafts as well as identifying mine employees that are colluding with illegal miners.

Since the implementation of the “*zero-zama*” campaign in 2003, Sibanye Stillwater has assisted with the arrested 3,402 illegal miners and about 1,404 employees who were found complicit have been charged by the company (Sibanye Stillwater, 2019). With some of its shafts having a Life-of-Mine (LOM) of less than 5 years, Harmony is prioritising rehabilitation and the closure of redundant shafts and decommissioning mining infrastructure (Harmony Gold Mining, 2019). In support of legitimising ASM, Harmony has ring-fenced some of its waste rock dumps for local entrepreneurs and

businesses. According to Sibanye Stillwater (2019a), given the technical challenges facing *most* gold mines, industry restructuring is inevitable. The retrenchments combined with the loss of economic opportunities due to downscaling are expected to continue to fuel illegal mining in the country.

In summary, amongst the common criticisms levelled towards the *past* approaches implemented to manage ASM is the disconnect between the sector's activities and the socio-economic context of South Africa. The same arguments have been raised in interrogating *current* measures and responses instituted to deal with illegal mining. Mkhize (2017) submitted that the challenges seen in the sector are perpetuated by the lack of context-specific, integrated, and standardised approaches. To this effect, there is a need to contextualise environments in which a spectrum of ASM activities is taking place and understand the driving factors.

The other criticism raised relates to the inadequacy of legislative frameworks governing mining activities. *Firstly*, the shortcomings of the MPRDA in legitimising ASM activities. *Secondly*, concerns have been raised in terms of the extent to which current legislation provides for the prosecution of illegal mining. This is noted by Sibanye Stillwater (2019) that there are “*no offences in existing legislation with definitions consistent with the practice of illegal mining, therefore those apprehended cannot be charged with illegal mining*”. Munakamwe (2015) also submitted that there are no explicit laws to prosecute illegal mining and hence current sentencing draws from trespassing, theft, and possession of ore-bearing material, which are charges that can be disputed because of the environments where ASM is taking place. The other shortcomings of the current responses are identified within the rehabilitation programme, where *again* the impact of the projects is tied to the socio-economic

challenges in communities. This came out as evidenced in the Giyani case study where Mhlongo *et al* (2019) discussed the re-opening of shafts by community members after rehabilitation.

According to the South African Human Rights Commission (2015), the current responses implemented to deal with illegal mining *appear* to not have the capability of eliminating ASM. The main conclusion from the investigative hearings was that the socio-economic conditions driving ASM cannot be ignored, and the government needs to address the shortcomings in existing legislative frameworks. Given the spectrum of ASM activities in the country, it is important to identify a mix of responses and interventions that will be required to accommodate both the positive and negative impacts of the sector's activities. This is particularly important because the ASM sector in its totality has a bearing on the realisation of the country's development objectives.

5.8. Chapter summary

The objective of this Chapter was to establish the link between ASM and the developmental context of South Africa. This was done by situating ASM within the socio-economic history of the country, establishing the position of ASM in the post-1994 agenda of the country and its current position taking from the contemporary issues seen in the country. From the discussions, it is established that ASM is an important feature in the developmental context of South Africa. This is because the sector's activities have direct links with socio-economic aspects in the country looking at both the past and current landscapes.

To this effect, it is difficult to separate the sector from what is happening in the country and its developmental objectives. The Chapter provided a discussion on the positive and negative characteristics of the sector, both of which have implications on the country's

national development plan. As it stands, there is a need to consider all characteristics of the sector to establish its role in the country's development objectives.

CHAPTER 6: APPROACH TO PRIMARY DATA COLLECTION AND ANALYSIS

6.1. Introduction

To recap, the Thesis has two objectives, which are to establish the developmental potential of the ASM sector and to develop a strategy for the sector. This Chapter presents the methodology that was followed to collect primary data for the study. The Chapter explains the research paradigm that underpinned the study as well as the selected research design. The Chapter also provides a discussion on the methods used to collect and analyse data for the study. The aspects on research validity and reliability, ethical considerations, as well as the challenges experienced during the research and the limitations of the study are included in the Chapter.

6.2. Research paradigm and approach

The starting point of the study was selecting a research paradigm that best captured how the problem prompting the research is understood and needed to be approached to address the objectives of the study. Kuhn (1970) defined a research paradigm as a “set of common beliefs and agreements shared between scientists about how problems should be understood and addressed”. According to Khaldi (2017), a research paradigm comprises of general theoretical assumptions, laws, and techniques that a particular scientific community adopts for their application.

Willis (2007) and Mittwede (2012) noted that a research paradigm provides a framework that guides research and practice in a particular field. The philosophical underpinnings of the different research paradigms provide a frame for responding to the

following questions: what is to be observed, what type of questions should be asked, how should the questions be structured, how should the questions be asked, and how should the results be analysed (Perera, 2018). Essentially, a research paradigm guides research design, approach, data collection methods, data analysis methods and ethical considerations (Gemma, 2018).

There are several research philosophies used in different fields, for this study, the pragmatic paradigm was selected to guide the study. This was informed by the objectives of the study and the contexts in which the study is situated. Given the multifaceted nature of ASM, addressing the objectives of the study requires a holistic and in-depth understanding of the sector and the contexts in which its activities take place. This is because these have a bearing on the role that ASM plays in the country and the challenges in the sector. The ASM sector also interfaces with several actors through its value chains and impacts on its surroundings. As such, it was important for the research study to be structured such that it not only provides an understanding of the sector from the miners' perspectives but also brings forth the views of other actors on the issues that are raised in the research.

The selection of the research approach was also informed by consideration of the ASM context and associated issues in the country. The study is taking place in a context where there is contention around some of the aspects that are investigated and to avoid bias, it was important to look at issues through various lenses. The study is also taking place in a context where there is limited information on the sector as well as evidence to support the characterisation often levelled towards the sector's activities. Amongst the envisaged contributions of the study is to address some of the misinformation that has been attached to the sector's activities.

Because of the multiple dimensions of ASM and the aspects that the study needs to investigate, the pragmatic paradigm was deemed suitable because it recognises complexities surrounding problems and advocates for the use of relevant methods to undertake research (Saunders *et al*, 2012). Kelemen and Rumens (2008) noted that pragmatism is based on the notion that concepts are only relevant where they support action. Saunders *et al* (2012) and Perera (2018) explained that within the pragmatist view, the research starts with the problem and is followed by consideration of the best methods to use that solve the problem. The research that is situated within the pragmatic paradigm can be actioned using different approaches and methods for data collection and analysis (Saunders *et al*, 2012, Khaldi, 2017, Kivunja and Kuyini, 2017).

For this research, the case study approach was chosen. Also, the mixed-method approach involving the use of quantitative and qualitative methods of data collection and analysis was used in the study. Crowe *et al* (2011) described the case study method as a research approach that is used to obtain an in-depth and multifaceted understanding of a complex issue in its real-life context. According to Yin (2014), case studies are used to explain and describe phenomena in the contexts in which they occur. Another characteristic of the approach is that it is suitable for use where the boundary between the phenomena and context in which it exists is not clearly understood (Yin, 2014).

While designed to understand particular contexts, case studies can take several forms including understanding contexts from different perspectives, understanding individuals or shared meanings, establishing aspects that are of importance and establishing where certain aspects fit in the overall findings (Zainal, 2007). Yin (2014) notes that case studies allow for *what*, *why*, and *how* questions to be addressed. The approach can accommodate the use of both quantitative and qualitative methods of data

collection and analysis. Zainal (2007) noted that, by using a combination of methods, case studies help to explain the process and outcome of the phenomena. According to Tellis (1997), case studies enable researchers to not only understand the views of targeted actors within a particular setting but also those of relevant groups that may be found in the study area and the connections between them. Tellis (1997) also mentioned that the case study method is a triangulated approach where multiple approaches enable validation of the research and its outputs. The disadvantages of the case study method are that it is considered to lack rigour, has little basis for scientific generalisation, and may be biased because it is limited to a particular setting which may have a small sample.

To address the shortcomings of the approach, a multi-case study method was adopted for the research. According to Baxter and Jack (2008), this method enables the researcher to study the similarities and differences between the selected case studies thereby providing evidence that can be used to make inferences on some of the findings coming from the study areas. Yin (2003) explained that, through the multi-case study method, a researcher can analyse data both within and across situations. This enables the researcher to clarify if the results are valuable or not. Baxter and Jack (2008) noted that evidence gathered through multiple case studies is strong and reliable.

6.3. The study areas

6.3.1. Selection of the study areas

According to Seawright and Gerring (2008), the selection of a case study should be based on where it is situated along the dimensions within the population of interest. Seawright and Gerring (2008), identified seven characteristics that can be considered when selecting a case study and these are; typical (i.e. cases with common

characteristics), diverse (i.e., cases with diverse characteristics), extreme (i.e., cases with unusual characteristics), deviant (i.e., cases which are different from typical examples), influential (i.e. cases that receive most attention), most similar (i.e., cases with same characteristics) and most different (i.e. cases that are different to each other).

The study locations to conduct the research were purposively selected. The aspects that were considered were that; the case studies needed to cover different mineral commodities, be located in different provinces, and use different mining methods. The other aspect that was looked at was the presence or evidence of interventions that have been implemented to formalise the sector. The aspect of an influential case study was also considered when looking at mineral commodities because certain minerals are receiving considerable attention and are surrounded by controversies with mixed views coming from stakeholders on how these should be managed.

Another aspect that was considered was ethical considerations when choosing the specific locations. This was in terms of the security issues in some of the ASM sites where there have been reports of violent clashes and criminal activities. Lastly, the selection of study areas was informed by advice from practitioners working in the sector.

Table 6.1. provides the study areas where research was conducted. Eight ASM sites are captured in the table, and these have been categorised into two groups, which are primary and secondary ASM sites. The primary sites are those that were selected as the focus of the study and secondary sites are those where some of the data on the study was collected with to increase contextual understanding of the sector. In particular, the baseline surveys used to collect quantitative data to build a profile for the sector were extended to the secondary sites, and this data is included in the findings of the research.

The bulk of the research was conducted in the primary sites (i.e., *Kimberley, Carletonville, and Ermelo*). Figure 6.1 illustrates the locations of the ASM sites.

Table 6:1: Details of study areas

No.	ASM site	Mineral commodity	Mining method	Province	Category of ASM sites
1	Kimberley	Diamonds	Surface	Northern Cape	Primary
2	Carletonville	Gold	Surface and underground	Gauteng	Primary
3	Ermelo	Coal	Underground	Mpumalanga	Primary
4	Prieska	Tiger's eye	Surface	Northern Cape	Secondary
5	Niekerkshoop	Tiger's eye	Surface	Northern Cape	Secondary
6	Griekwastad	Tiger's eye	Surface	Northern Cape	Secondary
7	Burgersfort	Chrome	Surface	Limpopo	Secondary
8	Vlakfontein	Gold	Surface and underground	Gauteng	Secondary

6.3.2. Description of the study areas

6.3.2.1. Primary ASM sites

Kimberley - It is the capital city of the Northern Cape province, which is found in the western part of South Africa. Northern Cape is the largest province in the country with a surface area of 372 889m². It is however sparsely populated with only 2.2% of the country's population (i.e., that is approximately 1.3 million people) (Statistics South Africa, 2021). The province borders Namibia and Botswana. The history of mining in South Africa has its roots in the province with the exploitation of copper deposits in the 1850s (Potgieter, 1996). The province is also known for diamond mining which started in the 1870s. According to Sol Plaatje Local Municipality (2017), Kimberley was established in 1882 at the back of diamond mining, which started as diamond diggings (i.e., artisanal operations) and these were later consolidated giving rise to large-scale mining operations owned by De Beers Consolidated Mines Ltd (de Wit *et al*, 2016).

The company had been in operation since 1888 until 2005 when it started to scale down its operations (Sol Plaatje Local Municipality, 2017). In May 2010, Petra Diamonds bought De Beers assets in Kimberley and in 2015, they entered into a joint venture with Ekapa Mining (Pty) to work on the remaining assets. In 2018, Petra Diamonds sold its stake to Ekapa Mining, which is currently mining diamonds in Kimberley. The decline of the mining industry in Kimberley had adverse impacts on its economy and this was worsened by the waning performance of the manufacturing sector because it also had strong links with the mining industry (Sol Plaatje Local Municipality, 2017). Over the years, Kimberley has experienced an increase in artisanal mining activities. Some of the ASM activities are taking place on concessions that are under the ownership of Ekapa Mining.

The research for the study was undertaken at three sites in Kimberley, namely, Samaria, Beefmaster, and Greenpoint. While there are no reliable statistics on the number of miners working on these sites, it is estimated that there are between 2,000 and 3,000 artisanal miners in Kimberley. Mining in Kimberley takes place in abandoned mining sites, on mine dumps and the surface where miners are recovering diamonds from what they call “*floors*.” The latter involves scraping diamond-rich soil from the surface and screening it to obtain gravel where diamonds are picked through manual sorting (i.e., this is the mining method used in the three study sites).

In 2018, the miners were organised into two cooperatives (i.e., Bathopele Mining Cooperative and Goedemoed Mining Primary Cooperative). The cooperatives were granted mining permits²⁵ to work on land that was made available by Ekapa Mining

²⁵ The mining permits were issued in terms of the Mineral and Petroleum Resource Development Act (i.e., this was not a tributary arrangement with Ekapa Mining).

(i.e., about 400 hectares). This initiative involved Ekapa Mining, artisanal miners, DMRE, the provincial government, and Sol Plaatje Local Municipality. In terms of the objectives of the research, this study area brings forth insights into the history of mining as it relates to ASM, the connection between ASM and large-scale mining, the opportunities and challenges relating to diamond mining, and lessons and experiences from formalisation efforts.

Carletonville – South Africa is well known for its major gold deposits that are found in the Witwatersrand basin, which is the largest known gold deposit in the world having accounted for 40% of the global production at one time (Robb, 2008; Turker *et al*, 2016). It comprises of eight active goldfields and Carletonville is located within the West Rand goldfields, which is situated in the north-western part of the Witwatersrand basin in the Gauteng Province. Carletonville was established in the 1930s after the discovery of gold and the exploitation thereof. According to Merafong City Local Municipality (2017), the mining industry has played an important role in the economy of the area contributing more than 50% to the local GDP.

The decline of the sector has had negative socioeconomic impacts on the area, and this has resulted in growing numbers of community members moving into illegal mining activities (Merafong City Local Municipality, 2017). The research for the study was conducted in Khutsong, which is a township located 16 km from Carletonville. According to Tunce (2016), Khutsong has been a labour-sending area for gold mining with workers coming from parts of South Africa and neighbouring countries settling in the area. ASM in the area takes place on the outskirts of settlements and within the community on the streets. For these operations, the miners are extracting gold from the soil that has been scrapped from the surface as well as from excavations. The other

categories of ASM activities take place in underground mines in both abandoned and operational mines as well as on mine dumps.

Ermelo – The area is located in Mpumalanga province, which is in the eastern part of the country. The province hosts large coal deposits which are currently being exploited. Coal mining in Ermelo started in the 1850s (Hancox and Götz (2014). According to Legault *et al* (2017), most of the operations in the area were abandoned and among the challenges that the communities are dealing with are environmental impacts from unrehabilitated mines. The ASM activities are taking place in abandoned underground mines and the miners are mining coal from pillars that were left as support underground.

The research for the study was conducted in four sites located a few kilometres from Wesselton, a township in Ermelo. The miners in all sites work underground. In terms of the value chain, the miners work in groups of four to five. The process starts underground where coal is mined. It is loaded in wheelbarrows which are pushed out of the mine to the surface, where coal is stockpiled for sale. The coal is sold to community members directly as well as coal yards (i.e., small businesses that buy coal from the miners and sell it to communities).

6.3.2.2. Secondary study areas

Prieska, Niekerkshoop, and Griekwastad – The three areas are located in the Northern Cape province, about 200km from Kimberley. The history of tiger's eye mining is traced to the 1800s when the stones were discovered in Prieska. Tiger's eye is a semi-precious stone that is formed from asbestos that has been silicified by iron-bearing quartz. Tiger's eye has been exploited using ASM methods and this has continued to date. There are, however, sites where excavators are hired to dig the stones out because of the increasing depth of mining. Tiger's eye mining is taking place on the surface, on

private farms, and land owned by the local municipality According to Basson (2017), the communal farms in Prieska and Niekerkshoop cover an area of 32,000 hectares and private farms cover 5,000 hectares. The research for the study was conducted on communal sites in the three areas. In terms of the value chain, tiger's eye stones are mined and sold to local buyers who then export them to China and India. While there have been efforts to legalise tiger's eye mining activities, most of the miners are working without mining licenses.

Burgersfort – Burgersfort is located in Limpopo province in the northern part of South Africa. The province borders Botswana, Zimbabwe, and Mozambique. The province hosts the Bushveld Igneous Complex which contains large deposits of platinum, palladium, rhodium, chromium, and vanadium (Kinnaird, n.d). The Burgersfort area houses several large-scale chrome mining operations including Twickenham, Bokone, Marula, and Sefateng mines. The Twickenham and Bokone mines are owned by Anglo American, and Marula is owned by Impala Platinum (i.e., Implats).

According to Tshedimosho (2018), chrome mining by communities started in 2007 after a nearby mine closed its operations. In 2016, there was increased interest in chrome mining with external people known to communities as “investors” coming into the villages seeking opportunities to mine chrome. From the site visits, it was established that the investors sought permission to mine chrome from the Chiefs in the local villages. The Chiefs then allocated land to them, about 3 to 5 hectares in size. The investors came with machinery and employed community members to mine chrome. In one of the villages that were visited (Ga-Mampa), about 500 youth were employed in these operations. At the time of the site visits, mining had been stopped by the DMRE and the police. Only a few community members were found on the sites. ASM is taking

place in the pits that were excavated during the “*investors*” operations. Mining is taking place within villages, in homes, and in sites that belong to large-scale mining operations. The miners sell the chrome to local buyers who then transport it to Steelpoort (i.e., a town that is about 30km from Burgersfort). According to MD360° and CIRDI (2019), the chrome is exported to Mozambique and then to China and Korea.

Vlakfontein - It is also located in Gauteng province, about 120km from Carletonville in the East Rand goldfields of the Witwatersrand Basin. As the case in Carletonville, mining takes place both on the surface (i.e., mine dumps) and underground. The site that was visited was located outside the township and the miners were taking ore material from the mine dump. The same practices seen in Carletonville were used in Vlakfontein where miners are using gravity-based methods to concentrate the gold. The pictures showing all the sites are included in Appendix A.



Figure 6:1: Locations of ASM sites

6.4. Data collection and analysis methods

The mixed-method approach was adopted for the study. Morse (2003) described the approach as combining various quantitative and qualitative research strategies in a single project that may have either quantitative or qualitative theoretical motivations. Guest and Fleming (2014) noted that using more than one type of data source provides an increased understanding of the research problem being investigated. Amongst the benefits of the mixed-method approach is that the strengths of one method offset the weaknesses of another. Creswell *et al* (2011) indicated that the use of several research methods fosters interdisciplinary collaboration leading to results that are comprehensive and convincing.

According to Dunning *et al* (2008), the mixed-method approach has two objectives, which are confirmation and comprehension. In explaining confirmation, Dunning *et al* (2008) cite Mitchell (1986) who related confirmation to conceptual validation, which involves establishing patterns of relationships and meaning between variables measured using either or both quantitative and qualitative methods. Comprehension as a benefit of the mixed-method approach is described as the ability to bring together different methods to provide an in-depth understanding of a phenomenon and to explain certain anomalies in the data (Dunning *et al*, 2008).

Morse (2003) highlighted that the mixed-method approach increases confidence in the results of the study. According to Dunning *et al* (2008), the approach is an output of triangulation where both methods can confirm the results that are coming out thereby increasing the reliability of the findings of the research. The shortcomings of the mixed-method approach are potential conflicts in the theoretical underpinnings of the methods used. Morse (2003) highlighted the importance of methodological congruence, and that

the selection of methods should not be “mix and match”. The combination of methods should be informed by identifying the supplemental research that is required and would not be obtainable using one particular method. The basis of selecting methods to use should be guided by research questions to ensure that the methods used are those that can best address the research objectives (Creswell and Plano Clark, 2011). The discussions below provide details of the methods used to undertake the research.

6.4.1. Quantitative data

The primary difference between quantitative and qualitative research designs is the philosophical underpinnings guiding the research including data collection and analysis. Quantitative research is embedded within the positivism paradigm, which is based on the belief that there is a single reality, which exists independently of humans (Perera, 2018; Mittwede, 2012). According to Dudovskiy (n.d), the goal of positivist inquiry is to generate explanatory associations and/or relationships that lead to the prediction and control of phenomena. From this framing, quantitative methods involve the collection and analysis of numeric data to describe, understand, explain, predict, and control variables and phenomena being studied. Creswell (2009) noted that quantitative methods are used to examine relationships between variables, such as dependents, independent and extraneous.

According to Holton and Burnett (2005), the steps followed when conducting quantitative research include establishing research questions, identifying research participants, selecting methods to collect and analyse the data, and understanding and interpreting the results. There are several types of methods that fall under the category of quantitative research. For the study, the survey research method was used to collect the data that was required. Check and Schutt (2012:160) described the survey method

as involving the “collection of information from a sample of individuals through their responses to questions.” The survey methods are used to collect a variety of information. According to Creswell (2005), they can be used to collect data that is used to describe the characteristics of a group or population. They can also be used to collect data on attitudes, opinions, behaviour, and other characteristics of the population being studied (Creswell, 2005).

In the study, two surveys were conducted. The first survey was a baseline survey conducted to collect data needed to build a profile of the people that work in the ASM sector. This was guided by the question *who are the miners?* Demographic information was collected during this survey. The other data points included in the survey aimed to collect information on circumstances that led to the miners working in ASM, socioeconomic status, and their perceptions towards the sector. The survey was administered using a structured questionnaire and this is included in Appendix B.

The second survey that was conducted included collecting data on the living standards of the miners. Living standard is defined as the degree of wealth, material comfort, and necessities available to a person or group of people in a particular socio-economic class or geographic area. The living standard measure (LSM) is a multivariate wealth measure based on the standard of living (Ungerer and Joubert, 2011). South Africa uses LSM as a development indicator to measure the poverty status of the population. This indicator was used to assess the impact of the ASM on the miners (i.e., thereby addressing the question on the role of ASM in socio-economic development in the country). A detailed discussion on LSM as used in the study is provided in Chapter 9. A structured questionnaire adopted from the LSM tool developed by the South African Audience

Research Foundation (SAARF) was used to collect the data. The questionnaire is included in Appendix C.

For both surveys, the target population was the miners. Because of the limited information on the ASM sector in the country (i.e., population size is unknown), a non-probability sampling technique was used. Albert *et al* (2010) described non-probability sampling as sampling where the different members of the population do not have equal chances of being selected to participate in a study. This is because the selection is based mostly on judgement rather than random selection (i.e., as with probability sampling) (Albert *et al*, 2010; Showkat and Parveen, 2017).

Amongst the advantages of non-probability sampling is its ability to target particular known groups of the population. It is also less expensive to conduct. Its main shortcoming is that it does not have the statistical foundation and as such, it is difficult to establish the level of representation of the population studied. Another shortcoming relates to sample size determination particularly when the target population is unknown. To address this gap, several methods have been developed that allow sample size to be calculated based on a set of judgements (Shete *et al*, 2020)

For example, Cochran's formula is widely used to estimate the sample size of an unknown population and it is based on making judgements on known characteristics of the population as well as confidence levels and error margins. In the absence of a base to make judgements, scholars recommend the use of rules of thumb to guide the estimation of sample size (Bujang, 2021). According to Ward (2022), a minimum sample size of 100 is usually considered sufficient to allow for meaningful analysis. On the upper end, a maximum sample size that is often recommended is usually 10% with 1,000 being the cap (Bisits, n.d). In the absence of a base to scientifically determine the

required sample size, the studied sample was a factor of voluntary sampling. In consideration of this shortcoming, it was ensured that the size of the sample is adequate enough to provide meaningful analysis as per the rules of thumb.

There are different method falling under the non-probability sampling, and voluntary sampling was deemed suitable for the study given the base on which the research was conducted. Voluntary sampling involves selecting a final sample from participants that have volunteered and qualify to participate in a particular research study. This method of sampling is often used in research that is sensitive. The process of implementing the sampling method starts with the research information being sent to the potential participants prior to the study. The participant will then use this information to decide if they will take part in the research or not (Murairwa (2015). The final sample size for the study is a factor of the number of participants that agreed to take part in the research. Table 6.2 provides a summary of the surveys that were conducted in the various study locations.

Table 6:2: Locations of ASM sites

ASM sites	Baseline surveys	LSM surveys
Kimberley	528	172
Carletonville	601	594
Ermelo	82	81
Prieska, Niekerkshoop and Griekwastad	73	0
Burgersfort	22	22
Vlakfontein	49	49
Total	1355	918

A total of 1,360 (n=1,360) baseline surveys were collected and of these, 5 (n=5) were discarded because of the age of the respondents (i.e., the study required that the respondents needed to be 18 years and older). Five respondents were under the age of

18 years (i.e., they were aged between 15 and 17 years and all were from Carletonville). After removing the five submissions, the sample that was worked with comprised of 1,355 (n=1,355) respondents.

The other surveys conducted were administered using the LSM questionnaire. This questionnaire was attached to the baseline questionnaire enabling data to be collected at the same time. This was done in all locations except in Kimberley where two surveys were conducted during different periods (hence the wide difference in the sample sizes). In the other locations, the difference in baseline and LSM surveys was a result of cleaning the data (i.e., removing incomplete submissions). The LSM surveys were not conducted in Prieska, Niekerkshoop, and Griekwastad. A total of 918 (n=918) LSM surveys formed part of the sample that was analysed.

In all the sites, access was facilitated by gatekeepers, mainly representatives of the community-based organisations that are working with the miners on various projects. These CBOs were: Northern Cape Artisanal Miners Association (NCAMA) in Kimberley, Tswelopele Community Network in Carletonville, Khuthala Environmental Care Group in Ermelo, Ekurhuleni Environmental Organisation (EEO) in Vlakfontein and Sekhukhune Environmental Justice Network in Burgersfort. In Prieska, Niekerkshoop, and Griekwastad, the researcher worked with practitioners who had done work in tiger's eye mining and beneficiation. The fieldworkers coming from different organisations were taken through the survey questionnaires and ethical requirements when conducting research.

The site visits were planned prior to travelling to the sites. Upon arrival at the different sites, the miners were approached and informed about the research and its objectives and were asked if they were interested in participating in the research or not. After

giving consent to participate in the study, survey data was collected. For baseline surveys, the questionnaire was added to the Kobo Toolbox application which is an open-source platform used to manage data collection and analysis. At the start of the research, it was planned that surveys will be conducted using the application. However, because of the challenges with devices, the survey questionnaires were printed out to simplify the data collection process. Each submission was then transferred to the electronic questionnaire on Kobo Toolbox. The output of this process was a spreadsheet with all the submissions and data points.

This process was followed by the cleaning of data and data analysis according to the objectives of the study. The survey data was analysed using Microsoft Excel and the Statistical Package for Social Sciences (SPSS). With the LSM data, a framework and *linked* calculator were created from the guidelines provided by SAARF. These were used to capture the data and calculate the LSM scores of the respondents. These scores were analysed alongside the baseline data using several statistical measures. Detailed information on the analysis of the LSM data set is provided in Chapter 9.

6.4.2. Qualitative data

As with quantitative research, the qualitative approach is grounded within a particular research paradigm. This is constructivism (also referred to as interpretivism) and it is based on the view that truth and knowledge are subjective (Gemma, 2018). Mittwede (2012) noted that the constructivist paradigm supports the belief that human behaviour cannot be understood by pre-defined probabilistic models. According to Polit *et al* (2001), the constructivist paradigm supports the notion that reality is constructed by research participants and that the truth is a composite of realities. The type of research that is advocated by the constructivist paradigm is qualitative research.

This is because qualitative research enables the researcher to explore social phenomena and how they are meaningful in everyday life (Polit *et al*, 2001). According to Vishnevsky and Beanlands (2004), qualitative research focuses on human experiences to provide holistic and in-depth perspectives, and it is suited to exploring complex problems. According to Lakshman *et al* (2000), qualitative research is concerned with the beliefs, motivations, and actions of people, organisations, or institutions. Holton and Burnett (2005) highlighted that qualitative research works well in obtaining an in-depth understanding of a group or sample.

Lakshman *et al* (2000) noted that qualitative research is suitable in circumstances where contextual issues are not well-defined, uncontrolled, or situational. Qualitative research methods can be used to supplement or complement the understanding that has been built through employing quantitative methods. They can also be used to develop new hypotheses (Lakshman *et al*, 2000).

As with quantitative research, there is a set of methods that can be used to conduct qualitative research. Examples of qualitative research methods include observations, interviews, focus groups discussion, and material reviews (i.e., existing data in the form of text, images, videos, etc.). Two methods were used in the study, and these were interviews and site observations. The latter was used primarily to understand the practices in the sites as well as the mineral value chains in the different sites. The information coming from the site observations was also used to identify potential respondents for the study.

Most of the qualitative research was conducted using interviews. Schostak (2006) described an interview as a conversation that aims to collect in-depth information about a certain topic/subject through which a phenomenon can be interpreted based on the

meanings that interviewees bring. Individual interviews were conducted with different categories of respondents to obtain insights on the various aspects of the study. The interviews were conducted using semi-structured questionnaires developed in view of the objectives of the study and tailored to the different participants.

The latter component was guided by an understanding of the links between the ASM sector, and the different participants as studied from literature. The semi-structured questionnaires were created such that there were questions posed to all participants to obtain a holistic view of certain aspects. The various questionnaires also contained questions that targeted particular participants. The set of interviews was conducted with the miners, hosting communities, government and supporting institutions, community-based organisations, and civil society organisations, large-scale mining operations, academia and independent practitioners working in the sector, and trade union. The questionnaires used to conduct interviews are in Appendix D. The summary of the line of inquiry (i.e., and aspects) covered in the interviews conducted with the different participants is provided below:

- *Miners* – As alluded to above, the quantitative surveys were conducted with only the miners. The first objective of interviewing the miners was to obtain insights into the responses that they provided during the surveys and the results that were coming out from analysing the survey data. The second objective of the interviews was to obtain an understanding of their work practices and also their experiences and perspectives in terms of their participation in ASM, their outlook on the sector, challenges that they are facing, and areas of interventions. These various aspects feed into the objectives of the study as presented in the

subsequent chapters. The interviews were conducted with miners from three focus areas, Kimberley, Carletonville, and Ermelo.

- *Hosting communities* – The hosting communities as noted in the study are communities where ASM activities are taking place or where the majority of ASM operators live. Communities were included in the study because of the need to understand their relationship with ASM and the impact that the sector's activities have in communities. This ties to the first objective of the study which includes assessing the role of ASM in socio-economic development in the country. The perspectives of communities are also important in understanding the challenges in the sector that need to form the base of the ASM strategy that will be developed in the Thesis. Based on these objectives, communities needed to be interviewed to obtain insights from their own experiences as they interact with ASM activities and operators daily. The community interviews were conducted in two study locations, Carletonville, and Ermelo (i.e., they were not conducted in Kimberley).
- *Government and supporting institutions* – The aspects that were covered in the interviews with the government and supporting institutions link to all the objectives of the study. The supporting institutions are organisations that are working with the government and have been mandated to support the ASM sector. The interviews were conducted with respondents from the DMRE and supporting institutions cover Mintek and Mining Qualification Authorisation (MQA). Mintek is a Science Council that reports to the DMRE. It has a division (i.e., Small Scale Mining and Beneficiation Division) that was established to support the ASM sector through technology development and training. Through this work, Mintek has conducted extensive research in the sector and has

implemented numerous programmes. Mintek is also leading the implementation of the Derelict and Ownerless Mines project in the country and understands the issues relating to the ASM activities that are taking place in abandoned mining sites.

The MQA is the skills, education, and training authority (SETA) responsible for the administration of skills development programmes in the mining industry in the country. It has supported training projects in the ASM sector and has worked with various institutions to identify skills and training needs in the sector. In addition to posing questions aimed at understanding the ASM landscape from the work that the government has done, attention was also directed to policy and legislative issues in the sector as well as institutional framework and arrangements. These aspects were raised not only from the need to understand the challenges facing the miners but also the bottlenecks from the government's side in fulfilling its mandates towards the sector

- *Miner's associations* – In September 2019, the National Association of Artisanal Miners (NAAM) was launched. The formation of NAAM resulted from calls to the government to decriminalise the ASM sector. The association was established to provide a platform for the miners to raise their issues and contribute to the debates that are taking place in the country. The association not only comprises of miners, but also representatives of mining-affected communities, CBOs, and CSOs. It is also affiliated with several institutions and/or professionals that are working in the ASM sector. In view of this network, the interview with NAAM covered various aspects and these were posed such that the submissions provide a broad understanding of the issues in the ASM

sector. This was taking from the understanding that NAAM works with miners from different locations, and also, that they interact with different stakeholders at various levels on ASM issues.

The other association that contributed to the research is the Northern Cape Artisanal Miners Association. The miners from the association are part of Batho Pele Artisanal Mining and Goedemoed Mining Primary Cooperatives. The two cooperatives were established in Kimberley where the ASM activities that were taking place on Ekapa's concession were granted mining permits. The representatives of the cooperatives assisted with the research (i.e., in terms of the data collection). They also took part in the interviews providing an understanding of the aspects that were the focus of the research. The submissions coming from the interviews with the miners' associations feed into several objectives of the study (i.e., understanding the drivers of ASM, the role of ASM in the country's development, challenges in the sector and areas of intervention).

- *CBOs and CSOs* – The same aspects covered in the interview with NAAM were discussed with the CBOs and CSOs that took part in the study. Both CBOs and CSOs work with miners and communities. They also interface with various stakeholders on ASM issues that are coming from their work. The CBOs and CSOs that provided insights on various aspects of ASM include Tswelopele Community Network, Khuthala Environmental Care Group Ekurhuleni Environmental Organisation, Sekhukhune Environmental Justice Network, Mining Affected Communities United in Action, ActionAid South Africa, and Benchmark Foundation. These organisations have done considerable research

work in ASM that provides an understanding of the dynamics in the sector. Through their work, they interface with various stakeholders and hence have a broad understanding of the issues in the sector.

- *Large-scale mining companies* – The interviews with large-scale mining companies focused on their understanding of the ASM sector and the broad aspects in terms of what is happening in the country as far as it concerns ASM. Particular attention in the interviews was directed to understanding the interface between large-scale mining and ASM operations, the impacts thereof, and possible interventions.
- *Academia and ASM consultants* – Interviews were also conducted with academics and development consultants who are working and looking at various aspects in the ASM sector. In knowing the area of research/work that the academics/consultants do, some of the questions in the interviews focused more on particular areas that link to their work. The insights provided by some of the academics/consultants did not only cover the ASM landscape and issues in South Africa but provided experiences from other countries as well.
- *Trade unions* – While there have been submissions from trade unions on ASM (i.e., mostly in terms of illegal mining taking place in large-scale mining concessions), the perspectives of trade unions on ASM as a key stakeholder in the mining industry are unknown. In August 2019, IndustriALL Global Union hosted a workshop on ASM formalisation in Africa. On finding out about the workshop, the trade union was invited to participate in an interview. The interview was steered towards understanding the position of trade unions on ASM in South Africa. This was raised in view of trade unions working with large-scale mining operations (i.e., some of which have been affected by illegal

mining), and also, as representatives of mineworkers (i.e., some of which end up moving into ASM). Another key aspect of the interview that was covered was the discussion on the potential role of trade unions in ASM in the country.

A total of 143 interviews were conducted for the study. Of these, 56 interviews were with miners across the three sites and 64 with communities in Carletonville and Ermelo. The remaining 23 interviews cover the other ASM stakeholders (i.e., as noted above). Section 6.6 discusses ethical considerations that were followed during the research. Amongst the requirements of ethics was maintaining anonymity in the final report. As such, pseudonyms are used to present the findings from the interviews. Given (2008) defined a pseudonym as a “fictional name assigned to give anonymity to a person, group, or place”. The submissions from the interviews are presented in an aggregated format where themes and broad explanations are extracted. Where it is deemed necessary, direct quotations are used alongside pseudonyms.

As with the surveys, the miners that were interviewed were those that accepted the invitation to participate in the research. The same approach was used with community members that participated in the interviews. For the other ASM stakeholders, a combination of purposive and snowball sampling methods was used in the study. The two sampling methods are also classified as non-probability sampling. Maxwell (2012) defined purposive sampling as a “strategy in which particular settings, persons or events are selected to provide important information that cannot be obtained from other choices”. The snowball sampling involves identifying research participants from their acquaintances (Naderifar *et al*, 2017). The ASM stakeholders were identified from the researcher’s own networks and also through referrals by colleagues and those that

participated in the research. For the miners and communities, the interviews were conducted face-to-face on ASM sites as well as within the community by approaching community members on the street and in their homes. The interviews with the other ASM stakeholders were conducted face-to-face, telephonically, using online platforms and some were written submissions.

During the interviews, notes were taken and permission to record the interviews was requested. The interviews were conducted in the languages that the participants were comfortable with. In Kimberley, it was mostly Setswana, Afrikaans, and English; Carletonville was Setswana and isiZulu; and Ermelo was SiSwati. The researcher can communicate in Setswana and isiZulu. As noted above, the researcher worked with CBOs in Carletonville and Ermelo as well as the miner's cooperative in Kimberley. They assisted where translation was required. All the interviews conducted with ASM stakeholders were done in English.

All the interviews that were conducted in English were transcribed while those conducted in local languages were *first* translated into English and then transcribed. The thematic analysis method was used to analyse the data. Braun and Clarke (2006) characterised thematic analysis as a method used to identify, analyse and report repeated themes found within the data. According to Castleberry and Nolen (2018), thematic analysis is a widely used qualitative method of analysis because it can address a variety of research questions and topics.

The approach follows the general framework of analysing qualitative data which can be summed into five steps: compiling, disassembling, reassembling, interpreting, and concluding (Castleberry and Nolen, 2018). The process starts with preparing the data for analysis. This is followed by disassembling of the data which involves reading

through the data to identify groupings. According to Castleberry and Nolen (2018), this process is done using coding where similarities and differences in the submissions are noted and coded. The third step is reassembling where the codes or categories of submissions are mapped to identify links, which then lead to themes. Braun and Clarke (2006) described themes as patterns within the data set that capture important aspects of the data in relation to the research questions.

Once the themes are identified, the next steps are to discuss and explain the findings that are coming out and make inferences based on the questions being addressed. Castleberry and Nolen (2018) indicated that, while thematic analysis is presented as a linear process, it allows for data to be described and interpreted as themes are extracted. This is an iterative process guided by the research questions that are being addressed.

6.5. Research validity and reliability

The validity and reliability of research are two indicators used to ascertain the quality of the research and findings being presented. Ghauri and Gronhaug (2005) described validity as the extent to which the collected data covers the actual area of investigation. According to Abowitz and Toole (2010), research validity is an indicator used to determine if the results emanating from research measured what they were supposed to measure. Reliability is defined as the extent to which the results of the research can be reproduced when repeated under the same conditions (Abowitz and Toole, 2010). Taherdoost (2017) highlighted that reliability is concerned with repeatability as an indicator of the trustworthiness of the research. Various methods can be used to establish the validity and reliability of quantitative and qualitative research.

Amongst the principles of the pragmatic paradigm is that research methods are selected based on the ability to address the research questions. Two primary methods considered

to be appropriate for the study were chosen, namely, the case study approach and the mixed-method approach. The case study method was selected because of its ability to investigate multifaceted research problems. The method can also take different forms enabling the use of multiple methods and varied questions (i.e., what, why, and how questions) to be addressed in the same research study. As such, the method caters to both quantitative and qualitative research inquiries. As alluded to above (i.e., section 6.2), the main criticisms levelled towards the case study approach are that it lacks rigour and representativeness and hence cannot be generalised. Hamel (1993) noted that the lack of rigour results in bias in the research and this can be introduced by the researcher and those that participate in the case study.

According to Zainal (2017), the key characteristic of a case study approach that ensures the validity and reliability of the findings is triangulation. Patton (1999) explained triangulation as a strategy involving the use of multiple methods or data sources in research to obtain a comprehensive understanding of a phenomenon. There are different types of triangulation methods, and these include data triangulation which involves the use of multiple data sources. According to UNAIDS (n.d), through data triangulation, the findings of the research can be corroborated and any weaknesses in the data can be identified and compensated by the results coming from other sources.

Data triangulation can be used to increase the validity and reliability of the results, and also reduce the risk of false interpretation (UNAIDS, n.d). In the study, data was collected from different categories of participants, and as noted, there were similarities in terms of the questions that were posed to the participants. This was done to ensure that the aspects covered in the research were understood from different perspectives.

The method of triangulation is also another technique that can be used to reduce biases in research studies. It involves the use of multiple methods to study a phenomenon (UNAIDS, n.d). The study used both quantitative and qualitative research methods to collect data. For some aspects of the study, the data collection was designed or structured such that there was a link between the quantitative and qualitative data that was collected. Some of the questions in the surveys were repeated in the interviews and this was done to obtain a contextual understanding of the submissions obtained from the surveys.

Another type of triangulation employed in the study was the investigator triangulation technique which involves the use of more than one investigator to collect, analyse, and interpret the data. The investigator triangulation as used in the study relates to the assistance provided by the community organisations (as noted above) to collect data for the research. They were trained to use the research instruments and they assisted with the data collection. As such, some of the data from the study was collected by several field workers. According to Denzin (1970), using multiple investigators reduces bias in gathering, reporting, and analysing of the data.

The main bias that was anticipated in the research was the submission of false information because of the environment in which ASM activities are taking place. This is in relation to the fact that most of the miners are working outside the legal framework and illegal mining is taken as criminal activity in the country. With the reports of police arrests, there is fear of being arrested amongst the miners and this was identified as a risk to the credibility of the study with the miners providing false information to protect themselves. To deal with this, voluntary sampling was adopted where only the miners that provided consent to participate in the research formed part of the data collection.

This was done to ensure that their decision to participate or not in the research was made from having information about the study. The data collection instruments were designed such that the miners were not required to provide any identification information, although some miners insisted that it was noted down. The miners were also told that they did not have to answer the questions that they found to be uncomfortable. While these aspects were put in place because of the ethical requirements for the study, they also assisted in decreasing the likelihood of the miners providing false information.

6.6. Ethical considerations and requirements

As part of the University research requirements, an ethical application was submitted and approved with the protocol number H17/08/12. The ethics requirements as set out were followed during the research process. The ethical clearance covered the researcher as well as the field workers that assisted with the data collection. The fieldworkers were trained on the ethics requirements before the data collection process started. Some of the requirements were noted above in terms of how potential participants were approached and selected as well as aspects concerning anonymity during data collection, analysis, and reporting.

For example, not requesting names and/or any information that can be linked to the participants' identities. In terms of analysis and reporting, the data from the research was coded, and labels were used to analyse the data. The findings of the study were reported in a generalised manner at an aggregate level. Where direct quotations were required to support the results, pseudonyms were used to protect the identities of the participants. Another key aspect of the ethics was the confidentiality of the data that was obtained from the participants. During the research, the raw data was not disclosed to anyone.

Two major concerns were raised by the ethics committee about the research study. The first concern was that the research involved vulnerable groups. The application defines vulnerable groups as including “children under 18, orphans, prisoners, persons with cognitive or communication disorders, people who are traumatised or currently in traumatic situations”. The miners fell under this category because most of them conduct their activities outside the legal framework, and some may be undocumented migrants hence participation in the research had the potential to expose them to risks or harm. This concern was addressed first by only allowing participants who are 18 years old and above to take part in the study.

Secondly, participation in the research was through consent. Thirdly, ethical requirements on anonymity and confidentiality were followed during the research, as well as when reporting the results. The second concern that was raised by the Committee was the potential risk to the researcher, again because most ASM activities were taking place without appropriate licenses. In understanding the landscape of ASM activities in the country, the research was conducted in sites that were deemed to be safe. These are sites where the researcher has done prior work, and also sites that were recommended by the CBOs that the researcher was working with. During the entire research process, the researcher worked alongside fieldworkers who are known in the community and by the miners.

6.7. Research challenges and limitations

The challenges faced during the research emanated from the status of ASM activities in the country. This is with regard to most activities taking place illegally and the consequences thereof. The first challenge that was encountered (i.e., which has been discussed in part) relates to the participation of the miners. During the research, some

of the miners declined to participate in the research. The reasons given were that they did not feel comfortable, some thought that the researcher worked for DMRE or the police and some expressed that they were tired of participating in research studies. ASM activities have been in the spotlight receiving attention from various stakeholders, more especially the media. There has also been an increase in research work conducted in ASM sites. The concern raised by the miners was that they have not seen any change after having participated in various studies.

It was picked up that the miners had expectations or there were promises which were not fulfilled. In sharing the details of the research, it was highlighted that the research was conducted as part of the researcher's doctoral studies at the University of the Witwatersrand. This was to ensure that there were no expectations from accepting the invitation to take part in the research. While a considerable number of miners did not take place in the research, sufficient data was collected during the research. The second challenge that was experienced was with regard to the participation of ASM stakeholders. From the literature review, a list of key informants was compiled and several of the potential participants targeted for the research did not respond to the invitations to take part in the study, even after several follow-ups. The referrals from colleagues and those who participated in the research assisted in obtaining a sample that comprised of different categories stakeholders.

6.8. Chapter summary

The objective of the Chapter was to discuss the research methodology that was used to carry out the research. The study employed multiple case studies with the use of a mixed-method approach to collect and analyse data needed to respond to the research questions. The results and analysis are presented in the Chapters that follow.

CHAPTER 7: BUILDING A PROFILE OF THE ASM SECTOR

7.1. Introduction

The Chapter aims to build a profile of the ASM sector in South Africa with a specific focus on the people that engage in the sector's activities. Amongst the shortcomings of policy implementation and intervention in the ASM sector is the lack of knowledge and understanding of the sector's activities and those that engage in it. Several scholars have linked the unsatisfactory implementation of formalisation efforts to the lack of census data and population analysis in the ASM sector (Hilson and Maponga, 2004, IGF, 2017). Specifically, in South Africa, one of the recommendations made by the South African Human Rights Commission (2015) during investigative hearings on unregulated artisanal mining in the country was the need for an evidence base to understand the size, shape, and scope of the sector's activities. This is because the lack of data on the ASM sector has contributed to misinformation and biased perspectives about the sector's activities.

The Chapter seeks to address the following questions: who are the miners, are there specific groups of people that participate in ASM activities, can these groups be segmented from demographic analysis, and lastly, given an understanding of the demographic characterisation of the ASM population, where do the miners fall in terms of socioeconomic population profiles of South Africa? This latter question is underpinned by the premise that the general characteristics of most miners closely resemble those of a particular population group in the country that is considered to be at risk of poverty and unemployment. In proving that most of the miners fall under this category, this will support the argument that ASM has the potential to play a role in

poverty alleviation, and broadly in the socioeconomic development priorities in the country.

The Chapter addresses the above questions through an analysis of the demographic information collected from the miners. The Chapter *first* provides an analysis of individual attributes and then a cross-tabulation of the characteristics to obtain an in-depth understanding of the ASM population. The analysis is provided at both the individual (i.e., study location) and aggregated levels. The analysis of the demographics of the miners is followed by an attempt to segment the population into identifiable groups using the clustering method. Clustering is a widely used statistical technique in demographic segmentation analysis because it allows population data to be classified into *meaningful* groups. While this analysis is exploratory in this Chapter, clustering is an important technique that can be used to understand the composition of ASM groups.

7.2. Socio-economic characteristics of the miners

The general characteristics of the people that engage in ASM activities include age, gender, race, and origin (i.e., where the miners are coming from within the country), nationality, education, family and dependants, *previous* employment status, and incomes earned. The results are presented at both aggregated (n=1355) and site levels showing the profiles of the main study areas (i.e., Carletonville, Kimberley, Ermelo) and the three comparative sites (i.e., Prieska²⁶, Vlakfontein and Burgersfort). The figures presented in the Chapter are supported by tables with detailed data found in Appendix E. The category “unknown” as included in the results denotes missing data.

²⁶ Prieska as presented in the results includes the data that was collected in the other two tiger’s eye sites, which are Niekerkshoop and Griekwastad.

7.2.1. Age distribution

Figure 7.1 shows the age distribution of the respondents. As seen in the figure, the age profile takes the form of a log-normal distribution with most of the respondents falling in the age range of 24 and 44 years (i.e., 2% and above). The minimum and maximum age of the respondents is 18 and 82 years respectively²⁷. The mean age is 37.87 years with a standard deviation of 11.609. The median age is 36 years.

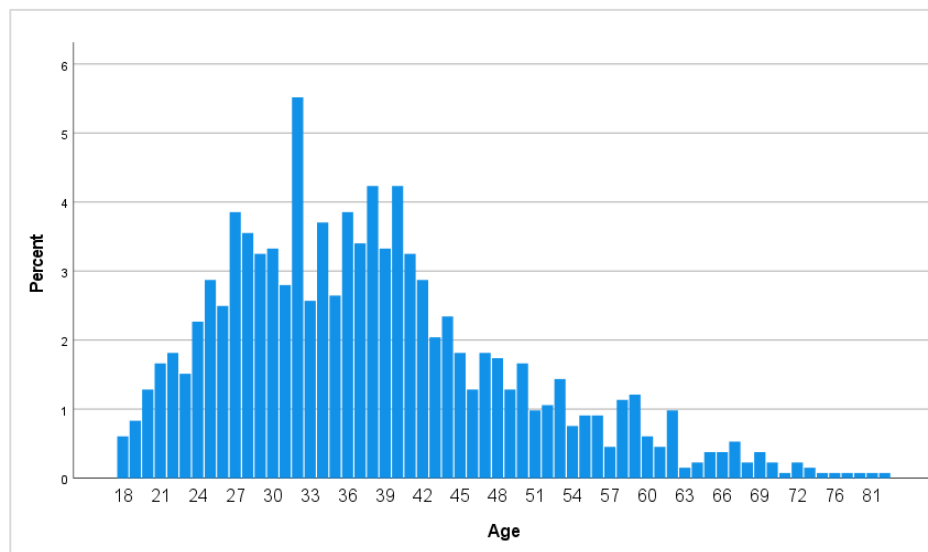


Figure 7.1: Age distribution of the respondents

Figure 7.2 disaggregates the results across the study areas. The figure shows the age profiles of the different study locations with percentage shares of the various age categories. These are compared to the aggregated results.

²⁷ Due to ethical requirements, the minimum age set for the data collection was 18 years. This is because 18 years is the age of majority in terms of the Children's Act No 38 of 2005 of South Africa. At this age, individuals can provide their own consent. While participation in the surveys was restricted to 18 years and older, several miners under the age of 18 years were encountered during data collection. However, the numbers that were counted were small to suggest there is extensive child labour in the ASM sites visited. In one of the interviews with a key informant working for a Civil Society Organisation, it came out that in some sites, there is a growing percentage of miners that are below the age of 18 years. This is an area of research that has not been looked at in South Africa.

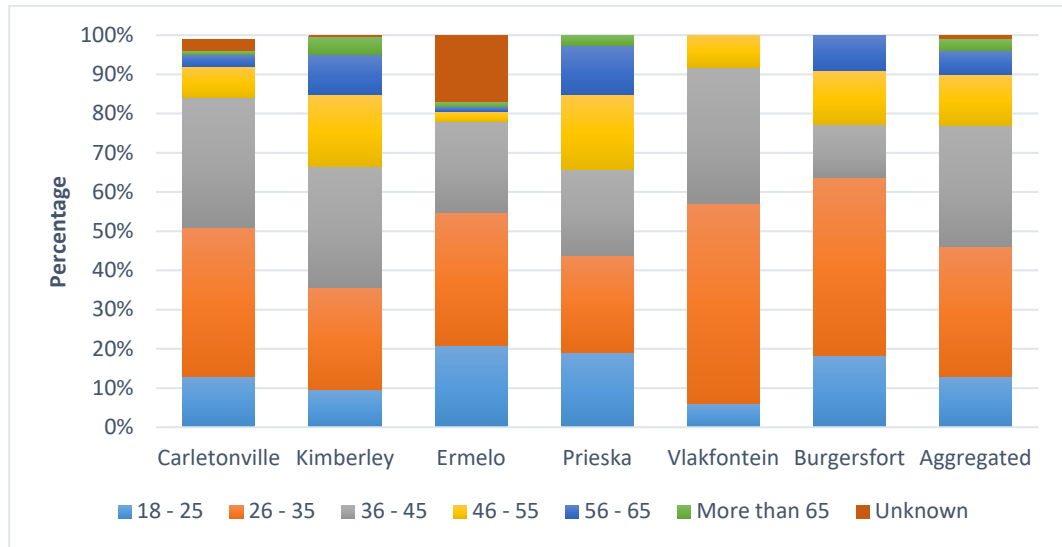


Figure 7.2: Age distribution of the respondents

As seen in figure 7.2, the majority of the respondents across the study locations are found in the age categories 26 to 35 years and 36 to 45 years. The two age groups account for between 22% and 51% in the different locations. In terms of the aggregated results, the two age groups account for 33% and 31%, respectively. The average ages of the three main sites are 35.70 years, 41.12 years and 32.71 years for Carletonville, Kimberley, and Ermelo, respectively. The corresponding median ages for the three sites are 35 years, 39 years, and 32 years. Of the three sites, Kimberley has the highest percentage of respondents in older age groups (i.e., 56 years and above). Prieska and Burgersfort also have considerable percentages of respondents in older age groups.

From the figure, it is also seen that there is a sizeable percentage of respondents in the age group 18 to 25 years. The percentage of respondents in this age group ranges from 6% in Vlakfontein, and 21% in Ermelo. Overall, this age group accounts for 18% of the total respondents. As defined in South Africa, youth include those that are aged between 14 and 35 years. From the data collected, the percentage of youth ranges between 36% and 63%. The highest percentages of youth are found in Burgersfort (63%), Vlakfontein

(57%), Ermelo (55%), and Carletonville (51%). The percentage of youth in Kimberley and Prieska is 36% and 44%, respectively.

The other information that can be extracted from figure 7.2 is the participation of older respondents from age 56 years and more. Prieska, Kimberley and Burgersfort have the highest percentage (i.e., from 9% to 12%) of the respondents in the age group 56 to 65 years. Overall, this age group accounts for 6% of the total respondents. The last age category as captured in the figure is 65 years and above. Most of the respondents in this age group are found in Kimberley as well as Prieska.

7.2.2. Gender

Figure 7.3 shows the gender profiles of the respondents. As seen in the figure, the gender profiles are relatively the same across the study locations except in Burgersfort where there a high percentage of female respondents was recorded (i.e., 41% for females and 59% for males). In the other five locations, the percentage of female respondents ranges from 11% to 17%, and the percentage of male respondents ranges from 83% to 88%. The combined percentage (i.e., all sites) of female and male respondents is 14% and 85%, respectively.

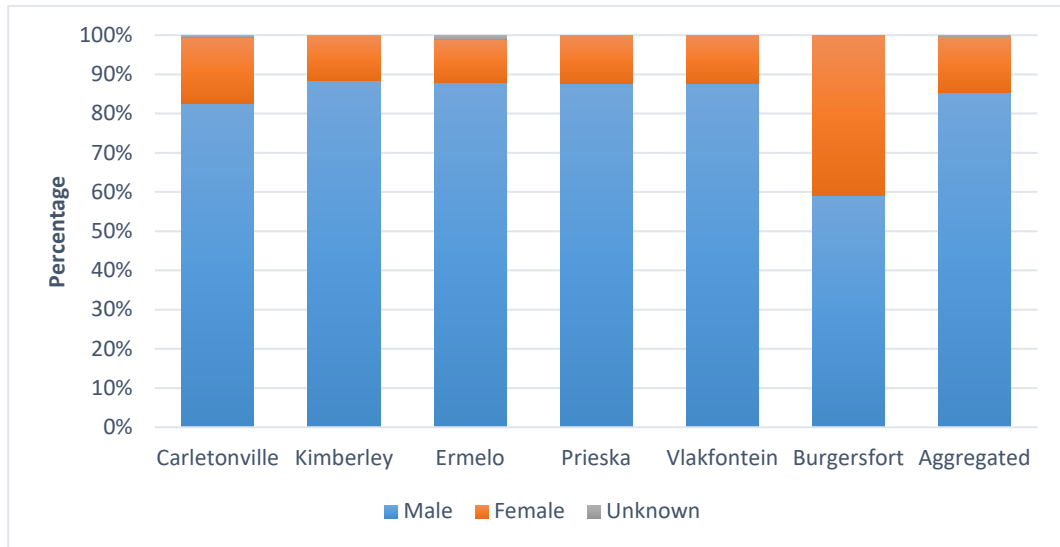


Figure 7.3: Gender profiles of the respondents

7.2.3. Race and origin

Figure 7.4 depicts the race profiles of the respondents. From the figure, the majority (i.e., between 92% and 100%) of the respondents are Black except for Prieska where the majority (82%) are Coloured²⁸. This is reflective of the race profile in Prieska where the majority (67.4%) of the population is Coloured (Frith, 2011). The percentage of respondents who are Coloured in Kimberley was also expected to be higher because of its population patterns, with Blacks and Coloured accounting for 41% and 37%, respectively (Frith, 2011). However, this is not the case with Coloured respondents only occupying 8% of the total respondents. In Vlakfontein, Burgersfort, and Ermelo, all the respondents were Black. Overall, Black, and Coloured respondents account 90% and 8% of the total respondents, respectively.

²⁸ South Africa's population is classified into four racial groups, namely, Blacks, Coloured, Indians, and White. Blacks and Coloureds account for the largest share of the population, at 81% and 9%. The Indian and White South Africans account for 3% and 8% respectively.

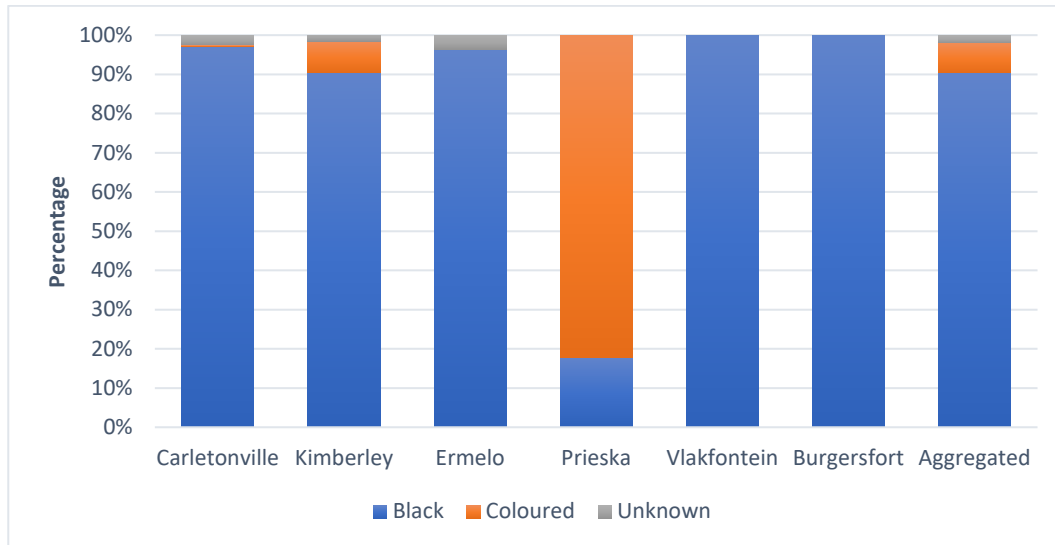


Figure 7:4: Race profiles of the respondents

Figure 7.5 presents the data on the origin (i.e., areas where the miners are coming from). This data only considers South African respondents in order to establish if they are locals²⁹ or not in the respective study locations. As can be seen in the figure, the majority (i.e., between 63% and 100%) of the respondents are locals except for Kimberley where non-locals account for 58% of the total respondents. The high percentage of non-locals in Kimberley may be the reason why the race patterns of the respondents are not reflective of the area's population profile. From the figure, it can also be seen that there is a significant percentage (37%) of non-locals in Carletonville. Overall, locals and non-locals in the study locations account for 58% and 41% of the total respondents, respectively.

²⁹ As referred to in the discussion, locals are respondents that were born and raised in the respective study locations, whereas non-locals are those coming from outside the study locations.

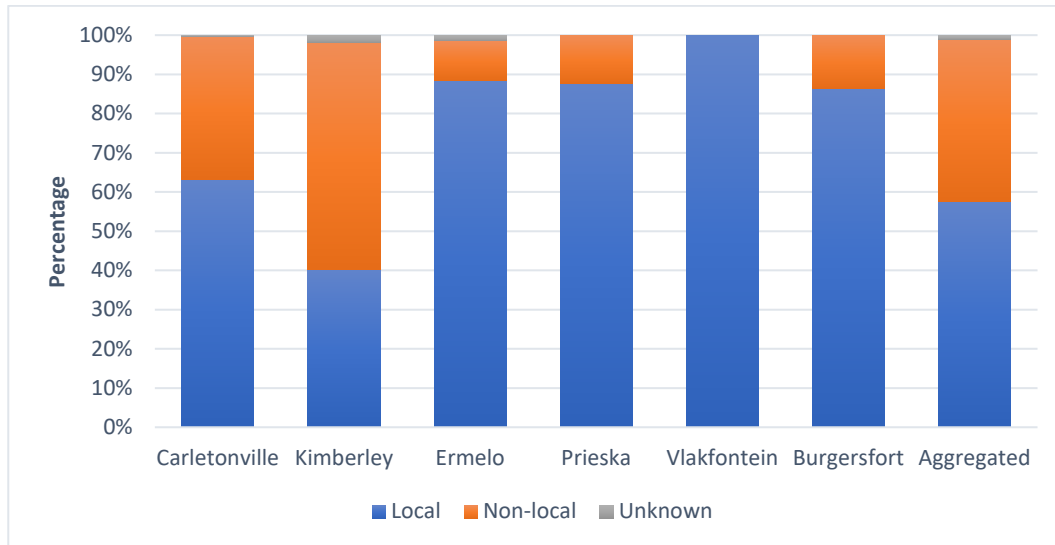


Figure 7:5: Where do the miners come from?

Figure 7.6 shows the provinces where the non-locals are coming from. The majority of the respondents (i.e., more than 20%) reside in the North West Province. A sizeable percentage (i.e., between 11% and 20%) of the respondents come from the Northern Cape and Eastern Cape Provinces. The Free State and Kwa-Zulu Natal Provinces are home to 8% and 5% of the respondents, respectively.

Kimberley is the study area with the largest percentage of non-locals, and the majority of the respondents come from the North West Province (i.e., 53%). The *specific* locations in the province are Wolmaransstad, Taung, and Pampierstad. These three areas are situated closer to the border of North West and Northern Cape Provinces. There is also a significant percentage (26%) of non-locals in Kimberley that are coming from surrounding areas in the Northern Cape Province. Most of these respondents come from Barkly West and Warrenton. In the case of Carletonville, the majority of the non-locals come from the Eastern Cape Province.

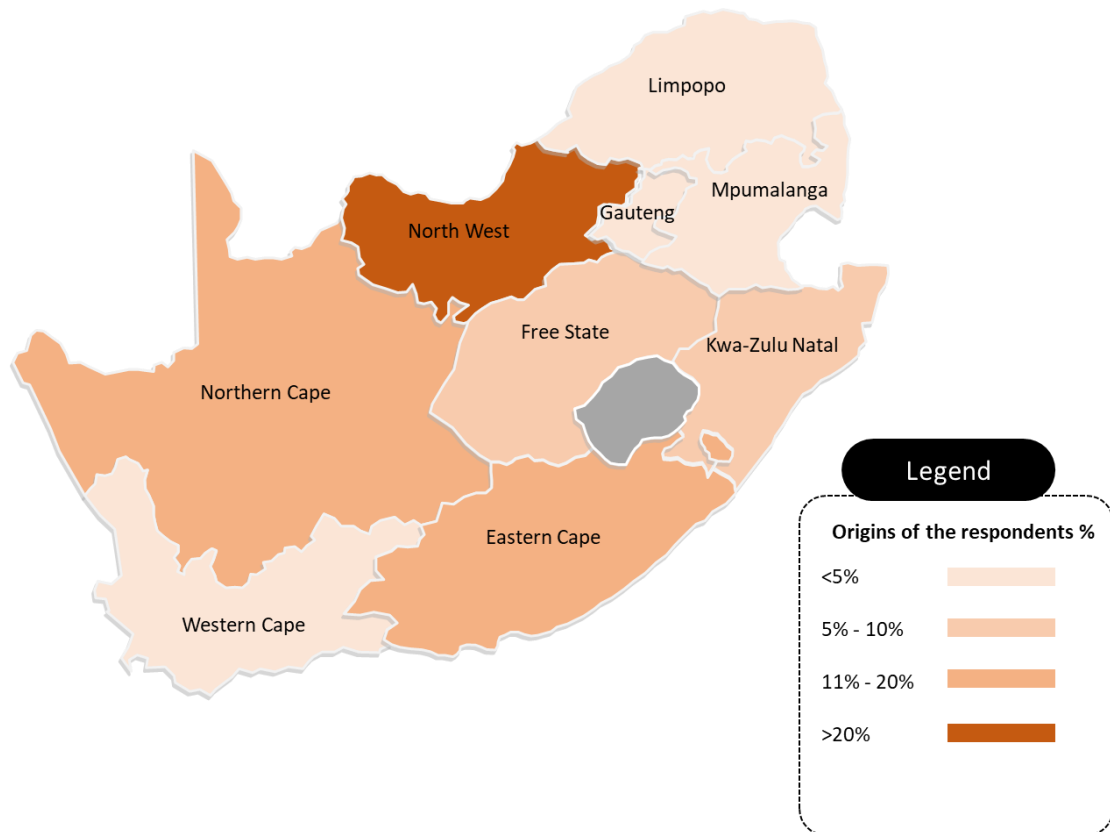


Figure 7:6: ASM locations of origin

7.2.4. Nationality

Figure 7.7 shows the nationality of the respondents. The majority (74%) of the respondents are South Africans. Foreign nationals account for 26% of the total respondents. In Prieska, all the respondents are South Africans. In Kimberley and Ermelo, South Africans account for 6% and 84% of the total respondents, respectively. The two study locations with a significant percentage of foreign nationals are Carletonville and Vlakfontein where gold mining is taking place. The percentage of foreign nationals in Carletonville and Vlakfontein are 40% and 51%, respectively.

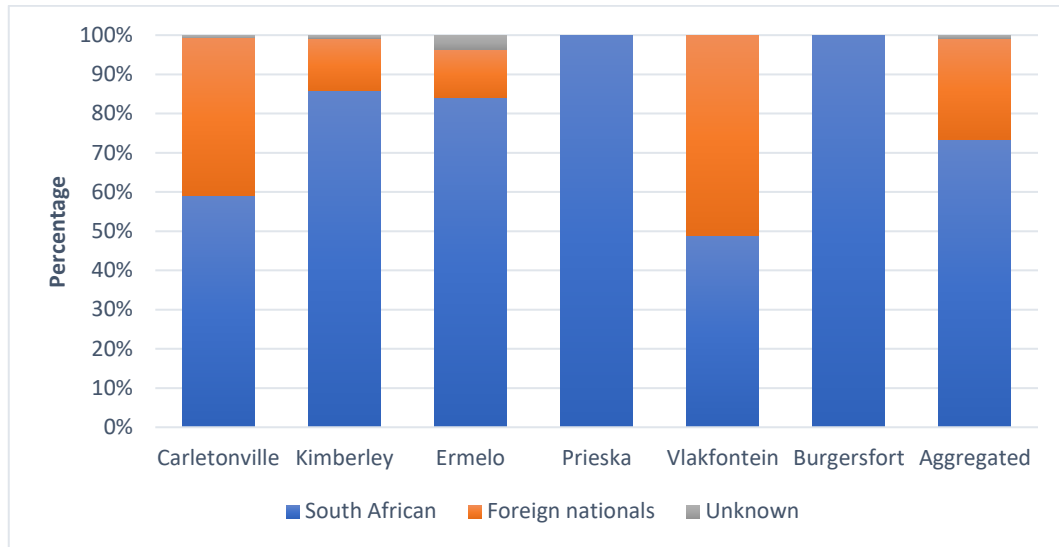


Figure 7:7: Nationality of the respondents

Figure 7.8 disaggregates the foreign nationality by country. From the figure, it is seen that Lesotho nationals account for 46% of the total respondents. This is followed by Mozambique and Zimbabwe with 30% and 14% of the total respondents, respectively. In the case of Kimberley, Lesotho nationals account for 73% of the respondents. In Carletonville and Vlakfontein, they account for 40% and 12%, respectively.

Most of the respondents coming from Mozambique are found in Carletonville (33%), Ermelo (40%), and Vlakfontein (48%). Most of the Zimbabweans are working in Carletonville and Vlakfontein. The countries captured in the “other category” include Zambia, Swaziland, Botswana, the Democratic Republic of Congo, and Malawi.

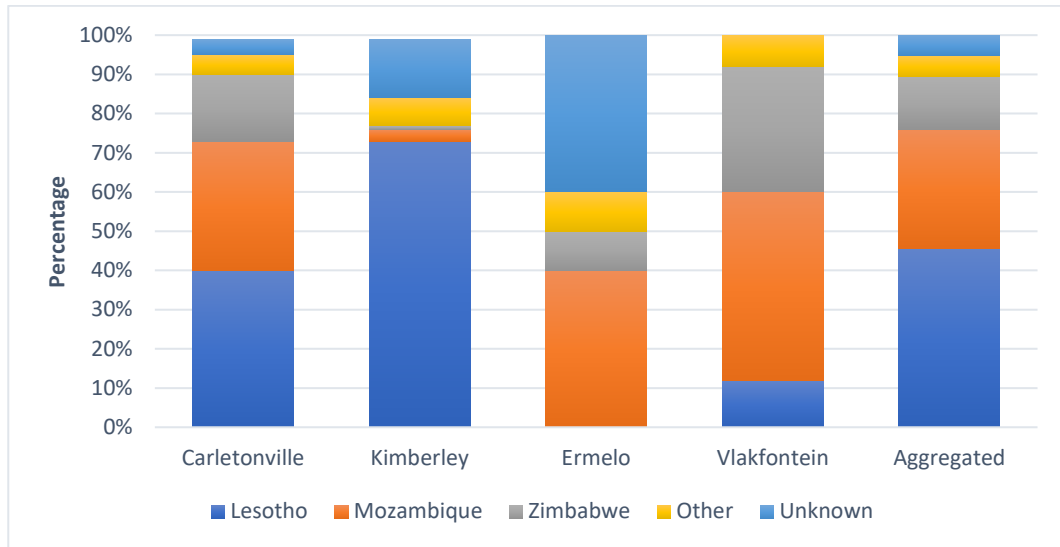


Figure 7:8: Foreign nationality by country

7.2.5. Education levels

Figure 7.9 depicts the education levels of the respondents. As seen in the figure, there are noticeable differences between the education profiles of the respondents working in the different study locations. While this is the case, most of the respondents in all locations have middle school education (i.e., grades 6 to 11). Overall, this equates to 45% of the total respondents. Primary schooling accounts for 24% of the total respondents. The percentage of the respondents with no formal education (i.e., no schooling) is less than 10% in most locations except in Carletonville and Vlakfontein.

From the figure, it is seen that none of the respondents in Vlakfontein have matric qualifications (i.e., secondary education). In the other locations, the percentage of respondents with matric qualification ranges from 15% to 27%. From the aggregated results, only 21% of the total respondents have completed matric.

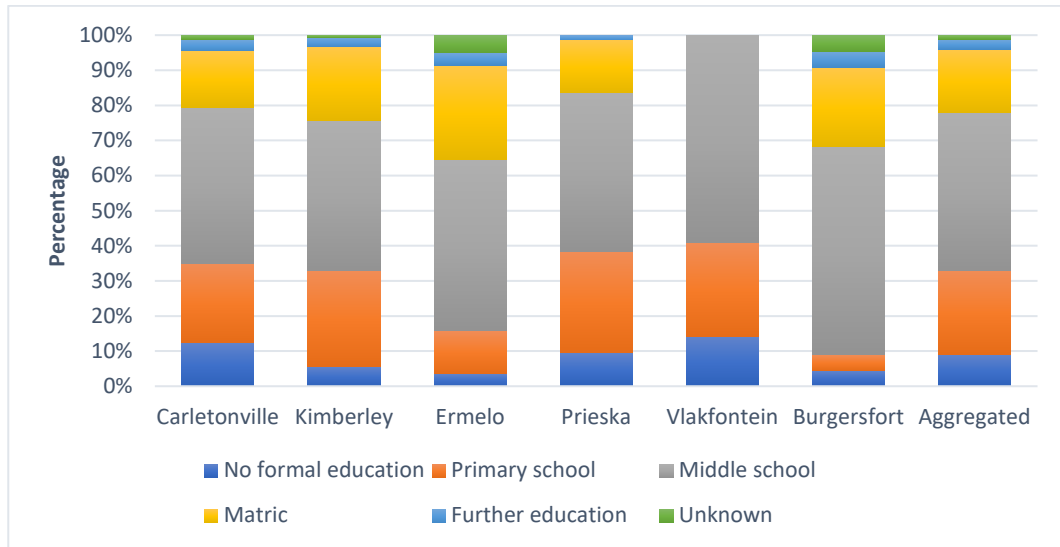


Figure 7.9: Education levels

7.2.6. Family and dependants

Figure 7.10 shows the data on family and dependants. The majority (i.e., 78% and above) of the respondents have dependants. A significant percentage (87%) of the respondents are breadwinners. Figure 7.11 depicts the number of dependants. Most (i.e., between 52% and 80%) of the respondents have between 1 and 3 dependants. Between 15% and 48% (i.e., across study locations) of the respondents support between 4 and 6 dependents. From the aggregated results, about 8% of the respondents have between 7 and 9 dependents. In Ermelo, 14% of the respondents support between 7 and 9 dependants, and 6% of the respondents support 10 and more dependants.

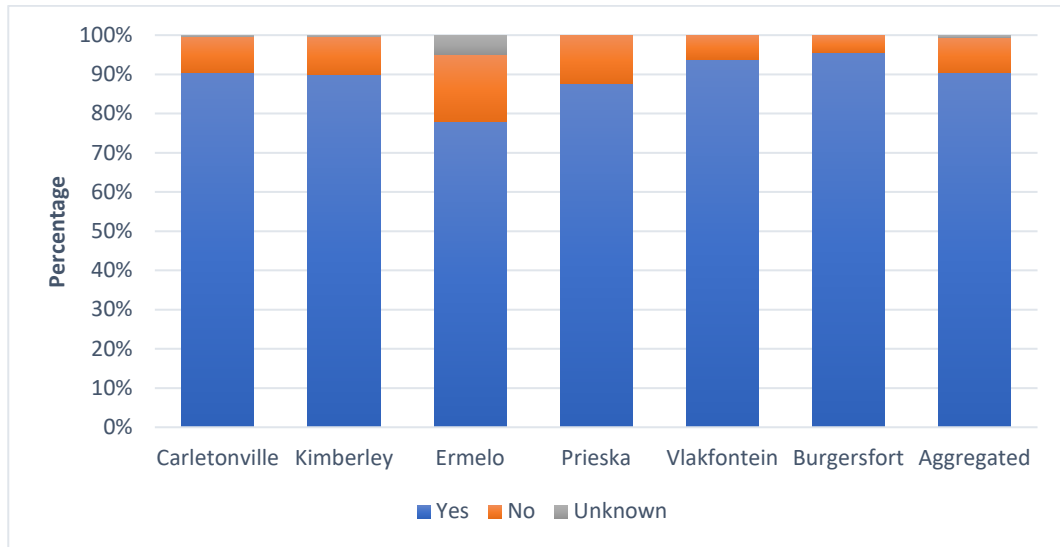


Figure 7:10: Family and dependents

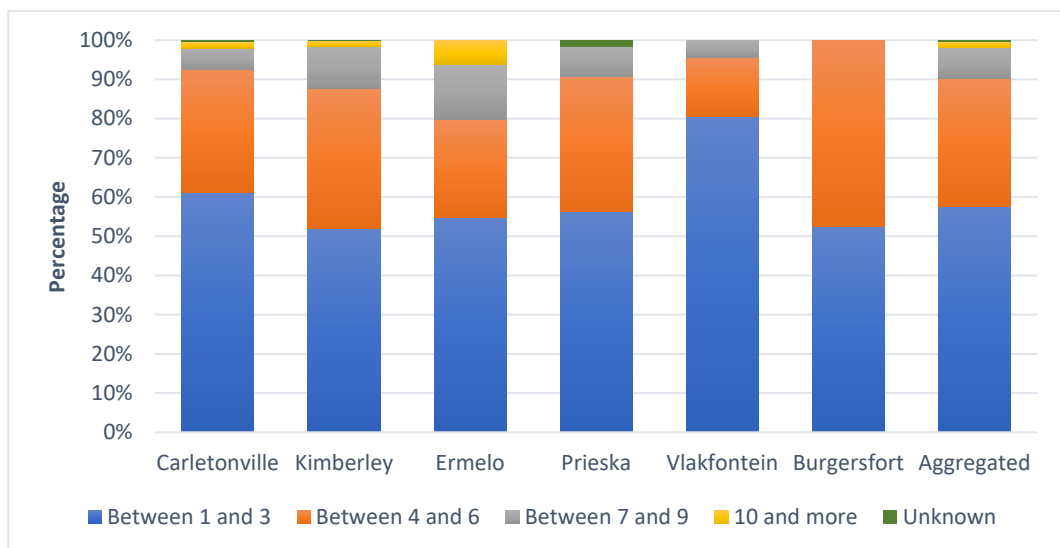


Figure 7:11: Number of dependents

7.2.7. Employment status

Figure 7.12 shows the employment profile of the respondents before engaging in ASM activities. The status of employment differs in the respective study locations. Overall, 46% of the respondents were working before engaging in ASM, and the other 47% were unemployed. Most of the respondents working in Prieska (71%), Kimberley (53%), and Ermelo (50%) were working before moving into ASM. The highest percentages of

respondents that were unemployed are recorded in Vlakfontein, Carletonville, and Burgersfort with 78%, 58% and 59% respectively. In Kimberley and Ermelo, 34% and 46% of the respondents were not working, respectively.

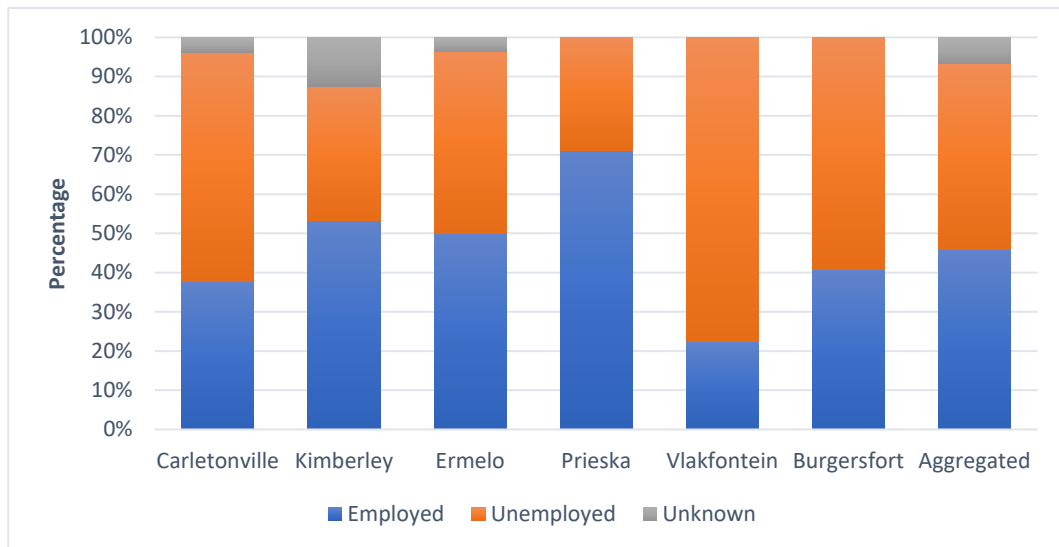


Figure 7:12: Employment status

Figure 7.13 provides the aggregated results of *previous* employment by economic sector (i.e., those that indicated that they were employed were asked where they were working). As seen in the figure, the majority of the respondents (34%) were employed in the mining industry. This is followed by 9% in the construction sector, 6% in the retail sector, and 5% in the agricultural sector. The other category (16%) includes domestic work, government, security, transport, hospitality, and self-employment (see table M in *Appendix E*).

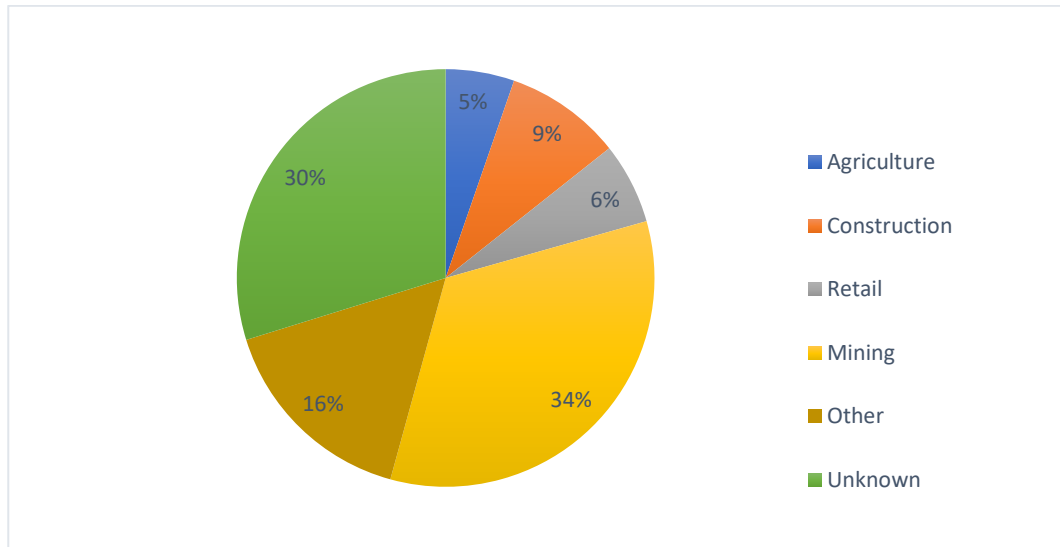


Figure 7:13: Previous employment by economic sector

Figure 7.14 captures the reasons for leaving *previous* employment which differ across the economic sectors. The majority of those that were employed in the mining industry (51%) were retrenched and 26% of the respondents indicated that they were temporarily employed (i.e., captured as a contract). About 52% of those that were employed in the agricultural sector resigned. In the case of the construction sector, the majority of the respondents (43%) were on contracts.

Of those who worked in the retail sector, 36% resigned, 26% were retrenched and 26% were on contract. In comparing the four economic sectors, the mining industry has the highest percentage of retrenchments as well as temporary employment. On the other hand, the agricultural and construction sectors have the largest percentage of resignations and contract employment, respectively.

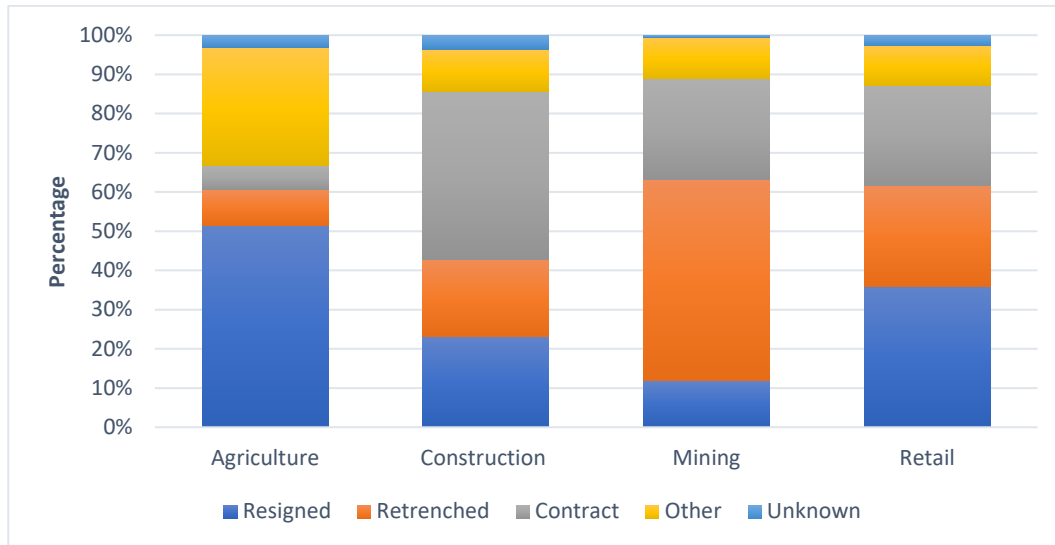


Figure 7:14: Reasons for leaving previous employment

7.3. Cross analysis of the demographics

This analysis provides in-depth insights into the demographic characteristics by segmenting the results according to age, gender, education, and nationality as primary units of analysis, and comparing the categories within each variable. The objective of the analysis is to establish if there are *specific* trends that emerge from cross analysis of variables that may be important in building a profile of the ASM sector.

7.3.1. Age and gender

As presented above, most of the respondents fall under the age categories, 26 to 35 years, and 36 to 45 years. Figure 7.15 provides the age distribution by gender. The age profiles of males and females are relatively the same with slight differences in some age categories. The average age of male and female respondents is 37.6 years and 39.3 years, respectively. In terms of the youth cohort, male respondents account for 7% of the total male respondents, while female respondents account for 40%.

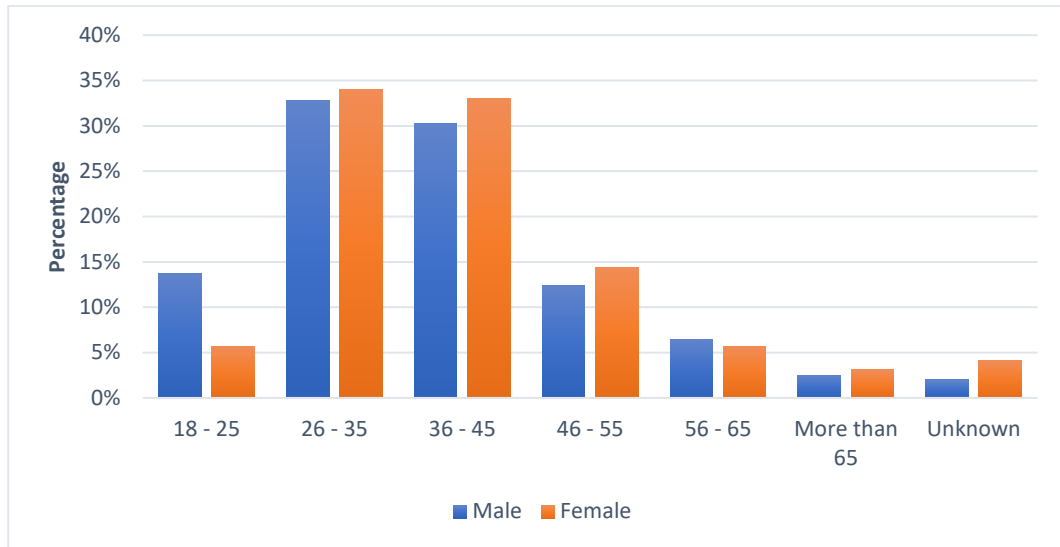


Figure 7:15: Age distribution by gender

7.3.2. Age and education

Figure 7.16 presents the education profiles of the different age groups. In all age groups except for respondents who are 56 years and older, the majority of the respondents (i.e., 40% and above) have middle school education. Four trends are visible from the figure. The first one being the percentage of respondents with middle school, which decreases as the age of respondents increases, (i.e., there is a decline from 52% in age group 18 to 25 years to 17% in the group 65 years and above). The same trend can be seen with the percentage of respondents with matric qualification from younger to older age groups.

There is a 23% difference between the percentage of the respondents in the age categories 18 to 25 years and more than 65 years. The other two trends capture the percentage share of respondents with primary education and no formal education. For both education levels, the percentage of the respondents increases moving from younger to older age groups. A considerable percentage of respondents (more than 50%) in the age range 56 years and above only have primary schooling.

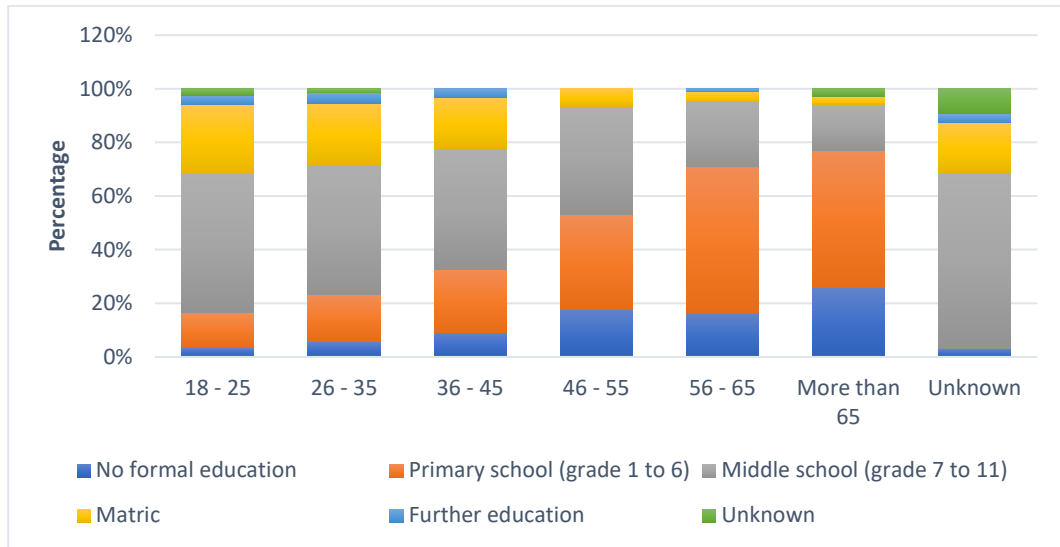


Figure 7:16: Age distribution by education levels

7.3.3. Age and nationality

Figure 7.17 compares the age profile of South Africans and foreign nationals. As can be seen in the figure, the profiles are relatively the same with the majority of the respondents found in the age groups 26 to 35 years and 36 to 45 years. The average age of South Africans and foreign nationals is 38 years and 36 years, respectively. In terms of youth cohort, South Africans and foreign nationals constitute 45% and 48% respectively.

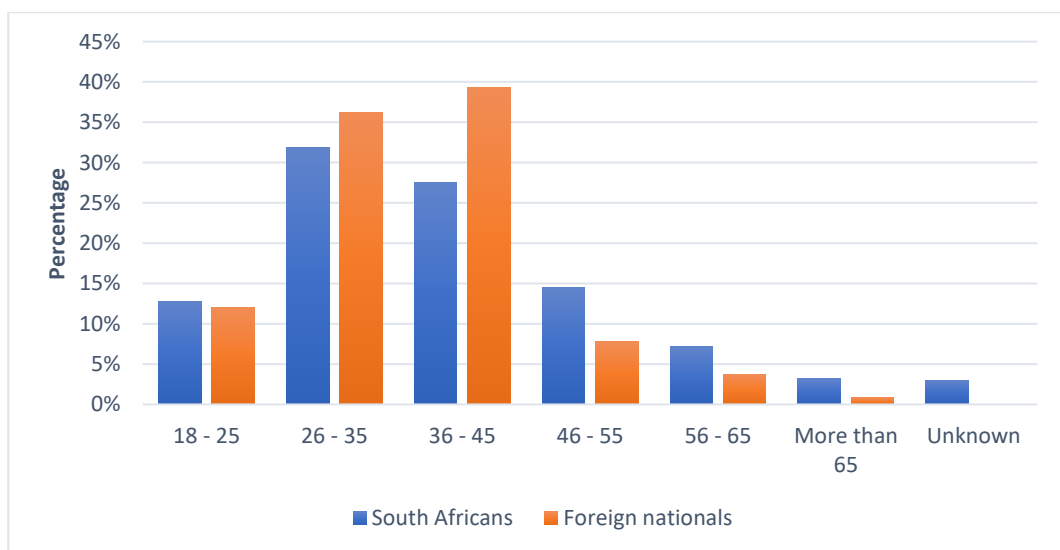


Figure 7:17: Age distribution by nationality

Figure 7.18 disaggregates the age profile of foreign nationals by country. Similarly, to the aggregated results, most of the respondents in all the countries fall in the two age cohorts (i.e., 26 to 35 years and 36 to 45 years). In Lesotho and Zimbabwe, there is a slightly higher percentage (6% and 8% respectively) of respondents in age group 36 to 45 years than in 26 to 35 years. In Mozambique, more respondents (i.e., 5%) are found in age group 26 to 35 years. The percentages of youth are 47%, 54% and 48% in Lesotho, Mozambique, and Zimbabwe, respectively. This compares to 45% in South Africa. In all the countries, older age groups (i.e., 56 years and above) account for less than 10% of the total respondents.

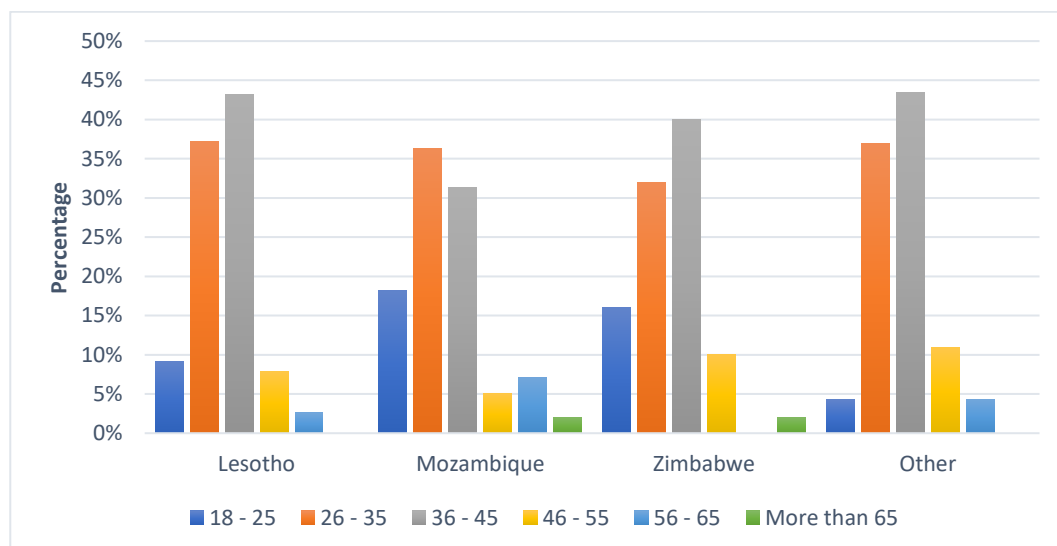


Figure 7:18: Age profiles by country

7.3.4. Age and employment status

Figure 7.19 shows the employment status (i.e., before engaging in ASM) of the different age groups. There is no clear pattern on the relationship between age and employment status. However, it is noticed that the percentage of respondents who were employed increases moving from 18 to 25 years to 56 to 65 years. As expected, the percentage of employment declines in the age category more than 65 years because the retirement age

in the country is 60 years. In the two *dominant age* groups (i.e., 26 to 35 and 36 to 45), there is a close split between respondents who were employed and unemployed. Those who were not working 53% and 46% of the total respondents in the two age groups. It is also seen that most (68%) of the respondents in age group 18 to 25 were unemployed.

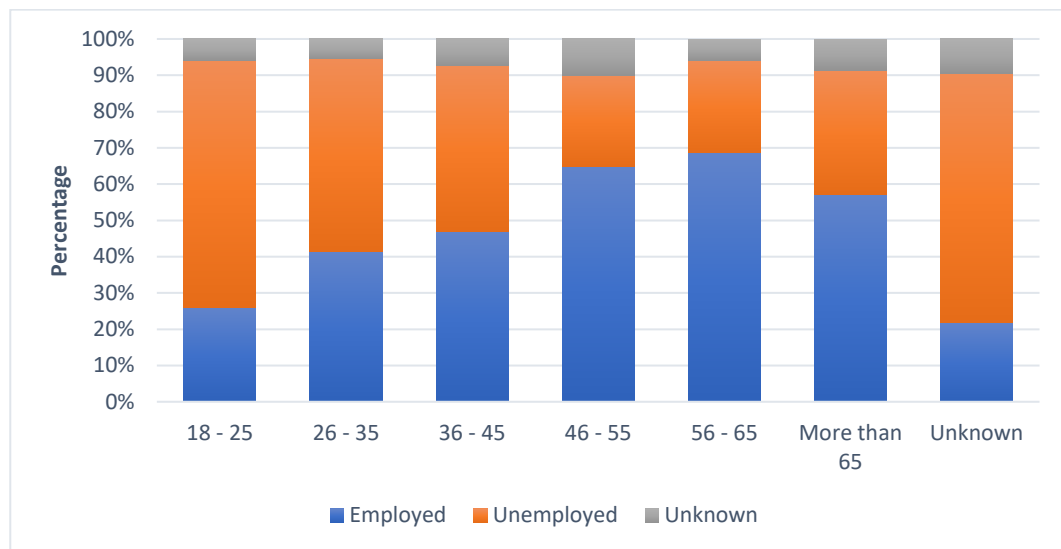


Figure 7:19: Age distribution and employment status

7.3.5. Age and family support

In all age categories, most of the respondents (i.e., between 50% and 100%) have dependants and are breadwinners. Figure 7.20 shows the number of dependants according to different age groups. From the figure, most respondents (i.e., between 41% and 57%) support between 1 and 3 dependants. They are followed by those supporting between 4 and 6 dependants (i.e., 23% and 34%).

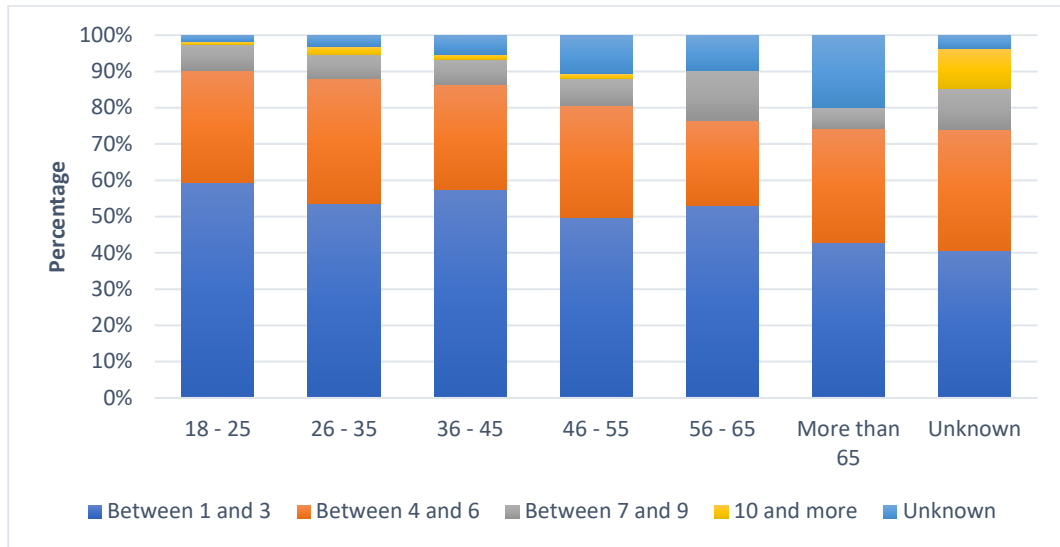


Figure 7:20: Age and the number of dependants

7.3.6. Gender and education

Figure 7.21 shows the gender profile according to education levels. As seen from the figure, the education levels of male and female respondents are relatively the same with slight differences. The majority of the respondents in both female and male have middle school as their highest level of education. The percentage of respondents with matric qualification is also relatively the same in both female and male groups.

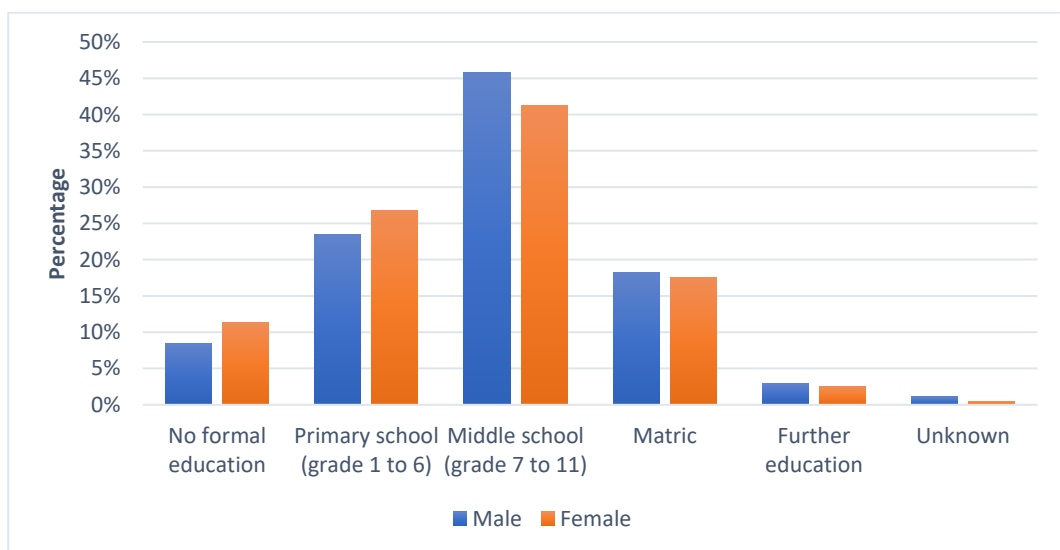


Figure 7:21: Gender profile by education levels

7.3.7. Gender and nationality

Figure 7.22 depicts the gender distribution by nationality. The same trends are seen in the three countries with the percentage of female respondents accounting less than 20%. The largest percentage of female respondents is captured in Lesotho and Zimbabwe at 18%. This compares to 14% in South Africa.

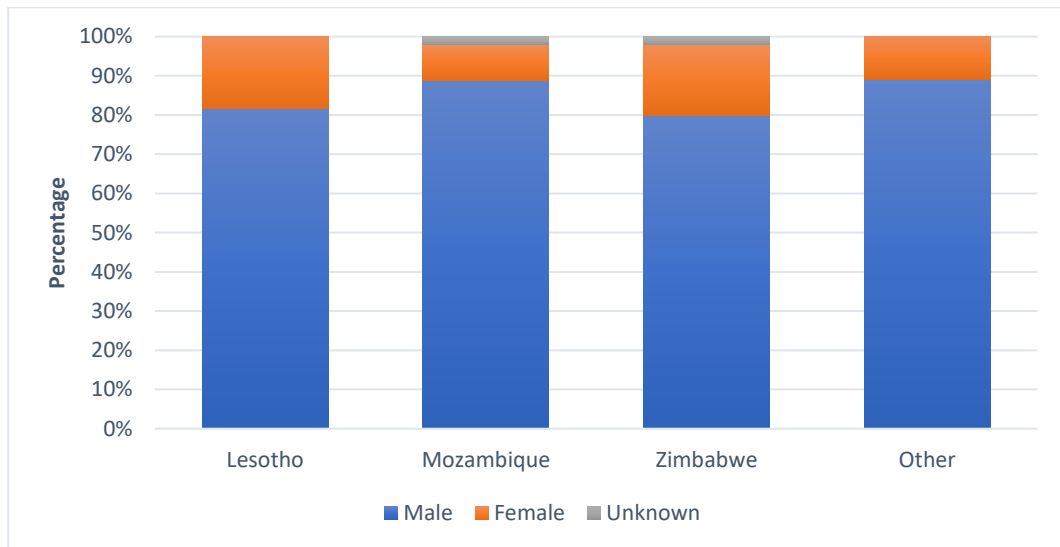


Figure 7:22: Gender by nationality

7.3.8. Gender and family support

In terms of gender and family support, more than 90% of respondents in both female and male groups have dependants. A higher percentage (i.e., of 6%) is seen in female respondents. Figure 7.23 shows the number of dependants for male and female respondents. As seen in the figure, the number of dependants across gender is relatively the same with female respondents accounting slightly higher percentages in two categories (i.e., between 1 and 3, and between 4 and 6).

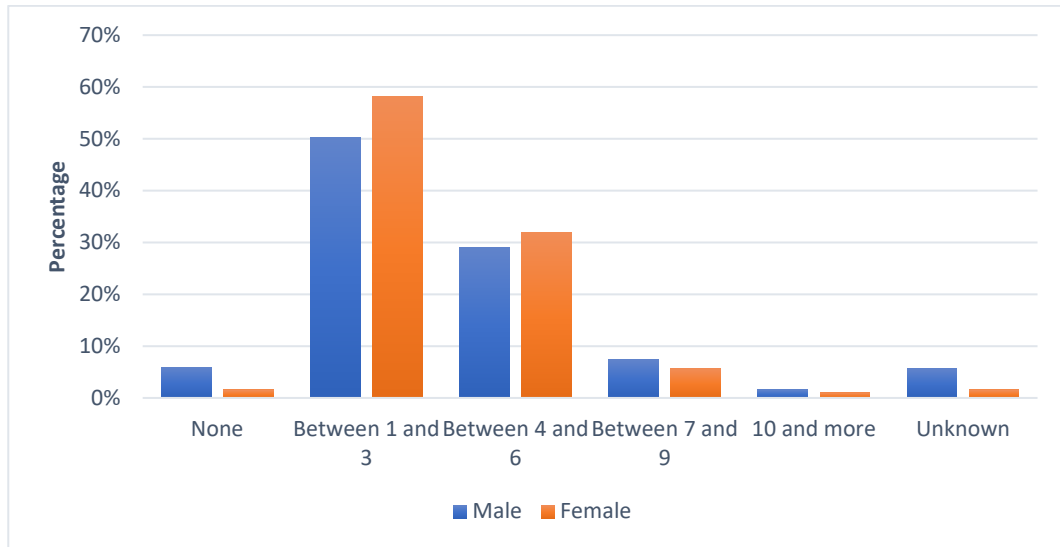


Figure 7:23: Gender and the number of dependants

7.3.9. Gender and employment status

Figure 7.24 plots the gender distribution according to previous employment status. As can be seen, the percentage of respondents who were unemployed before engaging in ASM is the highest amongst female respondents at 58%. This compares to 45% of unemployed male respondents.

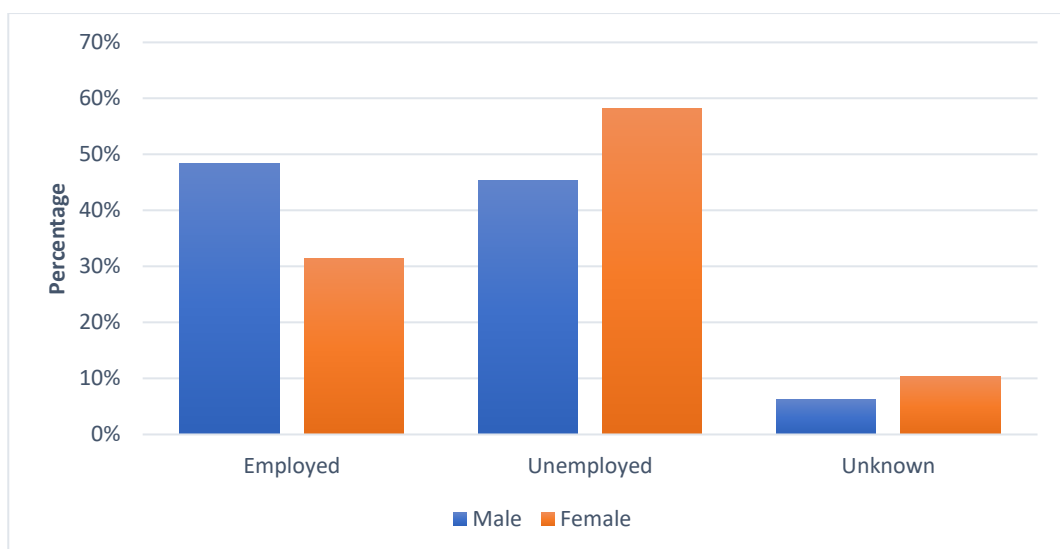


Figure 7:24: Gender by employment status

7.3.10. Education and nationality

Figure 7.25 illustrates the education levels according to nationality. There are differences between the highest level of education amongst South Africans and foreign nationals. While the majority of the respondents in both groups have middle school education, a significant percentage of foreign nationals (36%) only has primary schooling compared to South Africans (20%). The percentage of foreign nationals with no formal education is also higher (16%) compared to South Africans (7%). In terms of matric qualification, South Africans have the highest percentage (22%) with only 7% of the foreign nationals having completed matric. In both categories, less than 5% of the respondents have tertiary qualifications.

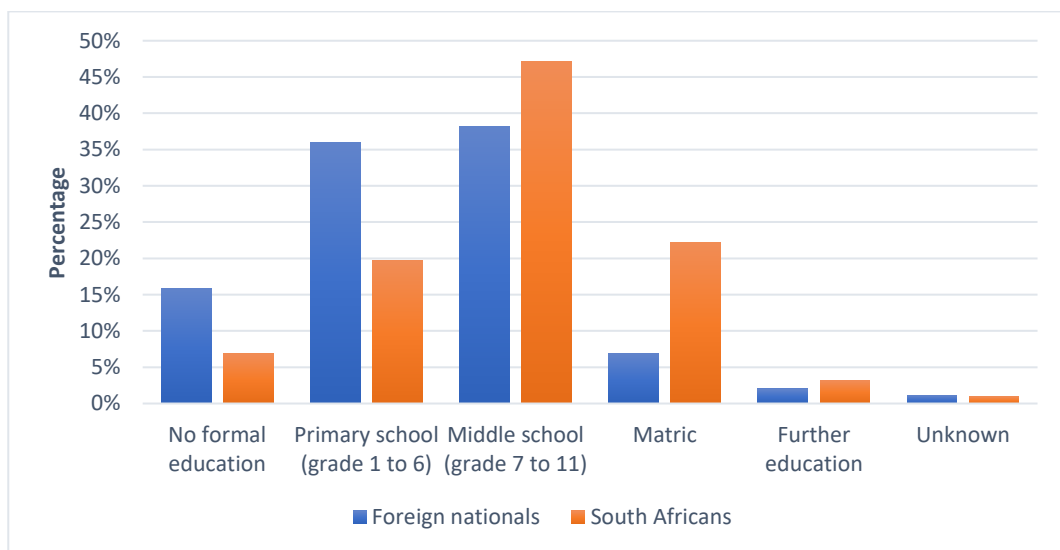


Figure 7:25: Education levels by nationality

Figure 7.26 disaggregates education levels by country. There are differences in the education profiles of the different countries. Mozambique has the largest percentage of respondents (58%) with no formal education and primary education compared to Lesotho (53%) and Zimbabwe (38%). Zimbabwe has the highest percentage of respondents with matric qualification (i.e., equivalent).

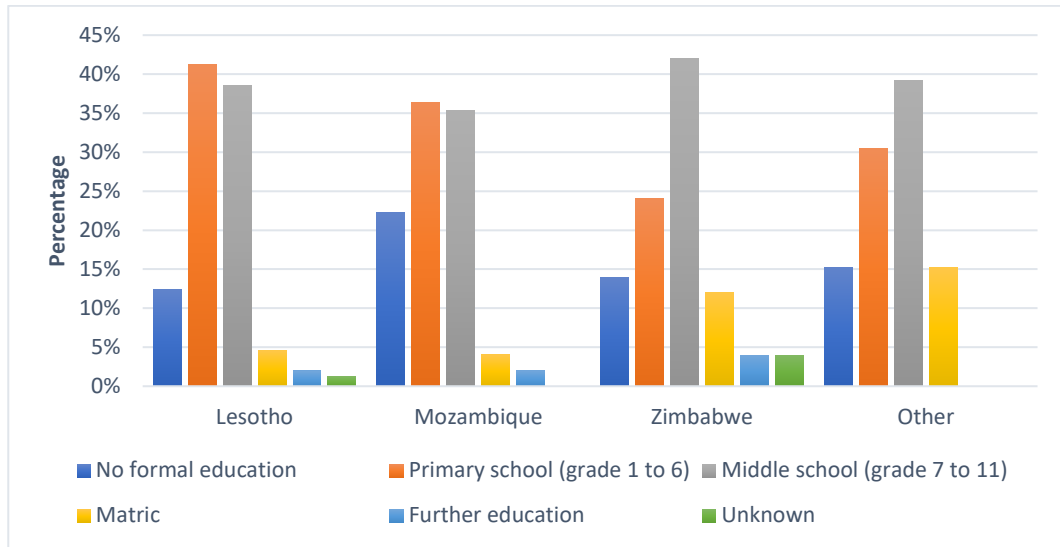


Figure 7:26: Education levels by country

7.3.11. Education and employment status

Figure 7.27 shows education levels by *previous* employment status. There is no distinct relationship between education attainment and employment status. As seen on the figure, the percentage of the respondents is *closely* split between employed and unemployed in all education levels.

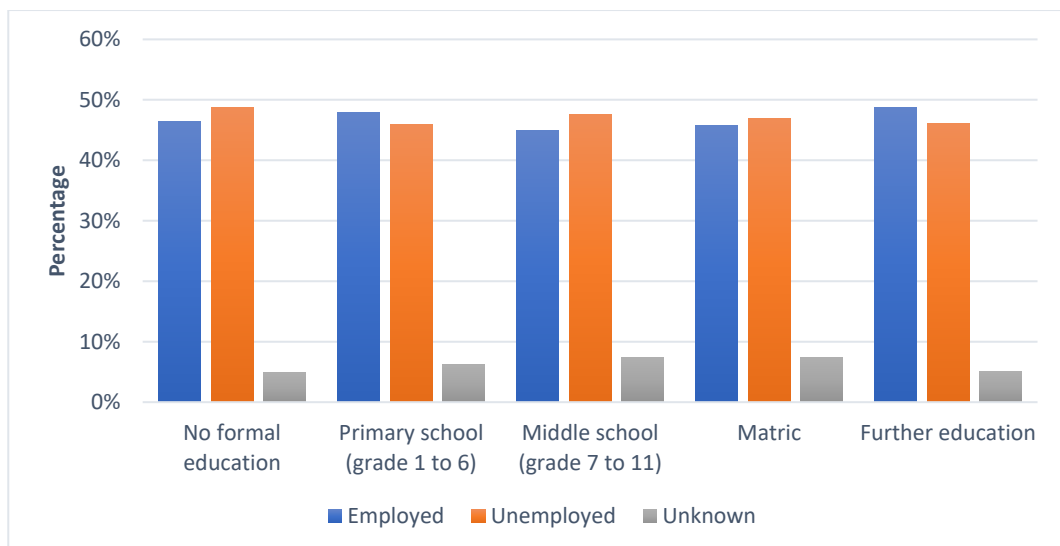


Figure 7:27: Education levels by employment status

7.3.12. Nationality and employment status

Figure 7.28 presents nationality by employment status. Of the respondents that were employed, the highest percentage is found amongst South Africans at 50%. This compares to 34% amongst foreign nationals. If disaggregated by country, the highest percentages of respondents who were unemployed before working in ASM are found in Mozambique (40%) and Zimbabwe (44%). Those coming from Lesotho, 27% of the respondents indicated that were not working before moving into ASM.

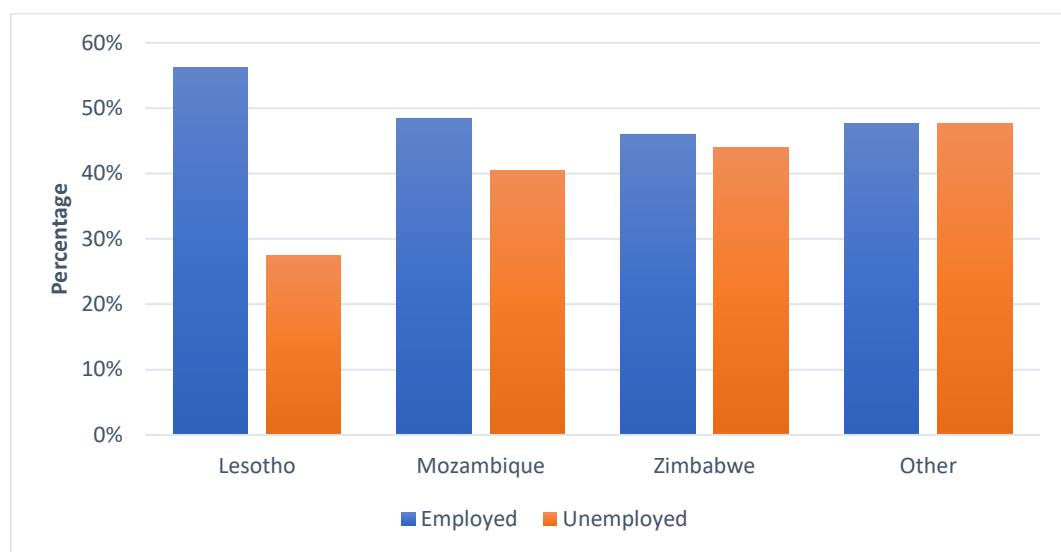


Figure 7:28: Nationality by previous employment status

7.4. Identification of ASM groups

The third objective of the demographic analysis is to segment the population data to identify ASM groups. This is done using clustering. Cluster analysis is defined as a process of identifying natural groupings within population data based on the characteristics it possesses (Zhang *et al*, 1996; Mahamed *et al*, 2007). According to Yaduvanshi *et al*, (2019), clustering methods divide population data into small groups based on similarities or dissimilarities of the attributes of data points. Effectively, clustering finds hidden patterns in a data set. There are various clustering methods but

the widely used techniques are K-means clustering, Hierarchical cluster analysis, and Two-step analysis. The choice of the method depends on several factors including the type of data to be clustered. The two-step technique was selected as the *preferred* clustering method for the analysis in the Chapter. This is because, the technique can handle large data sets, and can accommodate both categorical and continuous variables. The method also determines the number of clusters/groupings that can come out from the analysis (Rundle-Thiele *et al*, 2015; Moroke, 2015; Yaduvanshi *et al*, 2019). Two-step analysis also allows clustering to be carried out without preconceived knowledge of profiles, similarities, or performance measures (Facca and Scott, 2011; Moroke, 2015)

Another advantage of the two-step analysis is that it can provide cluster solutions with or without outliers. Outliers are the data points with values that are different from the data set which *might* represent error or unique attributes within the data. While it is *often* recommended to remove outliers, it is important to understand the composition of the outlier (data points) to determine if they constitute errors or are *merely* unique cases. In the analysis provided, the outliers were removed (i.e., however, independently analysed as a cluster). The Statistical Package for Social Sciences (SPSS) version 27 was used to conduct the clustering analysis.

Of the total sample (n=1355), the cluster solution was created from 909 data points. The data points that were not part of the solution included the outliers (n=225), and those with missing values (n=221). The clustering was performed on the nine demographic attributes which include age, gender, race, nationality, education, native residency (i.e., if they are locals?), family and dependants (i.e., if they have dependants?), family

support (i.e., if they are breadwinners?), *previous* employment (i.e., if they were working before ASM).

7.4.1. Model summary

The model summary provides information on the number of inputs, clusters, and cluster quality. Figure 7.29 shows the model summary with the *specified* information.

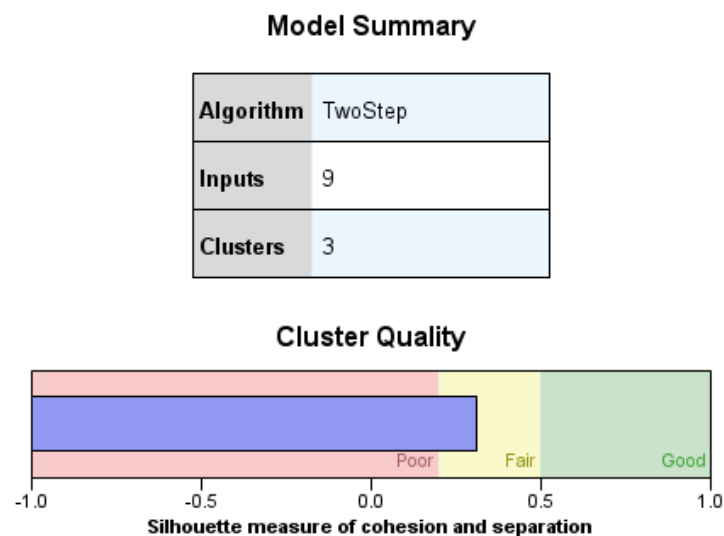


Figure 7:29: Model summary

Based on the nine attributes (inputs), the cluster solution identified the optimal number of clusters to be three. The cluster quality denotes the appropriateness of the cluster configuration, or the model fit. It is determined by the silhouette coefficient which measures the similarity and dissimilarity within and between clusters, respectively (Belyadi and Haghighat, 2021). The silhouette value is determined by two factors, which are cohesion and separation. Cohesion measures the homogeneity within clusters (i.e., how similar the data points are within a particular cluster), and separation

establishes the heterogeneity between clusters (i.e., how different the clusters are from each other) (Sapruta *et al*, 2019).

As shown in figure 7.28, a silhouette measure is a value between -1 and 1. The higher the value, the appropriate the solution (i.e., the data points are well-matched in the allocated cluster and poorly matched to the neighbouring clusters). To assist with the interpretation, a two-step analysis provides a scale bar that categorises the silhouette value into poor, fair, and good. For the solution provided, the cluster quality of 0.3 is considered to be fair.

7.4.2. Predictor importance

Another output of the two-step analysis is the predictor importance which determines the significance of input variables in establishing clusters. According to Yaduvanshi *et al* (2019), the predictor importance output assists in identifying attributes that have maximum significance in terms of impact and grouping of population characteristics. The predictor importance is a value between 0 and 1, where the two extremes denote the least important and most important variables, respectively. Figure 7.30 shows the predictor importance of the cluster solution. The most important attributes among the nine classification variables are nationality, *previous* employment, native residency, and education. The least important variables are gender, family support (i.e., are you a breadwinner?), race, and age.

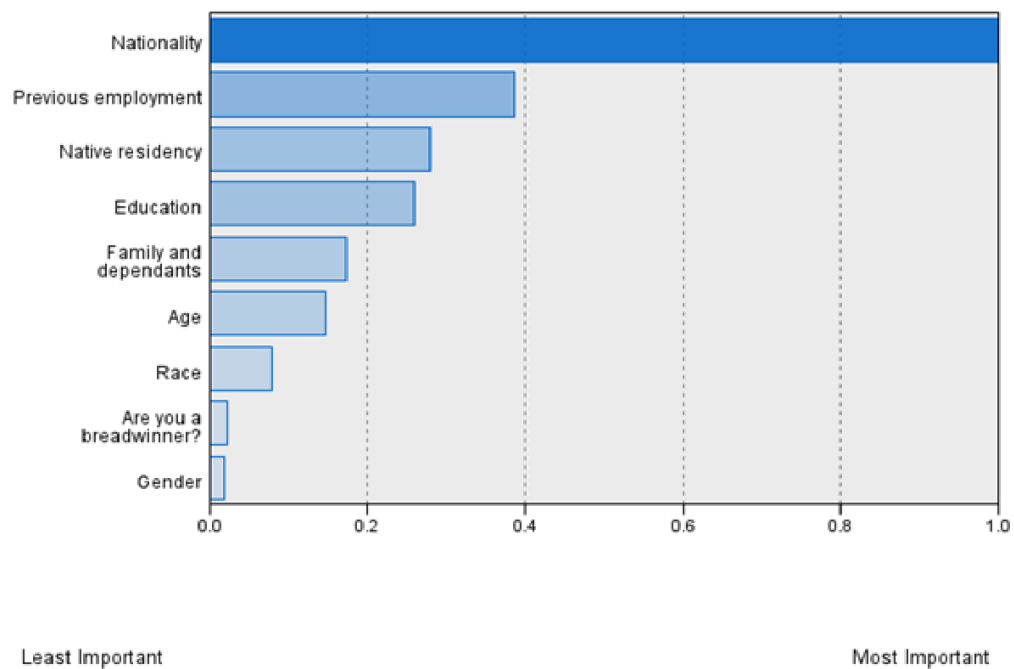


Figure 7:30: Predictor importance

7.4.3. Cluster sizes

Three clusters were identified within the ASM population data (n=909) without outliers. Cluster 1 is the largest cluster with 364 respondents representing 40% of the total sample. Cluster 2 is the smallest cluster with 265 respondents and accounts for 29.2%. Cluster 3 comprises of 280 respondents and accounts for 30.8% of the total sample. The ratio between the largest and smallest cluster is 1.37.

7.4.4. Characteristics of the clusters

Table 7.1 shows the profile of the three clusters based on the demographic attributes and the *dominant* categories making up the individual attributes. The table also provides the size of each cluster in terms of the number of respondents and percentage share. The descriptions of the clusters are provided below.

Table 7.1: Summary and characteristics of clusters

Clusters

Input (Predictor) Importance


Cluster	1	2	3
Label			
Description			
Size	 40.0% (364)	 29.2% (265)	 30.8% (280)
Inputs	Nationality South African (100.0%)	Nationality Foreign national (100.0%)	Nationality South African (100.0%)
	Previous employment Employed (88.2%)	Previous employment Unemployed (64.5%)	Previous employment Unemployed (82.1%)
	Native residency Local (58.5%)	Native residency Non-local (100.0%)	Native residency Local (55.0%)
	Education Middle school (61.5%)	Education Middle school (41.1%)	Education Middle school (44.6%)
	Number of dependants Between 4 and 6 (50.8%)	Number of dependants Between 1 and 3 (54.3%)	Number of dependants Between 1 and 3 (88.6%)
	Age 42.27	Age 35.93	Age 33.32
	Race Black (95.4%)	Race Black (99.6%)	Race Black (98.9%)
	Are you a breadwinner? Yes (98.6%)	Are you a breadwinner? Yes (98.5%)	Are you a breadwinner? Yes (92.9%)
	Gender Male (97.3%)	Gender Male (89.1%)	Gender Male (91.4%)

7.4.4.1. Cluster 1

Cluster 1 is the largest among the three identified clusters. All the miners in this cluster are South Africans. Most of the miners (88.2%) were employed before working in the ASM sector. This group comprises *mostly* miners who are locals. There is, however, a considerable percentage of the miners that are non-locals in this group. In terms of education, most of the miners (61.5%) have middle school education. The majority of the miners in this group have between 4 and 6 dependants. Most miners in this group are in the older age categories, with a mean age of 42.27 years. The majority of the miners are Black, male, and breadwinners.

7.4.4.2. Cluster 2

Cluster 2 is the smallest cluster with 265 miners. The group comprises only of foreign nationals. As expected, the majority of the miners (64.5%) in this group were not working before engaging in ASM activities. While most of the miners (41.1%) have middle school, there is also a significant percentage of the miners (40%) in this group with primary schooling as the highest level of education. The majority of the miners (88.6%) have between 1 and 3 dependants. Similarly, to cluster 1, the majority of the miners (i.e., above 90%) are Black, male, and breadwinners. In terms of gender, a large percentage of female respondents that took part in the study are found in this group. Female miners account for 10.9% of this group and this the highest amongst all clusters. Cluster 2 is dominated by miners in younger age categories and the mean age of this group is 35.83 years.

7.4.4.3. Cluster 3

The size of cluster 3 is *almost* similar to cluster 2 with a 1.6% difference in the percentage share. Cluster 3 is another group that has only South Africans. In comparison to cluster 1, most of the miners (82.1%) in this group were unemployed before working in ASM. Most of the miners (55.0%) in this cluster are locals. The highest level of education attained by most miners in cluster 3 is also middle school. They are followed by those with matric qualifications. This means this cluster consists of miners that are better educated compared to those in clusters 1 and 2. Likewise, this group is dominated by Blacks male respondents who are breadwinners. In terms of age, this is the youngest group with a mean age of 33.32 years.

7.4.4.4. Outlier group

After being excluded from the analysis, the outlier data points (n=225) were analysed separately. The outlier group comprised both South Africans and foreign nationals. Most of the miners (80.9%) are South Africans. In terms of *previous* employment, there is only a 10% difference between employed and unemployed. In terms of the level of education, the percentages of the miners with primary education, middle school, and matric hovers around 20% of the total miners in the group. The distribution of the number of dependants amongst the miners is also *equally* split at around 20% of the different categories. Similarly, to the clusters above, most of the miners are Black, male, and breadwinners. The percentage of females in this group is 42.2% making it the largest among the *identified* clusters. The average age in the outlier group is 40.61 years.

7.5. Key findings and discussion

In building the profile for the ASM sector, the Chapter comprised of three objectives. These were to; provide the demographics of the people that work in the sector, identify shared or similar characteristics amongst the miners to determine if there are particular groups of people that are drawn in ASM, and draw links between the profile of the miners and the country's population considered to be vulnerable to poverty and unemployment in the country. The following discussion provides the key findings in response to the three objectives of the Chapter.

7.5.1. Broad characteristics of the miners

Broadly, all types of people are working in the ASM sector. However, from the demographic data, the dominant attributes can be identified. The key findings are discussed below.

Age profile - Participation in ASM is found across all age categories with the minimum and maximum ages of 18 years and 82 years, respectively. The dominant age groups were identified as 26 to 35 years and 36 to 45 years. The average age of the miners was found to be 37 years (aggregated). The average ages of the study locations were 35 years (Carletonville), 41 years (Kimberley), and 32 years (Ermelo). Based on these figures, one can submit that there are two groups of miners, the *younger* and *older* miners. Most of the *younger* miners are found in Carletonville and Ermelo, and this may be because of the mining practices with activities taking place mostly underground. Most of the *older* miners are working in Kimberley. Again, this may be because mining takes place on the surface, requiring less physical work compared to underground work.

The other insight obtained from age profiles is that youth accounted about 45% of the total miners, making it the largest group in the ASM population that was studied. The high percentage of youth was found across gender (i.e., in both males and females) as well as across nationalities. The participation of young people and percentages thereof as found in the study support the findings made by two studies conducted by Nhlengetwa and Hein (2015) and Thornton (2014). Both studies highlighted the high percentage of young people working in ASM sites in South Africa. From their research, Nhlengetwa and Hein (2015) characterised *most* miners as young African men aged between 15 and 30 years.

Gender distribution – The largest percentage of the miners are male, and this is the case across all study locations. There is however a sizeable percentage of females working in the sector and this ranges between 10% and 20%. There is one location (i.e., Burgersfort) where the percentage of women from the total miners was 41%. While this sparked interest, the sample size (n=22) obtained from the site was too small to make

any conclusions. However, what can be taken from these findings is that the participation of women in ASM in the country is higher than the 5% *normally* reported (See IGF, 2017). The findings also suggest that female miners likely account for more than 20% of the workforce in some ASM sites. This possibly holds given the reluctance of female miners to participate in research studies. This is a common challenge experienced by scholars (See Bester, 2019)³⁰. The same challenge was encountered during this study, with female miners declining the invitation to take part in the research.

Racial profile and origin - Most of the miners are Black, and this is the case across all study locations except in Prieska, where most of the miners are Coloureds. A considerable percentage of the miners in Kimberley is also Coloureds. Given the population profiles of Kimberley, it was expected (i.e., same as with Prieska) for the majority of the miners to be Coloureds. This was not the case. It was found that a significant percentage of the miners working in Kimberley were non-locals (i.e., they were coming from other areas in the country). This somewhat explained the racial patterns of the miners *versus* those of the area's population. As is the case of Kimberley, it was found that most of the miners working in Carletonville were coming from other parts of the country. Amongst the defining characteristics of the mining industry in South Africa are the migration and the migrant labour system. Establishing whether the

³⁰ In discussing the limitations on research conducted in ASM sites in Gauteng, Bester (2019) highlighted the unwillingness of female miners to participate in the research. In this specific study, none of the female miners encountered on the site agreed to be interviewed. The same response as experienced by Bester (2019) from female miners was encountered in the study locations visited. While this reluctance has not been explicitly investigated, it could be linked to a myriad of factors. Broadly, the cultural and societal norms and belief still constrain the participation of women in a variety of activities, and *specifically* in the ASM sector, there is visible evidence on the imbalances and power dynamics as far as the participation of women is concerned. Most of the female miners that participated in the interviews were either working alone on their sites (and/or with other groups of women) and with some, they were permitted by their male colleagues to participate in the research. The other factor that potentially contributes to the constrained participation of female miners is the fact that some miners work as families. In this case, it emerged that the work relationships were managed according to family values and rules. All these submissions are from observations and interactions on-site. As noted above, these experiences were not purposely investigated during the research.

miners were locals or not, provides findings that can be used to expand literature on mining and migration as it pertains to ASM (i.e., its role in cross border migration as well as within-country movements). In tracing where the miners are coming from, it was found that *most* of the miners working in Kimberley come from the North West Province. In the case of Carletonville, the majority of the miners come from the Eastern Cape Province.

The connections between provinces established by ASM have not been studied. However, it is worth mentioning that the North West Province has an extensive history of diamond mining, as such exposure and knowledge of diamonds may be amongst the reasons contributing to movements between the province and Kimberley, with people going to mine diamonds. In terms of the link between Carletonville and Eastern Cape, it is known that the province is a major labour-sending area for the gold mining industry. As such, one can submit that the miners working in Carletonville once worked for large-scale mining operations. Again, while there is abundant literature on the mining industry and migration, there is room to investigate the complexities around the subject as found in ASM.

Nationality - Several submissions have been made regarding the nationality of the people working in ASM sites. One is that most of the miners in the country are foreign nationals. The main finding from the study is that most of the miners are South Africans (i.e., they accounted for 74% of the total miners). There is however a sizeable percentage of foreign nationals in the sector, and these differ across the study locations. Foreign nationals are concentrated in gold mining sites (i.e., Carletonville and Vlakfontein). Of the total miners, foreign nationals accounted for more than 40% in each site. A sizeable percentage of foreign nationals were also found in Kimberley and

Ermelo (i.e., 13% and 12%). In the other sites, mining is conducted by South Africans. The other insights provided by the results were that most of the foreign nationals come from Lesotho, Mozambique, and Zimbabwe.

The findings from the study were that Lesotho nationals are working in both diamond and gold mining, while most miners from Mozambique and Zimbabwe are found in gold mining sites. In addition to the socioeconomic challenges faced in the three countries and the subsequent need for livelihood, the participation of foreign nationals in ASM can be linked to familiarity and/or exposure to mining activities with the people working in the sector having worked there before moving to South Africa. ASM activities are widespread in Sub-Saharan Africa and as such, the movement of the miners within and between neighbouring countries is a common feature in the sector.

Education levels in the sector – It was found the majority of the miners have middle school as their highest education level. This was the case in all study locations, as well as across gender, nationality, and *most* age categories. In terms of gender, no significant differences were noted between males and females when looking at their education levels. While most miners coming from the different countries have middle school education, it was found that South Africans were better educated compared to foreign nationals. This is because the *second* dominant education level amongst foreign nationals is primary schooling. The percentage of foreign nationals with matric qualification was found to be lower compared to South Africans. In terms of age group, most miners in the youth cohort were found to be better educated compared to other age groups.

Family and dependants - When looking at family support, it was found that the majority of the miners have dependants and are breadwinners. Most of the miners have between

1 and 3 dependants. This is followed by those supporting between 4 and 6 dependants. The average household size in South Africa is 3.3 (Statistics South Africa, 2021). Using this as a proxy for dependency ratio (i.e., under the assumption that one miner supports 3 dependants), the total number of people that depend on ASM for livelihoods can be calculated. For the study areas (n=1355), this comes to about 4,000 people. Unfortunately, the number of people that engage in ASM activities in the country is not known to determine the number of people that depend on the sector for livelihoods.

Previous employment status - This *final* attribute provided insights into the employment status of the miners before they worked in ASM. From the results, about half of the miner indicated that were working, while the other half was unemployed. There are differences in employment status across the study locations, as well as across age groups, gender, and nationality. Most of the *younger* miners were unemployed compared to those in *older* age categories. The majority of South Africans were employed prior to participating in ASM compared to foreign nationals. Most female miners were not working compared to their male counterparts. No distinct patterns were identified when looking at employment status and education levels.

The other insight provided from the miners' employment status is sectors of employment. The majority of the miners that were employed worked in the mining industry. Some worked in the construction, retail, and agricultural sectors. The reasons for leaving work were noted, and for the mining industry, the reasons were mostly retrenchments and temporary employment. In the case of the construction sector, most of the miners were on temporary employment. For the retail and agricultural sectors, the majority of the miners indicated that they resigned, with most stating low income as the reason for their resignation.

7.5.2. Emerging ASM groups

Three ASM groups emerged and based on the characteristics, the clusters are given the following identifiers: cluster 1 (*older South Africans*), cluster 2 (*younger foreign nationals*), cluster 3 (*younger South Africans*), and outlier group (*older multinational*). The characteristics of each cluster are provided below (i.e., these are attributes of the majority of the miners thereby defining the group's characteristics).

- Cluster 1 (*older South Africans*) – This is the largest group, and comprises of South Africans, *mostly* older and male. The majority of the miners in this cluster were working prior to engaging in ASM activities. They are poorly educated, are breadwinners, and support the highest number of dependants (i.e., between 4 and 6).
- Cluster 2 (*younger foreign nationals*) – This is the smallest group, and consists of young miners, who are all foreign nationals. Mostly male, however, there is a sizeable percentage of females in the group. Most miners have poor educational backgrounds, and they were not working before their participation in ASM. They are breadwinners, and most have between 1 and 3 dependants.
- Cluster 3 (*younger South Africans*) – This group comprises of young miners, all South Africans. Mostly male with a considerable percentage of female miners. Most miners were not working before ASM. They are better educated compared to the two groups; however, education levels are still low. Most are breadwinners and have between 1 and 3 dependants.
- Outlier group (*older multinational*) – There are both South Africans and foreign nationals in the group. Mostly male, but with the highest number of female miners. Most of the miners in this group are older (i.e., the same average age as

cluster 1). Most miners were not working before ASM. They are breadwinners and the number of dependants differs in the group.

In summary, the similarities that can be extracted from the four groupings are that the miners are poorly educated, they are breadwinners, and have dependants. Mostly male, and based on their average age, the majority are within working age and still have a number of years to be in the labour market.

7.5.3. ASM and the country's socio-economic profiles

According to DPME *et al* (2018), the country's demographic structure is a major predictor of poverty and unemployment among the population. The demographics such as age, race, gender, levels of education, employment status, number of children in a household, size of household, and geographic location can be used to explain poverty and unemployment trends in the country. Table 7.2 provides the socioeconomic profiles of the people that are engaging in ASM and the country's population.

Similarities can be drawn between the two profiles supporting the premise that most of the people that work in ASM are among those that are poor and found themselves with limited economic opportunities in the country. The profile of the poor population in the country is typically Black South Africans, female-headed households, those with low levels of education, those who are economically inactive, those who are young, those with more than one dependant, those who live in large families, and those who live in rural areas. As noted, the majority of the people that participate in ASM activities are black, young people, those with low levels of education, were not working before ASM, are breadwinners, and have dependants (with some supporting large families).

7.6. Chapter summary

The objective of the Chapter was to build a profile for the ASM sector. In doing so, provide an understanding of the miners and groupings in the sector. Also, establish where the people working in ASM are in terms of the socio-economic profiles in the country to make inferences about the potential role of the sector in the country's development priorities. The findings from the Chapter revealed that most of the people engaging in ASM activities are Black South Africans, young people, those with low levels of education, those who were not working before ASM, and those who are breadwinners and have dependants. These characteristics resemble those used to define the country's population group that is most vulnerable to poverty and unemployment. More so, when looking at poverty and unemployment trends, this population group has the highest poverty and unemployment rates in the country.

The conclusion from the Chapter is that the ASM sector has been able to accommodate and provide economic opportunities to the population group that is most affected by poverty and unemployment in the country. Based on these findings, there is ground for promoting the sector as an avenue to addressing poverty and unemployment in the country.

Table 7:2: Comparison of country's socio-economic profile and ASM characteristics

Demographic	Country's population most vulnerable to poverty and unemployment	ASM characteristics
Race	- Majority of Black South Africans live in poverty with the highest levels of unemployment. They are followed by Coloured (i.e., out of the country's four population groups)³¹. - The probability of the two racial groups to find employment are also low compared to the other groups.	- Majority of the miners are Black South Africans. - It was also found that there is a sizeable percentage of Coloureds working in the sector, depending on the locations of ASM sites.
Gender	Poverty and unemployment levels are high amongst females and female-headed households. Females have a low probability of participating in the labour market³².	While most of the miners are male, there is a considerable percentage of female miners that are working in the sector. The findings and insights from the study also suggest that that the number of women in ASM may be higher than reported.
Age	- Poverty levels are the highest amongst children below the age of 15 years. They are also high (i.e., 30% and more) amongst the youth. - Young people have the highest unemployment rate³³ in the country and chances to participate in the labour market affected by education levels as well as the skills and experience required.	While participation in ASM is across all age categories, most of the miners are young people.
Education level	The levels of poverty are high amongst those with low levels of education³⁴.	The miners have low levels of education, with the majority having only completed middle school education.

³¹ According to DPME *et al* (2018), the poverty rates amongst Blacks and Coloureds were 47% and 23% in 2015, respectively. The unemployment rates stood at 39.1% and 29.8% in 2021 respectively (Statistics South Africa, 2022).

³² Female-headed households have the highest poverty rates (i.e., 51% in 2015) compared to male-headed households (i.e., 31% in 2015). Unemployment across gender is 38.2% for females and 32.8% for males (Statistics South Africa, 2022).

³³ . Unemployment amongst youth in the age categories 15 to 24 years and 25 to 34 years was 66.5% and 43.5% respectively in the last quarter of 2021 (Statistics South Africa, 2022).

³⁴ The worst affected by poverty and unemployment are those with lower levels of education (i.e., 55% of the individuals with no formal education were classified as poor in 2015). The unemployment rate amongst those without matric (i.e., secondary qualification) is 39.8%. This compares to 37.7% of those with matric qualifications. It has been reported that while there are differences in levels of unemployment across education levels, the chances of finding employment have been declining across all education levels.

	• There is also a defined relationship between education and employment in that the chances of finding employment increase with educational attainment. • It was found that unemployment has been increasing across all education categories making access into the labour market difficult for those with poor educational backgrounds.	• Only a few have matric qualifications and tertiary education.
Employment status	• Those who are not economically active experience, the highest levels of poverty.³⁵ • The chances of those who are unemployed to find employment are low because of the skills and experience that are often required to enter the labour market.	• From the findings, most of the miners indicated that they were not working before engaging in ASM activities. • Of those that were working, most of them were either retrenched or were on temporary employment.
Family size and support	• Larger families and those with higher number of dependants have the highest levels of poverty³⁶. • An inverse relationship has been established between family size and the probability of finding employment.	• The majority of the miners are breadwinners and have dependants. • From the results, most have between 1 and 3 dependants, followed by those with between 4 and 6 dependants.
Geographic location	• Rural areas have the highest levels of poverty³⁷. • People living in rural areas find it difficult to find employment because of the lack of economic activities. They also find it difficult to find employment in urban areas because of their educational background and levels of skills and experience.	• Some of the ASM sites are located in rural areas, and these locations are found in provinces with high levels of poverty³⁸. • From the study, it was found that the miners are not locals and come from other areas in the country. Some of these areas have high levels of poverty and unemployment³⁹.

³⁵ According to DPME *et al* (2018), about 45% of those who are not working live in poverty.

³⁶ It has been reported that the poverty rate of households with at least three children is 76% (DPME *et al*, 2018).

³⁷ The poverty level in rural areas was 59.7% in 2015. According to Statistics South Africa (2022), while there are no significant differences between levels of unemployment in rural and urban areas, the chances of finding employment in urban areas are 3% higher than in rural areas.

³⁸ The unemployment rate in the three main study locations (i.e., Kimberley, Carletonville, and Ermelo) is 31.9%, 27.2% and 26.8% respectively. Youth unemployment in these areas ranges from 34.5% to 41.7% (Statistics South Africa, 2020).

³⁹ An obvious example is the Eastern Cape Province, where the miners in Carletonville come from. The province has the highest poverty and unemployment rate in the country (i.e., 59.1% and 45% respectively). (DPME *et al*, 2018; Statistics South Africa, 2022).

CHAPTER 8: UNDERSTANDING THE DRIVERS AND PROSPECTS OF THE ASM SECTOR

8.1. Introduction

The key conclusion from the previous Chapter was that most of the people that work in the ASM sector fall under the category of the country's population that is *most* vulnerable to poverty and unemployment. Based on this inference, it can be submitted that the major factors driving people into ASM are poverty and unemployment. While this may be the case, especially given the socio-economic challenges in South Africa, there is still a need to unpack the drivers of ASM to have a holistic understanding of the factors that support the proliferation of the sector's activities, and how these relate to each other.

The need to *fully* understand the drivers of ASM also comes at the back of the argument raised by Musah-Surugu *et al* (2017) and Ferring *et al* (2016) with regard to the dominant characterisation of the sector's activities, which is *often* constrained within the poverty-driven narrative⁴⁰. Ferring *et al* (2016) noted that while this description may hold for the majority of ASM activities, it is important to identify the *additional* attributes that provide more insights into the drivers of ASM and in some instances, assist in explaining the overarching causes of the movement into the sector.

This is important in that, capturing the unique dimensions of ASM may lead to not only an increased understanding of the sector's context but also open more entry points for ASM formalisation and interventions. This Chapter provides insights into the factors that are underpinning the growth of ASM activities in the country. It draws from the

⁴⁰ This discussion is highlighted in Chapter 4 of the Thesis.

perspectives of the miners as well as practitioners⁴¹ who are working in the sector and/or interacting with the sector's activities.

8.2. ASM drivers as shared by the miners

The assessment of the factors that underpin participation in ASM (as pointed out by the miners) was carried out in two stages. The first stage involved the analysis of the quantitative data collected from the surveys. The miners were asked the question, *what attracted you to ASM* as part of the structured questions. This question was framed within the “push and pull” framework, which is widely used to categorise the factors that drive people into ASM. Within the context of livelihood diversification, the push factors encompass participation that is driven by desperation and the desire to escape poverty. The pull factors, on the other hand, capture participation that is motivated by the desire for greater economic returns (Maclin *et al*, 2017). Broad examples of the two include loss of employment and income (as an example of a push factor) and opportunities to generate better income (as an example of a pull factor).

From the question above, the miners were given four responses to choose from. In recognising that the miners may have multiple reasons for engaging in ASM activities, the selection was captured such that the miners could select more than one answer. The four responses to the question were (1) limited jobs (as a push factor), (2) high income (as a pull factor), (3) quick income (as a pull factor) and (4) other reasons. The “other category” was included to capture the reasons that were outside of the three responses that were provided.

⁴¹ In the context of the Thesis, practitioners include professionals who are *either* working in the ASM sector or have interfaced with the sector's activities through their work. These include professionals working for the government, civil society organisations (CSOs), community-based organisations (CBOs), academia, large-scale mining companies, trade unions, and those with their *own* consultancy companies.

Of the total respondents (n=1355), 86% of the miners were drawn into ASM because of limited job opportunities. About 10% of the miners were attracted by the opportunity to generate high incomes, and 8% of the miners were motivated by the potential of the sector to provide quick income. The trends on the drivers of ASM were found to be relatively the same across the different study locations. In all the sites, over 80% of the miners moved into the ASM sector because of the lack of jobs in their communities. In the “other category”, a myriad of reasons was provided, and these are hunger, poverty, self-employment, and benefits thereof, low entry requirements, no documentation to work, no source of income, insufficient income from previous employment, the need to supplement current income, social grant not being enough, generational links, family referrals, family support and responsibilities, and the need to make a living.

Stage 2 of the data analysis involved analysing the qualitative data collected during the study. Through this process and considering the findings from the quantitative data (i.e., in stage 1), the driving factors raised by the miners converged into six thematic areas, and these are lack of economic activities, family support and responsibilities, remuneration and benefits, labour market requirements, self-employment, and associated benefits, and potential for wealth generation and improvement of well-being. These categories are discussed below.

8.2.1. Lack of economic opportunities

As established from the quantitative results, limited job opportunities came out as the main driver pushing people into ASM. This was the case in the individual interviews as well with most of the miners citing lack of jobs or “no jobs at all” as the reason why they decided to work in the ASM sector. From the data that was analysed, the economic challenges experienced by the miners were tied to several prevailing realities in the

country. Amongst the challenges that were raised were high levels of poverty and unemployment in rural areas and the consequences to the already struggling communities and households *especially* female-headed households. Several female miners indicated that they have left their homes because of the difficulties in finding employment. During a focus group discussion with the female miners in Kimberley, when asked what made them decide to work as artisanal miners, Matlhodi⁴² shared that:

Being unemployed, there are no jobs especially in rural areas, when we heard about the opportunities in Kimberley, we decided to come here. When we arrived at the camp, there were not a lot of women working here, this was in 2017, there were a few women, they were not a lot (Matlhodi, focus group, 26 November 2019).

According to the female miners in Kimberley, the number of women working in Kimberley has increased considerably since 2017. Some of the women shared that they came with their husbands or partners to work as families, some came to visit their partners and ended up working in ASM, and some (as per the response above) came independently seeking livelihood opportunities. In the case of Kimberley, the female miners come from different locations across the country with the main provinces being North West, Northern Cape, and Free State. There is also a considerable percentage of women who come from neighbouring countries.

From the quantitative results, it was found that of the total women that participated in the study, 71% are South Africans and 28% are foreign nationals coming *mostly* from Lesotho, Mozambique, Zimbabwe, and Botswana. It was found that *some* of the female

⁴² In line with the requirements for anonymity, pseudonyms are used throughout the analysis Chapter to protect the identity of the respondents.

miners were employed as domestic workers before moving into ASM. When asked why they decided to leave domestic work, most of them said that the salary that they received was not enough to provide for their families. In an interview, Lethabo mentioned that:

The salary that I received as a domestic worker was not enough so I could not afford some of the responsibilities at home, so I decided to leave this work
(Lethabo, interview, 21 July 2020)

Lethabo is a miner working at a coal mining site in Ermelo. She is 35 years old and has been working in ASM for four years. She is a breadwinner and has six dependants. Another miner, Salome, 48 years old also left domestic work when she became a breadwinner because her husband lost his job. Salome has six dependants including her husband. She has been working in ASM for six years (Salome, interview, 20 July 2020).

Another challenge that was shared by miners as the reason for deciding to work as artisanal miners were retrenchments in large-scale mining operations. The majority of those that were employed *prior* to engaging in ASM activities worked for large-scale mining operations. Their work experience in these operations spans 1 to 36 years. About 33% of the miners have between 5 and 10 years of experience, and 22% worked more than 10 years in large-scale mining operations.

Despite having considerable work experience, some of the miners shared that they had difficulties finding employment after being retrenched. One of the miners, Thabang who was employed as a Rock drill operator at a coal mine in Mpumalanga mentioned that he struggled to find employment until he decided to work in ASM. He has been working as a miner since 2006 (Thabang, interview, 21 July 2020). Another miner, Joseph, said this when asked why he decided to work in ASM:

It is because of hunger because there is no work. There was no means for my children to survive, I saw an opportunity from the dumps owned by white people that they can help me. I saw that it can help me with income so I can provide for my children (Joseph, interview, 23 July 2020).

Joseph is 46 years old and worked for a coal mining operation where he lost his job in 1994. Since then, he has been working in artisanal mining, *first* in gold and currently in diamond mining. The other issue relating to retrenchments that was raised by the mines was the lack of benefits and compensation from large-scale mining operations. One of the miners, Albert stated:

The mine closed and we were retrenched, we were left with no money, no benefits and compensation (Albert, interview, 20 July 2020)

Albert is amongst the oldest miners in Ermelo at the age of 67 years. He has been working in ASM for five years. He is a breadwinner and supports his wife and six children. As a pensioner, Albert receives an old age grant per month. With no pension money from the mine, he shared that the grant is not enough to support his family. As a result, he decided to seek additional sources of income. Albert owns a van which he uses to transport coal for people. In the interview, he said that:

I have no pension money, if I count from the grant, it is ZAR40 per day. There is many of us at home, I have 5 children, 6 including my wife. We cannot survive on the grant, the income is ZAR40 per day (Albert, interview, 20 July 2020).

The above sentiment captures the reality that is facing ex-mineworkers where they must seek alternative sources of income even after working for many years at the mines. The other reality that comes out is the inadequacy of social grants to meet the needs of

families, in particular large families. Albert captured this succinctly if one considers the daily expenses that families need to cover to survive.

The issue of retrenchments and difficulties in finding employment were also raised by miners who worked in the construction sector. This was raised by Martin:

I worked for construction for a long time, I started as a car mechanic, I left and worked for construction, from there I found that the work I wanted, I could not find. That time I had children and responsibilities, I ended up becoming a zama-zama (Martin, interview, 21 July 2020).

Martin is an artisanal gold miner working in Carletonville. He is 45 years old and from Mozambique. He has been working in ASM for 15 years. The temporary nature of employment in the construction sector also emerged as a driver of ASM. When asked what they were doing before engaging in ASM, several miners said that they had “piece jobs” in the construction sector. When their contracts ended, they struggled to find work, and this led to them deciding to work in ASM. This is what David said:

I was a bricklayer. I came working for a construction company working for Sol Plaatjies University. I left because the contract finished, then I came to artisanal mining (David, interview, 22 July 2020).

David is 45 years old and is originally from Mozambique. He has been working in ASM for five years. The difficulties in finding employment cuts across *most* of the economic sectors with the miners having been employed in retail, security, hospitality, manufacturing, transport, tourism, and others. Walter was working as a Griller at a local restaurant. After losing his job, he could not find a job. He has been working in ASM for 7 years (Walter, interview, 13 July 2020).

The other submission that was made relating to economic opportunities was the lack of opportunities to study in the country. As a result, school leavers end up working in ASM in the absence of employment and funding to further their studies. These are young people who have finished their matric qualification. One of the miners shared that he decided to work in ASM because of the lack of bursaries and opportunities to further his studies.

8.2.2. Family support and responsibilities

Most of the miners carry the responsibilities of family support as breadwinners. While family support was raised as a secondary driver, for most miners, it exacerbated the urgency of seeking income-generating opportunities. One reality that the miners shared, particularly those that were employed before moving into ASM was expectations from family to continue to support them having been a breadwinner. This was raised by most miners who previously worked for large-scale mining operations. Their decision to work in ASM was influenced by the need to continue to provide for their families. This was raised by Christopher when asked why he decided to work in ASM:

Because I have kids and they are struggling and do not have food. I have to work for my kids, so they have food, and go to bed full (Christopher, interview, 15 July 2020).

Christopher is 40 years old and has been working in ASM for nine years. He is a breadwinner and takes care of five children. Another miner, Lebogang shared the same challenges. His decision to work in ASM was driven by the need to provide for himself and his family. Lebogang is 34 years old and has been an artisanal miner for two years (Lebogang, interview, 22 July 2020).

The other reality that was shared by the miners is the pressures that come with supporting large families. While the majority of the miners have between 1 and 3 dependants, a considerable number of them have more than 3 dependants. Some miners shared that in addition to their children and immediate family, they support their relatives as well. The hardships of supporting a large family are what pushed Thabang into ASM. Thabang is 28 years old and works in coal mining in Ermelo. He has been working in the operation for 3 years. Prior to engaging in ASM activities, he worked as a baker. Due to the need to support his family, he became an artisanal miner because of the potential to earn more income. Thabang shared that he is a breadwinner and supports 12 family members.

8.2.3. Remuneration and benefits

The need for better remuneration as a driver of ASM was expressed in terms of the prospects of earning a higher income. This was *mostly* highlighted in the diamond sites in Kimberley. One miner, Celia mentioned that she was attracted to ASM because:

Diamond mining generates money faster compared to domestic work. You can be a millionaire in a day (Celia, focus group, 26 November 2019).

Another female miner, Maria who was employed as a domestic worker echoed the same sentiments about the opportunity of making large amounts of money compared to what she was earning. Maria is 35 years old and has been working in ASM for 3 years (Maria, interview, 20 July 2020). The phrase “*strike a diamond, strike it rich*”⁴³ resonates with the diamond miners. While most of them were driven into ASM by the need for livelihoods, the prospects of earning large amounts of money are keeping them

⁴³ This is tied to the belief that they will find diamonds that will generate large sums of money thereby making them rich.

motivated to work. This is despite the erratic nature of diamond mining where miners can work for long periods without finding diamonds. During the interaction with the miners, it was pointed out that they can work for days, months and even a year without finding stones or only finding small stones (which they call a “point” which is less than 1 carat stone) which would sell for less than R2, 000.

One of the miners, Thomas has been working as a miner for 2 years. When asked if his life has changed working in ASM, he said that it has not changed because he has not found a diamond (Thomas, interview, 22 July 2020). Thomas is 54 years old and continues to work with the hope that he will *strike it rich* one day. This is what keeps most of the miners motivated, and also news coming from other miners who have reportedly found large diamonds. During a site visit in November 2019, it was shared that a family of three found an 18-carat stone, which was sold for ZAR1, 6 million.

During the site visits, some of the miners also disclosed the amount of money that they have made from a sale of a diamond. This ranges between less than a thousand to millions of rands. One miner shared that they once sold a stone for R1,7 million. When one finds a large diamond, one would go and purchase cars and several other things that people can see. This continues to strengthen the working spirit amongst diamond miners. The general sentiment amongst them is that the hardships of diamond mining can be tolerated because of the potential for greater economic returns which will drastically change their lives.

The need for better remuneration was also linked to *previous* employment. Most of the miners shared that they left their jobs to work in ASM because of the low salaries that they received. The miners worked in different sectors but those that raised the issue of low remuneration worked as domestic workers, general workers, truck drivers, petrol

attendants, and security guards. Some of the miners worked in the construction and retail sectors. One miner, Gift indicated that after finishing school, he worked at a retail store. He later decided to resign to go work in ASM. His reasoning was that:

I have many needs and my family was unable to provide for my needs, so I had to work for myself (Gift, interview, 13 July 2020)

Gift is amongst the young miners in Ermelo. He is 22 years old and has been working as a miner for 1 year. Another miner, Leroy resigned from his previous job because he was not satisfied with his salary. Leroy was working temporary jobs in a construction company. He shared that:

I had piece jobs in construction. I saw that the money was not enough, I saw my friends who worked in zama-zama, and their lives were not the same as mine. Once I left the piece job, I saw my life change (Leroy, interview, 21 July 2020).

Leroy is 32 years old, and he is originally from Zimbabwe. He has been working as a miner since 2008. He supports his wife and 3 children. There are several other miners who decided to leave their jobs who were employed in the construction sector. Vusi worked for a construction company in Johannesburg. His reason for resigning was:

Because that side I was not making much money, I was getting low salary. I saw that I can try with gold because I saw others, then I learnt and I am perfect now (Vusi, interview, 15 July 2020).

Vusi is 33 years old, and he is working in ASM gold sites in Carletonville. He has been working as a miner for 10 years. The decision to leave employment because of low remuneration did not only emerge amongst the “young” miners but came out during interviews with the “older” miners. Thomas is 54 years old, and he worked as a truck

driver. He resigned from work because of the income that he was earning as he was struggling to make ends meet. He is a breadwinner and has five children (Thomas, interview, 22 July 2020).

Several miners shared that they had small businesses before engaging in ASM activities. The miners indicated that they decided to work in ASM because their businesses were struggling and not making enough money to take care of their families. One of the miners, Daniel was selling vegetables and he decided to leave the business because it was not performing well. Daniel is 43 years old and has been working as an artisanal miner since 2005. Another miner, Josias had a welding business in the community. His reason for leaving his business was:

I saw that I was not making progress from the welding work, sometimes customers do not pay, I made burglars [burglar bars], they don't pay, people don't have money, so I saw that I was struggling. I met someone in zama-zama, then I joined zama-zama (Josias, interview, 21 July 2020).

Josias is 47 years old and has been working in ASM for 12 years. He mentioned that he still does welding work on the side which adds to his income from mining. Another miner, Cansley shared his experiences of owning a small business. When asked about his job before working in ASM he said:

First, I worked for a construction company, building. I saw that the employer ran away with money every time during fortnight when we were supposed to be get paid, we don't get money, the employer runs away. I then borrowed money, I started a business to sell clothes. I stocked in Joburg, I came to Carletonville, and I sold my stuff, then I saw that the business was not making money. I only made enough to buy food and pay rent, so I spoke to the people I know and my

family members in Mozambique and I joined zama-zama (Cansley, interview, 21 July 2020).

Cansley is 32 years old and has been working as an artisanal miner for 7 years. He has since left the business and is solely dependent on ASM for income.

Another driver that was mentioned by the miners regarding remuneration was the need to supplement income. From the quantitative results, of the total respondents, 9% of the miners indicated that they have other sources of income. These sources of income include social grants mostly child grants and old age grants. Some of the miners have small businesses. The types of small businesses include selling food, owning a tavern, taxi business, carwash, hairdressing/salon, and money lending (i.e., loan sharks). Some of the miners work part-time jobs as domestic workers, carpenters, mechanics, welders, builders, and electricians.

An unexpected finding during the site visit was a traffic officer who had taken leave to work in diamond mining. There was also a miner that said that he was employed under the Community Works Programme (i.e., this is the government's initiative established to provide employment to those who are not working and afford them an opportunity to gain skills and experience thereby increasing their chances of obtaining employment at the end of the programme).

8.2.4. Labour market restrictions

The restrictions associated with the labour market were raised in comparison between ASM and formal employment. Some of the miners shared that they were attracted to ASM because there were no restrictions in terms of age. A miner, Charlie said this:

I like to work, during the time when I was looking for work, there were restrictions so here there is nothing preventing me from working because of age (Charlie, interview, 22 July 2020).

Charlie is 66 years old and has been working as a diamond miner for 3 years. Previously, he worked at a cheese factory. Several miners indicated that they decided to work in ASM because they did not have the documentation required to find employment in the formal sector. Robert is originally from Mozambique, and he has been working as a miner since 1998. His response to working as a miner was that *“I don’t have rights and documents to work like ID⁴⁴”* (Robert, interview, 15 July 2020). The same response was given by another miner, Mike who is also from Mozambique and has been working in ASM for 12 years. Mike is 33 years old (Mike, interview, 15 July 2020).

The other drivers relating to labour market restrictions are the requirements in terms of qualification, skills, and experience. Several miners mentioned that they were attracted to ASM because there were no entry requirements. One can engage in ASM activities without qualifications and working experience. One miner, Musa shared that:

I was working at a garage in ..., My job ended and I could not get a job. I decided that since I was not working and there are no entry requirements, I decided to be an artisanal miner (Musa, interview, 15 July 2020).

Musa is 32 years old and has been working in ASM for 8 years. While there are no entry requirements as far as education and skills are concerned, having *prior* mining skills also contributed to the decision to work in ASM for those who were previously employed by large-scale mining operations.

⁴⁴ This is an abbreviation for Identity Document.

8.2.5. Self-employment and associated benefits

Working for oneself was also highlighted as a reason for engaging in ASM activities. This was expressed in terms of independence, own control, and the freedom that participation in ASM provides. One miner, Francis said that he was attracted to ASM because of the benefits of reporting to himself and that he gets all the money he has worked for. In his words, Francis shared:

I saw that zama-zama is a simple job and you get money every day. You don't wait for somebody to pay you. You can make money to buy food, clothes, and do whatever you want. Every day, I get enough money (Francis, interview, 15 July 2020).

Francis mentioned that ever since he finished school, he has never secured formal employment. He has been working as a miner for 18 years. He is 40 years old. During a focus group discussion, one female miner, Elizabeth highlighted the benefits of being self-employed:

It is nice to work here because you are your own boss. You start working at your own time. If you feel tired, no one can tell you that you did not work and did not bring production. If you feel you want to knock off, you knock off. If you want to take two days, you take two days off and nurse your body and resume work (Elizabeth, interview, 19 November 2019).

Another miner, Sifiso, also alluded to the benefits of self-employment and he said:

Artisanal mining has assisted us a lot, it has assisted us with many things, it is important. What made me work as an artisanal miner is that everything, you don't need to go to anyone, you go to work, you go sell and take your money to

go do what you want.... yes, I am independent, I am tired of working for white people, they abuse us a lot (Sifiso, interview, 12 July 2020).

The independence that is associated with working in ASM is among the factors that are making the sector's activities attractive to young people. Katlego, a young female miner expressed that:

As a young person, most of my peers make money from sugar daddies, sex work and have babies to get grants from SASSA⁴⁵. At my age, I don't have a child, I came here to work for myself, build my own house and buy my own car. I want to create motivation for my peers that you don't have to engage in sexual activities to make money. I work here to show my peers that there is a future outside of men...there is future outside...you can create your own future and be independent (Katlego, focus group, 19 November 2019).

In supporting the sentiments shared by Katlego, another female miner, Maureen shared that:

I came to work here to have my own money and not be dictated by men on when to use money. I came to Kimberley to have my own money and do what I want and when I want (Maureen, focus group, 19 November 2019).

The strong need for independence was raised mostly by the female miners as well as the youth. For the "older" miners, the benefits of self-employment that they hold important are having control over their money, and the security and certainty that ASM

⁴⁵ This abbreviation stands for the South African Social Security Agency. This is a government's agency responsible for distributing social grants to qualifying South Africans.

provides in terms of knowing how much income they are going to generate, and how much will come to them.

8.2.6. Potential for wealth generation and improvement of well-being

The final category captures the drivers relating to the potential of ASM to generate greater economic returns thereby offering opportunities for improving living standards. For most of the miners, ASM provides a long-term livelihood strategy that has the potential to improve their lives and those of their families. The potential of ASM as discussed by the miners was in relation to what they were not able to achieve before working in ASM. Some of the miners, having seen the impact of ASM on the lives of family members and/or friends working in the sector believe that their lives will also change.

One miner, Salome was working at a preschool, and she shared that she left her job to become a miner because she wanted to improve her life (Salome, interview, 22 July 2020). Another miner, Cathy was working as a security guard said she decided to move into ASM because she saw that she will be able to make a life for herself (Cathy, interview, 20 July 2020). Some of the miners, like Tshepo put it explicitly saying that he was attracted to ASM because of the wealth that is found there. Tshepo is 26 years old and has been working as an artisanal miner since 2013 (Tshepo, interview, 20 July 2020).

8.3. ASM drivers as identified by the practitioners

The drivers identified by the practitioners are closely related to those shared by the miners. Through thematic analysis, five categories of drivers emerged, and these are socio-economic circumstances in the country, historical legacies of mining, nature of

mining skills, bureaucracies surrounding economic participation, and the attractiveness of ASM. These are discussed below.

8.3.1. Socio-economic circumstances in the country

The drivers of ASM as they relate to the socio-economic challenges in the country were raised in terms of poverty, unemployment, and inequality. Most of the practitioners attributed the proliferation of ASM activities to high rates of poverty and unemployment as well as disparities in income and wealth distribution. These challenges and how they drive people into ASM were discussed at three levels.

Firstly, at the macro level given the growing levels of poverty and unemployment. According to Musa⁴⁶, this has created a situation where people have started to look for economic opportunities outside the traditional channels. This is what Musa raised as the main driver of ASM:

Socio-economic conditions in the country as a whole, with poverty levels, you know, income disparities that are so disheartening and have really led to a lot of thinking out of the box, if you like, for a lot of people (Musa, large-scale mining company interviewee, 29 January 2021).

The challenge of unemployment is linked to the lack of economic opportunities as well as skills development. When asked about the drivers of ASM, this was highlighted by Mark:

In my view, it is poverty, unemployment. I think those are the two main drivers for both illegal mining and ASM, and no opportunities for skills or for jobs. But

⁴⁶ Pseudonyms are used with the practitioners as well. The category of stakeholder is provided to mark the perspectives of the different stakeholders working and/or interfacing with the ASM sector.

that speaks directly to unemployment (Mark, large-scale mining company interviewee, 03 February 2021).

The lack of economic opportunities was also isolated as a key differentiator between ASM activities as seen today against the landscape that was understood when the sector became part of the socio-economic agenda of the country in 1994. After characterising ASM as a poverty-driven activity, Bill noted:

You know back in the day, they were often seasonal, you know, they mine for a period of time and they go do something else, do some agriculture. You know, it was kind of a seasonal activity but now it seems to be just the lack of opportunities (Bill, large-scale mining company interviewee, 15 December 2020).

At the *second level*, the lack of economic opportunities is located within the mining industry given its contribution to the country's economy. Several practitioners alluded to the retrenchments in large-scale mining operations and how they have contributed to the growth of ASM activities in the country. This was one of the submissions that were made:

There is evidence of a direct link between retrenchment of mineworkers and informal mining where former mineworkers having the requisite knowledge of not only of the process but also of the workings and underground infrastructure of the mines (Environmental Activist Group, written submission, 27 November 2020)

The link between mine retrenchments and ASM was contextualised by two practitioners who work with mining-affected communities in the country. One practitioner spoke

about historical mine closures and layoffs, and how retrenched mineworkers were left without alternative opportunities to earn a living. Giving an example of the Free State and Gauteng, George alluded to a situation where retrenched mineworkers were left in the hostels with nowhere else to stay and nothing to do after the closure of mining operations. This then resulted in most ex-mineworkers *especially* those from neighbouring countries going back to the mines to seek a living (George, Community Based Organisation, interview, 01 December 2020).

A similar account was shared by another practitioner, Paseka, when tracing the emergence of artisanal mining activities in Carletonville. Paseka shared that:

Artisanal mining started in the 1990s and those who were working it [in the sector] were people from local [communities]. The buyers were local people. After this thing of mine closures, it started to increase, that's when more people, they start to be artisanal miners. Especially the immigrants. Because it started at a mine level where people were doing it at those dumps during 1995, 1996, and 1997. When these big mines started to retrench people, that's where it grows...it was Harmony and Blyvoor mine that started to retrench people. See this thing of amalgamation, they start to retrench when the new company and new owners come (Paseka, Community Based Organisation, 26 April 2020)

The relationship between retrenchments and ASM was also raised in the context of Covid-19 and how it impacted the mining industry. As noted by Bryan:

Since Covid-19, things got worse because remember the mines were allowed to open 50% only of their staff. So since then, since Covid-19 and the lockdown regulations, those that were retrenched from the mining operation went to seek

refuge in artisanal and small-scale mining (Bryan, Miners Association, interview, 07 December 2020).

At the *third* level, the practitioners also touched on the effects of socio-economic challenges as manifesting at a community level. Several practitioners alluded to the state of communities and how they have been worsened amid the growing levels of unemployment. Tshepiso noted that:

ASM is a way of a survival strategy for most people who are marginalised and disadvantaged. So, there would be push and pull factors, many being retrenched or being unemployed or having to live in a community that is economically unstable. So that drives people towards partaking in these measures (Tshepiso, Academia, interview, 30 April 2020).

A dominant perspective that emerged from several practitioners was that ASM is driven by the need for livelihoods and for some communities, particularly those with mineral resources, ASM presents an opportunity to earn a living. This is what Bongiwe highlighted:

Socioeconomic status of individuals in the country, with the high unemployment rate that we have. People are pushed to do whatever means necessary and in mineral-rich communities that happen to be ASM, as one of the alternatives to unemployment (Bongiwe, ASM Consultant, interview, 03 December 2020).

Another practitioner, Nqobile echoed the same views highlighting the reason for people choosing to engage in ASM as:

One of the major issues is livelihood. I think that people are trying to make money using what they believe are the best resource to them. So, I don't believe

that people join the ASM sector because they enjoy being outside or its fascinating. I think it's an issue of livelihood and its actually driven by the economics. I think when you look at just the socio-economic conditions in South Africa, if you look at the unemployment rate, you look at peoples' living standards, you'll see that people are actually mining in order to better their lives (Nqobile, Legal Consultant, interview, 22 April 2020)

8.3.2. Historical legacies of mining

The historical legacies as drivers of the ASM sector touched on both the track record of large-scale mining operations and ASM as a traditional livelihood strategy for families and/or communities. As a base, the legacy of historic mines is characterised by mines that are not poorly rehabilitated and not closed properly. Mineral availability and access in these mines provide an avenue for communities to engage in ASM activities. The other driving factors include the exclusion of most of the population in the participation and sharing of benefits in the mining industry. The prevailing view amongst the miners as highlighted by the practitioners is that they continue to be excluded from the benefits attained from the mining industry despite their contribution towards building the country's economy. To this effect, ASM provides an opportunity to work for oneself and to *directly* benefit from the country's mineral endowment. These sentiments were highlighted by Paul who alluded that:

South Africa itself, particularly let me say Joburg was built as a result of mining, which we see people today. Mainly the Whites are still benefitting from that. People who have been excluded over a long time are now saying "no, if we can do mining to benefit these Whites, why can't we do it for ourselves" (Paul, Civil Society Organisation, interview, 01 December 2020)

The position of the miners on benefits sharing and wealth redistribution was also highlighted in terms of mineral ownership in the country and the rights of the citizens. The standing perspective amongst the miners as shared by the practitioners is that they have a right to benefit from the mining industry because minerals and land belong to the people. To them, their participation in ASM is part of the nationalisation agenda. This is a captured response from Musa:

People feel that it's only right that they participate in an extractive industry when the minerals of the land should be the peoples'. So, it's very like, soft nationalisation, really. So, it's, you know, there's that, why should there be regulation and red tape for something that belongs to the people, and we should all be able to participate in (Musa, large-scale mining company, interview, 29 January 2021).

In explaining the consequences of the lack of benefits and how that has drawn people into ASM, Musa shared a lived reality that is experienced by some of the people living in mining-affected communities. Musa noted:

[Imagine] waking up in the morning, basically, and seeing a mine at your doorstep knowing your grandfather or your father.... someone you know, all the people in previous generations worked at the mines and may be didn't get benefits that have maintained or managed to pull down to descendants (Musa, large-scale mining company, interview, 29 January 2021).

Another legacy issue that was mentioned by the practitioners which has connections with the realities of *most* mining communities is the dependency of community members on mining operations. This was raised in terms of how the history of mining and the systems that were put in place built a culture that remains deep-rooted in

communities both in South Africa and neighbouring countries. In unpacking this, Siyabonga spoke about the migrant labour system and how it encouraged migration into South Africa and the demand for cheap labour in the mines. While the percentage of foreign nationals working in the mining industry has declined, the perceptions around opportunities in the mining industry in South Africa remain particularly amongst foreign nationals. This was noted by Siyabonga:

The whole of SADC has been encouraged to come to South Africa during the mineral rush and work in the country. They, some of them grew up here. Some of them have never worked anywhere else besides mining (Siyabonga, Civil Society Organisation, interview, 03 December 2020).

The connections that families and communities have with mining were also highlighted by Paseka, a Community Activist in Carletonville. According to Paseka, the dominant perspective amongst the Lesotho nationals is that the gold mines were started by them. They refer to themselves as *shaft sinkers* and hence they believe that they have a right to work in the mines and benefit from them. The other view amongst Lesotho nationals relates to the benefits that were lost when the mines closed. As noted by Paseka, the miners have shared that the mines made several promises to them which were not delivered. They were left with no benefits and sources of income when the mines closed.

The only option that is available to them is to go back to the mines to work for themselves. According to Paseka, these viewpoints link to the reasons why some of the Lesotho nationals have decided to take over control of mines making them “*no-go areas*”. Like South Africans who have worked in the mines, foreign nationals also feel cheated because they did not benefit from the mines. According to the Paseka:

[Lesotho nationals] want recognition because the mines have closed. They contributed to building the economy of South Africa. They want recognition from the government, they want permits to be able to work in the abandoned mines (Paseka, Community Based Organisation, interview, 29 April 2020).

Another belief that is deep-rooted amongst the Lesotho nationals relates to the superiority of mining in terms of income that is generated. In explaining the perceptions surrounding mining, Paseka indicated that the views of most Lesotho nationals are that:

There's a lot of money in mining and if you want money you must go to mining. Like, that is why a lot of Basotho are coming this side. That perception is coming from their families that their fathers were working in the mines, so they also have to work in the mines. If you want to have money, you have to work in the mines. So that's why they are flocking into South Africa (Paseka, Community Based Organisation, interview, 26 April 2020).

The other key characteristics of the historical legacies that are connected to the growth of ASM activities are poor mine closure and rehabilitation practices. This was raised in connection to the lack of benefits, no alternative means of income, and the need for livelihoods (George, Community Based Organisation, interview, 01 December 2020).

A separate issue that also forms part of historical legacies is that ASM is considered a generational activity in communities. It was highlighted that ASM has an established history in some communities/families and has remained central to the livelihood strategies that people depend on. As explained by Bongiwe, some people find themselves in ASM because of where they grew up. Bongiwe mentioned that:

It's not even a question that they'll be miners but because they grew up as miners, their parents were miners and they will also be miners because of the community in which they come from (Bongiwe, ASM Consultant, interview, 03 December 2020).

8.3.3. Nature of mining skills

Mining skills as a driver of ASM were discussed from three perspectives and these cover the formal labour market, limitations of mining skills, and skills opportunities in ASM. The difficulties in accessing opportunities in the formal labour market were linked to the lack of skills, education, and qualifications among the miners. The majority of South Africans are found to be disadvantaged by the entry requirements into the formal labour market where certain qualifications and skills are required. An example of barrier of entry relating to skills and qualifications was given in the context where employment opportunities would be available in large-scale mining operations, however, cannot be accessed by community members because they do not have the required qualifications and experience (Musa, large-scale mining company, interview, 29 January 2021).

Practitioners also spoke about the dormant nature of mining skills. This was concerning the submissions that retrenched mineworkers struggle to find employment because mining skills and knowledge are difficult to transfer and use in other economic sectors. It was raised in the interviews that the chances of employment amongst retrenched mineworkers are often reduced by the fact that some of the miners have never worked in other sectors. This was captured by Siyabonga:

The only trade that they've known and the only trick that they still know is mining and mineral understanding. When I talk about mineral understanding, I

talk about them knowing which minerals to find, where the residues are, where the reserves are (Siyabonga, Civil Society Organisation, interview, 03 December 2020).

According to George, the people who started working in *zama-zama* mining were old, retrenched mineworkers because they could not find employment opportunities outside of mining. Those that came into the sector without mining experience were taught by ex-mineworkers who they found working in ASM sites. The growth of the sector has been supported by the ease of transfer of skills between the miners with mining experience and those without (George, Community Based Organisation, interview, 01 December 2020). This was highlighted by Tshepiso as well, who noted that some people are attracted to ASM because of the opportunity to learn and acquire skills (Tshepiso, Academia, interview, 30 April 2020).

8.3.4. Bureaucracies surrounding economic participation

The restrictions associated with economic participation were raised in contrasting formal channels of participation against the entry requirements for ASM. Two issues were highlighted by the practitioners. *Firstly*, the regulations and red tape make it difficult for people to take part in the economy. This was raised in both the context of illegal mining (i.e., with most ASM activities taking place outside the legal framework because of the stringent requirements) as well as *more broadly* in terms of how bureaucracies often constrain people and force them to seek opportunities in particular livelihood strategies. The other key aspect was in relation to the difficulties facing foreign nationals which are brought by restrictive migrant laws that result in them being constrained to certain economic opportunities. This is the insight provided by Joleen:

From a labour migration perspective, it is actually part of what I call liminal, that which migrants especially those who are qualified like geologists or engineers, who don't have the opportunity of course to enter the formal labour market, work in the mines due to, you know, restrictive immigration laws. They actually find an economic safety net during the liminal phase whilst they're waiting for the paperwork to be processed (Joleen, Academia, interview, 06 May 2020).

Linking these challenges to ASM, Joleen further noted:

So, it gets to this particular point of the easiest livelihood...a kind of activity that one can easily enter much as anyone else would actually do is informal. There are no bureaucracies attached to it (Joleen, Academia, interview, 06 May 2020).

The ease of entry into ASM was highlighted as another driver of the sector by several practitioners. This was noted by Tshepiso:

The fact that ASM is low scale, it doesn't require much except for labour. And sometimes people, who may be did not finish school, did not further studies, don't have qualifications to actually get a real job. It worked for them. So that's why most people stay in it as well. So, you don't need much, except for the learnt experience of actually mining the mineral (Tshepiso, Academia, interview, 30 April 2020).

8.3.5. Attractiveness of ASM

In addition to the need to make a living, practitioners alluded to several factors that make ASM an attractive livelihood strategy. As raised by the practitioners, ASM

activities offer other incentives that extend its role beyond being an economic safety net. One of the practitioners spoke about the connections between livelihoods and being able to earn an income and how those influence perceptions on citizenship and belongingness in the community. The practitioner highlighted:

You'd find that as much as those driving factors that drove these people to partake in ASM activities, well, one of them was the fact that they couldn't actually participate in the economy, they couldn't buy, they couldn't sell. So that means that they weren't viewed as citizens enough. And so, when you become part of an ASM community, where you have the ability to partake in the economic activities of the world, when you are recognised economically as a taxpayer, or as a buyer that's paying into the tax, you are part of a community, a part of the world and you are recognised as such. And so being part of ASM gives you that citizenship and that sense of identity and belonging. It's more than just an activity to survive (Tshepiso, Academia, interview, 30 April 2020).

Another factor that was highlighted is the level of independence and benefits that are associated with ASM as an entrepreneurial activity. This was particularly raised in view of the considerable participation of youth in the sector. This was the submission from Musa:

Young people with entrepreneurial mindsets, people in general, that sometimes whether right or wrong, really don't desire to work for large [corporations], for one reason, is the white monopoly capital really. [They] want to work but have their own control. So, the attraction of doing something, that yes, might be dangerous, but even because sometimes when the miners or individuals are hired within these industries, so I'm speaking mostly of illegal mining, there is

still a sense of you know, you're almost an independent contractor that's now working in the tiers of the ladder. And so, there's still a sense of own control over that, probably getting a large percentage of what it is that you mine compared to if you worked in a more traditional setting (Musa, large-scale mining company, interview, 29 January 2021).

The potential for greater returns also forms an integral part of choosing between the livelihood options that might be available in communities or for individuals. This came out as an important factor, particularly for those that were employed and decided to resign. This was highlighted by Nqobile:

I think people would still be drawn to ASM because it is the extent of the livelihood, and also not all livelihoods are the same. So, you could maybe also be working at a garage or as a security worker, but you find that maybe you're making four times as much in the ASM sector and then you would in another job. So, I think that people are doing what they believe would maybe give them the most income (Nqobile, Legal Consultant, interview, 22 April 2020).

In addition to making a decision based on better incomes, the other factors that influence people's choice of livelihoods relate to experience in terms of what works and what does not work, the geographic locations of livelihood options, accessibility, and the entrepreneurial aspects as highlighted above. In terms of the latter, the practitioner accentuated the need for control over one's own time and work schedules, resources, and production, as well as "*ideas of what success look like*" as some of the factors that the miners take into consideration when choosing an appropriate livelihood strategy (Nqobile, Legal Consultant, interview, 22 April 2020).

While the perceptions of the potential of ASM to provide greater returns are supported by what people see in the community in terms of how the lives of family members and/or friends who work in ASM have changed; one of the practitioners spoke about the “*illusion of artisanal mining*” as also increasing the number of people moving into ASM. As Bongiwe explained:

The illusion of artisanal mining where people often you know, will talk about these extreme grades, you know, like for example, in Kimberley, they’ll tell you, “Oh we found a 70 carat”. So, then that almost acts as a psychological pull because, you know, the artisanal miners then are thinking, “I can get my one big break”, then they are pulled into this poverty cycle instead (Bongiwe, ASM Consultant, interview, 03 December 2020).

The vulnerability of ASM to criminal activities was also identified as contributing to the rise in the sector’s activities across the country. As explained:

The informal nature of ASM as well as the non-existent legal protection make it amenable to illegal dealings, especially in high-value minerals such as diamonds and gold (Environmental Activist Group, written submission, 27 November 2022).

8.4. Contextualising the ASM drivers

Many of the drivers that were identified by the miners and practitioners fall under the same categories, and these can be grouped into three areas. Table 8.1 provides a summary of the drivers. The first category of drivers speaks to the socio-economic challenges in the country. The second category of drivers covers the challenges experienced in the specific economic sectors in the country. The last category of drivers speaks to the factors that have led to the miners choosing ASM as a preferred livelihood option.

Table 8:1: Summary of the ASM drivers

Categories of drivers	ASM drivers
Macro socio-economic factors	• Poverty and unemployment ○ Lack of employment opportunities ○ Labour market restrictions ○ Socio-economic challenges in rural areas ○ Challenges facing women and youth ○ Opportunities for skills development ○ Inadequacy of socio-economic programmes (i.e., social grants) • Inequality ○ Disparities income and wealth distribution in the country
Industry-related factors	• Mining industry ○ Retrenchments ○ Historical mine closure ○ Lack of benefits and compensation ○ Transformation issues ○ Socio-economic status of mining communities ○ Perception about mining ○ Mining skills ○ Impacts of mining on communities • Other economic sectors (i.e., Construction, Retail) ○ Temporary employment ○ Low remuneration • Small businesses and challenges faced by local entrepreneurs ○ Customers not paying for products/services rendered on time and impact on the profitability of the small businesses)
ASM specific factors	• ASM as a preferred livelihood • Better income • No entry requirements • No documentation required • Easy transfer of skills • Better prospects to improve living standards • Benefits associated with self-employment

8.4.1. Macro socio-economic factors

The triple challenges of poverty, unemployment, and inequality facing the country were identified as the main drivers of ASM. The specific challenges that were raised include the lack of economic opportunities, labour market restrictions making it difficult for people to find employment, and the socioeconomic challenges facing rural areas,

women, and youth. The other challenge that was highlighted was the inadequacy of the socioeconomic programmes, specifically, the social grant put in place to reduce the burden of unemployment and poverty in the country. Inequality was also highlighted an issue in the country and a contributing factor to the increase in ASM activities in the country. All these challenges are at the centre of the country's development plan⁴⁷.

While the government has implemented programmes aimed at reducing poverty and unemployment, prevailing sentiments are that the country is unlikely to attain the targets set out in the NDP. The levels of poverty and unemployment are expected to continue to increase. According to the National Planning Commission (2020), job losses are inevitable and some of them are expected to be permanent because of Covid-19. With this outlook, the number of people moving into ASM is expected to increase amid limited economic opportunities, particularly for those that fall under the category of poor people in the country.

In response to the macroeconomic drivers of ASM, the sector, if well positioned has the potential to; create jobs in both rural and urban areas, reduce levels of poverty, increase entrepreneurship in local communities, create economic opportunities for women and youth, re-integrate those who have lost their jobs into the labour market, and create opportunities for those who are struggling to enter the labour market.

⁴⁷ The country's NDP aim to eliminate poverty and inequality in the country by 2030 and amongst the key interventions that the country is working towards is increasing employment base through economic growth (National Planning Commission, 2012). From the employment figures provided in *Chapter 2*, it was seen that South Africa is struggling to both create and maintain employment levels. The unemployment rate has been increasing, while the levels of employment have declined (i.e., unemployment increased from 32.5% in 2020 to 35.3% in 2021). In the same period, total employment declined from employment declined from 15.02 million to 14.54 million. In view of the socio-economic challenges, prevailing sentiments are that the country is unlikely to attain the targets set out in the NDP, and that poverty and unemployment will continue to increase. According to the National Planning Commission (2020), job losses are inevitable and some of them are expected to be permanent because of Covid-19.

8.4.2. At the industry-related level

The growth of ASM activities has *mostly* been associated with the mining industry and its shortcomings. The findings from the study revealed that participation in ASM can also be linked to other economic sectors in the country. This is because a sizeable percentage of the miners worked in other sectors other than the mining industry, and hence the specific challenges experienced in these sectors have also influenced the decision to work in ASM. The following discussion is divided into two, with the first part discussing the ASM links to the mining industry and the second part looking at the aspects concerning other economic sectors.

ASM and the mining industry

A broad range of challenges was highlighted that link large-scale mining operations to ASM participation and growth. These include retrenchments, historical mine closures, lack of benefits and compensation, transformation issues, socio-economic status of mining communities, perceptions on mining, nature of mining skills, bureaucracies surrounding mining, and impacts of mining on communities. One of the prevailing issues with a direct link to people moving into ASM is the retrenchments in the mining industry. Figure 8.1 shows total employment and contribution to provincial GDP for the period 2008 to 2020 for different provinces.

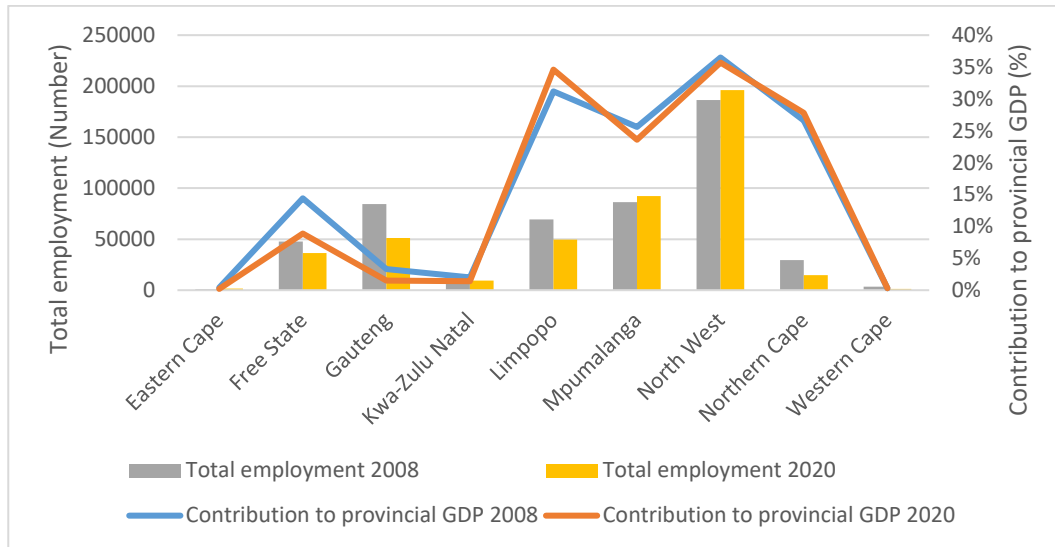


Figure 8:1: Total employment and contribution to GDP across provinces

Source: DMR, 2014; Mineral Council South Africa, 2018; 2021

As seen in the figure, several provinces have experienced losses in mining's GDP share. Overall, the contribution of mining to provincial GDP has remained relatively the same over 13 years. In terms of employment, several provinces recorded losses, except for two provinces with employment gains (i.e., Mpumalanga and North West). There is an increase of 7% and 5% in employment in Mpumalanga, and North West provinces, respectively. The biggest losses are seen in Gauteng, Limpopo, Northern Cape, Free State and Western Cape provinces. In Gauteng, the mining industry lost 33,256 employees which constitutes a 39% loss in employment. In the Northern Cape, Limpopo, and Free State, the percentage loss in employment was 50%, 29%, and 24% respectively. Even though it has the lowest employment share, a 62% decline in employment was recorded in the Western Cape province (i.e., employment decreased from 3,615 to 1,357).

In juxtaposing employment loss against ASM locations, there is a noticeable link between provinces with high recorded losses and the prevalence of ASM activities.

From literature, it is known that ASM activities are widespread in gold and diamond. This places most of the activities in Gauteng and Free State for gold mining, as well as the Northern Cape for diamond mining. From the results above, these three provinces are amongst those that have experienced considerable losses in employment. Another province that recorded high employment loss is Limpopo, and as the case in the other provinces, an increase in ASM activities exploiting chrome has been reported.

Looking at the three study areas, the same patterns have been reported. In the case of Kimberley, the Sol Plaatjies Local Municipality (2017) reported a decline in the contribution of mining, which has been attributed to the closure of three of the five Kimberley Mines (Sol Plaatjies Local Municipality, 2017). This has not only affected mining employment but also the performance of other key sectors of the economy, in particular the manufacturing sector which was a direct product of mining activities in the area. According to the Sol Plaatjies Municipality (2017), the contraction of the mining and manufacturing sectors has increased unemployment levels in the area. As a result, about 32.1% of the households in the municipality depend on social grants as a primary source of income.

The economy of Carletonville has also been affected by declining mining activity. While mining remains the largest sector in the area contributing 25.4% to the total employment, it recorded the largest loss in employment between 2006 and 2016. A total of 12, 970 people lost their jobs during this period. This is linked to downscaling and mine closures (Merafong City Local Municipality, 2020). In the case of Ermelo, the share of mining to total employment has also decreased from 9.8% in 2012 to 7.7% in 2015 (Msukaligwa Local Municipality, 2020).

The loss in the employment as seen in the different provinces and locations has affected the miners, their families, and their communities. Ackerman *et al* (2018) highlighted that mine closures and retrenchments have devastating impacts on ex-mineworkers. The experiences of the miners as captured by Ackerman *et al* (2018) are similar to the sentiments shared by miners in the study who used to work for large-scale mining operations. Using the example of the Aurora mine, which was liquidated in 2011, Ackerman *et al* (2018) noted that the miners were left without any pay-outs and benefits including medical aid, unemployment insurance and pension. The case of Aurora is not unique in the mining industry.

This is a systemic problem that is facing ex-mineworkers where mines are closed without paying the miners their pension money and/or other benefits that are due to them. The Maverick Citizen also published an article on this where the Ex-mineworkers Association in Khayelitsha has reportedly spent more than 10 years trying to trace unpaid pension benefits (Nortier, 2019). This was also raised in the study with the miners indicating that they did not receive any compensation. As a result, they were forced to go and look for employment to earn a living even after years of working in the mines.

According to Ackerman *et al* (2018), the situation of retrenched mineworkers is worsened by the inability to find other employment leaving them with no means of income. In the absence of income, the miners usually resort to economic resources that are available around them to generate income. The inability of the miners to find employment has been linked to several factors. One of the factors relates to mining skills. Several scholars have spoken about the enclave nature of the mining industry and gaps between the sector and other economic sectors making “mining skills” not

transferrable to other sectors (Turok, 2013; Ackerman *et al*, 2018). The consequence of this is ex-mineworkers being unable to find employment because their skills cannot be used in other economic sectors. This came out in the submissions with those that have worked in the large-scale mining industry indicating that they moved into ASM because of difficulties finding employment after being retrenched. This is despite them their considerable working experience.

From the quantitative results, of those that worked in large-scale operations, 45% have 4 years (and below), 33% have between 5 and 10 years, and 22% have more than 10 years' experience. The maximum years of experience that were recorded were 36 years. The employability of ex-mineworkers is also affected by their education levels. According to the Mining Qualification Authority (MQA) (2017), about 48% of the workers in the formal mining industry fall under the education category of grade 10 and grade 12. About 16% of the employees have achieved between grade 4 and grade 9.

The other issue that relates to skills that is *often* highlighted is the effectiveness of the reskilling programmes and their impact on the socio-economic status of ex-mineworkers (MQA, 2017). In terms of the MPRDA through the Social and Labour Plan obligations, mining operations are required to provide training and skills to ex-mineworkers. This requirement hinges on providing skills that offer alternative livelihood opportunities to minimise the social and economic impacts on retrenched mineworkers, their families, and communities (Centre for Applied Legal Studies, 2018).

According to Molefe *et al* (2006), the training programmes that have been implemented by large-scale operations include bricklaying, painting, carpentry, sewing and dressmaking, plumbing, farming, and others. While some miners have managed to secure employment as a result of the training provided, the overall analysis is that the

reskilling programmes have not performed well in terms of improving the chances of finding alternative employment for the miners and their families who underwent the training (Molefe *et al*, 2006).

Another aspect that emanated from the study linking ASM to large-scale mining is mine closure. According to Ackerman *et al* (2018), declining mining activity has adverse impacts on communities' livelihood assets, strategies, and outcomes. Capturing this in the context of the five capitals model, Ackerman *et al* (2018) noted that mine closures affect communities' health, education, food security, water, shelter, and participation in the economy. These challenges are not experienced only post-closure but during operation as well. The state of most mining communities in the country is characterised as poor with limited employment opportunities (Mining Charter, 2018).

In a study conducted by ActionAid South Africa (2018) on the socio-economic conditions of mining-affected communities in the country, unemployment was identified as *either* the first or second area of concern in the studied locations. The submissions made by community members regarding the issue of unemployment were that the mines do not employ them, there are limited economic opportunities in the mines, as well as few alternative livelihood strategies in their communities.

The community members also shared that their employability is adversely impacted by their health, which continues to deteriorate because of the negative impacts of mining operations (ActionAid South Africa, 2018). Due to lack of livelihood opportunities, the study found that most community members are reliant on social grants as their primary source of income. As raised in the submissions, for some households, social grants are not enough to meet the needs of the family, especially for large families. As a result, the need for additional income-generating activities becomes important. As was found

in the study, some of the miners moved into ASM to complement social grants to be able to provide for their families.

The other issues that were raised connecting the mining industry to ASM is the industry's transformation agenda and the progress that has been made to address the disparities instituted by the apartheid government. For *some* of the miners, participation in ASM is regarded as a means to self-address the exclusion of the majority of South Africans from benefitting in the minerals industry. To this end, ASM is interpreted as a mechanism for benefit-sharing and wealth redistribution. As noted in the submissions, some of the people that engage in ASM activities see it as self-nationalisation where mining *directly* benefits the miners, their families, and communities. These sentiments were shared by not only those who worked in large-scale operations but also the people who have been affected by mining.

Links between ASM and other economic sectors

Participation in ASM can also be linked to the performance and the challenges seen in other economic sectors. Second to mining, a sizeable number of the miners who were employed before moving into ASM worked in the construction sector. Three main issues were raised in the submissions explaining the move to ASM and these are retrenchments, temporary work, and difficulties in finding employment. Like the mining industry, the contribution of the construction sector to total employment has declined in the country. At present, the construction sector accounts for 8% to total formal employment and 17% to total informal employment (Agbola *et al*, 2019).

Between 2019 and 2020, the sector lost about 14% of the workforce. This equates to 184,000 people (Statistics South Africa, 2021). According to Agbola *et al* (2019), the construction sector is characterised by temporary work and casual labour, and this is

tied to the supply and demand of infrastructure development. As noted in the submission, several miners indicated that they were employed on a contract basis. After the contracts ended, they struggled to find employment. This led them deciding to eke out a living in ASM.

Another challenge that dominated the submissions was the low remuneration in the various occupations such as domestic workers, general workers, truck drivers, petrol attendants, security guards as well as those in the construction sector. The working poverty line in South Africa was around R4,000 per month in 2016. According to the National Treasury (2016), about 6.7 million people earn less than R4,000 per month. Of these, 4.6 million people earn less than R2,500 per month.

Based on the employment figures in the different sectors, 90% of those employed in the agricultural sector, 63% in the construction sector and 95% in domestic services sectors are earning below the working poverty line (School of Economic and Business Science, 2015). In juxtaposing the working poverty line and food poverty line which costs R445.55 per person per month, R2,500 can cover only food assuming that the breadwinner supports a family of five (National Treasury, 2016). This means the other essentials will not be covered unless supplementary sources of income are found. From the submissions, some of the miners indicated that they resigned from work because their income was not sufficient to support their families and improve their standard of living.

It was indicated in the submission that the decision to work in ASM was also because of the failure of small businesses to generate adequate income. Several the miners indicated that they were entrepreneurs before engaging in ASM activities. There is extensive literature on small businesses and entrepreneurship in South Africa.

According to Mbonyane and Ladzani (2011), 50 % of small businesses in the country fail to grow beyond the survival stage. Because of numerous challenges such as lack of funding, institutional support, marketing resource, and others, they end up closing. This has been the reality of some of the miners who indicated that they struggled to maintain their businesses and because of family responsibilities, they ended up looking for other opportunities.

8.4.3. ASM-specific factors

Over and above the need for economic opportunities, the decision to participate in ASM activities was influenced by several factors including the attractiveness of ASM as a livelihood strategy as well personal experiences. Broadly, the choice between ASM and other livelihood options was influenced by the availability of resources and work, entry requirements, potential to earn a higher income, and prospects of improving living standards. The other issues that were raised were family support and responsibilities and the benefits associated with self-employment and entrepreneurship in particular independence, and having *own* control over time, business decisions, and money.

8.5. The prospects of ASM

Attached to the criminalisation/decriminalisation debates on ASM is the assessment of the prospects of the sector's activities. One of the dominant questions is whether ASM is a short-term or long-term phenomenon. This question was posed to the miners to capture their perspective on their outlook on the sector as far as their participation is concerned. They were asked two questions; (1) *do you perceive ASM to be a short-term or long-term employment opportunity?* and (2) *if you are offered an alternative employment opportunity, would you leave ASM?*

On the first question, most of the miners (more than 90%) indicated that they see ASM as being a long-term employment opportunity. The longevity of ASM was asserted in terms of mineral availability. The miners indicated that there are still sufficient mineral resources that can be exploited by the miners for years to come. This response was linked to the rudimentary nature of ASM which is characterised by low production outputs. For the miners that have worked in ASM for a considerable number of years, the prospects of ASM were supported by their years of experience in ASM. These miners highlighted that having worked in the sector for several years is evidence that there are opportunities to continue to earn a living from ASM activities.

The prospects of ASM were also connected to the ability of the sector's activities to absorb more labour. According to the miners, there is sufficient space to accommodate more people. Some of the miners indicated that large-scale mining operations are closing, and this will create opportunities for communities to enter and work in ASM. The potential of the ASM sector to create more jobs was also linked to opportunities that come with formalisation. Some of the miners remarked that if they are granted mining licenses, many people will be attracted to ASM. The miners believe that the envisaged role of ASM in benefitting communities will be achieved if the sector is formalised.

The long-term prospects of ASM were also interpreted in terms of the ability of the sector to benefit families and communities. Some of the miners see the sector as a generational activity that will continue to support them, their children, and grandchildren. It was also raised that communities depend on ASM and in the absence of employment opportunities, ASM will continue to be the primary source of livelihood for many people. The reality of the lack of jobs was raised by several miners who

indicated that they see nothing outside of ASM and explicitly stated that they will die in ASM. The few miners that perceive ASM as a short-term employment opportunity explained this in terms of the income that they are generating stating that it is only enough to put bread on the table.

On the second question, again, most of the miners (more than 90%) indicated that they will not leave ASM even when offered an alternative employment opportunity. Amongst the many reasons given was that ASM is a better occupation compared to previous employment because they generate more money and the money comes frequently. This was a response from one of the miners, Thabang:

No, I won't. As I said, there is a lot of money that you will not get from working for someone else. Your boss will make you work from the 1st to 31st and give you 7000, that money you can make within 2 to 3 days, so I will not leave mining (Thabang, interview, 12 July 2020).

Given the experiences of some of the miners that were retrenched and the prevailing economic challenges, some of the miners indicated that they will not leave ASM because of the nature of the jobs that are available. They indicated that there is no job security. The miners indicated that available jobs are temporary work that can end any time. The choice to settle in ASM is influenced by the fact that no one can retrench them. This was shared by Joseph:

I see it as a long-term job, it will not end. I will leave this job when I die because no one hired me. I came here myself, so no one can retrench me (Joseph, interview, 23 July 2020).

The above view resonated with several miners. While others believe that there are *some* job opportunities outside of ASM, others indicated that they will not be able to find any employment. The decision to stay in ASM is also tied to the benefits of self-employment. The freedom associated with ASM, and control over production and revenue were raised by several miners. This was a response from Jonas:

I am happy at the mine, that is where I know my work, I am able to make an income. I don't want to work for someone else, I mine coal, I sell it to people. I am able to buy things from the income here. I have deposited a wardrobe, I am going to pay for it soon (Jonas, interview, 20 July 2020).

The ability to provide for family and meet their needs was also given as a reason for settling in ASM. The miners indicated that they are content because they can provide for their families. The opportunities that ASM provides in terms of skills transfer also came out in the responses. Some of the miners indicated that they have gained skills and knowledge. In addition, ASM provides guaranteed earnings in that what you work for, is what you receive. Linked to skills, some of the miners shared that they will not leave ASM because it is the only trade that they know. This is what Francis said:

No, I won't because I never taught myself any work, I have never worked for any white person. I have been working for myself as a zama-zama. I make enough money that I am comfortable with (Francis, interview, 15 July 2020).

The culture and/or established relationships at the ASM sites were also highlighted. The miners shared that they enjoy working in ASM because of the unity amongst the miners and the relationships which hinges on the spirit of working together. *Lastly*, the decision to stay in ASM, for some miners, is about their aspirations to have a better life that they believe that ASM can enable them to achieve their dreams.

A few miners were on the other side of the scale indicating that they will leave ASM if an alternative opportunity presents itself. The reasons provided included health and safety concerns with ASM activities taking place underground. One miner, Donald said:

I will leave this work because of safety underground, it is not adhered to. If it was adhered to, I would not leave this work because as I said, it has the potential to benefit our grandchildren (Donald, interview, 20 July 2020).

Another miner also raised the issue of health and safety specifically in terms of the murders seen in underground gold mining. The miner, Robert shared:

Yes, I will leave zama-zama because of the guns and people killing each other. I enjoy the work, but I am scared (Robert, interview, 15 July 2020).

In line with the premise of the “illusion of ASM”, as highlighted above, one miner indicated that they would leave ASM because there are no benefits and that it is a gamble. The other perspective was provided by David, who indicated that:

Yes, I would. However, if I work for myself, if I get a certificate to be a sub-contractor but not to work for someone as an owner, no (David, interview, 22 July 2020).

Having worked as a bricklayer in the construction sector, David will only leave ASM if he is given the opportunity to work in the formal sector as a sub-contractor. The condition attached to moving out of ASM was picked up from those who are not sure if they will leave or not. All of them indicated that the decision to leave ASM will depend on the remuneration that is being offered and if it will be sufficient to provide for the family the way ASM is able to. These were the remarks from one of the miners, Josias:

It will depend on the type of work, if it pays enough so I can be able to support my family, then I will leave and take the job (Josias, interview, 21 July 2020).

While most of the miners entered the ASM sector because of desperation for jobs and economic hardships, their choice to stay in ASM is influenced by a myriad of factors over and above the ability to earn an income. These factors will have to be taken into consideration when devising alternative livelihood programmes. Globally, these have been implemented as countermeasures to manage the proliferation of ASM activities. While there are case studies where people moved from ASM, the view from those working in the sector is that there is inadequate evidence supporting the viability of alternative livelihood projects. According to Tschakert (2009), concerns regarding the viability of alternative projects have been raised in view of the attractiveness (or lack thereof) of the projects, lucrativeness compared to ASM, and set of requirements such as land, start-up capital, certain levels of education and skills.

8.6. Chapter summary

The overarching goal of the Chapter was to establish a link between ASM and what is happening in the country as a foundation for marking the potential role of the sector in the country's development priorities. This goal comprised of two objectives, the first being to provide an understanding of the factors that underpin participation and growth of the ASM sector. The second objective involved obtaining insights into the prospects of the sector to ascertain the possible trajectory to be followed by the sector.

The key finding from the study was that poverty, unemployment, and inequality in the country are the main drivers of ASM activities. The performance of economic sectors (i.e., not only the mining industry) and associated conditions were also revealed as contributing to the expansion of the ASM sector. As a livelihood strategy, participation

in ASM has also been linked to its characteristics which are drawing people and also keeping them in the sector. The Chapter also revealed that ASM is considered to be a long-term employment opportunity. With most of the miners indicating that they will not leave the sector, there is a need to explore ways in which the sector's activities can be supported. In concluding the Chapter, the drivers and prospects of the sector tie its activities to the socio-economic landscape of the country.

CHAPTER 9: ASSESSING THE ROLE OF THE ASM SECTOR IN THE COUNTRY'S DEVELOPMENT PRIORITIES

9.1. Introduction

A holistic understanding of the role of ASM in socioeconomic development remains a grey area. Several scholars have attributed this to the skewed focus on the negative impacts of the sector's activities as opposed to a balanced assessment that considers both the positive and negative impacts of the sector in order to derive a *particular* conclusion on where ASM lies in the broader development agendas. This Chapter aims to ascertain the role of the sector in addressing the socio-economic hardships in the country. The Chapter comes at the back of the question, *does ASM have the potential to contribute to poverty alleviation and the broader socio-economic development priorities in the country?*

In responding to these questions, the Chapter provides an assessment of the impact of the sector at three levels. *Firstly*, the Chapter looks at the impacts of ASM on the miners. This is underpinned by the question of whether the sector's activities have improved the lives of the miners or not. This assessment is situated within the debates on the role of ASM in poverty alleviation. The Chapter employs poverty indicators used to measure the extent of poverty amongst the population to determine the impact of ASM on the miners. The *second* part of the assessment turns attention to the role of ASM at a community level. In this section, the Chapter provides the perspectives of community members on the impacts of ASM in communities. The *last* part of the assessment discusses the impacts of ASM against the country's development agenda.

9.2. Impacts of ASM on the miners

9.2.1. Background on poverty measures

The impact of ASM on the miners is assessed through measurements of poverty to determine if engagement in the sector has improved their lives or not, and where the miners lie in terms of poverty benchmarks. While poverty is a universal phenomenon, a repeating statement found in literature is that the concept has a cluster of meanings that influence measurements and resulting in population stratification. The dominant view amongst scholars is that poverty is multidimensional and hence its meanings are tied to the different conceptualisations of *what* it means to be poor (See Kwadzo, 2015; Hagenaars and de Vos, 1988; Nyasulu, 2010). To this end, Nyasulu (2010) identified a myriad of definitions of poverty ranging from statistical and income-based definitions to political and social definitions.

At the basic level, poverty is defined as material lack in relation to human survival. MacPherson and Silburn (1998) characterised poor populations as those that are unable to feed and clothe themselves and risk death as a consequence. Along the same category of definitions, the Studies in Poverty and Inequality Institute (SPII) (2013) described poverty as the lack of resources needed for survival. Poverty is also defined as circumstances where persons, families, and groups of persons whose resources (i.e., material, social and cultural) are limited to meet the minimum acceptable standard of living (Maxwell, 1999; Dvorak, 2015). Another definition of poverty relates to the lack of resources that are required for full participation in society. From this range of definitions, poverty can be characterised as a continuum moving from “*making ends meet*” to “*affording minimum standard of living*” to “*full participation in society*” (SPII, 2013).

Four conceptualisations underpinning the characterisation of poverty were found in literature and these are absolute poverty, relative poverty, capability approach, and participatory approach. Most of the definitions of poverty are linked to the notions of absolute and relative poverty. Absolute poverty relates to material lack as a barrier to a minimum standard of living. Williamson and Reutter (1999) described absolute poverty as the deprivation of economic resources that are required to meet basic needs (i.e., such as food, shelter, and clothing). This definition aligns with the earliest interpretation provided by Rowntree (1901) where absolute poverty denoted households whose total earnings are inadequate to afford minimum necessities required for the maintenance of physical efficiency. Relative poverty, on the other hand, defines poverty in relation to a particular context.

For example, relative poverty measures the poverty status of a particular person in relation to others in the same society. According to Williamson and Reutter (1999), relative poverty measures not only include physical well-being but psychological and social well-being as well. Given its spread of measurement, relative poverty is often used as a benchmark for assessing social justice and inequality (SPII, 2013). This is because the measure places poverty at a particular point on the distribution curve, say of income or expenditure of particular population groups. From this, socioeconomic patterns can be established serving as evidence of disparities that may exist in a particular society.

The other two categories of approaches (i.e., capability and participatory approaches) are underpinned by the need to capture other dimensions of poverty that are important to poverty alleviation. These include aspects of education, health, housing, access to services, security, the standard of living, participation, and rights, and others (See

Hagenaars and de Vos, 1988). The capability approach is based on Sen's right-based theory of distribution which defines poverty as the failure of a person to develop capabilities to achieve a certain level of functioning. Based on Sen's theoretical framework, capabilities, and functioning are opportunities that people have (Rod, 2012). These include material access, human capital, social capital, living environment, employment, and health. These factors are important in determining one's poverty status.

The participatory approach, also known as the people-driven approach is based on the premise that people understand their situations better than anyone else. As such, the definition of poverty is devised from the perspectives of people in terms of what they consider to be poor (Laderchi et al, 2003). This approach emanated from a project implemented by the World Bank which aimed to capture "*Voices of the Poor*" as an approach to devising a definition that speaks to the realities on the ground.

Given the spread of the characterisation of poverty, there is a wide range of indicators that have been developed to measure the different dimensions of poverty. The commonly used indicators are poverty lines which measure poverty in terms of particular thresholds. Poverty lines are *usually* devised from consumption, expenditure, or income levels that are sufficient to meet basic needs (Greeley, 1994). Absolute poverty lines are often linked to a particular income level (i.e., an example is the international poverty line of USD1.9 per day used to denote a fixed income level required to afford a minimum standard of living). Relative poverty lines, on the other hand, provides cut-offs in welfare distribution curves (Statistics South Africa, 2008).

In addition to monetary benchmarks, various composite indices exist that consider the other dimensions of poverty. These include education, health, housing, water and

sanitation, access to services and other aspects collated through expert knowledge and/or the public experiences. An example of a composite index is the United Nations Human Development Index which measures poverty according to aspects of health, education, and standard of living. There is also the Physical Quality of Life Index that measures poverty as well-being assessed in terms of education and health. The other poverty indicators that countries employ are benefit-sharing measures which determine poverty levels based on the number of people that are part of social security programmes (MacPherson and Silburn, 1998). While social security programmes are primary interventions aimed at alleviation of poverty, various countries use the number of beneficiaries as a proxy to understanding the extent of poverty. Given the multiple layers of poverty, the common practice is to use several indicators to measure poverty levels. The choice of indicators also depends on data availability and the end use of the poverty classification.

South Africa employs a variety of poverty indicators. For the assessment in the Chapter, poverty lines are used. Specifically, the Food Poverty Line (i.e., FPL), Lower Bound Poverty Line (i.e., LBPL), and Upper Bound Poverty Line (i.e., UBPL). As noted, the poverty lines have been constructed from the costs of goods and services required to meet the minimum standard of living. The FPL marks the amount of income that an individual needs to afford basic nutrition estimated at 2,100 calories per day. This amount is R585 (i.e., 2020 prices) per person per month. The LBPL captures the cost of food and non-items such as clothing, shelter, and other essentials. The LBPL amount is R840 per person per month. The UBPL also includes the amount required to cover

both food and non-food items. The value of UBPL is R1, 268 (Statistics South Africa, 2019)⁴⁸.

These poverty lines are normally used as primary inputs to compute various poverty measures such as the poverty headcount index (which provides a share of the population that is living below a specified poverty line) and the poverty gap (which measures the extent of poverty by determining the distance between average income and poverty line). There is also the poverty density which maps the number of poor persons per square kilometre. All these measures are calculated from poverty lines and income and expenditure data.

The other measure of poverty used in the country is the Living Standard Measure (LSM). As described in Chapter 6, the LSM is a multivariate wealth measure based on living standard. The LSM as used in the country was created by the South African Audience Research Foundation (SAARF) in the 1980s (Martins, 2007)⁴⁹. The SAARF LSM uses a criterion that is based on access to services and durables, and geographic locations as determinants of standard of living. The LSM is calculated from a set of 29 variables. The resulting scores are linked to a scale that classifies the population into 10 LSM groups, with LSM 1 denoting low living standard and LSM 10 depicting high living standard.

Another indicator used to measure poverty level is the social assistance programme. The country uses the number of people that are part of the social grant system as a

⁴⁸ The difference between LBPL and UBPL is that, in the lower category, the income that is available to an individual or household is often insufficient to cover both food and non-food items leading to some of the necessities being sacrificed. In the upper threshold, individuals can afford both food and non-food items needed for a minimum standard of living.

⁴⁹ It was developed to serve as a market segmentation tool to provide structured understanding of the composition and behavioural characteristics of consumer market. The LSM is based on the premise that people have similar behavioural patterns that can be grouped to produce defined clusters of living standards.

measurement of poverty. The underlying premise is that the size of the grant system indicates the inability of the country to provide employment opportunities to those that fall within the working age population (DPME, 2017). There are five types of social grants that are paid by the government, and these include old age pension, disability grant, child support grant, foster child grant, and child dependency grant. The grant system in the country supports about 17 million South Africans. The other elements of the social assistance programme include insurance provisions and the expanded public work programme which aim to reduce the economic hardships associated with poverty and unemployment.

Based on the data that was collected during the research, the Chapter uses three poverty indicators to assess the impact of ASM on the miners. The *first* indicator encompasses three poverty lines (i.e., FPL, LBPL, and UBPL) which are used to determine the poverty patterns in the country. For the Chapter, the poverty lines are used as baselines for analysing the income data collected from the miners. The idea is to establish where most of the miners fall in terms of poverty patterns in the country.

The *second* indicator that is used is the data from the social assistance programme. Again, the income data collected from the miners is compared to social grants. The reason why this is included in the section is because the social grants came out as one of the drivers of ASM (i.e., reasons why people are engaging in ASM activities). Comparing ASM and poverty alleviation programmes will provide insights into where the sector falls in terms of its contribution to socioeconomic development in the country. The *third* indicator that is used is the LSM to determine the relationship between ASM and the living standards of the miners. The last part of the analysis captures the perspectives of the miners on whether ASM has improved their lives or not. These

submissions are included to provide a holistic picture of the impacts of ASM on the lives of the miners.

9.2.2. ASM and socio-economic patterns in the country

This assessment includes measuring the income generated from ASM against the three poverty lines to determine the levels of poverty amongst the miners. In Chapter 7, there was a discussion on the demographics of the miners and how those relate to poverty. Amongst the inferences that were made, were that, based on the demographic profiles of the miners, most of the miners are most vulnerable to poverty and unemployment. This section turns attention to income as a determinant of poverty. The overarching questions underpinning the section are, (1) *how does ASM income measure against national poverty lines*, (2) *where do most of the miners fall in terms of poverty patterns in the country*, and (3) *what has been the impact of ASM on poverty status of the miners?*

To respond to these questions, the assessment employs a combination of poverty indices. These are poverty headcount, poverty gap, and squared poverty gap. The three poverty indicators are part of the Foster-Greer-Thorbecke (FGT) family of poverty metrics used to measure different dimensions of poverty (Foster *et al*, 2010). The poverty headcount measures the percentage of the population whose income is below the specified poverty line. The poverty gap measures the intensity or depth of poverty. It provides the mean distance between income and the poverty line. The squared poverty gap measures poverty severity. It provides the distribution of poverty below the poverty line. According to Statistics South Africa (2017), poverty severity considers both the extent of poverty as well as the inequality amongst the poor. The FGT measure is based on the following formula.

$$P(\alpha) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z-y_i}{z} \right)^\alpha \dots\dots\dots \text{Equation 1}$$

(Source: Foster, *et al*, 2010)

In the formula, P is the poverty measure, n is the population size, q is the number of people that are poor, y_i is the income of the i^{th} person, z is the poverty line, and α is the poverty aversion parameter which varies between 0 and 2, for different poverty dimensions. Based on the FGT formula, the three poverty indicators based on varying poverty constants are calculated as follows:

$$P(0) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z-y_i}{z} \right)^0 = \frac{q}{n} \text{ (Poverty headcount)} \dots\dots\dots \text{Equation 2}$$

$$P(1) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z-y_i}{z} \right)^1 \text{ (Poverty gap)} \dots\dots\dots \text{Equation 3}$$

$$P(2) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z-y_i}{z} \right)^2 \text{ (Squared poverty gap)} \dots\dots\dots \text{Equation 4}$$

The FGT poverty measures are based on the premise that an individual is poor when per capita income is less than the specified poverty line (i.e., $y_i < z$). As such, the two inputs needed to calculate FGT measures are income per capita and poverty lines. Several assumptions were made in order to be able to calculate per capita income of the miners. These are outlined below:

- Given the requirement of monthly incomes, the assessment is based on study locations where miners were able to provide estimates of their monthly incomes. For this reason, Kimberley was excluded because of the volatility and uncertainty of the incomes generated from ASM. During the site visits, the miners found it difficult to provide estimates of monthly income because of the erratic nature of mining, and as a result, the incomes that were provided were

based on the latest sale of diamonds. The data that is presented in the section, covers Carletonville, Ermelo, Prieska, Vlakfontein, and Burgersfort. In these sites, the incomes generated from ASM are relatively stable and can be estimated on a monthly basis.

- Another assumption that had to be made related to household income. Given that most of the miners are breadwinners, the assumption that was made was that the income generated from ASM was the only income that was available to support their families. Based on this assumption, ASM income was treated and equated to household income.
- During the surveys, about 10% of the miners indicated that they had other sources of income in addition to income earned from ASM. This means that, for these miners, their household income will consist of ASM income and income from other sources. For the purpose of the assessment, the miners with other sources of income were excluded because the exact income coming from these sources was not collected. The assessment, therefore, covers only the miners that are solely dependent on ASM.
- The income data as collected during the site surveys were in ranges as opposed to exact amounts. To be able to calculate per capita income, mid-points of the different income categories were taken. For example, those that are earning between R1,000 and R2,000, were assigned an income level of R1,500 which is the mid-point value. For incomes that fall under the last category (i.e., R10,000 and more), the exact amounts were collected. For this group, the average income was calculated and found as R25,000. This amount was therefore assigned to the miners earning R10,000 and more.

- Per capita income is calculated by dividing household income by family size. As such, the number of dependants was used as a proxy of family size. Similarly, to ASM income, the data on the number of dependants was collected in ranges (i.e., between 1 and 3 dependants). To be able to calculate per capita income, average dependants were calculated. For example, the miners falling under the category of between 4 and 6 dependants, were assigned 5 as the average number of dependants.
- After incorporating these assumptions, per capita income was calculated and compared to the three poverty lines. As outlined above, the FPL, LBPL and UBPL are R585, R840 and R1, 268 per person per month (2020 prices) respectively.

Figure 9.1 shows the income distribution of all the sites except Kimberly. The figure shows the estimated monthly incomes from ASM in the various sites⁵⁰. As can be seen in the figure, most of the miners are earning between R1,000 and R2,000 (i.e., 36%) and R2,001 and R5,000 (i.e., 35%). Less than 15% of the miners are earning below R1,000 and also on the upper end, less than 15% are earning more than R5,000.

⁵⁰ Some of the miners were not comfortable with sharing the amount of money that they generate from ASM. The decision to capture income as ranges somewhat addressed this as miners were not comfortable providing exact amounts of income earned from ASM. In interacting with the miners, it was also picked up that some miners underreported the income that was generated from ASM. This was a way of safeguarding oneself. The underestimation of incomes from ASM came out during a workshop where the field data was presented to the miners. Several miners indicated that they earn more than what they reported.

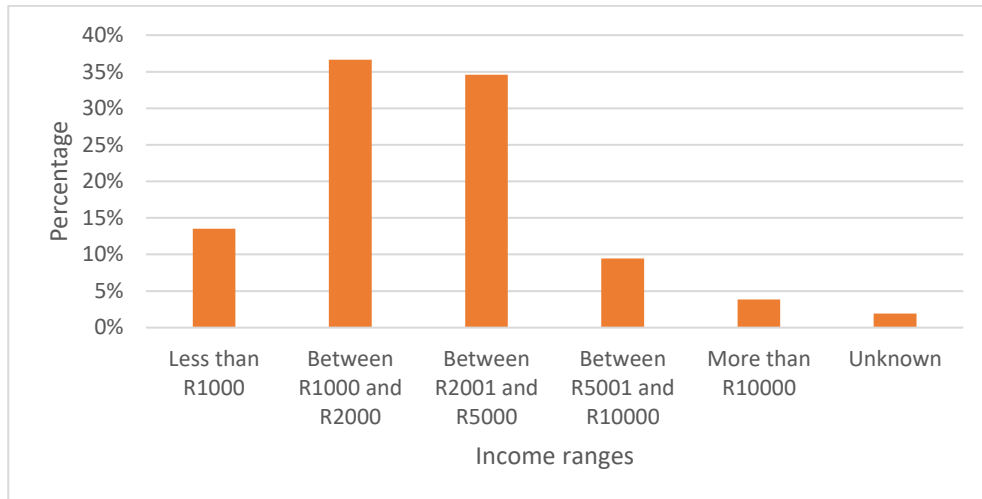


Figure 9:1: Monthly Income distribution of miners for all sites

Figure 9.2 disaggregates the income patterns by study location showing income levels in Carletonville and Ermelo. In the case of Carletonville, the majority of the miners are found in two income categories, namely, between R1,000 and R2,000, as well as R2,001 and R5,000. In Ermelo, most of the miners earn between R2,001 and R5,000 (i.e., 45%). They are followed by those earning between R1,000 and R2,000 (i.e., about 20%) and R5, 001 and R10,000 (i.e., about 10%). In comparing the two sites, it is seen that income levels are higher in coal mining compared to gold mining.

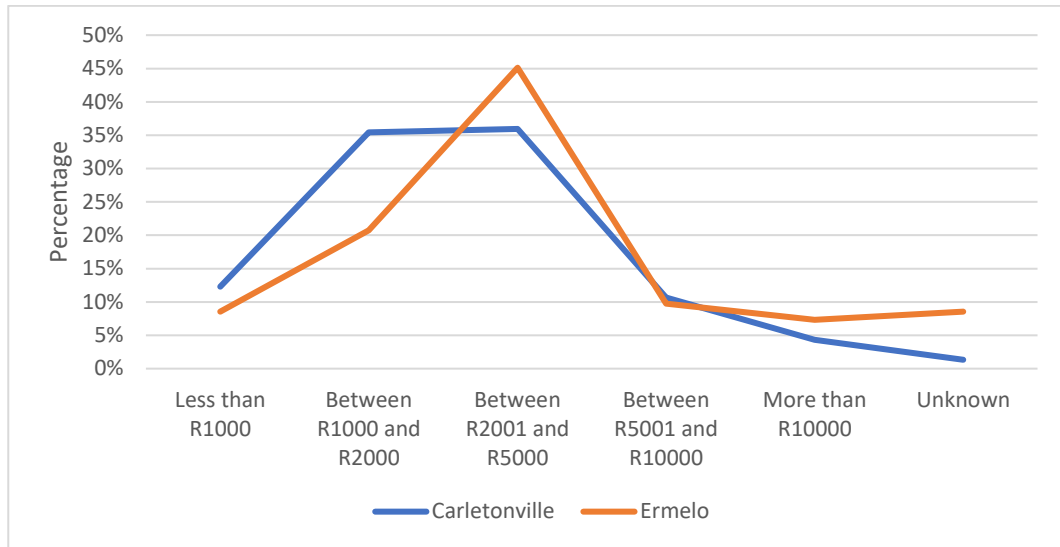


Figure 9:2: Income levels of miners in Carletonville and Ermelo

This can be attributed to several factors but mainly the certainty of production and income. For coal miners, they are guaranteed that what they mine is saleable. The amount of gold that is recovered is affected by several factors. These include the quality of the deposit, type of deposit being worked, level of geological knowledge, as well as methods and equipment used to extract and process the minerals. Some of the gold miners expressed that gold mining was the same as gambling in that the amount of gold recovered differs according to the type of deposit being worked on (i.e., some deposits are easy to work for example alluvial deposits while others require several processing steps, in particular, hard rock deposits).

The certainty of income is also affected by the criminality in the gold mining sector where the miners are at times robbed of their production. Having a picture of the incomes generated in ASM, the following discussion turns the attention to how they measure against the three national poverty lines. Figure 9.3 shows the percentage share of the miners according to the poverty lines.

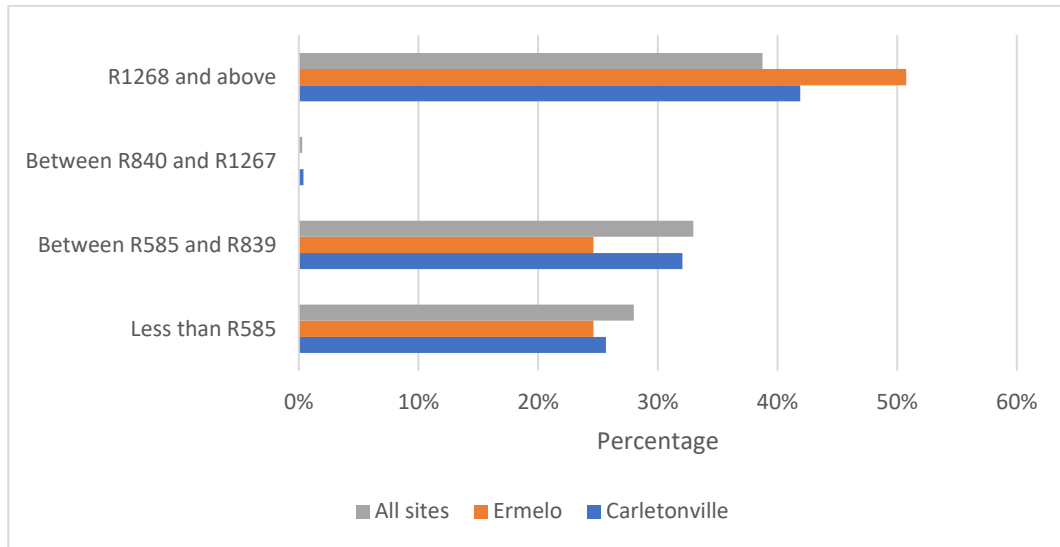


Figure 9:3: Miners' per capita income against national poverty lines

As can be seen in the figure, of the total miners, only 28% are living below the subsistence poverty line (i.e., FPL of R585 per person per month). In Ermelo and Carletonville, 25% and 26% of the miners fall under this category, respectively. This means, 72% of the miners can afford basic necessities from the income generated from ASM activities. Of this percentage, 33% of the miners are below the *second* poverty threshold of R840 per person per month. It is seen that less than 1% of the miners are found between the lower and upper poverty threshold. The rest of the miners, (i.e., which are the majority both at an aggregate level as well as in the individual sites) are found above the UBPL. About 51% of the miners in Ermelo and 42% in Carletonville are above UBPL. These miners can afford food and non-food essentials as per the definitions of UBPL.

While the results presented above provide the poverty status of the miners based on ASM incomes, what would have enhanced the results was ascertaining the level of impact of ASM. This is the shortfall of the assessment because of the limitations of the data that was collected i.e., the per capita income of the miners before engagement in

ASM was not collected and hence the impact analysis cannot be conducted. To compensate for that, the idea is to compare the poverty status of the miners that were employed before ASM was explored. For this group of miners, the incomes from previous employment were collected. Using the same assumptions, the per capita income from previous employment was calculated.

Figure 9.4 compares ASM incomes against income from *previous* employment. As highlighted in Chapter 7, a significant percentage of the miners that were previously employed worked for large-scale mining operations. With that in mind, it is expected that the incomes from previous employment will be higher than in ASM. This is the case looking at figure 9.4. Most of the miners (i.e., 33%) earned between R2, 001 and R5, 000 in their previous employment. This compares to 23% falling under this income category in ASM. Overall, most of the miners that were *previously* employed earned higher than they are in ASM.

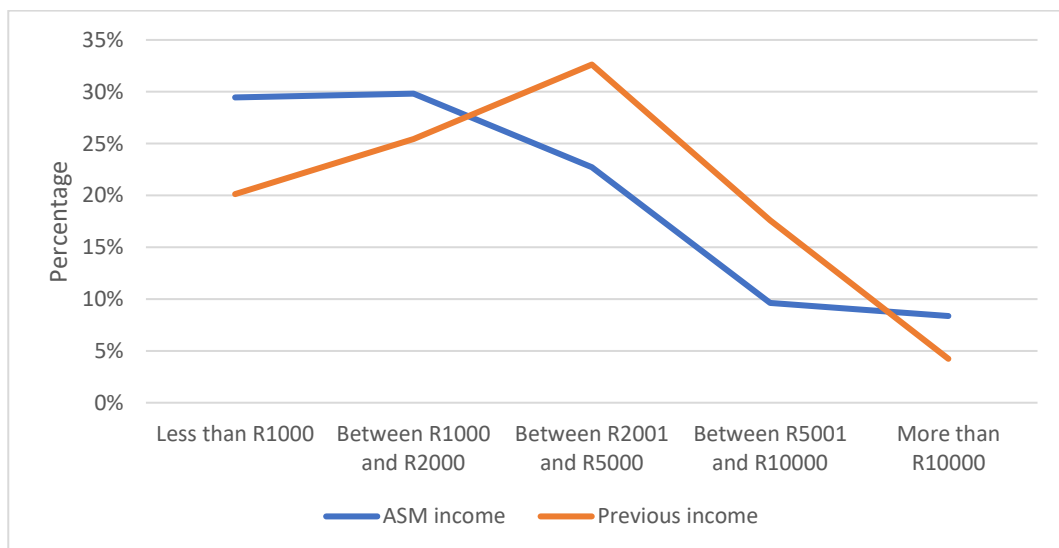


Figure 9:4: ASM incomes against income from previous employment

Figure 9.5 compares ASM incomes and incomes from previous employment against the three poverty lines. In correspondence with the income levels presented above, an

increase in the percentage of miners living below the food poverty line is picked up. This may be because of the decline in income levels moving from working in large-scale mining to ASM. As seen in figure 9.5, before ASM, 65% of the miners were able to afford necessities. After ASM, this percentage is recorded at 58%. In terms of the second poverty line, the percentage of the miners before ASM is 21%, and after ASM is 23%. In this category, a 2% improvement is recorded.

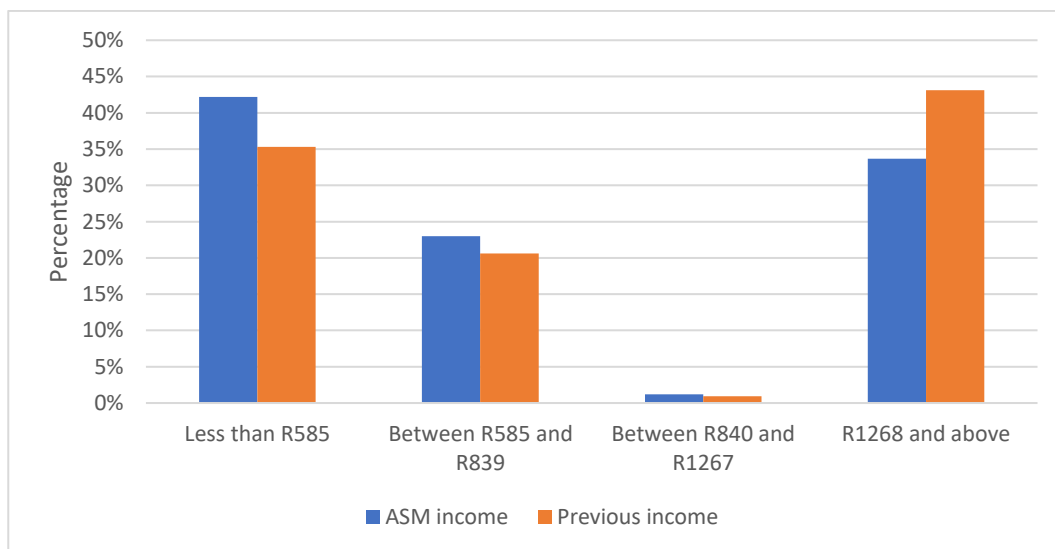


Figure 9:5: Miners' incomes pre-and post-ASM against poverty lines

Based on the UBPL, 43% of the miners fell under this category before ASM, and post-ASM, this figure is 34%. This is a percentage difference of 9%. From the results presented, one can conclude that the miners were better off in their *previous* employment than ASM. While the results support this submission, looking at the differences in the percentage share of the miners in the various categories, the level of regression is not that significant (i.e., it is less than 10%). This means that ASM has been able to maintain the socioeconomic status of most of the miners who were employed and earned higher than their current income in ASM. There are also slight

improvements (i.e., a 2% gain in the category between R585 and R839) in the poverty status of some miners.

Table 9.1 to 9.3 provide a summary of the FGT measures as determined from the per capita income of the miners and the three poverty lines. From the table, at FPL, only 28.01% of the miners are unable to meet basic needs. The lowest percentage of the miners falling under this category is in Ermelo at 24.62%. The poverty gap, which measures the depth of poverty uses a scale from 0 to 100, with 0 denoting no poverty and 100 showing no income. It is expressed as a percentage of the poverty line. From the results, the poverty gap against the FPL is 14.38%. This means that on average, the miners in this category are 14.38% away from the poverty line. This translates to a deficit of R300 per person per month (i.e., this is the amount of income that is needed to pull the miners out of extreme poverty).

Table 9:1: FGT measures at FPL

Category	At poverty line R585		
	Poverty headcount	Poverty gap	Poverty severity
All sites	28,01	14,38	8,21
Carletonville	25,68	12,98	7,23
Ermelo	24,62	10,38	5,50
ASM income (those that were employed)	42,18	26,48	18,07
Previous job income (those that were employed)	35,31	21,33	14,36

The table also provides the squared poverty gap which measures the severity of poverty. As noted by Armstrong and Burger (2009) the squared poverty gap provides both the extent of poverty and inequality amongst the poor. It is also interpreted using a scale of 0 to 100. The higher the value, the more unequal poverty is amongst the poor. As seen

in the table, the poverty severity is 8% for all the sites. In line with the two FGT measures, the lowest poverty severity is recorded in Ermelo at 5.5%.

Table 9.2 shows the FGT measure at LBPL. From the table, about 60% of the miners are found below the LBPL. The poverty gap and poverty severity based on LBPL are 23% and 13%, respectively. Again, the poverty status of the miners in Ermelo compares better than in Carletonville and when looking at aggregated results.

Table 9:2: FGT measures at LBPL

Category	At poverty line R840		
	Poverty headcount	Poverty gap	Poverty severity
All sites	60,96	22,66	13,19
Carletonville	57,72	20,91	11,91
Ermelo	49,23	18,16	9,83
ASM income (those that were employed)	65,17	34,10	24,22
Previous job income (those that were employed)	55,92	28,31	19,62

Table 9.3 provides FGT measures at UBPL. There is a slight difference in the poverty headcount at UBPL and LBPL. However, there are sizeable differences in the poverty gap and poverty severity.

Table 9:3: FGT measures at UBPL

Category	At poverty line R1268		
	Poverty headcount	Poverty gap	Poverty severity
All sites	61,24	35,67	22,89
Carletonville	58,11	33,44	21,18
Ermelo	49,23	28,65	18,05
ASM income (those that were employed)	66,35	44,90	33,39
Previous job income (those that were employed)	56,87	37,88	27,71

The selection of the “*appropriate*” poverty level to classify the population remains an area of debate. Several scholars have raised concerns regarding the monetary value of the FPL stating that it is below the estimated cost of necessities. As such, a more appropriate threshold to mark the levels of poverty in the country is the LBPL. While those submissions are noted, from the results that have been presented, it is seen that the majority of the miners are able to afford basic necessities. Table 9.4 shows the national poverty gap and poverty severity in 2015. As can be seen in the table, the national poverty gap and severity across the three poverty lines are lower than those calculated in ASM. While this is the case, ASM comes above the poverty status of the population residing in rural areas.

Table 9:4: National poverty gap and severity

Poverty line	Poverty gap %			Poverty severity %			ASM %	
	Total	Urban	Rural	Total	Urban	Rural	Poverty gap	Poverty severity
FPL	9.0	4.1	17.7	4.5	1.8	9.1	14.4	8.2
LBPL	16.6	8.9	30.0	9.1	4.4	17.3	22.7	13.2
UBPL	27.7	17.5	45.5	17.0	9.7	29.7	35.7	22.9

Source: DPME *et al*, 2018

In assessing the drivers of ASM (i.e., *Chapter 8*), the inadequacy of social grants came out as a driver of ASM. Several miners indicated that the grants that they receive as part of the government’s social assistance programme were not enough to meet the needs of their families. As a result, they decided to take up ASM to supplement their household income. As a measure of poverty, a quick comparison of ASM income and social grants was done. Table 9.5 shows the amounts paid by the government for the different social grants.

Table 9:5: Social grants paid by government

Type of grants	Amount
Children's grant	R460
Old age grant	R1, 890 – R1, 910
Care dependency grant	R1, 860
Foster child grant	R1, 050
Disability grant	R1, 890
Grant in aid	R460
Unemployment grant	R350

Source: South African Social Security Agency, 2021

As seen in the table, the highest grant paid is the old age grant at R1, 910 per month. While the income of some of the miners (as shown above), compares closely to the amounts received from social grants, the income generated by some of the miners is higher than social grants. In this regard, ASM has the potential to supplement incomes (i.e., social grants in this instances) and to ensure that households have adequate incomes to afford basic necessities and other essentials needed to improve the standards of living of the miners. Figure 9.6 shows the spending patterns of the miners.

From the figure, it is seen that most of the ASM income goes to necessities. This is followed by children's education (i.e., 63%). Of the total miners, 47% of the miners send money home to support their families, and 37% of the miners direct some of the ASM income to personal savings⁵¹. About 29% of the miners indicated that they also pay for accommodation.

⁵¹ From the individual interviews, most of the miners working in Ermelo and Carletonville, when asked how they managed to survive during the COVID19 national lockdown, they indicated that they had put away savings from the income that they earn from ASM. Some of the miners indicated that, the income from ASM is sufficient to provide for their families and also put aside towards savings. This was not the case in Kimberley where most of the miners that were interviewed indicated that they did not have any savings. Most of the miners indicated that they depended on unemployment grant that the government introduced to lessen the impacts of Covid-19. The government has been paying R350 to the qualifying South African per month.

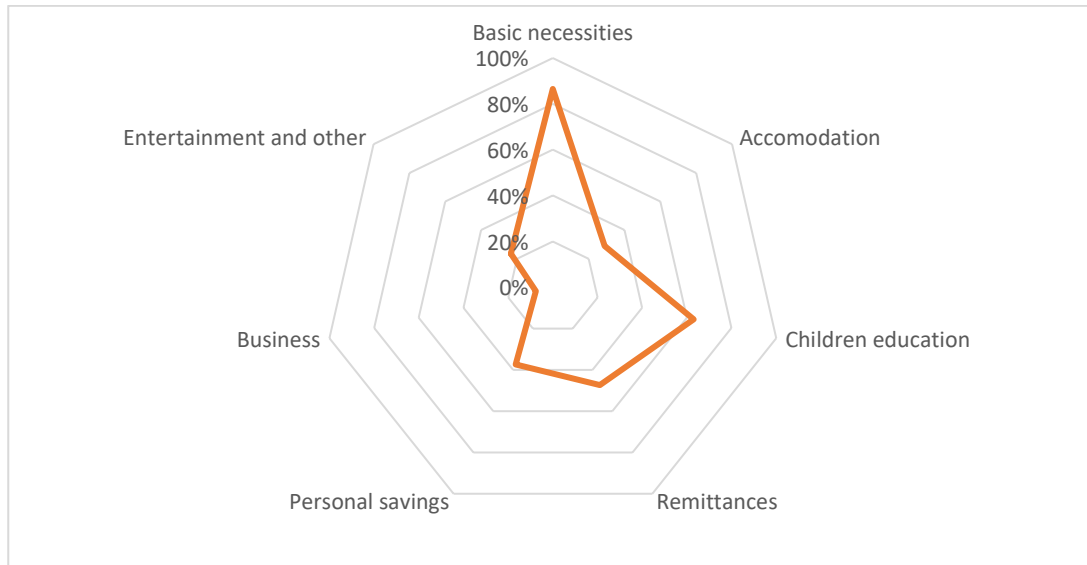


Figure 9:6: Spending patterns of the miners

With the limitations of the poverty impact analysis noted, the next poverty metric used to assess the impact of ASM on the miners is the living standard measure. As noted above, the living standard is a multivariate wealth measure that classifies the population according to different clusters of living standards.

9.2.3. LSM as a measure of poverty

LSM methodology and statistical measures

Table 9.6 provides the list of variables used to determine the LSM. Each variable is assigned a weighting depending on its significance as a determinant of living standards. The weighting is either positive or negative depending on the established relationship with living standards (Martin, 2002). SAARF provides a “*Do-It-Yourself LSM*” framework that provides a step-by-step guide to calculating the LSM (See SAARF, 2010). This was used to collect the data and populate the LSM data set. The collection of data was straightforward with respondents required to provide a yes or no answer. From collecting the data, individual responses were populated into an Excel spreadsheet

and the LSM score was calculated for each respondent. SAARF has a built-in LSM calculator⁵². This was used to validate the calculations in the Excel spreadsheet.

Table 9:6: SAARF LSM variables and assigned weightings

No.	Do you own the following at home?	Weighting, if yes
1	Hot running water from geyser	0,185224
2	Computer -desktop or laptop	0,311118
3	Electric stove	0,16322
4	No Domestic worker or helper or gardener	-0,301327
5	0 or 1 radio set	-0,245001
6	Flushing toilet in or outside the house	0,113306
7	Motor vehicle	0,16731
8	Washing machine	0,149009
9	Refrigerator (with freezer)	0,134133
10	Vacuum cleaner	0,164736
11	Pay TV (DSTV/Top TV)	0,12736
12	Dishwashing machine	0,212562
13	3 or more cellphone	0,184676
14	2 cellphones	0,124007
15	Home security service	0,151623
16	Deep freezer	0,116673
17	Microwave oven	0,126409
18	Do you live in a non-urban area?	-0,129361
19	House/cluster house/townhouse	0,113907
20	DVD player/Blu ray player	0,09607
21	Tumble dryer	0,166056
22	Home theatre system	0,096072
23	Home telephone (landline)	0,104531
24	Swimming pool	0,166031
25	Tap water in the house/yard	0,123015
26	Built-in kitchen sink	0,132822
27	TV set	0,120814
28	Air conditioner	0,178044
29	Do you stay in a metropolitan area? (Population of more than 250000)	0,079321

Source: SAARF, 2010

⁵² See website: <https://www.eighty20.co.za/lsm-calculator/>. [Accessed 08 April 2021].

Table 9.7 shows the range of scores assigned to the different LSM groups. The final LSM classification is based on these scores. There are 10 LSM groups, with LSM 1 at the bottom and LSM 10 at the top. The standard of living increases as one moves from LSM 1 to LSM 10.

Table 9:7: LSM categories and scale ranges

LSM category	Bounds
LSM 1	Less than -1.39014
LSM 2	Between -1.390140 to -1.242001
LSM 3	Between -1.242000 to -1.011801
LSM 4	Between -1.011800 to -0.691001
LSM 5	Between -0.691000 to -0.278001
LSM 6	Between -0.278000 to 0.381999
LSM 7	Between 0.382000 to 0.800999
LSM 8	Between 0.801000 to 1.168999
LSM 9	Between 1.169000 to 1.744999
LSM 10	More than 1.744999

Source: SAARF, 2010

The LSM data set comprises of two scores measuring the living standards of the miners prior to engaging in ASM (i.e., referred to herein as ASM before) and during participation in ASM (i.e., referred herein as ASM after). The difference between the two scores is the focus of the analysis as it provides a base for responding to the question of whether ASM has improved the lives of the miners or not.

To assess the change in living standards, various statistical measures were used to analyse the LSM data set. These included: descriptive statistics, weighted average difference, Mahalanobis Distance Measure, and Population Stability Index. The choice of statistical measures was based primarily on the ease of use and interpretation, as well as the ability to perform the calculations manually using an Excel spreadsheet. The

different statistical measures were also selected because of their reliability and wide application in comparing two data sets and *associated* distributions. A brief description of the measures is provided below.

Description statistics are *normally* used to provide the general characteristics of the data set. They provide a simple way of summarising the key features of the data set or variables under study. The following categories of descriptive statistics were used to analyse the LSM data set; measures of frequency (i.e., percentages), measures of central tendency (i.e., mean, median and mode), and measures of dispersion (i.e., standard deviation). By comparing the LSM before and LSM after, descriptive statistics provide point estimates that tell one if there is a change in living standards or not. The measures also provide the direction of the change, if the change is positive or negative. In the context of the study, a positive output denotes an improvement in LSM, while negative result shows a regression in living standards. Descriptive statistics can also be used to assess the extent and variability of the change in LSM.

Weighted average (W) is defined as the average where each observed value has a weight assigned to it. Calculated from two data inputs, the weighted average is the sum of individual values multiplied by their assigned weights divided by the sum of the weight. This is represented by the formula below, where n is the total number of data points to be averaged, i is the specific data point, X_i is the value to be averaged and w_i is the weighting of each data point.

$$W = \frac{\sum_{i=1}^n w_i X_i}{\sum_{i=1}^n w_i} \dots \dots \dots \text{Equation 5}$$

The weighted average difference also formed part of the analysis. Based on the formula above, the LSM weighted average difference was calculated from the change in LSM

(i.e., ranging between -9 and +9) multiplied by the percentage share of each change divide by total percentage. The individual averages were added together to obtain the final weighted average difference which represented the overall LSM change. The interpretation of the weighted difference average is the same in descriptive statistics where positive and negative values indicate improvement and regression, respectively. The extent or amount of the change is given by the size of the LSM value, where higher values indicate significant change and *vice versa*.

Mahalanobis Distance is another measure that was used to assess change in LSM. Statistical distances are popularly used to quantify distances between two statistical objects, which can be two random variables, probability distributions, sample points, wider sample data, and other data sets (du Pisanie and Visagie, 2020). There are different types of distance measures that are applied in multivariate statistics. Amongst them is the Mahalanobis Distance (MD) which is used to quantify the distance between two data sets. The MD finds use in many applications, with primary use identified in areas such as clustering, classification of data, outlier detection, pattern analysis, and others (Ghorbani, 2019). The MD measure is found by calculating the distance between a point and the centre of a distribution considering the variation in the distribution (Venturini and García, 2015). The MD is calculated from the means and variances of two data sets, using the following formula:

$$MD = \frac{\mu_2 - \mu_1}{\sigma} \dots \dots \dots \text{Equation 6}$$

In the formula, μ is the mean of the first and second data sets, and σ is the pooled standard deviation of the two distributions. The Pooled standard deviation is calculated from the formula below; n_A is the number of points in the first data set and n_B is the number of points in the second data set, and N is the sum of points in the two data sets

(i.e., $n_A + n_B$). The respective standard deviation is represented by σ for the *specified* data sets.

$$\sigma = \left(\frac{n_A \sigma_A^2 + n_B \sigma_B^2}{N} \right)^{1/2} \dots \dots \dots \text{Equation 7}$$

In relating the formula to the two LSM data sets, the *first* data set represents the LSM before, and the *second* data set is LSM after. The MD was calculated from the mean difference of LSM before and LSM after divided by the combined standard deviation. With the resultant MD representing the distance between the LSM before and LSM after distributions, a lower MD value means that the distributions are closer to each other. The higher the MD, the further the distributions are from each other. There are no benchmarks assigned to the interpretation of the MD, however, as a rule of thumb, an MD of less than 1 shows that the distributions are closer to each other. The higher the MD becomes, the wider the distance between the distributions. Against this description, MD is used to assess the extent of the LSM change.

The *final* measure that was used in the analysis is the **Population Stability Index (PSI)**. The PSI is a statistical measure used to measure how the population or a particular variable has shifted over time. It is widely used in the banking sector to monitor the stability and applicability of statistical models. According to Yurdakul (2018), the PSI is *commonly* applied to scorecard distributions where is it used to monitor variations between the current population and the defined/base population used during model development. It is used to establish if there is a discrepancy between the current distribution and base distribution. It is calculated using the formula below:

$$PSI = \sum_{i=1}^B (y_c - y_b) \ln \left(\frac{y_c}{y_b} \right) \dots \dots \dots \text{Equation 8}$$

In the formula, B is the sample categories, y_c represents the scores from the current population and y_b represents the scores from the base population. The PSI for the study is therefore the difference between LSM before and LSM after multiplied by the natural logarithm of the ratio between LSM after and LSM before. The final calculation provides a PSI value, which tells one if the base population/distribution has changed or stayed the same. The advantage offered by PSI is that it provides benchmarks for interpreting the results.

A PSI that is less than 0.10 means that the population has remained the same. A PSI that is between 0.10 and 0.25 denotes a moderate shift in the population. A PSI that is greater than 0.25 indicates that there is a significant change in the population (du Pisanie and Visagie, 2020). In model development, a PSI that is greater than 0.25 warrants the model invalid because the change is considered to be big. There are currently no other benchmarks outside of the banking sector that are used to interpret population change using the PSI. For the LSM data, the PSI that is above 0.25 is taken as significant change. The higher the PSI, the higher the change across LSM groups.

In summary, the choice to use several statistical measures, was *first* to be able to respond to the three base questions underpinning the analysis, which are to determine if the living standards of the miners have changed or stayed the same, to establish if the living standards have improved or regressed (i.e., the direction of the change), and to quantify the level and/or amount of change in the living standards. As the *second* objective, the application of various measures presents a way of cross-checking the results and the trends that are coming out.

LSM trends and findings

The results are structured as follows; *first*, the aggregated LSM trends (i.e., all sites) are presented, followed by the trends from the individual study sites (i.e., Carletonville, Kimberley, and Ermelo), and *lastly*, LSM trends across various demographic characteristics. A summary of the statistical measures referred to in the section is provided in Appendix B.

Figure 9.7 shows the LSM distribution before and after engagement in ASM. From the figure, it is seen that the majority of the miners (38%) were in LSM 3 before working in ASM. This is followed by miners in LSM 4 accounting for 23% of the total miners. Looking at the LSM after trend, most miners are concentrated in LSM 6 and LSM 5. The percentage shares of the two LSM categories are 28% and 21%, respectively.

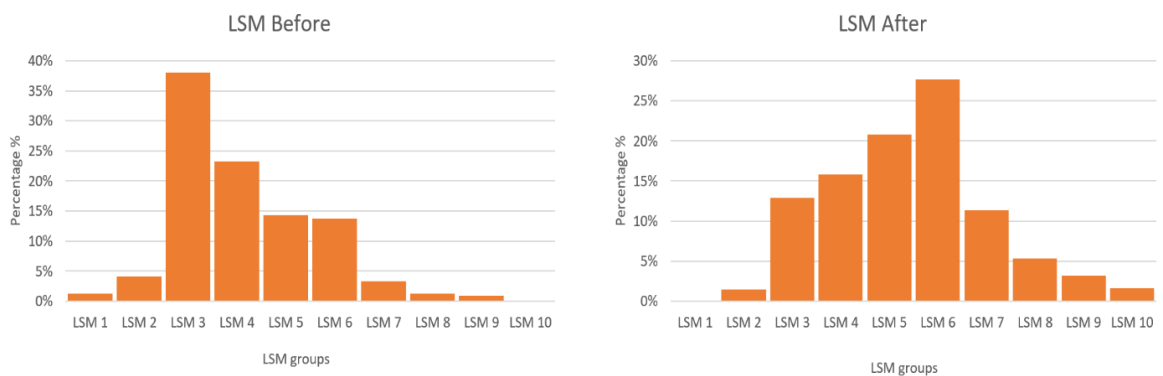


Figure 9.7: LSM distributions showing before and after ASM (aggregated)

Figure 9.8 combines the two LSM distributions. As seen in the figure, the LSM after distribution is *more* to the right compared to the LSM before trend showing an improvement in the living standards of the miners. The highest percentage increase is recorded in LSM 6 moving from 14% to 28%. There are also noticeable percentage increases in upper LSM categories (i.e., LSM 7 to 10). On the other end, the highest

percentage decline is in LSM 3 from 38% to 13%. The percentage of miners in LSM 1, 2, and 4 also declined.

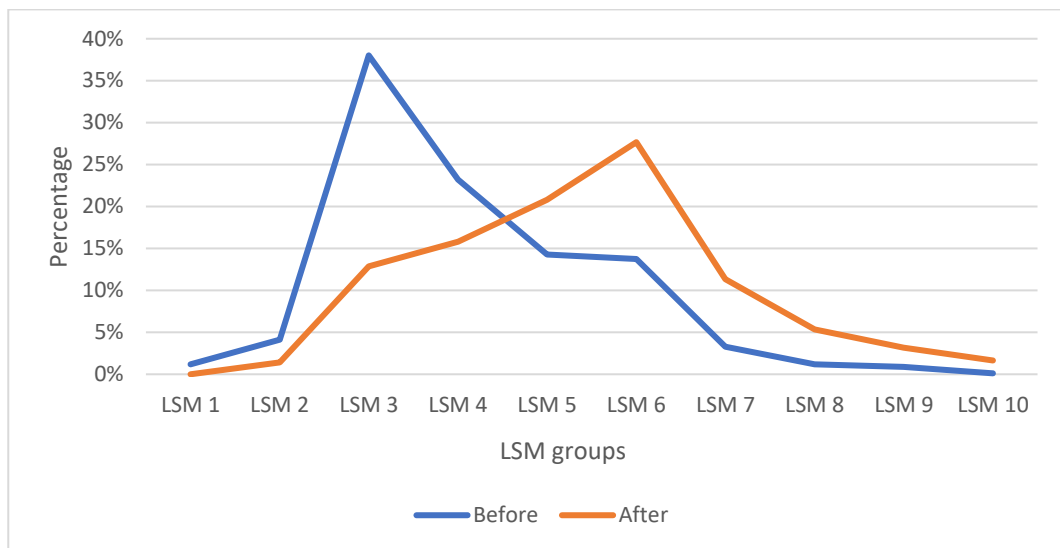


Figure 9:8: Combined LSM distributions (Aggregated)

Figure 9.9 provides the attained LSM changes and percentage share. The figure shows that the living standards of most of the miners (i.e., 56%) changed positively (i.e., this was found by adding the percentage score of LSM change from 1 onwards). About 17% of the miners moved one LSM up, 16% moved two LSMs up and 12% moved 3 LSMs up. The figure also shows that the living standard of 37% of the miners did not change. About 5% of the miners regressed with LSM change being negative.

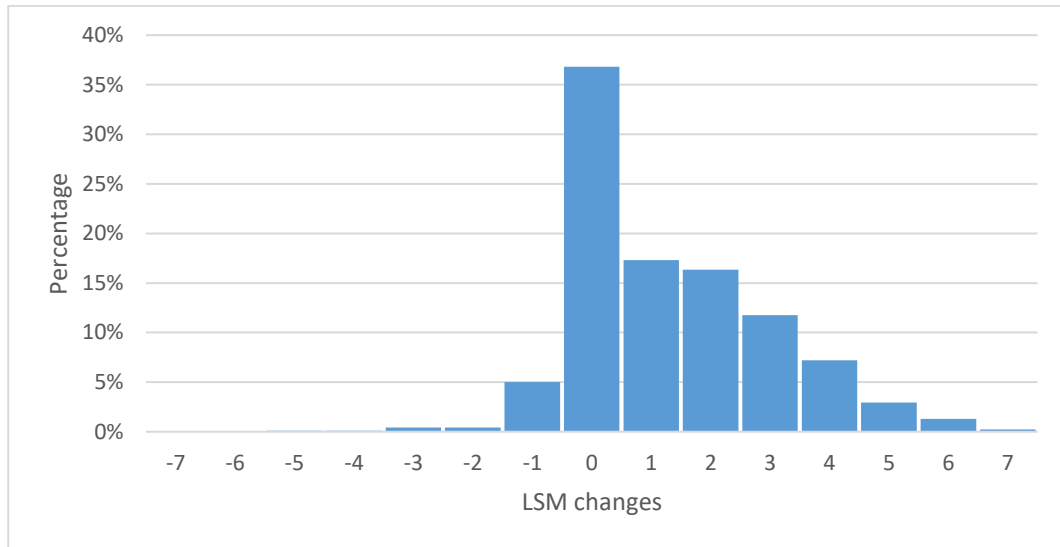


Figure 9:9: LSM changes and percentage shares (Aggregated)

The statistical measures support the LSM trends as presented. The MD between the LSM before and LSM after distribution is 1.052 (which is >1) and the PSI is 0.826 (which is >0.25) showing that there was a significant change in LSM. The positive change in living standards is also seen in the difference in the means of 1.270. The weighted average difference was found to be 1.3. This means that on average, the living standards of the miners improved by 1.3 (i.e., between 1 and 2 LSMs).

Moving to the individual sites, figure 9.10 shows the LSM distributions in Carletonville. As can be seen in the figure, the LSM trends are *somewhat* similar to the aggregated LSM patterns. Most of the miners (46%) fell under LSM 3 before working in ASM. There was also a considerable percentage (24%) in LSM 4. Moving to the LSM after trend, the majority of the miners (25%) are found sitting in LSM 6. The percentage of the miners in LSM 5 also increased from 12% to 18%. There are also noticeable increases in the size of LSM groups at the upper end of the LSM continuum.

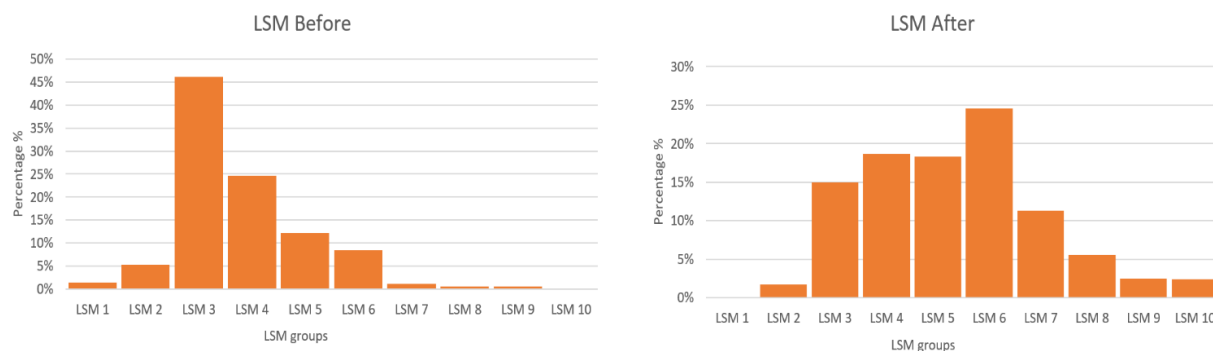


Figure 9:10: LSM distributions showing before and after ASM (Carletonville)

The combined LSM distributions for Carletonville are shown in figure 9.11. A shift to the right of the LSM continuum and a flattening of the LSM trend are visible from the figure. These are due to the percentage decline in lower LSM groups and increases in the upper LSM groups. A significant drop is seen in LSM 3 moving from 45% to 15%. This is accompanied by a considerable gain in LSM 6 moving from 8% to 25%. Beyond LSM 6, there are also noticeable improvements in living standards.

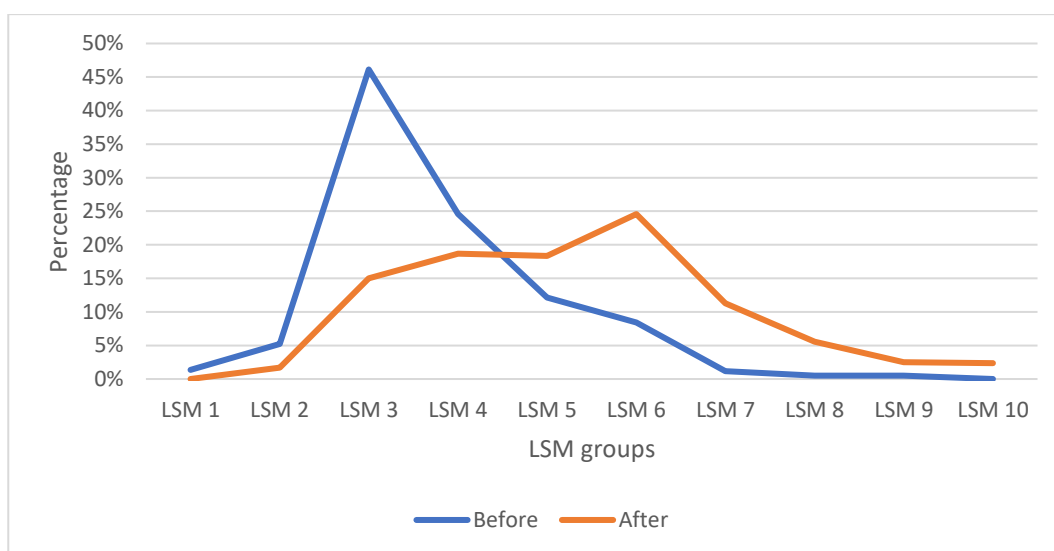


Figure 9:11: Combined LSM distributions (Carletonville)

Figure 9.12 illustrates the attained changes in LSM. From the figure, it is seen that the living standards of the majority of the miners (i.e., 63%) changed positively, while 31%

of the miners did not see any change. About 16% of the miners moved one LSM up, 17% moved two LSMs up and 14% of the miners moved three LSMs up. The percentage of the miners that regressed is about 5%.

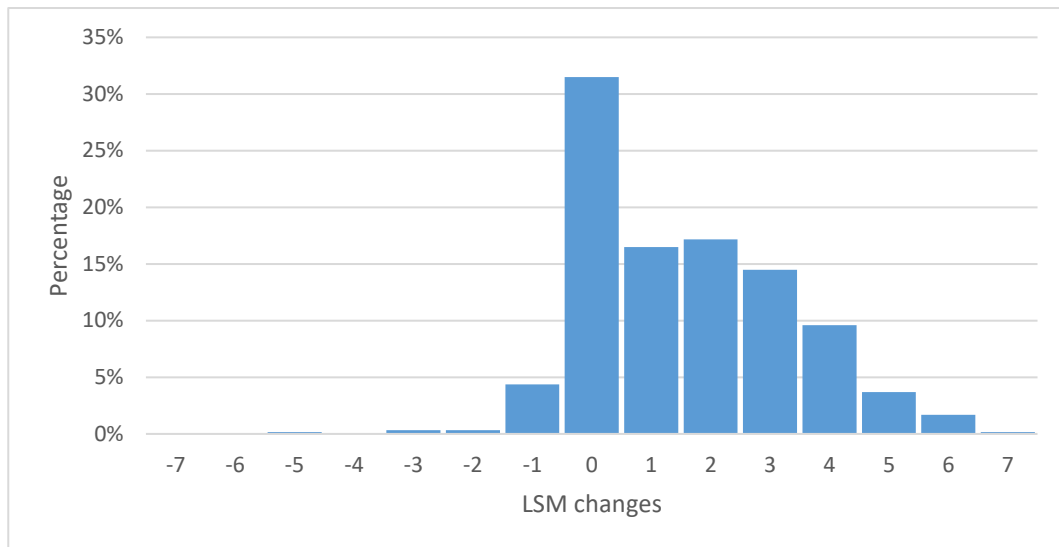


Figure 9:12: LSM differences and percentage shares (Carletonville)

The change in the living standards of the miners in Carletonville compares higher to the aggregated results. The MD between the LSM distributions is 1.371 (this compares to 1.052 for aggregated results). The PSI is 1.438 (i.e., compares to 0.826 for aggregated results). The amount of change is also higher with the living standards improving by 1.5. The difference in the median is 2 with the mid-point of the distribution moving from LSM 3 to LSM 5. The mode moved from LSM 3 to LSM 6.

Figure 9.13 shows the LSM before and after for Kimberley. The two LSM trends appear to be similar with little changes in the living standards. From the figure, it is seen that the living standards of miners in Kimberley before working in ASM were higher compared to the miners in Carletonville. This may be because most of them were employed before moving into ASM. The majority of the miners were located in LSM 6

(35%) and LSM 5 (22%) before engaging in ASM. Moving to the LSM after trend most of the miners remained in LSM 6 (35%) and LSM 5 (22%).

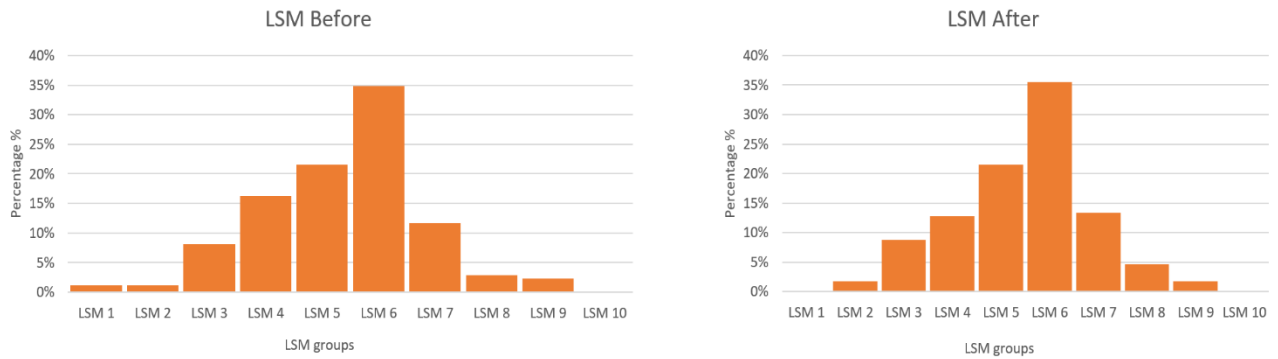


Figure 9:13: LSM distributions showing before and after ASM (Kimberley)

Figure 9.14 brings together the two distributions. As noticed, there are little changes in the LSM (i.e., see LSM 4, 7, 8). Overall, the living standards of the majority of the miners working in Kimberley have remained the same.

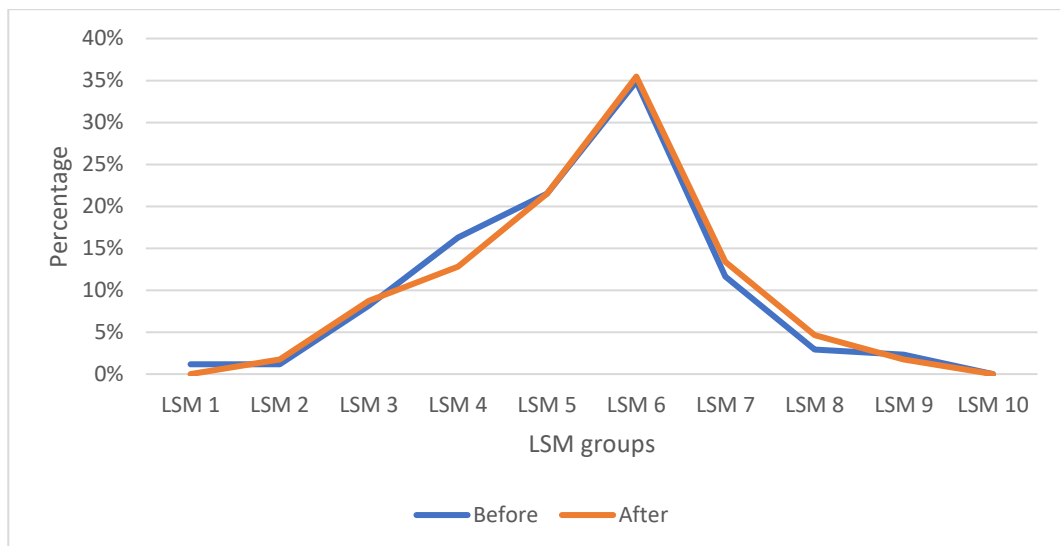


Figure 9:14: Combined LSM distributions (Kimberley)

Figure 9.15 shows the actual changes in LSM. In line with the above trends, it is seen that the living standards of the majority of the miners (i.e., 73%) did not change. Less

than 20% of the miners experienced an improvement in their living standards, and about 10% of the miners regressed.

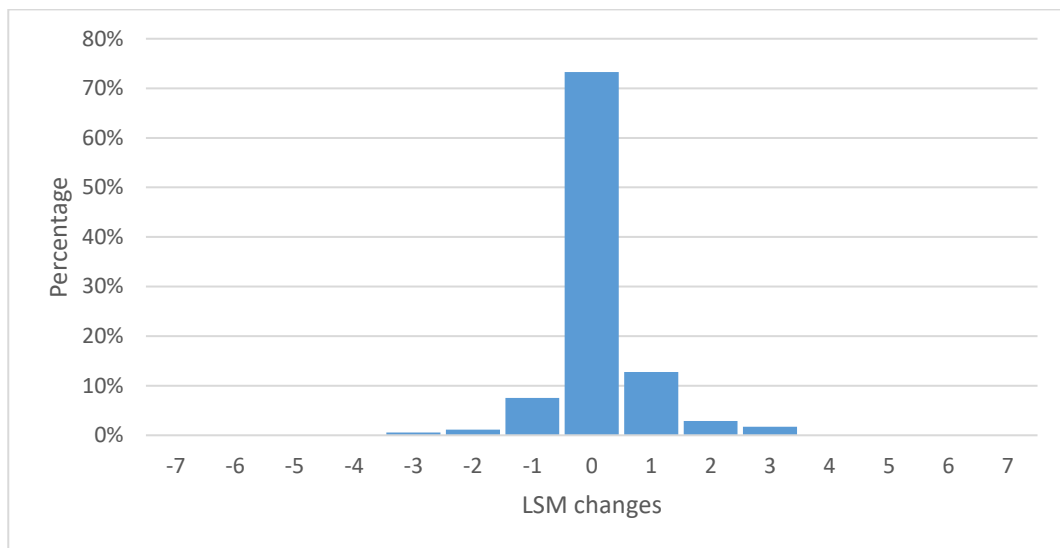


Figure 9:15: LSM differences and percentage shares (Kimberley)

From the statistical measures, the MD and PSI are 0.119 and 0.112, respectively. The low MD shows that the two distributions are closer to each other (as the case in figure 9.14). The PSI score of between 0.1 and 0.25 denotes a moderate change in LSM. The median and mode remained the same at LSM 6. The average difference in living standards is 0.122, which is significantly lower compared to the aggregated results and the LSM improvement in Carletonville.

The *third* study site is Ermelo and figure 9.16 illustrates the LSM trends. It is seen that a considerable percentage of the miners fell under LSM 3 (i.e., 26%) and LSM 4 (i.e., 25%) before working in ASM. The participation in ASM moved the significant percentage of the miners to LSM 6 (i.e., 31%) and LSM 7 (17%). Considerable increases are also seen in the LSM groups located at the upper end. The percentage of the miners in LSM 1 and LSM 2 decreased to 0% as shown in the figure.

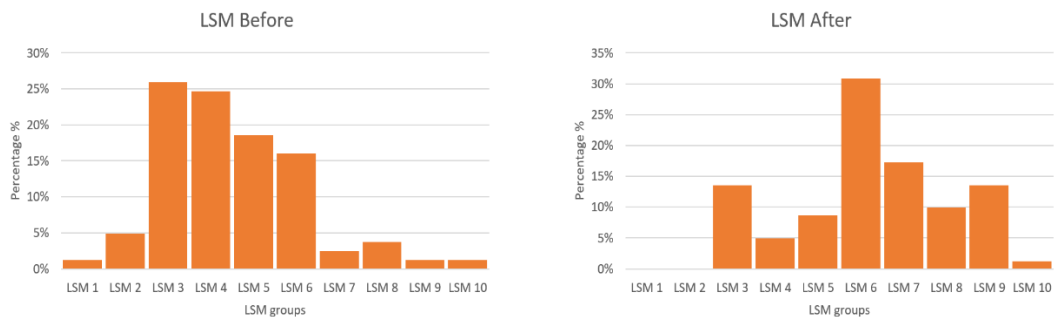


Figure 9:16: LSM distributions showing before and after ASM (Ermelo)

The combined trends for Ermelo are provided in figure 9.17. A shift to the right and burgeoning of the LSM groups at the upper part of the continuum are seen in the LSM after trend. This is as a result of percentage increases recorded in LSM 6 to LSM 9. The highest percentage increases are found in LSM 6 and LSM 7 both reporting a 15% increase in the percentage of miners under each group. The figure also shows the decline in all LSM groups in the bottom half of the LSM continuum.

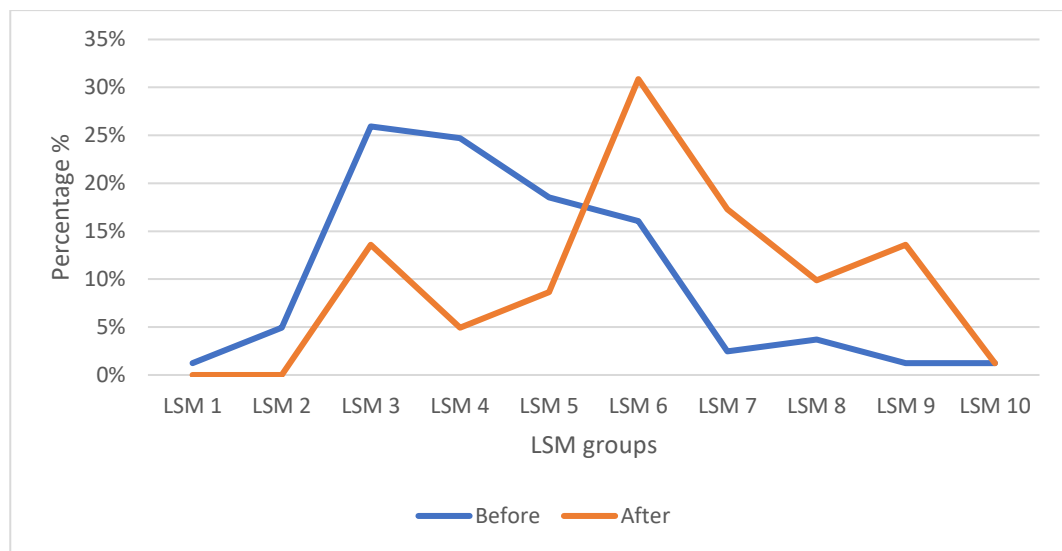


Figure 9:17: Combined LSM distributions (Ermelo)

Figure 9.18 shows the attained changes in LSM. Of the three sites, Ermelo achieved the highest improvement in LSM with about 90% of the miners recording a positive change

in their living standards. As seen in the figure, 23% of the miners moved one LSM up, 17% moved two LSMs up, and 12% moved 3 LSMs up. Only 19% of the miners did not record any change, while about 8% of the miners regressed.

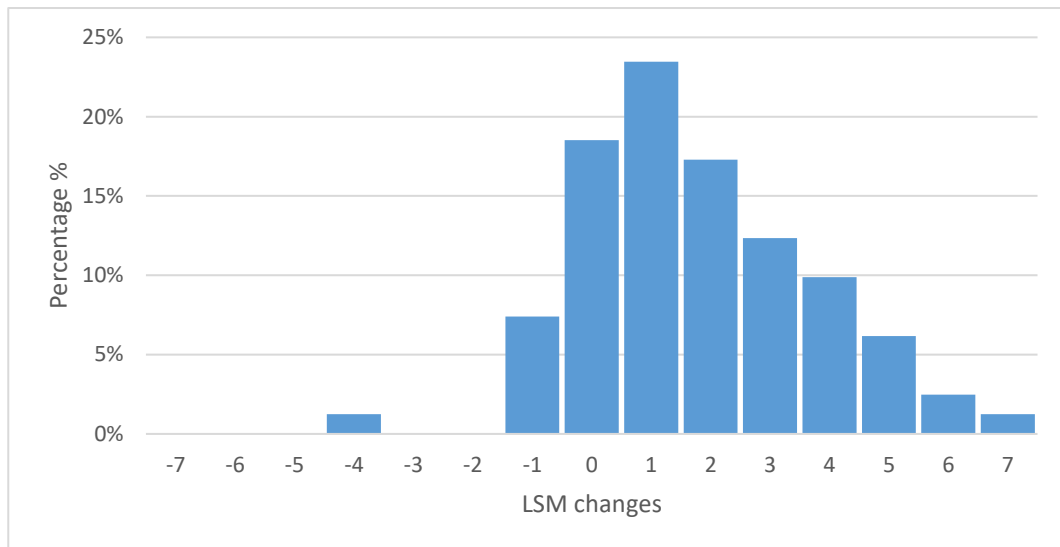


Figure 9:18: LSM differences and percentage shares (Ermelo)

Compared to the two sites, Ermelo recorded the most change in living standards. The MD and PSI were found to be 1.128 and 2.007, respectively. The median moved from LSM 4 to LSM 6. The mode moved from LSM 3 to LSM 6. The overall improvement in living standards of the miners in Ermelo is 1.770.

Having looked at the LSM trends at an aggregated level and at different sites, the following analysis turns attention to LSM trends plotted against the demographic characteristics of the miners. The primary objective is to establish if there are any significant differences in the living standards of the miners when looking at age, gender, nationality, education levels, family support, working experience, and income. The analysis also aims to determine if there is any relationship between living standards and the demographic profile of those that participate in the ASM sector. The statistical measures supporting the LSM trends are also included in Appendix B.

The first demographic characteristic that was analysed is age. Figure 9.19 shows the LSM trends for all the age categories. From the figure, it is seen that the LSM trends for age categories, 18 to 25, 26 to 35, and 36 to 45, are *almost* similar (i.e., particularly the LSM before trend) with the majority of the miners found in LSM 3. In the LSM after trends, most of the miners are found in LSM 5 and LSM 6 in these age categories. In the age category of 46 to 55, most of the miners fell under LSM 3 and LSM 4 before ASM. In the LSM after trend, the majority (i.e., about 40%) are sitting in LSM 6. For the age category, 56 to 65, most of the miners were in LSM 3 and LSM 5 before working in ASM. After ASM, most miners are concentrated in LSM 5. In the last age group (i.e., >65 years), most of the miners were in LSM 6. After engaging in ASM, the miners are spread across LSM 4 to LSM 8.



Figure 9:19: LSM differences and percentage shares (Ermelo)

From the trends above, it is seen that the living standards of the miners in all age categories changed. The PSI for all age groups is greater than 0.25 marking a significant change in LSM. The highest PSI scores are in the age groups, 56 to 65 and more than 65 years at 4.119 and 6.146 respectively. The largest MD between the distributions is found in age group, 56 to 65 (i.e. MD of 1.981). The percentage of the miners who experienced a positive change in their living standards ranges from 51% (i.e. in age group 46 to 55) to 59% (i.e. in the age group 18 to 25). The percentage of the miners whose living standards did not change ranges from 33% (i.e. in the age group, more than 65) and 42% (i.e. in the age group, 46 to 55).

Overall, there is a small difference in improvement in the living standards with the weighted average difference ranging between 1.125 (i.e. in the age group, 46 to 55) and 1.429 (i.e. in the age group, 36 to 45). Even so, based on the results, the highest improvement in living standards is found in the age group, 36 to 45. The lowest improvement is found in the age group, 46 to 55. That said, no clear relationship was picked up between age and living standards.

Figure 9.20 shows the LSM trends according to gender. As can be seen in the figure, there was little change in the living standards of the female miners (i.e. the MD and PSI for the distributions are 0.358 and 0.117 respectively). What is interesting to see is that the living standards of the female miners were higher than their male counterparts coming into ASM. The majority of the female were in LSM 5 and LSM 6, the most male miners were in LSM 3 before engaging in ASM. After ASM, the majority of female miners remained in LSM 5 and LSM 6, while male miners moved to LSM 6 and LSM groups in the upper end of the continuum. About 68% of the female miners did not experience any change in their living standards, only 24% improved while 8%

regressed. The largest change in LSM is seen in male miners (i.e. MD and PSI are 1.130 and 0.895 respectively). Of the total miners, 59% experienced an improvement in their living standards, 35% did not see any change while 5% regressed. On average, the living standards of male miners improved by 1.351 compared to 0.270 recorded for female miners.

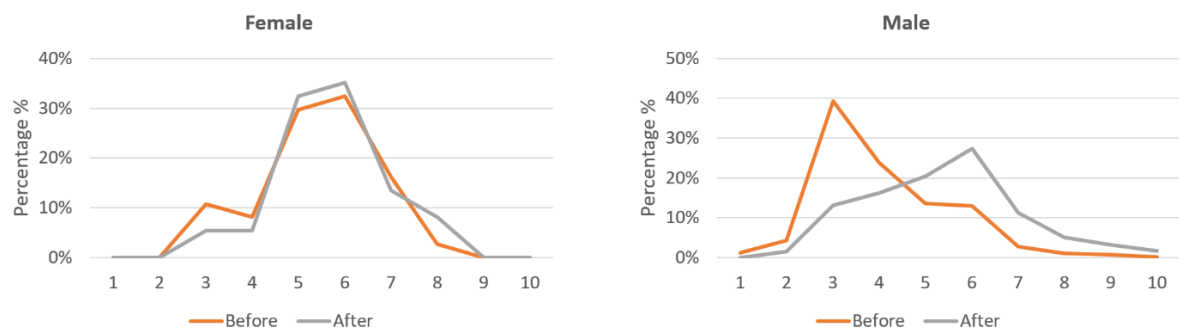


Figure 9:20: LSM distributions according to gender

Figure 9.21 shows LSM distributions according to education levels. Most miners in several education levels fell under LSM 3 before ASM. The exception covers those with further education who are spread across LSM 3 and LSM 4. After working in ASM, most of the miners are found in LSM 6. The education levels that experienced the largest changes in LSM are matric and further education. About 84% of the miners with further education experienced a positive change in their living standards. The percentage of the miners whose living standards improved in the matric category is 67%. Under further education, only 12% of the miners did not see any change. For miners with matric qualifications, only 26% did not experience any change in living standards. In the other education levels, the percentage of the miners with improvement in living standards ranges between 52% (i.e., those with primary schooling) and 59% (i.e., those with middle school).



Figure 9:21: LSM distributions according to education levels

It is important to note that while the largest improvement in living standards is found amongst those with matric and further education, no definitive relationship was found between education levels and living standards. This is because, the third largest improvement is seen amongst those with no formal education as opposed to those with middle school as the third education level going down from further education.

Figure 9.22 illustrates the LSM distributions according to nationality. Before moving into ASM, most of the miners (i.e., both South Africans and foreign nationals) were in LSM 3. After working in ASM, the majority of South Africans are found in LSM 6, which accounts for 30% of the total miners. There is also an increase to the right in the upper LSM categories in the South African trend. From the figure, it is seen that the

LSM trend for foreign national flattened and moved slightly to the right. The percentage of foreign nationals in LSM 3 declined from 41% to 20% after engagement in ASM. The foreign nationals are spread almost equally between LSM 3 and LSM 6. Overall, there is a slightly more improvement in the living standards of South Africans compared to foreign nationals. The average difference in living standards is 1.314 for South Africans and 1.278 for foreign nationals. Of the total South Africans, 58% saw an improvement in living standards, 36% did not see any change and 5% regressed. This compares to 55% who experienced positive change, 39% with no change, and 5% with negative change amongst foreign nationals.

The other set of graphs in figure 9.22 shows the LSM distributions for Lesotho, Mozambique, Zimbabwe, and other foreign countries. Of the three major countries, the most improvement is seen amongst miners coming from Zimbabwe. About 75% of the miners from Zimbabwe improved their living standards. This compares to 52% and 49% in Mozambique and Lesotho, respectively.

Based on the weighted average difference, the living standards of miners from Zimbabwe improved by between 2 and 3 LSMs (i.e., an average difference is 2.250). This is higher than the level of improvement amongst South Africans (i.e., an average difference is 1.314). The lowest improvement is seen in Mozambique with an average improvement of 1.093.

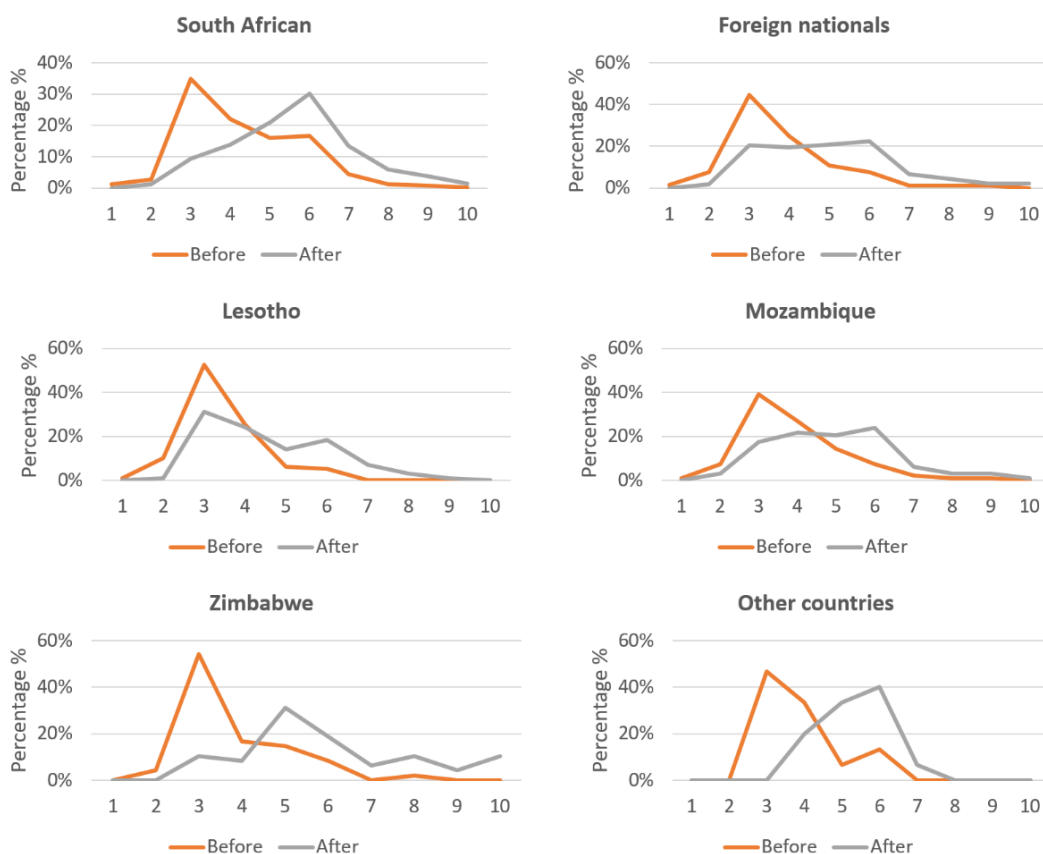


Figure 9:22: LSM distributions according to nationality

Figure 9.23 shows the LSM trends according to family support. As the case in other demographic attributes, most of the miners under the different categories of family support were sitting in LSM 3 before working in ASM. Likewise, the majority of the miners are found in LSM 6 in several categories after ASM. The largest improvement in living standards is found amongst those with no dependants. In this category, the percentage of miners whose living standards improved is 65%. The lowest improvement is seen amongst those supporting, between 4 and 6 dependants as well as between 7 and 9. In the former group, of the total miners, the living standards of 52% improved, 44% stayed the same and 4% regressed. In the latter category, the living standards of 51% improved, 32% have not changed and 17% regressed. For miners supporting 10 and more dependants, an unexpected improvement in living standards is observed. While it

is difficult to explain because of the data at hand, this may be a factor of working experience (i.e., a direct relationship between improvement in living standards and working experience in ASM is established in page 350). In cross-checking this, the data reveals that most of the miners with 10 and more dependants have been working in the ASM sector for more than 5 years.

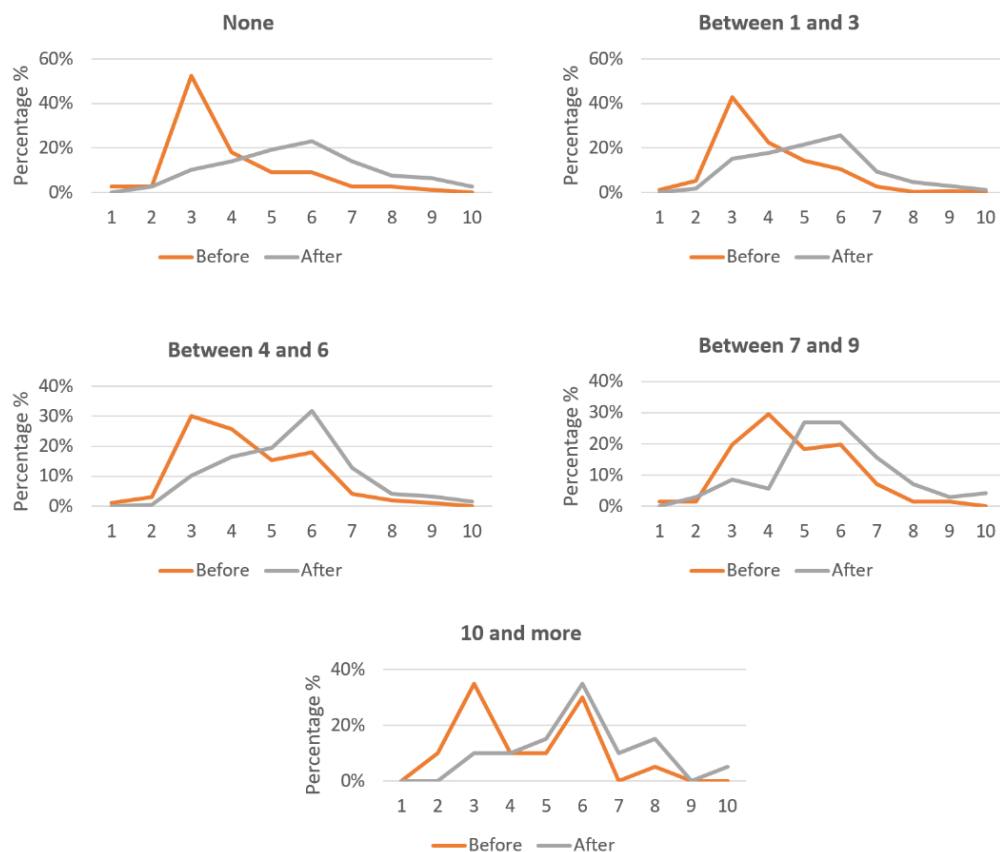


Figure 9:23: LSM distributions according to family support

Figure 9.24 compares the LSM trends of the miners who depend solely on ASM and those who have other sources of income. The living standards of those with other sources of income were higher upon moving into ASM. Most of the miners under this category were situated between LSM 3 and LSM 6. Most of the miners who depend only on ASM were in LSM 3 (i.e., about 40%). After working in ASM, for both categories, the majority of the miners are concentrated in LSM 6. Based on the average

differences, the most improvement in living standards is recorded amongst those that depend only on ASM for livelihoods. Their LSM improved by 1.312 compared to 1.158 for the other group.

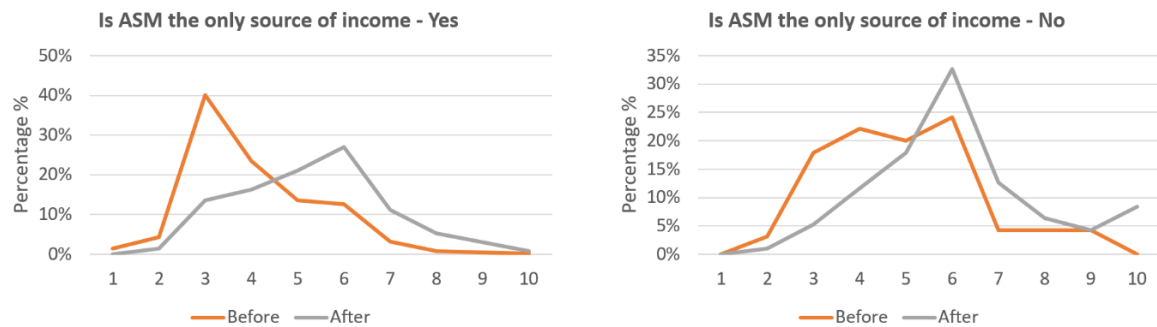


Figure 9:24: LSM distributions and sources of income

Figure 9.25 shows LSM trends according to *previous* employment status. In comparing the LSM of the miners in the two categories, it is seen that there is *slightly* more improvement in living standards of the miners that were working before ASM. About 73% of the miners who were working experienced an improvement in their living standards after ASM. This compares to 72% of those that were not employed. The percentage of the miners whose living standards did not change is 15% for *previously* unemployed and 16% for *previously* employed. The percentage of the miners whose living standards regressed is 14% and 11% respectively. Overall, the living standards of those that were *previously* employed increased by 1.721 compared to 1.483 for those that were not working.

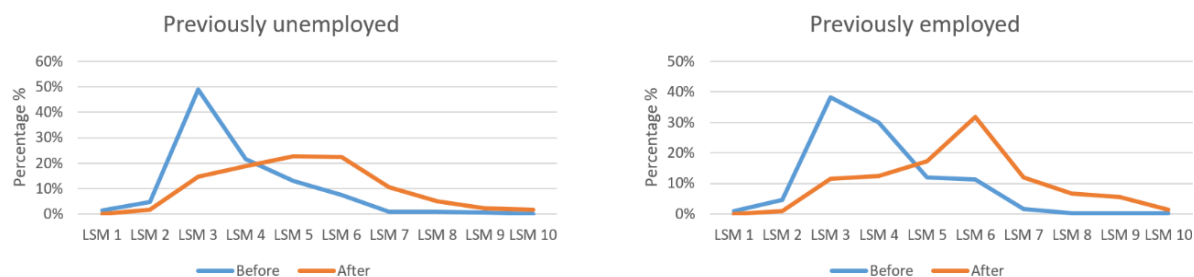


Figure 9:25: LSM distribution according to previous employment status

Figure 9.26 illustrates LSM trends according to ASM working experience (i.e., this is the number of years the miners have been working in the ASM sector). As the case in most distributions, the modal living standard before ASM is LSM 3.

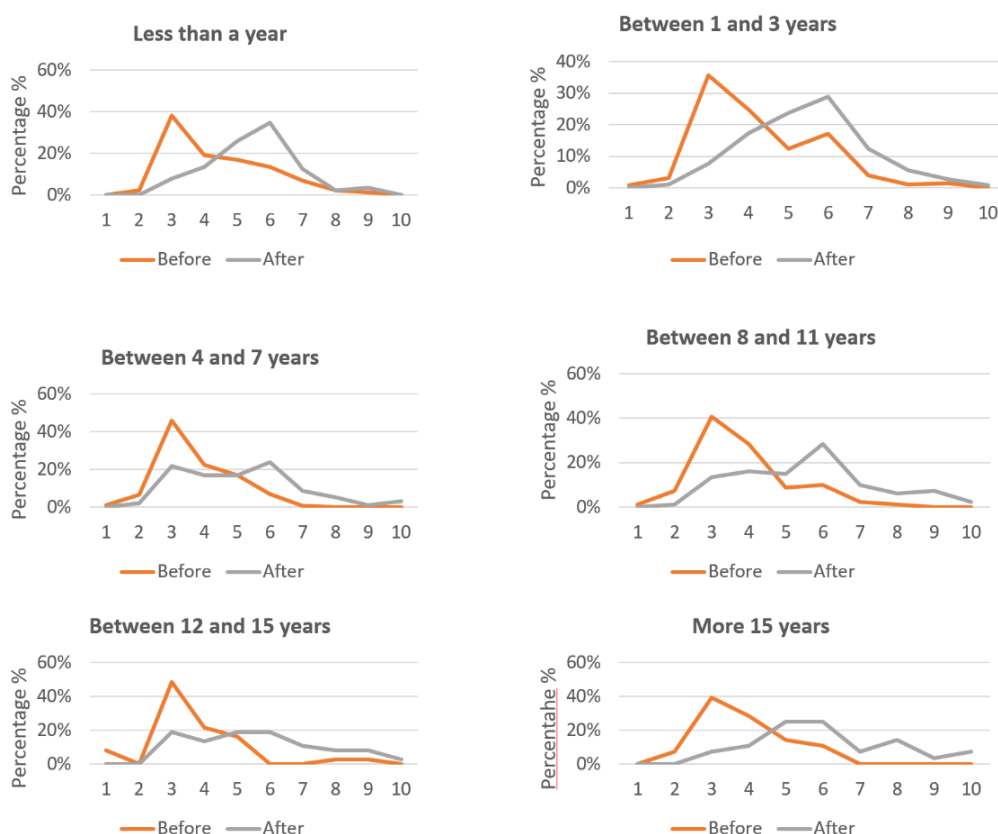


Figure 9:26: LSM distributions according to working experience

For those who have been working for less than a year in the sector, the majority moved from LSM 3 to LSM 6. The same shift is seen amongst those that have been working in

the sector between 1 and 3 years. Different patterns are seen for those with the working experience that is more than 3 years. As can be seen in the figure, the LSM after trends are flatter with the miners spread across LSM 3 and LSM 7 (i.e., in some categories).

Overall, there seems to be a relationship between working experience and living standards. This is seen in the percentage of the miners whose living standards changed positively and hence overall improvement measured in terms of weighted average differences. The percentage of the miners whose living standards improved ranges from 49% (i.e., less than a year of working experience) to 75% (i.e., more than 15 years of working experience). The average difference ranges from 1.146 (i.e., less than a year) to 2.250 (i.e., more than 15 years). Figure 9.27 shows the weighted average differences for the different categories of working experience. This is plotted with the percentage of the miners in each category.

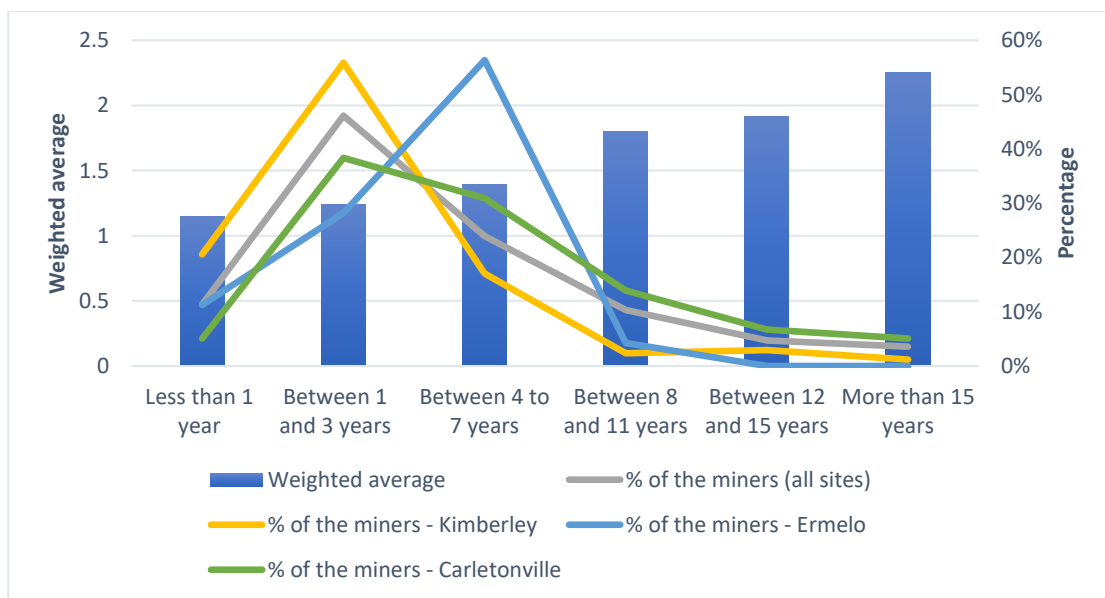


Figure 9.27: Weighted average difference and percentage of the miners by working experience

As can be seen in the figure, improvement in living standards increases with the number of years the miners have been working in the sector. There is about a 50% difference in improvement in living standards when comparing those that have been working for less than a year and those with more than of 15 years working experience. The secondary axis in the figure shows the percentage of the miners across the different years of experience. From the figure, it is seen that the majority of the miners (i.e., across all study sites) have been working in the sector for between 1 and 3 years. This is followed by those who have been working in the ASM sector for between 4 and 7 years (i.e., about 24%). The LSM improvement in these two categories is 1.24 and 1.39 respectively.

In terms of the individual sites, the majority of the miners in Kimberley (i.e., 56%) have been working in ASM between 1 and 3 years. They are followed by those (i.e., 21%) with less than a year experience. In Ermelo, the bulk of the miners (i.e., 56%) have been working in ASM for between 4 and 7 years. In Carletonville, most of the miners (i.e., 38%) have been working in the sector for between 1 and 3 years. They are followed by those with between 4 and 7 years of experience. In all the sites, less than 10% of the miners have been working in the sector for more than 11 years.

The final analysis on LSM entailed looking at the income generated from ASM against living standards. With a clear relationship between working experience and LSM, it was important to check if a similar relationship exists between income and living standards. The weighted average differences of the various income categories were obtained, and these are illustrated in figure 9.28. As with working experience, the percentage of the miners in each income category has been added to the figure to determine where most miners are situated in the income categories.

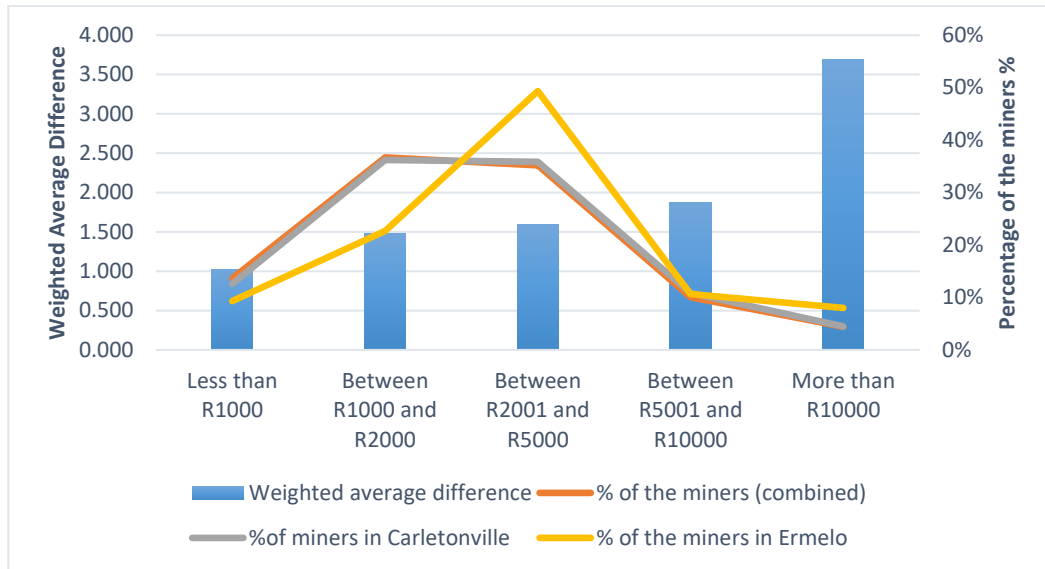


Figure 9:28: Weighted average difference and percentage of the miners against income

From the figure, it is seen that the weighted average difference increases with the amount of income generated from ASM activities. The higher the income earned, the higher the level of improvement in living standards. For those that earn more than R10,000 per month, their living standards improved by 3.688 (i.e., that is between 3 and 4 LSMs). This compares to an improvement of 1.020 for those who are earning less than R1,000 per month. Comparing the two income categories, there is a 28% difference in the level of improvement in living standards. In terms of the percentage of the miners, as seen in the figure, the majority of the miners (i.e., 36%) are found in income categories, between R1,000 and R2,000, as well as between R2,001 and R5,000.

The aggregated trends (i.e., showing all the miners) are the same as that in Carletonville. In the case of Ermelo, most of the miners (i.e., 49%) earn between R2,001 and R5,000. They are followed by those (i.e., 23%) who earn between R1,000 and R2,000. In both ASM sites, about 10% of the miners earn between R5,001 and R10,000. Less than 10% of the miners in both sites earn more than R10,000.

To summarise, the objective of the LSM analysis was to examine the relationship between ASM and the living standards of the miners. This was underpinned by three base questions – (1) *did the living standards of miners change or stay the same*, (2) *if there is a change, did the living standards improve or regress* and (3) *by how much did the living standards improve or regress?* On the first question, by looking at the LSM before and after trends, the difference in living standards can be picked up. From the aggregated results, it was found that the living standards of most of the miners changed. Of the total miners, about one-third of the miners did not see any change in their living standards. The rest of the miners experienced changes in their living standards.

The second question is based on the direction of change if it is positive or negative. As alluded to above, positive and negative change denotes improvement and regression in living standards, respectively. Based on the aggregated results, the overall change is positive with most of the miners seeing an improvement in their living standards. The percentage of miners whose living standards regressed is about 5%. On the third question (i.e., the amount of change), from the aggregated results, it was found that, on average, the living standards improved by 1.3. This means that the majority of the miners improved their living standards by between 1 and 2 LSMs. Table 9.8 provides a summary of the weighted average difference according to the different analysis points provided. The scores that were obtained are presented alongside data bars showing the level of improvement.

Table 9:8: Summary of the weighted average differences

Categories	Sub-category	Weighted average difference
Sites	All sites	1,300
	Carletonville	1,560
	Kimberley	0,122
	Ermelo	1,770
Gender	Male	1,351
	Female	0,270
Age	18 - 25	1,231
	26 - 35	1,261
	36 - 45	1,429
	46 - 55	1,125
	56 - 65	1,324
	More than 65	1,167
Education level	No formal education	1,387
	Primary school	0,923
	Middle school	1,305
	Matric	1,786
	Further education	2,840
Nationality	South African	1,314
	Other	1,278
	Lesotho	1,152
	Mozambique	1,093
	Zimbabwe	2,250
	Other	1,467
Dependants	None	1,846
	Between 1 and 3	1,305
	Between 4 and 6	1,150
	Between 7 and 9	1,155
	10 and more	1,600
Working experience	Less than 1 year	1,146
	Between 1 and 3 years	1,242
	Between 4 to 7 years	1,394
	Between 8 and 11 years	1,802
	Between 12 and 15 years	1,919
	More than 15 years	2,250
ASM and sources of income	Only source of income	1,312
	Other sources of income	1,158
Previous employment status	Previously employed	1,721
	Previously unemployed	1,483
ASM income	Less than R1000	1,020
	Between R1000 and R2000	1,474
	Between R2001 and R5000	1,588
	Between R5001 and R10000	1,877
	More than R10000	3,688

While LSM is being employed as a development indicator and a measure of poverty, one of the criticisms levelled against it is that it does not consider contextual issues that are important in differentiating between wealth and asset ownership of different socio-economic groups in the country (Ncube and Serumaga-Zake, 2015). More so, as a quantitative measure, the LSM fails to capture the other dimensions of poverty that have

implications for the standard of living. As part of the surveys, the miners were asked if ASM has improved their lives or not. Of the total miners (N=1355), 85% answered yes, 7% choose somewhat and 5% said no. These responses were followed up with individual interviews. The submission from the miners is summarised in the next section.

9.2.4. Perspectives of the miners

The responses from the follow-up interviews align with the quantitative results in that most of the miners shared that ASM changed their lives in a good way. As highlighted in Chapter 8, over and above the need for employment opportunities, the choice to engage in ASM activities was influenced by the need to provide for their families and improve their living standards. From the interviews, the positive impact of ASM was linked to the ability to make a living and provide for their families. These were the sentiments shared by most of the miners in all three study areas. One of the miners, Solly expressed:

It [ASM] has changed my life a lot because I am able to make a living from it. There is a lot of things, I am able to take my children to school from the income from artisanal mining (Solly, interview, 20 July 2020).

Another miner, Josias shared that he could see a difference in his life because of ASM compared to when he was working as a Welder and Boilermaker. He shared that:

I can support my family, take the children to school, there is a difference. I can see that there is a difference from sitting and working for a “white person”⁵³,

⁵³ White person in this context means an employer in a formal company?

so I can't work for a "white person". I have my own house, there is a difference, I can take my children to school (Josias, interview, 21 July 2020).

Josias falls under the group of miners that were previously employed before engaging in ASM and their reason for leaving is low remuneration from the previous job. He has been working as a miner for about 12 years. Being able to provide for his family is important to him and when asked if he would leave ASM if offered alternative employment, he indicated that he would leave ASM only if the job will provide income that is sufficient to meet his family's needs. Some of the miners shared that income from ASM has helped them to meet the needs of their families. This is what one miner, Christopher said with regard to the impact of ASM:

Things are now simple at home. Kids are able to eat, get clothes and go to school. Because government grant for children is not enough, I am able to increase the money with the money from zama-zama (Christopher, interview, 15 July 2020).

The second indication of the positive impact of ASM as shared by the miners is being able to buy and own various assets, *mostly* furniture and cars. A considerable number of the miners indicated they were able to build houses for themselves because of the income earned from ASM activities. These were the sentiments expressed by Musa:

A lot, the things that I did not have, I now have. I now have because of the income from artisanal mining, because I was working in the past and I could not afford to buy a car, but now I have bought a car from artisanal mining (Musa, interview, 15 July 2020).

Musa used to work at a garage and when his job ended, he struggled to find other employment. He decided to engage in artisanal gold mining, and he has been working in the sector for about 8 years. He mentioned during the interview that when he was working at the garage, he used to struggle at the end of the month and depended on *loan sharks*⁵⁴ to be able to support his family. He was trapped in the cycle of debt and through ASM, he managed to escape and can provide for his family without depending on *loan sharks*.

Another miner, Martin shared that he was able to buy a car and build a house for his family. This is what Martin shared:

Zama-zama has been beneficial from the income that we generate....my children go to school because of zama-zama, I have transport because of zama-zama, I have a house that I live in because of zama-zama (Martin, interview, 21 July 2020).

Another aspect that was highlighted *mostly* by the miners working in the coal sector was the ability to invest back into the business and increase earnings generated from artisanal mining. A considerable number of the miners shared that they were able to buy vans to transport coal to customers. This is what Thabang shared:

It definitely has, it has changed a lot because before working as an artisanal miner, things were difficult. Now that I am an artisanal miner, it has changed a lot. I am now a man, I have a car. There is a lot that I have done. I managed to extend the house at home, I have managed to add about 2 or 3 rooms and build

⁵⁴ Loan sharks as used in the interview refers to a person or a company (in some instances) that lends people money at higher interest rates than commercial banks. There is often an agreement between the lender and the *lender* that the loan with interest will be paid when the lender receives his or her monthly salary. In most cases, the *lenders* have no choice but to pay because they normally leave their identity documents (ID) as insurance.

another one outside. I managed to buy a car, a bakkie that I am transporting coal with. There is a lot that I can point and say, I have bought them with the income from artisanal mining (Thabang, interview, 21 July 2020).

At the time of the study, some of the miners outsourced vans to transport coal to their customers. They were charged R200 per load of coal (i.e., 1 tonne) to transport it to the surrounding communities. While this cost was paid by the customers, with their own transport, the miners are increasing their selling price from R500 to R700 per load of coal (i.e., gaining an extra R200). This is what Lethabo shared.

Yes, it has changed my life a lot, in a good way. As six women, we were able to buy our own van. We no longer depend on other people for transportation. Now we can transport coal using our own van (Lethabo, interview, 21 July 2020).

Lethabo is a female miner and works with five other women. During the interview, she shared that they produce about 7 tonnes of coal per week. Based on the selling price of R500 per one load (i.e., 1 tonne), this comes to an income of R3,500 generated per week. This comes to R14,000 per month. Lethabo did not share how much she takes home from ASM because she deemed it to be confidential. However, based on the interactions with the miners, some indicated that they share the revenue from the coal sales equally. Assuming this is the case in Lethabo's group, each miner takes home about R2,400 on a monthly basis. Having bought a van, this increased the monthly income to about R20,000 and individual income to R3,400. This comes to about a 28% increase in salaries.

Another female miner, Francinah who works with a group of seven miners shared that they were able to buy a van from the revenue generated from ASM. She indicated that they produce about 8 tonnes of coal per week. Using the same increase in the selling

price (i.e., R200), their income increased from R16,000 to R22, 400 per month. This amounts to an income of R3,200 per miner (i.e., if shared equally). This was the response from Francinah when asked if ASM changed her life:

A lot, in a good way. We bought a van so we can be able to transport coal to those who don't have transport. At home, my husband was not working. I am able to support the family and put bread on the table (Francinah, interview, 20 July 2020).

The potential earnings that come with investing back into the business have motivated several miners to increase production capacity and outputs. Some of the miners expressed aspirations of buying trucks to be able to transport *more* coal. Sifiso, a miner from Ermelo shared this:

I will not leave artisanal mining, it changed my life for good. It is difficult to stop, I will go hungry.... I bought a truck, tools, wheelbarrows, chairs, furniture at home. I am going forward, I want to buy a 32 tonne truck (Sifiso, interview, 12 July 2020).

In Sifiso's team, there are 10 miners. He indicated that they produce between 5 to 6 tonnes per day, and this comes to about 30 tonnes per week. They used to make R15,000 per week and R60,000 per month. Having their own transport, their total monthly revenue comes to R84,000. With additional tools, they hope to increase their production output and hence the plan to buy a bigger truck to save on petrol and associated costs.

Still, on growing businesses, several miners shared that they have started other businesses outside of mining. In one of the interviews, one miner shared that the miners are business-minded people, and that among the benefits of working as an artisanal

miner is that it exposes one to business ideas that generate additional income. This is what Thabang expressed:

At the mine, I learn a lot of things, like you learn about business quickly. You are able to see other business ideas and diversify your business, like open a shop at the mine, there is money. That's what I like about people there. The people that work at the mine are business minded and they are able to assist you to be business minded and make a living (Thabang, interview, 12 July 2020).

When asked if ASM changed his life, this was Thabang's response:

A lot, it has changed for the good. I can see improvement from the money, it is assisting me. I can start with furniture in my house, then my children, then in terms of business, I have another business besides transport. So, this money has helped with another business so it can operate (Thabang, interview, 12 July 2020).

The other positive impact that the miners shared which they attribute to participation is ASM is peace of mind from not having to worry about income. This was raised by Thulani:

Yes, it has changed my life. Now that I am working, I do not have the stress that I had when I was not working. I knew that I was going to bring coal and there will be people that need the coal nearby. I used to bring 50kg and they will buy them. I was able to make some income. I was able to survive. Working in artisanal mining, to be honest, I was able to buy food, so I don't go hungry, I bought toiletries (Thulani, interview, 13 July 2020).

Thulani was unemployed before deciding to engage in ASM. He is working in Ermelo. At the time of the study, he had been working for one and a half months. Even though he does not afford other things as yet, but he is happy being a miner, and gaining experience working underground. The appreciation of the experience and skills gained from working as an artisanal miner was also noted by other miners, more especially those that came without prior experience in mining. The *last* insight that came out from the interview with one miner in Carletonville was the link between ASM and criminal activities. The miner shared that ASM has taken him away from criminal activities by ensuring that can provide for his family. This is what the miner expressed:

Yes, it has changed in a good way because I don't face challenges like going to jail because of stealing from people. I am able to support my family (Comfort, interview, 21 July 2020).

As noted above, some miners indicated that ASM changed their lives to *some* extent (i.e., about 7% of the total miners), while some said that they have not seen any change (i.e., about 5%). This was the sentiment expressed by Fred:

It hasn't changed, but I have children and I am able to support them with the income from zama-zama (Fred, interview, 15 July 2020).

Of those that indicated that their lives have not changed, one miner shared that his life has changed in a bad way. This was the reason that he gave:

Because I am fighting every day. My woman says there is no money. I am just working and taking food from the house, problems like that. (Calvin, interview, 22 July 2020).

Calvin works in Kimberley in diamond mining. He is amongst the miners that shared that they depend on family members to assist with money to buy food when they are struggling to find diamonds.

9.3. Perspectives of communities on ASM

There are currently divergent views in terms of the role of ASM in local communities in the country. Some stakeholders are calling for the criminalisation of the ASM sector, while others are advocating for the decriminalisation of the sector. At the core of these debates are the impacts of ASM on local communities. Those calling for the criminalisation of ASM *often* point to the negative impacts of the sector on local communities and these are identified as health and safety risks, environmental hazards, and the sector's association with criminal activities. The stakeholders calling for the decriminalisation of the sector refer to the positive contribution of ASM in terms of job creation and the opportunities emanating from the establishment and expansion of small businesses.

While both submissions have merits, what is *often* missing from these debates are the direct voices of communities where ASM activities are taking place. It is not known where the opinions of communities lie in terms of ASM and how it impacts them and flowing from this, their level of acceptance of the sector's activities. In recognising this gap and the need to understand the role of ASM at a community level, this section brings forth the perspectives of communities on ASM. These are captured according to the five areas, namely: local economic development, community livelihoods and well-being, community safety and impacts, and general perceptions and recommendations towards the sector. The section provides an analysis of the community members in Carletonville and Ermelo (i.e., interviews were not conducted in Kimberley).

9.3.1. Local economic development

Table 9.9 summarises the responses from community members on the relationship between ASM and local economic development. This was underpinned by three questions as captured in the table. The views of community members in Carletonville are mixed, with one group indicating that ASM does not contribute to the economy of the area and has not created employment and opportunities for small businesses. There is also a considerable number of community members that submitted otherwise, alluding to the positive contribution of ASM to the economy of Carletonville.

The general remarks made by community members in the “*first group*” (i.e. those that alluded to ASM not contributing to the community) were that; “*ASM is only benefitting the miners and their families, ASM is a private activity, it is benefitting those living in informal settlements, it is benefitting foreign nationals, the miners are creating jobs for themselves and not the community, they are looking out for themselves and not the community*” (Community interviews, Carletonville, 2020).

Table 9:9: ASM and local economic development

	Carletonville		Ermelo	
Key questions	Yes	No	Yes	No
Does ASM contribute to the economy of the area?				
Has ASM created jobs for the community?				
Has ASM created opportunities for small businesses?				
Legend:				
High number				
Moderate number				
Low number (to none)				

The community members that alluded to the positive role of ASM in the community referred to the contribution of ASM to small businesses, particularly local shops where the miners buy food and working suppliers (i.e., the community members mentioned

supplies such as vinegar, salt, and tartaric acid which are used in gold processing). The general sentiments coming from this group were that; *“ASM is creating jobs for unemployed people and the youth, some of the miners have started their own businesses with income generated from ASM, and the level of crime in the community has declined”* (Community interviews, Carletonville, 2020).

In the case of Ermelo, the views of most community members converge. Most community members shared that ASM contributes to the economy of Ermelo, it has created jobs in the community and has supported the establishment and expansion of small businesses within and outside coal mining. From the interviews, the relationship between ASM and the community was described as complementary where both the miners and the *wider* community benefit. The positive contribution of ASM in the community was linked to the miners being able to supply coal to the community.

The insights provided by the community members were that coal is a primary source of energy with many households depending on it for domestic purposes (i.e., heating and cooking). This dependency has increased over the years because of electricity challenges in the area with periodic load shedding and power cuts. In the past, the community used to buy coal from *formal* coal suppliers, *usually* medium and large-scale mining operations. These operations have since stopped selling coal to the community and have turned their attention to larger markets (i.e., Eskom). This has made coal to be scarce in the community. The miners were able to fill this gap by not only supplying coal to the community but also at affordable prices. This is seen as a positive contribution to the community by *most* community members. Some of the community members expressed that the *“community benefiting from the minerals that they have”* (Community interviews, Ermelo, 2020).

The other benefits of ASM as identified by the community members were job creation and the establishment of small businesses. These are jobs created at the mine site, across the supply chain, and outside mining. The following remarks were made by two community members when asked about the contribution of ASM in Ermelo:

It does a lot. For instance, when I go to the suppliers and buy coal, when I return with it, I start a selling business and remember I can't start a selling business alone. I need people who will support me and work together. In that way, someone can use coal to run their business. You can buy coal and start cooking food and then go sell in town. You can buy coal and use it to make fat cakes, sell them to school learners. It plays a huge role in supporting the community (Desiree, interview, 09 December 2020).

Yes, it opened a number of opportunities. Like there were a number of people with vans which were stationary, today they are working because the artisanal miners go to mine coal in distant areas. So, you see, the vans now play a big role. You find approximately 50 to 60 vans a day supplying [coal] (Tommy, interview, 09 December 2020)

Coal mining has stimulated entrepreneurship in the community and supported the establishment of small businesses thereby increasing the employment contribution of the sector. From the operation, the miners work with community members that have vans and trucks to transport the coal to their customers. It was shared that an increasing number of community members have started businesses where they buy and sell coal in the community. These businesses are known as coal yards where they sell coal. Some of the community members that were interviewed owned coal yards. They shared that

selling coal is a lucrative business. They differ in terms of the size of the business and the amount of coal that they buy and sell.

One coal yard shared that the operation employs four people and sells about 35 tonnes of coal on a monthly basis. Another coal yard sells about 100 tonnes of coal per month and employs 11 people. The owner of this coal yard shared that he left his job because the business is profitable. Most of the business owners shared that they have a good working relationship with the miners because they can enter into agreements where they buy coal at half price and settle the balance after selling coal. Some of the coal yards have transferred this working relationship to community members where they sell coal on credit. The other businesses that benefit from ASM are food businesses that use coal to cook their food, the women that are selling food at the mine sites and the local shops where the miners buy their groceries and food.

9.3.2. Community livelihoods and well-being

In establishing the role of ASM in the local economy, the community members were asked if ASM has changed the lives of the miners, the direction of the change, and if there are *visible* changes in the community. The results from the submissions are provided in table 9.10. Again, the responses from Ermelo converge in one direction with the general observation being that ASM has improved the lives of the miners and that of the community. Some of the remarks made by community members were that; *“the unemployed are employed, people have their own money, people are able to feed themselves, they are able to feed families, there is change in families, there is bread and maize meal in homes, children are clothed and going to school, most of the miners are now able to buy cars, they are able to build houses”* (Community interviews, Ermelo, 2020).

Table 9:10: ASM and community livelihoods and well-being

	Carletonville		Ermelo	
Key questions	Yes	No	Yes	No
Has ASM changed the lives of the miners here?				
Did it change the lives of the miners in a good way?				
Is the broader change in the community positive?				
Legend:				
High number				
Moderate number				
Low number (to none)				

In the case of Carletonville, the results are mixed with some community members noting change in the livelihoods of the miners and *wider* community, and others indicating otherwise. Most of the community members shared that the lives of the people that participate in ASM have not changed. Several community members raised that the miners spend their money on alcohol. Some community members alluded to the cycle of behaviour where the miners earn income from ASM, spend large portions of the income on alcohol and get intoxicated, and be involved in fights. One community member remarked, that from a daily income ZAR500, the miners would spend ZAR300 on alcohol, and the remaining ZAR200 will be split between supplies for work and groceries. In terms of the *wider* community benefits, the majority expressed that the community is not benefiting from ASM activities.

The sentiments coming from community members were that; *“the miners look out for themselves, it is a small number of people that benefit, ASM has changed the lives of foreigners because it is predominantly them who are involved, they fight and kill each*

other, it is no longer safe because of artisanal mining, the miners dig in people's yards promising to pay them and they don't"⁵⁵ (Community interviews, Carletonville, 2020).

The comments from the group that is seeing improvements were that *"ASM is creating jobs for young people, artisanal miners help people to secure jobs, people are able to make a living and provide for their families, children go to school, they buy them clothes, the levels of crime have declined in the area with the unemployed youth working in the mines, people who have no IDs and passport are employed, the people that engage in ASM have turned away from bad habits of stealing, most people are no longer into crime and gangsterism"* (Community interviews, Carletonville, 2020).

9.3.3. ASM impacts on community security and environment

Amongst the contentious issues in ASM is its links with criminal activities. There have been several reports (i.e., particularly from the media) that link ASM to criminal activities to the point where the dominant perception is that most miners are responsible for the crimes reported in mining communities. The question of crime was pertinent to ask because communities host ASM operations and most of the miners are residents in these communities. It is also important to capture the impacts of ASM on the environment within communities.

⁵⁵ During site visits, it was discovered that mining also takes place on the street and in peoples' yards. This is because the soil in Carletonville is believed to have gold. As a result, the miners are found sweeping the streets to remove the soil and recover gold. They have also gone to the extent of asking community members to sweep their yards with an agreement that they will pay them after recovering and selling the gold. There have been instances where these promises are not kept and hence these sentiments from some community members.

Table 9:11: ASM impacts on community safety, security, and environment

	Carletonville		Ermelo	
Key questions	Yes	No	Yes	No
Has ASM brought crime into the area?				
Does ASM have negative impacts on the environment?				
Legend:				
High number				
Moderate number				
Low number (to none)				

In the case of Carletonville, most of the community members reported that miners are not responsible for the crimes reported in the community. Instead, ASM has contributed to reducing crime as an increasing number of people are working and able to make a living. According to this cohort, crime in the area is committed mostly by young people who smoke “*nyaope*”⁵⁶ and are involved in drugs. The view that came out was that the fights and crime linked to ASM are taking place at the mines and not in the community (Community interviews, Carletonville, 2020).

While some community members agreed that the miners were not responsible for criminal activities, they argued that ASM has brought crime into the community. It was expressed that ASM activities attract strangers in the community. The influx of people in the community has brought gangsterism and criminal activities, *mostly*, robberies and theft. Some community members submitted that miners are involved in criminal activities. They spoke about fights between the miners, that the miners carry guns, and that they have been involved in murders. While these fights are generally rife at the mine sites, it was raised that there have been instances where community members are caught in the crossfire during these fights.

⁵⁶ Nyaope is a form of heroin that is widely used by young people.

In terms of the environmental impacts, most of the community members in Carletonville indicated that ASM results in negative environmental impacts. These impacts include *“damage water pipes, some activities are taking place close to the nature reserve, the miners waste clean water, they mine in peoples’ yards and damage the ground, they leave holes and trenches open, the streets are muddy because of uncontrolled water use, there is increased soil erosion from the miners sweeping the streets, houses are collapsing, the miners have changed the landscape of the area”* (Community interviews, Carletonville, 2020). Some community members raised that the holes and trenches left open by the miners have become hiding spots for criminals. They are used by criminals to hide stolen goods, rob people and even commit rape (Community interviews, Carletonville, 2020).

The community members in Ermelo shared that ASM has not brought crime into the community. The general view is that ASM has reduced crime in the community. Several community members raised that crime is brought by gangsterism which also targets the miners stealing from them. In terms of the environmental impacts, most community members expressed that ASM does not result in negative impacts on the environment. This is based on the following observations: *“they mine using rudimentary tools, they mine small areas, they do not use water as they sell the coal as it is, they backfill the mined areas, they are mining in abandoned mines where the land is already degraded”* (Community interviews, Ermelo). The only concern that was raised by several communities in Ermelo was the working conditions and the safety of the miners underground.

9.3.4. General perceptions and recommendations

As the two last questions, the community members were asked about the general perceptions on ASM and what government response should be towards ASM activities (i.e., should ASM be supported or stopped?). On the first question, again, there are mixed responses in Carletonville with some community members saying that the community at large has a problem with ASM while others are saying that it is not the case. The reasons provided from both ends touch on the factors highlighted above. The group that raised that the community has problems with ASM linked this to environmental impacts, health and safety risks, association with criminal activities, fights amongst the miners, and the influx of strangers. Those who hold that view that most community members do not have issues with ASM spoke about the benefits that the sector's activities bring in the community.

Table 9:12: ASM and community perceptions and recommendations

	Carletonville		Ermelo	
Key questions	Yes	No	Yes	No
In your opinion, do community members have a problem with ASM?				
Should ASM be supported by the government?				
Legend:				
High number				
Moderate number				
Low number (to none)				

When asked about how government should respond, most community members raised that government should support ASM. There were a few community members that said the activities must be stopped because they bring crime into the community. From those that said that the sector should be supported, there were community members that submitted that ASM should be supported, and there were those that supported the idea but with conditions.

The reasons provided by the first group were that; *“a lot of people are unemployed, minerals are available, the miners work for their families, ASM helps to reduce crime, legalisation will improve their lives, they will be able to work together, mining will be controlled to reduce the impacts on the environment”* (Community interviews, Carletonville, 2020). For the second group, ASM should be supported under these conditions; *“the miners should work in derelict and abandoned mines, they should not mine near homes, they should work in secluded areas, there must be rules to avoid wars, they should be taxed to contribute to South Africa, laws of cooperation should be put in place”* (Community interviews, Carletonville, 2020).

The other submissions made by some community members were in terms of the government supporting the miners by finding or creating alternative employment for them. One community member remarked that *“the reason why the miners find ways to sneak into mines is because there are no jobs and they need money, government should help them find jobs”*. This is the narrative that some community members hold in that the solution lies with the government creating permanent employment for the community (Community interviews, Carletonville, 2020).

For Ermelo, the general perception is that the community does not have a problem with ASM and that the sector should be supported by the government. Some of the views expressed by community members were that *“they help and look after each other, we depend on them and they depend on us so we uplift each other, we are nothing without them and they are nothing without us, people are not stealing from anyone but trying for themselves, they are creating jobs out of nothing, zama zamas are community members themselves so coal comes back to the community and benefit the community”* (Community interviews, Ermelo, 200). Most community members indicated that the

government should support ASM with key interventions identified as health and safety (i.e., creating a safe working environment for the miners) and assisting them with equipment.

9.4. ASM and the National Development Plan

Table 9.13 maps the links between ASM, and key areas of intervention identified by the NDP. The table captures both the positive and negative impacts of ASM. ASM activities have a bearing on the attainment of the NDP with links to most of its priority areas. The strongest links are in the area of the economy and employment. The benefits of ASM include job creation, youth employment, and small business development. With a considerable percentage of the miners being young ASM contributes to youth employment and empowerment. The stimulation of entrepreneurship and subsequent set up of businesses by community members is another positive impact of ASM as seen in communities. The sector also supports existing small businesses by increasing buying power in communities.

Some of the negative economic impacts associated with the sector's activities are exploitation that is subjected to the miners leading to a large percentage of the incomes generated from mineral outputs going to middlemen and syndicates. The loss of revenue and potential taxes by the government is another example of negative economic impact. The Mineral Council South Africa (2019) estimates that the country is losing R7 billion from illicit mining and trading of gold and diamonds. ASM activities have also increased financial burdens in the large-scale mining industry as some of the activities take place in operating shafts. While some ASM activities threaten large-scale mining, the submission made by practitioners working for large-scale mining operations was that the two sectors can co-exist if ASM is regulated in the country.

Another area of intervention as identified by the NDP is economy and infrastructure and this speaks to the need to maintain and expand key infrastructure (i.e., electricity, water, transport, etc.) to support economic activities in the country. Amongst the negative impacts of ASM as identified specifically in Gauteng province has been damage to infrastructure as some of the activities take place near main roads, installed underground pipelines, and close to key infrastructure. There have been several reports from the municipality that ASM activities are damaging key infrastructure and hence the call for the DMRE to manage the activities. With some activities taking place in derelict and ownerless mines, there have been reports of the miners re-opening sealed shafts and working areas and also stripping existing infrastructure that was left behind to seal dangerous working areas.

To foster an integrated and inclusive rural economy, some of the areas of intervention identified include creating opportunities for rural communities through land reform and livelihood strategies, access to basic services, health care, education, and food security (i.e., amongst others). A considerable percentage of the people that participate in ASM in some of the sites are non-locals in that they are coming from other provinces. There is a wide spectrum of ASM activities taking place in rural areas in the country. From both scenarios, ASM provides livelihoods to communities.

The sector supports households with remittances from ASM (i.e., this is more the case with those that come from other provinces and foreign nationals who are sending money home to support their families). While participation in ASM has been linked to reducing crime in communities, some community members have suggested otherwise. The downside of ASM as seen in communities includes the influx of people, establishment

of informal settlements (i.e., as the case in Kimberley where the miners stay in informal camps), pressure on municipal services, and issues of safety and security.

On education, ASM contributes through the miners' ability to take their children to school. In terms of the miners, participation in ASM comes with on-the-job training where the miners with mining skills transfer and/or train those coming with no prior mining experience. Another finding from the study was the increase in entrepreneurship as miners are motivated to start other businesses and community members tapping into opportunities that are created by ASM activities. The negative impacts of ASM on education were noted in Carletonville where a considerable number of children do not go to school because of the lack of necessary documentation required for enrolment. This is a spillover effect of the parents not having legal documents to be in the country.

The other positive impacts (as captured in the table) relate to the participation of women in the sector, the ability of ASM incomes to complement social grants increasing affordability of households, community benefits emanating from relationships between the miners and communities, and the broader transformation objectives as they relate to redressing past injustices both in terms of participation in the mining industry and the national economy. The negative impacts of the sector cover the HSE hazards encountered by the miners and communities where the activities are taking place. There are also concerns around the percentage of undocumented foreign nationals that engage in the sector, the safety and security of the miners and communities as well as the issues of syndicates and high-order crimes such as kidnapping, drugs and human trafficking.

Table 9:13: The nexus between ASM and national development priorities

NDP's areas of intervention	Positive impacts	Negative impacts
Economy and employment	• Job creation and income generation • SMME development/expansion • Youth employment	• Exploitation of the miners by middlemen and syndicate • Illicit trading and revenue loss • Encroaching LSM operations
Economy infrastructure	• Miners investing back into their businesses to ensure mineral supply and access	• Damage to infrastructure • Re-opening of abandoned mines
Environmental sustainability	• Cleaning and rehabilitation of mine dumps	• Land degradation • Re-opening of abandoned mines • Increasing environmental liability • Use of mercury • Waste generation and poor disposal • Pressure on input resources
Integrated and inclusive rural economy	• Provides livelihoods to communities • Remittances coming to households • Stimulation of rural economies • Mineral supply for domestic purposes	• Influx of people and associated impacts • Safety and security
Transforming human settlement	• Miners affording to build their own houses	• Expansion of informal settlements • Increasing pressure on basic services
Improving education, training, and innovation	• Miners being able take their children to school • On the job training and skills transfer between the miners • Application of mining skills • Increase in entrepreneurship and business skills	• Children out of school because of lack of documentation for enrolment • Lack of technical mining skills
Promoting health	• Sound mental health that comes with the ability to make a living	• Exposure of the miners and communities to OSH hazards and diseases
Social protection	• Participation and empowerment of women • ASM income supplementing social grants	• Undocumented foreign nationals engaged in the sector
Building safer communities	• Reduced crime levels as more people make a living from ASM	• Conflicts and turf wars leading to fights and murders • Influx of people bringing crime into communities • ASM sites becoming hot spots for criminal activities
Building a capable state	• Self-organisation and the formation of associations and/or mining groups	• Illegality and working outside government regulations
Fighting corruption	• Avenue for addressing past injustices and ensuring increased participation of disadvantaged communities in the mining industry	• Syndicates benefit from revenue generated from ASM • Corruptions resulting from interactions with the ASM activities (i.e., police, government officials, employees of large-scale mining)
Transforming society and unity in the country	• Redistribution of wealth and empowerment of disadvantaged communities	• Divergent views on ASM and how it should be managed in the country
Positioning South Africa in the world	• Participation in ASM aligns with global and continental development frameworks (i.e., SDG, AMV, Agenda 2063)	• Exposure to criminal syndicates affecting the image of the country • Criminal activities linked to illegal immigrants working in ASM

9.5. Key findings and discussion

9.5.1. Impact of ASM on the miners

Based on the broader debates on ASM and poverty alleviation (i.e., *is ASM a subsistence or self-sustaining activity?*), the impacts of ASM on the miners were assessed in terms of poverty measures used to determine the poverty status of different population groups as well as their standard of living. The quantitative analysis was supported by direct submissions from the miners on whether ASM has improved their lives or not. From the results that were presented, the key findings are:

- Of the total miners, only 28% of the miners live below the subsistence (i.e., food) poverty line. It was found that most of the miners (i.e., 72%) are able to afford basic necessities from the income generated from ASM.
- Of the miners that are found above the FPL, a significant percentage (i.e., 39%) are located above the UBPL meaning that they can afford both food and non-food essentials required by their families.
- Another finding from the poverty assessment was that, in comparing the poverty status of the miners that were *previously* employed, it was found that while most of the miners earned higher in their previous jobs (i.e., most worked for large-scale operations which pay higher than ASM), the income generated from ASM has been able to maintain the socioeconomic status of most miners. The poverty status of only a few (i.e., 10%) regressed.
- In looking at the national poverty patterns and how it compares with ASM, it was found that while the poverty gap and severity as measured in ASM are higher than the national averages, the poverty status of the miners compares

better with the scores attained by the rural population. This may be because the income generated from ASM is higher than incomes from economic sources available in most rural communities, and the reality is that *some* rural households depend solely on social grants as the main source of income. In comparing the ASM income with social grants, it was established that while some miners earn relatively the same amount of money as received from social grants, they are able to supplement social grants thereby increasing their ability to meet the needs of their families. Some of the miners were found to make more money from ASM than social grants making ASM a potential intervention for poverty alleviation.

- Looking at the spending patterns of the miners, while most of the income is used for basic necessities and other household essentials, a considerable percentage of the miners indicated that, after covering essentials, they are still left with some disposable income, which they put away as savings. Some of the interviews were conducted during the COVID-19 lockdown when economic activities were restricted. The miners were asked how they were surviving during this period and a significant percentage of them (i.e., particularly from Ermelo and Carletonville) indicated that they had savings put away which they were tapping into to support their families during the lockdown.
- The second indicator used to assess the impact of ASM on the miners was the LSM. It was used to establish if ASM has improved the lives of the miners or not by comparing the material possessions of the mines before and after ASM. The line of enquiry was to establish if there was a change in living standards, the direction of the changes (i.e., whether positive or negative), and the extent of the change. The main finding was that LSM profiles of the miners before and

after ASM are different (i.e., except for Kimberley). Most of the miners fell under LSM 3 before engaging in ASM and after ASM, most of the miners are found in LSM 5 and LSM 6. Overall, there is improvement in the living standards increasing by 1 and 2 LSMs.

- In comparing the three study areas, the largest improvement was seen in Ermelo followed by Carletonville. In the case of Kimberly, the living standards of most of the miners remained the same. It was found that there is a direct relationship between living standards and working experience as well as income. The more working experience the miners have, the higher the improvement in their living standards. The higher income the miners generate from ASM, the more the improvement in living standards as they can afford to buy more things.
- Overall, most of the miners shared that their participation in the sector has improved their lives and those of their families. Some of the views expressed by the miners were that, through ASM income, they are able to make a living, meet the needs of their families, are able to take their children to school, able to buy assets (i.e., mainly furniture and cars), they were able to build own houses, and they were able to direct some of the income back into their businesses thereby increasing the prospects of more income.

9.5.2. Impacts of ASM on communities

The intention of the section was two-fold, *firstly*, to obtain insights on the impacts of ASM on communities as experienced by community members, and *secondly*, to use the submissions to gauge the level of acceptance of ASM by communities. The main findings as captured in the results are as follows:

- Community perspectives on the role of ASM in local economic development were mixed with some community members agreeing that ASM contributes to the economy, job creation, and that it has created the establishment of small businesses and has supported the expansion of existing businesses. The other community members submitted otherwise. For the latter group, ASM is seen as an activity that benefits only the people that work in the sector. These were mostly coming from Carletonville. In the case of Ermelo, the majority of the community members were in agreement indicating a positive relationship between ASM and community development.
- In comparing Ermelo and Carletonville, the difference in the community perspectives may be because, while both ASM activities take place outside the legal framework, gold mining (i.e., case of Carletonville) is *mostly* done in the shadows because of the fear of being arrested by the police. This is in terms of both mining and trading of the mineral. Due to the final use of gold, it only benefits the miners and those that purchase it from the miners. The strong link seen between ASM and communities in Ermelo can be attributed to the use of coal in the community and the ability of the miners to ensure the sustainability of supply to the community. Because of that, the contribution of ASM in the community becomes visible.
- On community livelihoods and well-being, again the views of community members in Carletonville were mixed. Some expressed that ASM activities improved the lives of the miners and had created a positive footprint in the community for small businesses. Some of the community members disagreed sharing that ASM only benefits the miners.

- On the issue of crime and links with ASM, it was argued that ASM is not responsible for the crimes reported in the community. Instead, ASM has contributed to the decline in criminal activities by providing income-earning opportunities, particularly to unemployed youth. While some agree with these sentiments, it was raised that ASM often attracts strangers in communities who may in turn be involved in criminal activities. The issues of turf wars and conflicts amongst miners were also raised by community members in Carletonville. Different views on the environmental impacts of ASM were also noted, with concerns raised in Carletonville on how these affect the safety of communities.
- While there are differing views on the aspects ASM, the general perspective is that government should formalise the sector's activities. This is in view of current impacts, both positive and negative as affecting communities.

9.5.3. ASM and the NDP

The links between ASM and the key areas of intervention as marked by the NDP were established. Most of the benefits of ASM are found in the areas of economy and employment, and rural economy and development. The other benefits that can be drawn between ASM and the country's development priorities are in education and training, social protection, and broader transformation objectives. The main negative impacts of ASM affect the following objectives: environmental sustainability, economy and employment, safety of communities, and health.

9.6. Chapter summary

The objective of the Chapter was to assess the role of the ASM sector in the country's development priorities. This was guided by the question, *does ASM have the potential to contribute to poverty alleviation and the country's socio-economic development agenda?* The evidence from the Chapter indicates that ASM is contributing towards the reduction of poverty in communities. By participating in ASM activities, the majority of the miners are able to provide for themselves and their families. ASM has also improved the living standards of most of the miners. The benefits of ASM extend beyond miners with communities are also benefitting from the sector's activities.

Several positive links were drawn between ASM, and the country's key intervention areas as set out in the national development plan. Also, negative links were identified taking into account the sector's characteristics. The conclusion from the Chapter is that the sector has the potential to contribute towards the country's development priorities. However, the challenges and associated negative impacts of the sector must be addressed for ASM to play a measurable role in the country.

CHAPTER 10: UNPACKING THE CHALLENGES IN THE ASM SECTOR

10.1. Introduction

The objective of the Chapter is to unpack the challenges in the sector to identify the factors that are affecting the development, growth, and contribution of the sector's activities in the country. As has been highlighted, there have been numerous efforts initiated to support the formalisation of the ASM sector as seen in various countries. While some of the interventions have achieved their intended objectives, the global landscape of ASM suggests otherwise as an indicator of the overall performance of the formalisation efforts. This is because of the persistent informality as 70 to 80% of the sector's activities still take place outside the required legislation⁵⁷. The concern regarding the landscape of ASM has also been linked to the current challenges seen in the sector, which mirrors most of the challenges that were identified some decades ago. The other issue speaks to the broader role of ASM and its contribution to socio-economic development priorities, which is still below the sector's envisaged potential in various countries.

In view of this evidence, recommendations toward ASM interventions have accentuated the need for a holistic understanding of issues in the sector and the connections between them. This perspective is in line with the importance of understanding ASM ecosystems to address the challenges and leverage the opportunities present in the sector. Within the framing of an ecosystem, ASM is understood as a socio-economic activity with multiple layers and connected activities, which influence its development trajectory

⁵⁷ For instance, it has been recorded that of the 4,134 gold mining operations in Colombia, 87% operate without mining licenses (See IGF, 2017).

(both directly and indirectly). As such, it is important to have a complete view of the issues in the sector as it provides a foundation for ASM interventions.

The Chapter is divided into two sections. The *first* section discusses the challenges as captured from the three study locations. The *second* section expands the discussion and brings forth broader perspectives on the challenges in the sector. This is taken from the practitioners' understanding of the ASM challenges. This separation of analysis was chosen because it allows for the identification of points of similarities and differences between the study locations and the broader landscape of ASM. It also assists in capturing the dominant issues, which may be found across ASM locations and may constitute a representation of the issues of the sector.

10.2. Challenges at the site level

10.2.1. Carletonville

The challenges faced by the miners in Carletonville converge into six areas and these are illegality, safety, and security, lack of cooperation, access to mining sites, police abuse, and extension services. Figure 10.1 provides a radar chart of the challenges based on the recurrence of the responses from the miners.

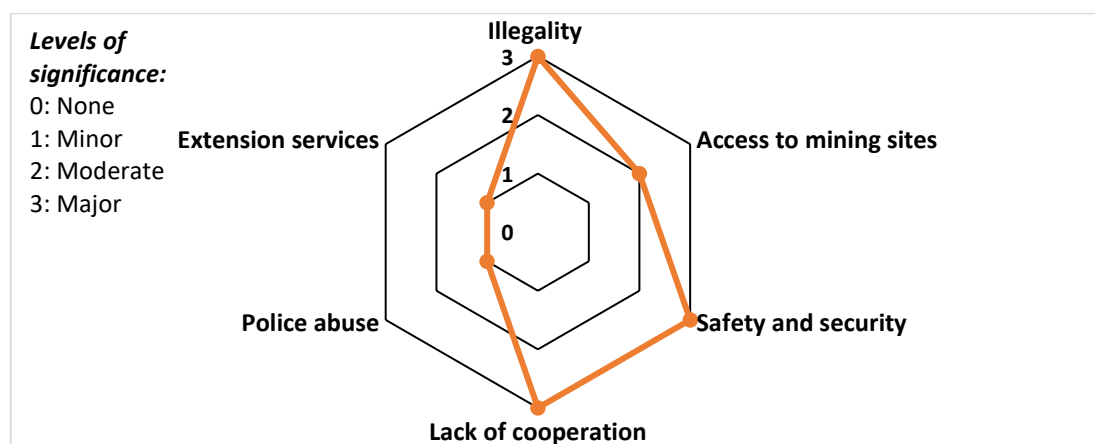


Figure 10.1: Main challenges in Carletonville

Amongst the main challenges faced by the miners are illegality and resulting impacts. This is in terms of the mining operations taking place outside the legal framework. Most of the miners are aware that the law requires them to have licenses to conduct mining activities. They understand that working without permission from the government makes their operations illegal and hence there is a possibility of being arrested if found by the police. As a result, they conduct their mining activities in hiding, *often* at night (in some locations) and in secluded areas because of the fear of being arrested. This was shared by one of the miners when asked about the challenges that they are facing:

What I don't like about zama-zama is that zama-zama, I don't do what government has permitted me to do. I do things in hiding, we work at night, we are being chased. When you look at where you are chased, there is no fence, no building, it is a bush. We are always being chased; I don't like that (Martin, interview, 21 July 2020).

In hiding from law enforcement, the miners have exposed themselves to safety and security risks. They raised that they have been victimised and targeted by people who commit crimes in the area. Another issue that they raised was exposure to clashes and fights among the miners. When asked about the source of the conflicts, the majority of miners pointed to “*Bo-ntate*” or “*Basotho*” as the instigators of most of the clashes. These are the names given to the miners who come from Lesotho. It was raised that “*Bo-ntate*” do not want to work and come to the mining sites with guns which they use to threaten other miners and take the material that they have mined. This is what Martin shared:

What causes the fights with Basothos is that Basothos don't like working for themselves, they want things to be done for them. When they find that you have

worked for yourself, they take the material to go use it. That is why there are fights because they are the ones fighting, they carry guns that are dangerous. Because we want to work, none of us carry guns, we go there to work, they make us work for them with their guns (Martin, interview, 21 July 2020).

A similar experience was shared by another miner who said the following:

When we go the mines, sometimes there are Basothos who don't want to work, they take our soil, they rape men, they beat you up, they say the mine is theirs. After working, they take the money they want because you have worked. After selling, they go with you and take the money they want. They tell you to come back and work because the mine is theirs (Robert, interview, 15 July 2020).

These experiences were shared by several miners that were interviewed. What also came out of the submissions was that the criminal activities taking place in the mines extend beyond the “*Basothos*” stealing and victimising other miners. The miners spoke about cases of assault, rape, and murder. For most of them, the biggest risks in ASM in Carletonville are the “*Basothos*” who carry guns, and the reality that they can get killed at any time.

The other concern raised by the miners was the lack of cooperation among the miners. This is also in terms of “*Basotho*” or other syndicate groups taking advantage of the miners. The miners also indicated that most of the mining sites are under the control of syndicate groups. For them to conduct mining activities, they have to work under the “*Basothos*”. This brings forth the challenge of access to mining sites where they must work under the control of syndicate groups or find alternative mining areas. Some of the miners have chosen to work in the community on the streets (i.e., they sweep the streets and remove the soil to recover the gold). While they are able to recover a few

grams (i.e., typically 1 to 2 grams per day), they indicated that the soil is not as viable as run of mine (ROM) from underground operations. And hence, as an area of intervention, the government must assist them to secure other mining sites.

The other challenge raised by the miners relates to their experiences with the police. A few of the miners shared experiences of being chased by the police and being threatened to pay bribes for working illegally. Some of the miners highlighted police abuse as a past experience and shared that they do not chase them anymore. One miner mentioned that there have been instances where the police assisted them to resolve fights at the mining sites.

The other challenges captured as the lack of extension services include the lack of machinery, Personal Protective Equipment (PPE), and medical supplies, and limited access to the markets as they sell to local buyers who control the price of gold. In view of the challenges experienced by the miners, at the core of interventions that were proposed by them, is permission from the government to operate within the law. The miners expressed that legalisation would address the challenges that they are facing at the mining sites. Mining licenses are expected to come with recognition of the miners, the work that they do, freedom of work, as well as safety and security.

The miners also highlighted the need for the government to clean up the mines and remove the people that commit crime and victimise other miners and communities. The miners also made a call to the government to provide access to mining sites where miners can work for themselves and sell their gold directly to the government. Some miners even shared that they would allow the government to take an agreed percentage from the sale of their gold if they receive assistance from them.

10.2.2. Kimberley

Most of the miners in Kimberley indicated that they are not experiencing any challenges, apart from theft and fighting among miners. These two came out as the main challenges as captured in figure 10.2. Several miners shared that their tools have been stolen by other miners. There were also concerns of fighting and quarrels amongst the miners and this was linked to divisions within the group.

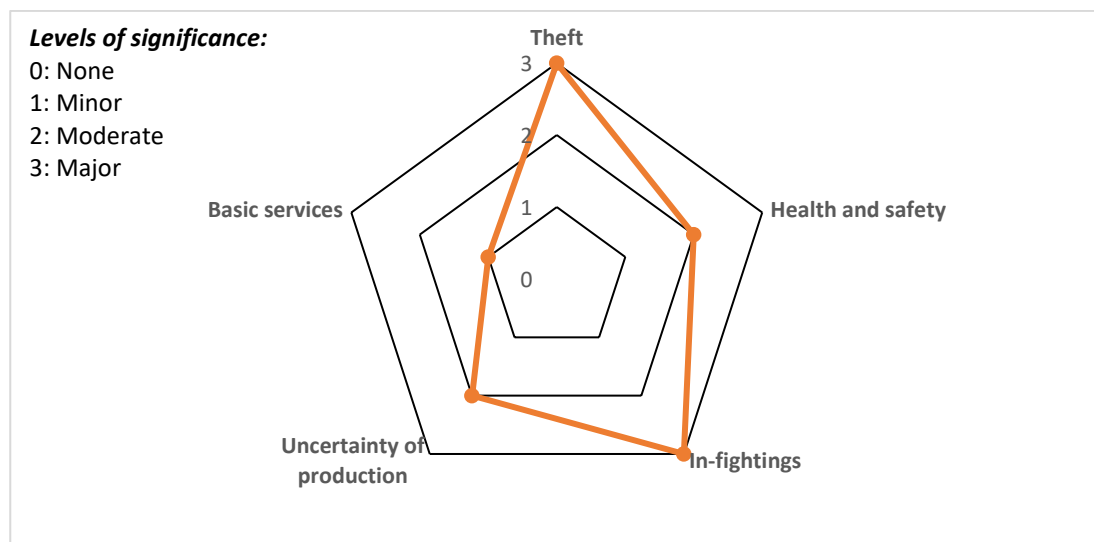


Figure 10:2: Main challenges in Kimberley

The other challenges raised by a few of the miners were health and safety issues and this is concerning their working conditions, namely, being exposed to dust, not having the correct PPE, and performing strenuous work. These challenges were raised mostly by female miners. The miners also spoke about the nature of diamond mining that there is no certainty in finding diamonds. They indicated that they could work for long periods without finding saleable diamonds.

As an area of intervention, the miners highlighted the need for sponsorship to be provided to them to cushion against times when they are struggling to find diamonds. The miners also requested equipment and machinery to increase production and chances

of finding stones. Some of the miners said that they need mining sites, with a suggestion of mine dumps to be given to them. It was indicated that the mining land where they are currently working is no longer viable as they are not finding diamonds. The other category of challenges was access to infrastructure and basic services, mostly water and sanitation at both mining sites and the camp where they are staying.

10.2.3. Ermelo

The challenges facing the miners in Ermelo are summarised in figure 10.3 below. The two main challenges are police abuse, and health and safety. According to the miners, the police come to the mining sites frequently to stop them from working and to make arrests. Most of the miners said that they have been arrested by the police and have pending cases with the court. During the arrests, they indicated that the police would confiscate their tools and the coal that they would have mined on the day. At times, they are forced to pay bribes to avoid being arrested.

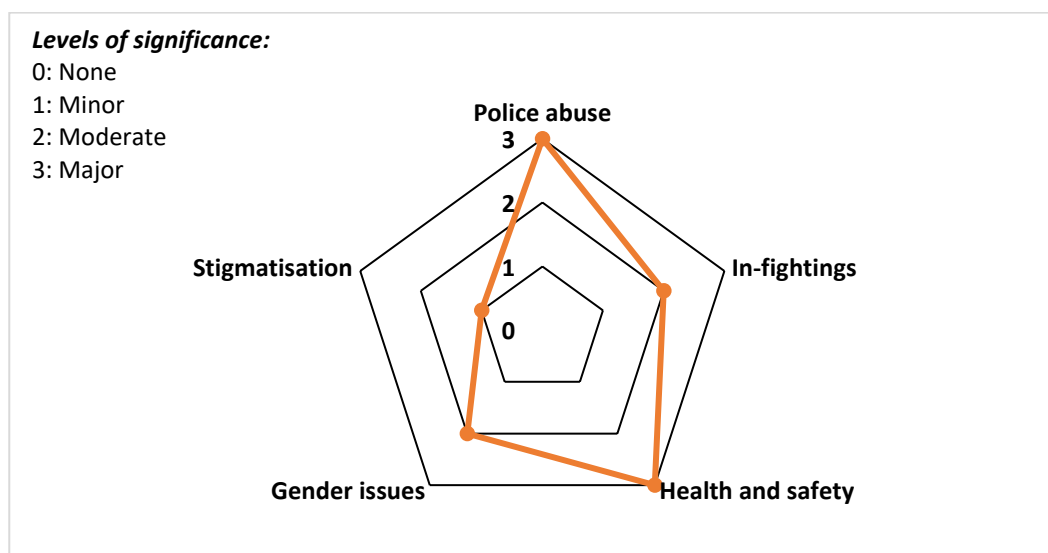


Figure 10.3: Main challenges in Ermelo

Another issue that the miners shared which has led to them being arrested is the land dispute over the area where mining is taking place. According to the miners, there are

“white people” who are claiming that the miners are working on their land. At the time of the fieldwork, this matter was with the courts. Health and safety concerns were also pointed out by the miners. This was in terms of the working conditions and the physical work that is required to mine the coal underground and transport it to the surface. The working conditions are worsened by dust, heat, and lack of ventilation. When asked about the dangers of underground mining, this was shared by Thulani:

We work at risk firstly, I have heard that there are areas underground that have gases, there is no oxygen underground, we haven't reached those areas. If you reach those areas, you die. I once worked in an area and when I was working, I couldn't breathe. They took me outside, removed my clothes, and poured water on me, then I came back. The older miners always tell us that we shouldn't put all our energy working because there is no oxygen. When you run a bit, you end up struggling to breathe, you are closed off, it is a risk (Thulani, interview, 13 July 2020).

Allowing ASM to take place in abandoned underground mines is one of the contentious issues surrounding the formalisation of the sector in the country. Some stakeholders are saying that government should not allow the sector's activities to take place underground. At the core of these debates are the health and safety concerns as they relate to the dangers of working underground. This concern was highlighted to the miners to obtain their views on health and safety. From the submissions, two responses were picked up. There was a group of miners that agreed that working underground is dangerous.

The other group said that they do not see the dangers associated with underground mining. The perspective of the miners is that there is danger everywhere and as such

the risks associated with underground mining are not reason enough to leave ASM. The other view that came out was that the need for a livelihood and to earn an income which outweighs the risks associated with underground mining. This was a response from one of the miners:

Yes, I can see that it is dangerous, but all the jobs have their own dangers, even nurses are in danger because of corona [Covid-19]. People who are in hospital are in danger because they could contract corona, more especially the police. They go to the streets and when they get there, they get injured. I can see the dangers, but there is nothing that I can do because I am able to make money and support my family (Victor, interview, 20 July 2020).

Another miner, Sifiso shared the same sentiments:

There is nothing that is not dangerous in the world. We can't say it is dangerous, when you go from one point to another. It is dangerous, even the white people were working underground, they were taking people underground. They didn't see that it was dangerous. There is nothing that is not dangerous, because they know that there is coal and it is like this, we do the safety that they did, just that we want to be united and find a person to take us forward, even corona can infect me. I am risking my life for my family, if I don't risk, my family will go to bed hungry on that day because I am the one who supposed to go see what is happening, that risk is facing me. I am the one that is responsible for the family. I am the breadwinner at home, you see (Sifiso, interview, 12 July 2020).

The other reasons provided by the miners were the working arrangements and rules that they have put in place to ensure that they safeguard their safety. This also came out in Carletonville when the issue of safety was posed. Some of the miners indicated that they

worked underground in large-scale operations before and hence are able to identify hazards and areas that are not safe. In the case of Ermelo, some miners have been appointed as safety officers and their responsibility is to assess working areas and identify hazards. During this process, they would barricade areas that are not safe and instruct other miners not to work in those areas.

The other points of safety that the miners rely on are the signage that they find underground indicating areas that are not safe. Some of the rules that they have underground are that the miners should not walk alone. They should always be in pairs or groups to assist each other in case of emergencies. The view from the miners is that, while these efforts assist in ensuring that they are safe, they need assistance in improving health and safety in the mines to ensure that they are working according to the required standards. This assistance should include training, provision of PPE, and technical experts to assess the working areas. The miners also mentioned that they need water and electricity as they currently bring water from home (i.e., for drinking) and they rely on torches to provide lighting underground. In explaining why, they need lighting, Victor responded that:

We need electricity because it is dark, you can't carry a torch on one hand and a shove on another, you can't hold a torch and you push a wheelbarrow at the same time (Victor, interview, 20 July 2020).

The other issues raised by the miners were in-fighting caused by stealing and also tensions arising from some miners not adhering to the rules. Some miners spoke about stigmatisation by the community. The miners shared that some community members

label them as “*nyaope*” smokers⁵⁸ because of the dirty clothes that they are *often* wearing after work. The concern is that this labelling can lead to them being mistaken for people who commit crimes in the community.

In terms of gender issues, as captured in the figure, the main challenges expressed by women working underground were safety and security concerns coming from some of the things that the male miners would say about them. The other discomfort that they shared was with regard to the male miners belittling them and discriminating against them because of the physical requirements of coal mining. With several groups comprising of only female miners, they have proved that they can do the same work as their male counterparts. The health of women is also a concern because of exposure to dust. The specific areas of intervention highlighted by women were the need for security, PPE, and the provision of medicals.

The other areas of intervention highlighted by the miners were the need for mining licenses and machinery. As was the case in Carletonville, illegality and operating outside the legal framework did not directly come out as a challenge facing the miners in Ermelo. It was raised as an intervention that is required to address the challenges that they have with the police. Their view is that with mining licenses, they will not be disturbed by the police and that land disputes will be settled. The other benefit of having mining licenses that they highlighted was that legalisation will come with health and safety assistance as well as security. The other points of assistance encompassed the need for machinery to enable them to increase their production and income generated from ASM.

⁵⁸ Nyaope is a form of drug widely used by young people in the country.

The need to access to market was also highlighted but more in terms of providing avenues to sell to “bigger” markets. The miners spoke about selling coal to nearby hospitals and correctional facilities. It was interesting to note that, when the miners allude to access to markets and government assistance, this is followed by a commitment to contribute to taxes. This came out as well in Carletonville with miners saying that, if the government provided opportunities to them to increase their revenue, they will be willing to pay taxes.

10.2.4. Combined challenges

Figure 10.4 combines the challenges as captured from the study locations (i.e., The challenges were thematised again resulting in the categories captured on the figure).

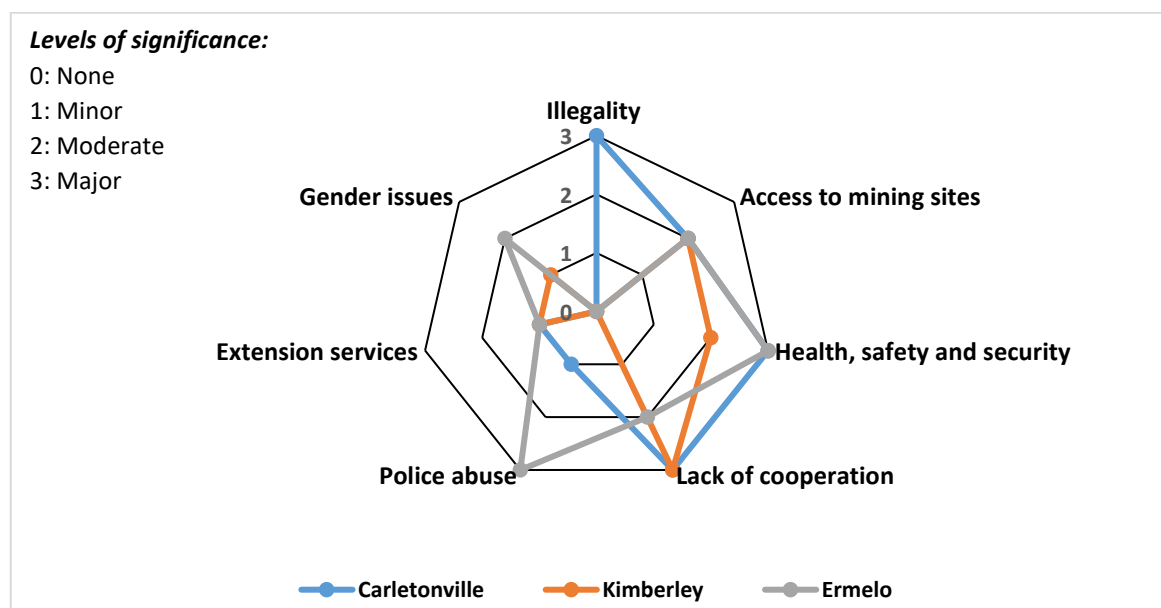


Figure 10:4: Combined challenges from the three study locations

From the figure, the issues that were identified as major challenges (i.e., which ranked third) include illegality, health, safety and security, lack of cooperation (in-fighting) and police abuse. Of these, health, and safety as well as lack of cooperation came out as the major concerns in the two study locations. In the case of Ermelo and Carletonville, the

issues around health and safety stem from the fact that mining takes place underground. However, in comparing the submissions from the two locations, the largest concern shared by the miners in Carletonville was the criminal activities that take place underground, which often results in assaults and murders. For Ermelo, the concerns concentrated on the working conditions and the intensiveness of the work. The similarity between the two locations was in relation to the perspectives of the miners on the dangers of working underground and how that has been accepted because of the need to make a living. That said, the miners in the two locations highlighted improving health and safety as an area of intervention. One of the key insights to note for consideration is the ability of the miners to identify hazards, make rules, enforce them, and train each other as it came out in Ermelo and Carletonville.

The other common challenge identified in all study locations was the lack of cooperation. This relates to the working relationships among the miners. The concerns that were highlighted included the miners fighting amongst each other, cases of theft and stealing of tools and victimisation. Some of these tensions are caused by groupings and/or divisions amongst the miners. The two other challenges that ranked high were issues of illegality and police abuse. On police abuse, the miners in Carletonville and Kimberley raised it as a challenge that they used to experience which has since subsided. In the case of Kimberley, this is because the miners were granted mining permits and hence permission to work on the mining sites. It is not clear why the situation in Carletonville changed because the miners are still working without mining licenses.

On illegality, while it was not raised as a challenge in Ermelo and Kimberley, it was highlighted as an area of intervention with the potential to address the challenges that the miners are facing. For example, in Ermelo, licensing was identified as a solution to

addressing police abuse as well as ensuring that they receive the necessary support to work safely and productively. Illegality in Kimberley was raised in terms of the renewal of mining permits which were close to expiry at the time of the fieldwork.

From figure 10.4, the issues that were raised in all study locations were access to mining sites and the need for extension services. For Carletonville, the main concern was mining sites being under the control of syndicates thereby restricting access to other miners to work. In Ermelo, it was the case of land disputes where the miners are working. In Kimberley, concerns were raised on the viability of the mining land where the mining permits were granted. The extension services as noted include equipment and machinery, PPE and safety supplies, training, access to markets, and basic services like water and electricity.

The last category of challenges captured in the figure covers gender issues. These were highlighted in Ermelo and Kimberley. In the case of Carletonville, all the miners that took part in the interviews were male, and hence gender-specific issues were not highlighted. The main challenges that were highlighted were health and safety concerns (i.e., the physical labour required when working underground, being exposed to dust and heat, working with rudimentary tools that are strenuous, and not having the appropriate PPE).

The issue of security was raised by the female miners in Ermelo with fears instilled by the comments coming from male miners about them. This same discomfort was raised during a focus group discussion with female miners in Kimberley, that they were not received well when they started working as miners. They indicated that the treatment changed as more women came to the camp to work as miners. Also, the experience changed as they interacted and worked alongside the male miners. Some of the female

miners indicated that they were trained by male miners to do the work, and this improved their working relationships. With an understanding of the challenges at the site level, the next section provides a more holistic understanding of the issues in ASM by bringing the perspectives of practitioners who are working and/or interfacing with the sector.

10.3. Broader perspectives on the challenges

Several challenges that were highlighted by the practitioners corroborated the submissions made by the miners. However, due to the broader engagements in the sector, more insights and associated causal factors were provided by the practitioners. From the submissions, the challenges in the sector can be grouped into two broad categories with three connecting layers. The two categories cover direct and indirect challenges. From the identification of similar characteristics, direct challenges are defined as factors that affect the entry and participation of the miners in the mining industry and consequently the development and growth of ASM as they relate to the benefits and the well-being of the miners.

The indirect challenges, on the other hand, include factors that affect the development and growth of the sector at a broader level. These include the shortcomings of interventions or support mechanisms put in place to foster the development of the sector. The indirect challenges also include “*broader*” challenges that result from the interface between ASM activities and wider stakeholders as well as the failure of interventions to manage the sector’s activities. This category of challenges, while it encompasses the impacts of ASM on wider stakeholders (i.e., communities where ASM activities are taking place), it is recognised that there are feedback consequences that affect the development of the sector. These *usually* manifest as negative perceptions

around the sector's activities affecting social license to operate and *more* broadly formalisation efforts and interventions. This classification is illustrated in figure 10.5 below.

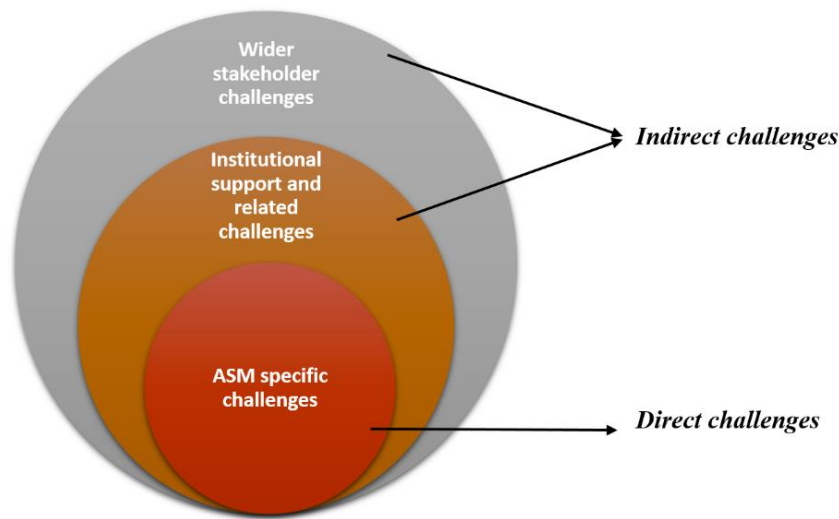


Figure 10.5: Classification of the challenges in the ASM sector

Source: Author's own, 2021

As seen in the figure, the second layer as defined above captures challenges related to the institutional framework. The outer layer captures the external environment which covers the impacts resulting from the interface between various stakeholders and ASM activities as well as the shortcomings of interventions to address the resulting impacts. The stakeholder challenges were captured from submissions made by communities and other stakeholders who are affected by ASM activities.

Based on the three categories of challenges, it is recognised that the participation, development, and broader contribution of the ASM sector do not only depend on addressing the direct challenges in the sector. It is also important to understand the barriers that affect support programmes and *associated* interventions because these have

direct links to the formalisation outcomes and the trajectory that the ASM sector takes. From the work that has been done (i.e., as seen in literature), most of the attention is usually on the direct challenges and how these can be addressed to support the development of the ASM sector. In most cases, it is found that the “feedback loops” that connect the outcome back to a particular intervention and ASM (i.e., the challenge that is being addressed) are not unpacked to understand the barriers from the implementation’s side.

The sequence of activities that is often followed includes identifying the challenges in the sector, making recommendations on the interventions that are required, the implementation of support programmes, and *some* monitoring and evaluation which directs the attention back to the ASM sector in terms of diagnosing successes and failures of the interventions themselves. It has been found that not enough attention is directed to understanding the mechanisms of the support programmes that may have affected the overall outcomes. As a result, diagnosing the challenges in the sector is usually linear and isolated from a broader understanding of the related factors that have considerable influence on the development and growth of the ASM sector.

In terms of the broad context, the institutional framework is defined as a “set of formal organisational structures, rules and informal norms for service provision” (Peters, n.d). The institutional framework is deemed to be a precondition for the successful implementation of interventions in a particular sector or project (Peters, n.d). As depicted in the figure above, the institutional framework is conceptualised as coming between ASM and the external environment. As a result, it also has a bearing on how the consequences of ASM affect the various stakeholders and the extent thereof. In this regard, failure to diagnose and address the shortcomings of the institutional framework

will not only have adverse impacts on ASM interventions but also on the wider stakeholders. These combined consequences can threaten the development and prospects of the ASM sector, and given the sector's externalities, several of the country's development priorities may also be affected. It is therefore important that ASM challenges (i.e., both direct and indirect) are understood holistically. The subsequent sections unpack the challenges in the sector according to the framework of analysis presented above.

10.3.1. ASM-specific challenges

As noted above, ASM-specific challenges are those that affect the entry and participation of the miners in the mining industry and have a bearing on the contribution and/or impacts of ASM on the miners and their well-being. Based on this description, the direct challenges converge into four thematic areas, which cover: policy and legal requirements, mining land and mineral resources, value chain constraints and related support, and attendant issues. The various issues are elaborated on below.

Policy and legal frameworks

From the submissions made by the miners, illegality came out as both a challenge and an area of intervention. Illegality as interpreted by the miners, is attached to working without government's permission and/or mining licenses. This means that the miners are aware that they need to have appropriate licenses to conduct mining activities. From the interactions with the miners, it was found that there is a willingness to work within the law and this is challenging the viewpoint that ASM operators want to remain

“informal” because of the benefits associated with the informal economy⁵⁹. A key insight from the research was that a considerable number of the miners want to operate within the law, and this is tied to the anticipated benefits of legalisation in addressing the challenges experienced by the miners in seeking livelihoods in ASM.

This finding has been made by other practitioners working in the sector. Based on this, illegality has been linked to the current legal framework and its shortcomings in terms of ensuring the participation of disadvantaged South Africans in the mining industry. The basis of the argument (as has been raised by several practitioners) is that the miners are willing to work within the law, but the legislation does not allow them to do so. This is because the legal requirements of obtaining mining licenses which are found to be excessive and beyond the reach of most of the miners (i.e., given their socio-economic status). At a broader level, the limited growth (as measured through the number of people working in the sector and the overall contribution to the economy) and the trajectory that the sector has taken have been linked to the failure of the legal framework to accommodate the ASM specific objectives as set out in the country’s mining policy.

The mismatch between the ASM sector and legal framework/requirements remains at the core of stakeholders’ debates. Specifically, as it relates to the MPRDA as the main legal framework responsible for licensing and *subsequent* entry and participation in the industry. Most of the issues that have been raised pertain to Section 27 of the MPRDA and accompanying requirements as stipulated in the National Environmental Management Act (No. 107) of 1998 (as amended in 2014). This is in terms of obtaining

⁵⁹ This perspective is grounded in the Voluntarist theory that describes the informal economy as consisting of entrepreneurs that choose to operate outside of the legal framework because this frees them from the costs associated with legal operations such as taxes (see Chen, 2012).

a mining permit and *subsequent* implementation. In order to put these concerns into perspective, figure 10.6 illustrates the mining permit application process. The figure shows the different stages of the application and highlights the bottlenecks/areas of concern affecting entry and legal participation in ASM.

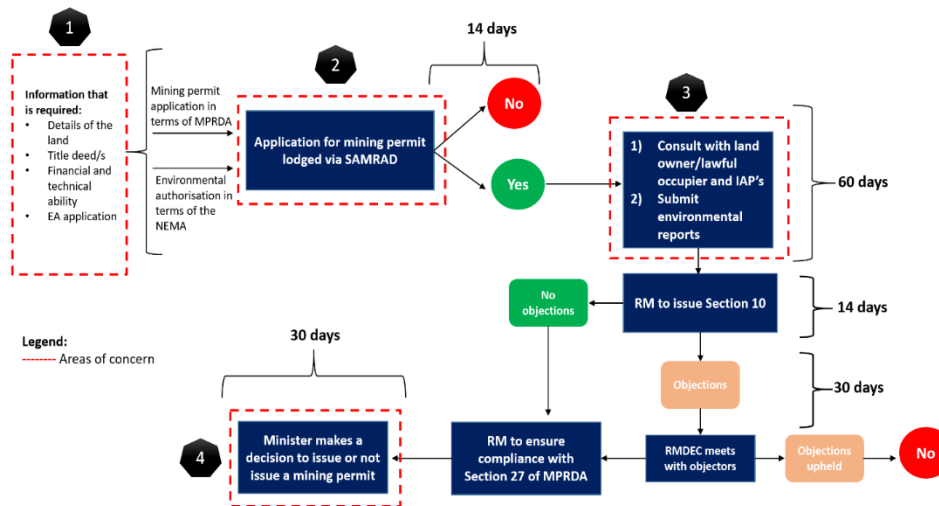


Figure 10.6: Mining permit application process

Compiled from MPRDA No. 28 of 2002 (See Government gazette, 2002)

From the figure, the application is done through an online system called the South African Mineral Resources Administration System (SAMRAD). This can be accessed through the DMRE website. The *first* stage of the application requires the applicant to submit two applications, i.e., for a mining permit⁶⁰ in terms of the MPRDA and environmental authorisation in terms of the National Environmental Management Act (No. 107 of 1998). The two applications are done simultaneously through the SAMRAD system. The information feeding into these applications includes details of the land,

⁶⁰ The MPRDA (i.e., South Africa's primary mining legislation) makes provision for two types of mining licenses: a mining permit and a mining right. Both licenses grant one permission to conduct mining activities in the country. Although not explicitly stated, a mining permit caters for ASM operations. It covers an area not exceeding 5 hectares, and it is valid for 2 years (i.e., it can be renewed three times, for a period not exceeding a year). A mining right covers an area of more than 5 hectares, and it is valid for 30 years (i.e., it can be renewed many times for periods not exceeding 30 years).

mineral, and type of operation. The applicant is also required to complete several documents that are uploaded with the application, and these include the financial and technical ability and the Environmental Authorisation (EA) documents. Once the application is lodged, it is reviewed by the Regional Manager (RM) located in the DMRE office where the mineral land is located. Based on the requirements stipulated in section 27, the RM can decline or accept the application. The outcome of the application is sent to the applicant within 14 days. If the application is accepted, the outcome is sent with instructions to submit public consultation and environment reports within 60 days.

The submission of the reports is followed by an announcement that calls for comments on the proposed mining operation. This is done in terms of section 10 of the Act. The public is given 30 days to make comments and raise objections to the project, if any. In cases where there are objections, these are taken to the Regional Mining Development and Environmental Committee (RMDEC) for investigation. If the objections are sustained, the mining permit application is rejected. Otherwise, the process proceeds. Once the RM has assessed all reports against the requirements in section 27, they are submitted to the Minister to decide on whether to issue the mining permit or not. In terms of section 41, it is during this period that the applicant may be required to make the financial provision for rehabilitation. This stage has been allocated 30 days. Based on the duration of the various stages, the process is supposed to take 6 months to be completed.

As seen on the figure, four main areas of concern have been noted across the application process. These include challenges at preparation, application (i.e., lodgement), within

the process, and at the end of the process. A brief discussion of the challenges is provided below.

- The *first* area of concern as raised by the practitioners is the requirement to appoint an Environmental Assessment Practitioner (EAP) as part of the EA process. The EAP must be registered with the South African Council for Natural Scientific Professions (SACNAP). This appointment is mandatory for the completion of the EA application. The concern with this is the cost associated with professional services, which most miners cannot afford. The requirement to appoint an EAP was part of the implementation of the One Environmental System, which aimed to streamline mining license applications as they require approvals from different departments.

With the single authorisation system, applicants are required to submit the mining permit application and the EA application at the same time (i.e., in the past, EA requirements were included in the mining license application). The separation of the two applications has resulted in additional costs⁶¹. As such, the increase in the cost of application and professional services are deemed to be barriers to entry. The implication of EA requirements has been noted by the DMRE. This is in evidence of the number of mining permit applications which were reported as declining. The DMRE has attributed this to the introduction of the One Environmental System and the lack of financial support on the part of the DMRE. As an area of intervention, the DMRE was said to be exploring the idea of shifting the cost of application to them to encourage participation in the ASM sector.

⁶¹ The EA application fee is ZAR2,000. This is non-refundable. Prior to the One Environmental System, the applicants were required to pay only ZAR100 application fee for mining permits.

- The *second* area of concern is associated with the SAMRAD system. This is largely in terms of the limitations on access to computers and the internet, knowledge, and ability to navigate through the system, language barriers (i.e., the system is only in English), and technical-related challenges when using the system. In consultation with the DMRE, it was mentioned that they assist the miners with the SAMRAD system. However, the challenge raised by the miners as feedback to that is travel costs to the DMRE offices which are located in towns and several kilometres from ASM sites.
- The *third* bottleneck is also related to the EA application and the environmental impact assessments and other specialist studies that are required in preparation for the environmental reports. There are two types of environmental authorisation that are linked to the mining license application. For ASM operations (i.e., mining permits), applicants are required to submit the Basic Assessment Report (BAR) and Environmental Management Plan (EMPr). For large-scale mining operations, the applicants are required to compile Scoping and Environmental Impact Assessment Report (S&EIR).

While it is acknowledged that the BAR is less burdensome compared to the S&EIR; the environmental studies and reports need to be completed by an EAP. The level of work depends on the type of mineral, the mining method, and the receiving environment. In some sites, specialist studies may be required to support the EMPr. The scope of work, therefore, informs the EAPs fees, which are estimated to range between R50, 000 and R100, 000.

- The *fourth* concern relates to the financial provisions for rehabilitation. The applicant is required to make financial provision before the mining permit is granted. There are no standard costs as the rehabilitation liability depends on the

environmental footprint of the mining operation. From the analysis of mine closure data (i.e., from the Northern Cape), the recorded financial provision for mining permits issued between 2005 and 2016 ranged between R3, 000 and R240, 000. This was for diamond mining operations (Tagne, 2018).

- The other concern that was highlighted (not depicted on the figure above) is the duration of the application process. The practitioners have noted that it usually takes more than 6 months for the process to be completed. In some instances, applicants have reportedly waited for *almost* a year for the initial outcome of their application. In this particular example, the practitioner shared that the outcome received was that there was an existing license on the targeted land. Transparency is another issue that was raised and the shortcomings of the country's cadastre system to provide immediate information on mining license applications.

The challenges with the legal framework extend to the implementation of mining permits once they are granted. This is to do with the provisions subjected to the permit. The practitioners have highlighted the limitations brought by the validity of the permit, the size of the mining area, and transferability conditions. The mining permit is valid for two years and can be renewed three times for a period not exceeding a year. The size of the area is 5 hectares, and the permit cannot be transferred, leased, or mortgaged. The submission on these conditions is that they have implications on the feasibility of ASM operations. In particular, the duration of mining permits is considered to be insufficient. This has been raised in terms of the time required to mine optimally and increase benefits from mining.

The other factor that has been highlighted relates to timing requirements that are *often* attached to funding. In this regard, the validity of permits is seen to affect funding prospects. The same argument has been raised in relation to the transferability of the permits or the lack thereof. The other provision (as noted) is the size of the concession. The limitation on this is made at the back of the exploitation of bulk minerals and those operations that are involved in both mining and processing. The view is that the permit area is not accommodative of the spectrum of ASM activities in the country.

It is important to note that the concerns raised about the MPRDA and NEMA extend to the other pieces of legislation that are applicable to the mining industry. Within the same arguments, the requirements imposed by other legal frameworks (i.e., in terms of health and safety, labour, trade, and others) have been labelled as being disconnected from the landscape of ASM activities in the country.

Overall, similar perspectives (as captured in the literature) came out of the submissions. Some of the views shared by the practitioners were that *policies and legislation are not friendly to artisanal miners; there is currently no specific regime that support the development of ASM sector; there is a need for a proper regulatory framework that is in tune with grassroots issues; current legislation is designed for large-scale operations, there is no need to impose macro objectives of national policy on ASM; mining permits are for SSM operations and not AM operations.*

The latter viewpoint was made in connection with the case of Kimberley where the miners were granted mining permits in 2018. At the time of the research, the representative cooperative (Bathopele cooperative) was in the process of renewing the mining permit. The sentiment that was shared was that the mining permits (i.e., as was granted), do not match the activities that the miners are conducting. There is also a gap

between ASM activities and compliance requirements. For this specific case, the mining permits were granted to the miners as a result of formalisation effort. The miners did not go through the legal process of obtaining the mining permit as they were assisted. The renewal of the permit is deemed to be difficult as they have to complete it themselves.

From the discussions above, it is important to look at the entire licensing process – *first* in terms of obtaining a mining permit, *second* as it pertains to the implementation of the permit (i.e., provisions), and *thirdly* in terms of compliance as it relates to safeguarding the exploitation of mineral resources but also as an input into the renewal process to continue mining.

Mining land and mineral resources

The challenges that were raised by the miners with regard to land and mineral resources touched on access, the viability of mining sites, and potential sites for ASM activities. These three issues were highlighted by practitioners as well. However, the submissions focused more on potential sites for ASM activities to facilitate the development of the sector and also as entry points to ensure the co-existence of the sector with large-scale mining operations. At present, ASM activities take place on both surface and underground, with miners working in abandoned mines, operating shafts, and on mine dumps. Some miners are exploiting primary deposits on the surface (i.e., taking place on private land, communal land, and areas that have been targeted for exploration). The location of most of the ASM activities is an area of contention and as such, several practitioners alluded to the need to identify mining sites for the miners. In this regard, the following were noted:

- With a considerable percentage of the ASM activities taking place in abandoned underground mines⁶²; this is an area of opportunity that both the miners and *some* practitioners have highlighted. The view is that South Africa has about 6,000 derelict and ownerless mines that have not been *fully* exploited and closed off properly when they were abandoned. The presence of the miners in these mines is taken as evidence that there are still minerals that can be economically mined. While this may be the case, there are divergent views in terms of allowing ASM to take place underground⁶³. At the core of this are issues related to health and safety.

The other concern that has been expressed is the violence associated with ASM activities making some of the sites dangerous territories. In acknowledging the risks associated with underground mining, practitioners raised that it should not be ruled out as an option for ASM development given the percentage of the activities that are taking place there. It was highlighted that the decision to allow underground mining (or not) should consider the health and safety requirements, the capacity of government to monitor and enforce regulations, and risks associated with underground mining affecting not only the miners but also existing large-scale operations. It was noted that some of the abandoned mines are connected to existing operations (i.e., especially in the gold mining), and this can pose risks to large-scale operations with the miners encroaching into their shafts.

⁶² Underground mining as practiced in ASM in South Africa takes place in abandoned mines as well as operational mines. At present, there are no known underground mining operations that are “newly” established where ASM is taking place. The use of underground mining as a suitable mining method in ASM sites has not been included in the debates that are taking place in the country.

⁶³ Underground mining as discussed only cover ASM activities that are taking place in abandoned underground mines. The questions on underground operations that have been developed by ASM operators (i.e., whether they should be allowed or not) were not covered.

- There are also ASM activities that are taking place on mine dumps and as such, exploitation of minerals from mine dumps has been identified as an opportunity for the sector. This was raised particularly in the case of gold and diamonds linking the two to the legacies of mining characterised by mine dumps. The view is that South Africa has mine dumps that are occupying significant amounts of land, which are not being re-mined or rehabilitated, and have adverse impacts on the health of communities. The envisaged benefits of allowing ASM to take place on mine dumps include land that is rehabilitated, reduced health, safety, and environmental impacts in communities, as well as economic benefits to both the miners and communities.

A pertinent issue that was highlighted with regard to historic mine dumps is ownership. The mine dumps do not fall under the jurisdiction of the MPRDA and as such, the government does not have authority over mine dumps (Leyden and Mametse, 2020). In terms of the law, mine dumps are movable assets that are owned by mining companies. The onus is therefore on mining companies to decide what they do with the dumps. In 2019, Petra Diamonds launched the ASM initiative at its Koffiefontein operations where it made available its Tailings Mineral Resources to support the formalisation of ASM in the host community. Amongst the issues that were highlighted by one practitioner (that need to be considered during mineral transfers) was community expectation around the viability of the resource and potential revenue.

It was raised that it is important to assess the viability of the dumps and *subsequently* share this information with the community/miners to manage their expectations. The need for a feasibility study and transparency thereof stems from the possibility that the dump may not be viable for ASM as it is for large-

scale mining. It was noted that the view amongst large-scale operations/companies is that mine dumps are temporary solutions that may lead to bigger issues affecting large-scale mining operations. This is among the reasons why mining companies are reluctant to transfer their assets to the miners because of the risks that may in turn affect their operations.

- This position has also been raised against proposals on the concessions relinquishment of concessions belonging to large-scale mining operations that are not exploited. The practitioners working in large-scale mining operations highlighted that the dominant view in the industry on releasing concessions is that this will lead to *more* illegal mining and associated risks that will in turn affect their operations. As such, there is little appetite from large-scale operations to release and/or relinquish their land. This position has also been raised against the failure of the government to regulate the ASM sector. As noted by one of the practitioners, the issue of illegality is a key differentiator in terms of what large-scale mining operations will support or not support. The other factor surrounding the release of concessions is the liabilities associated with environment, health, and safety compliance. It is understood that large-scale mining operations might have to take responsibility in terms of health and safety, environment, and social issues if they are to lease their mining concessions. It was raised that the MPRDA is not clear on how this will be dealt with, and this is seen in the arrangement between Ekapa mining and artisanal miners in Kimberly, which was not properly regulated and managed. This was in evidence of the challenges that the mining company experienced after the miners were given land and issued mining permits.

- The government's position on ASM and its role in the mining industry has been that the sector's potential lies in the exploitation of small deposits that are not viable for large-scale mining. This was raised in the submission as well when talking about how large-scale mining and ASM operations can both be accommodated and differentiated in the mining industry. The view is that there are mineral deposits that are not attractive to large-scale operations, and these should be earmarked for ASM development.
- Within the same discussions around the co-existence of ASM and large-scale mining and interaction thereof, some practitioners noted opportunities that are available in large operations relating to resource use and efficiency. In particular, they mentioned projects where waste is reprocessed, indicating that these projects should be earmarked for miners and communities. One practitioner gave an example of a mine tailings project that involves reprocessing tailings to recover minerals and produce other products (i.e., aggregate, bricks). These types of projects can increase the opportunities that are made available to the miners and communities.
- The other opportunities identified for the ASM sector are in the industrial minerals sector. These types of minerals are easy to mine and process and have considerable local markets to ensure the profitability of ASM operations. A map showing the distribution of the various industrial minerals and locations has been added in Appendix F. From the map, it is seen that there is a wide portfolio of industrial minerals that are found in all nine provinces. The DMRE has reported that most of the deposits remain untapped and this is an area that can foster the development and growth of the ASM sector in South Africa.

In summary, there are several opportunities for the ASM sector considering both the history and landscape of the mining industry. The availability and viability of the mineral deposits must be established before they can be earmarked for ASM development.

Value chain constraints and related support

In establishing the drivers of ASM, the main reasons for engaging in ASM activities was the lack of economic opportunities and the need to make a living. Having worked in ASM, most of the miners shared that they are able to provide for themselves and their families from the income generated from ASM activities. In comparing the three case studies, it was found that ASM income has a direct relationship with living standards and the improvement thereof. While ASM is a livelihood activity, it is still a business that is conducted to generate income. Like any business, the level of income depends on several factors that need to be in place to support the production process both in terms of the inputs and outputs of a business. Within this understanding, there are business elements that are important in ensuring that the miners maximise the income that they generate from ASM. Broadly, these cover various aspects such as finances, operation, marketing, knowledge and skills, and others.

The limited growth and contribution of the ASM sector have been linked to several value chain constraints (i.e., or the lack of business prerequisites). From the miner's side, these include equipment and machinery, inputs and supplies, basic services, sponsorship, and markets. The various issues raised by the practitioners can be grouped into five clusters, namely, finance and capital raising, operational challenges, marketing, skills and knowledge, and support and related services. These are summarised in figure 10.7 below.



Figure 10:7: Factors affecting ASM and its income-generating potential

The challenges relating to funding include difficulties in securing capital and/or credit. This is linked to several constraints affecting both legal and illegal operations. Amongst these are limited funding opportunities and/or platforms to access funding. In the past, the government established funding mechanisms to support the development of the sector. The funding was earmarked for use as rehabilitation guarantees, to purchase equipment, and cover operational costs (Ledwaba, 2017). The funding ceased in 2005

following the unsatisfactory performance of the support programme. In speaking to the DMRE representative, since then, the department has been exploring appropriate funding models to address the bottlenecks in the sector including the barriers brought by the cost of application (i.e., mining permit). With the lack of a dedicated funding platform, most miners depend on buyers and “sponsors” for credit. This can be in the form of loans, food, and input supplies needed for mining.

The concerns surrounding these relationships are that *some* of the buyers are part of criminal gangs and syndicates and as a result, they bring criminal elements into the sector. Due to the dual role played by the “sponsors” in terms of supporting production processes and providing a platform for trading, their relationships with the miners are often characterised by exploitation both in terms of mineral pricing and debt repayments. As a result, miners find themselves in a cycle of poverty which reinforces the dependency link between them and the “sponsors”.

As evidenced in the case of Kimberley, these relationships become difficult to escape. It was shared that, after the legalisation of the ASM activities, formal channels were established for miners to sell their diamonds at better prices. Some of the miners continued to sell their diamonds through informal markets even at lower prices. This was attributed to several factors with one being the established relationships between the miners and buyers, over and above buying and selling. It surfaced that the buyers assist the miners with loans to buy food and support their families when they are not finding diamonds. Because of these added benefits (i.e., which are not provided by the formal channels), they have chosen to continue to sell their diamonds through the black market.

The second category of challenges covers the operational issues which affect production outputs and income that is generated. Mineral availability was discussed in detail in the previous section. As the base of the operation, it has a direct impact on production outputs as well as the quality of the product which influence mineral prices. The type of equipment that the miners are using also affects production levels. The other challenges include the lack of input and basic services, technical capacity, and health and safety issues. The latter affects the location of mining (i.e., where mining can take place), the speed of mining (i.e., especially in underground operations where the miners need to be cognisant of the working areas and ensure that they do not over-mine in some areas leading to accidents), and intensity of mining (this is in terms of the ability of the miners to work under strenuous conditions).

One of the practitioners indicated that the success of projects is linked to market access and the availability of customers. These two factors are among the main bottlenecks in the sector. Most of the miners are dependent on local markets which comprise of few buyers. An example that was given was the case of Tiger's eye mining in the Northern Cape where there are three buyers whom the miners can sell to. These buyers are well known in the area, and they buy stones from the miners at cheap prices (i.e., because they have stronger negotiation powers) and export the stones to mostly China and India. The issues on mineral prices are linked to exploitation, involvement of middlemen and syndicates, and lack of knowledge on the markets and pricing, which lead to the miners obtaining low prices for their mineral products.

The other issue that was raised with bearing on access to markets and exploitation is the regulation of mineral trading. The bottlenecks highlighted were specific to Tiger's eye export license and the availability of the information to enable the miners to have direct

access to the international markets. It was indicated that the requirements of the export license are not clear and at present, only a few people are reported to have export licenses. The regulation of mineral trading was also highlighted in terms of the impact of illicit trading (i.e., lack of regulation and enforcement) on the income that the miners generate. It was also raised in terms of the restrictions imposed by *some* of the trading licenses that bulk buyers have.

The scenario that was painted was that a considerable number of buyers have trading permits issued under the Precious Metal Act (No. 35 of 2005). However, because of the barriers to entry in terms of buying and selling minerals from large-scale operations, the buyers have resorted to buying from ASM operations. This option is lucrative as buyers obtain precious metals at below-market prices. In unpacking illicit mining and trading in ASM, it is at this point (i.e., where regional bulk buyers are involved) where the delineation between informal and formal markets becomes unclear making it difficult to address illicit trading in the mining industry.

The lack of skills and training are cross-cutting issue with links to all the business prerequisites. The ability of the miners to conduct their operations optimally, access support, and capitalise on opportunities is linked to gaps in their training and skill set. The specific skills deemed important in supporting ASM operations cover the following aspects: technical and operational, markets, finance, management, entrepreneurship, and governance. The latter was proposed because of the conflicts and/or infighting amongst the miners, despite them having been organised into cooperatives. The other aspects that were highlighted were lack of knowledge brought by limited access to information, and training and mentorship.

The last category of the challenges (i.e., support and related services) is also applicable to most of the business aspects because it comes in as a “possible solution” with the potential to address the challenges in the sector. The main bottlenecks pertaining to support and related services are availability and access. The specific issues captured from the submissions were lack of financial and non-financial support (i.e., this is key in addressing financial, operational, marketing, skills, and training challenges), technical services and assistance (i.e., this is key in addressing operational challenges) and stakeholder buy-in. The latter aspect was indicated in evidence of a marketing project that failed because of the lack of stakeholder uptake⁶⁴. The issues relating to support and institutional framework are elaborated in the subsequent sections.

Attendant issues

Attendant issues encompass the consequences of the challenges in the sector affecting the well-being of the miners. Given the spectrum of the challenges, there is a wide range of issues that the miners experience and must deal with as a result of their participation in the ASM sector. These various issues as captured in the submissions are elaborated on below:

- Stigmatisation was raised as an issue by both the miners and practitioners. This relates to how the miners are perceived and treated in communities. This has been linked to the characterisation of the miners as criminals and the use of derogatory labels that are attached to the miners, which are often offensive and disrespectful. The stigmatisation as manifesting in the sector has been connected

⁶⁴ This was the Prieska Protocol which was established to support and increase the benefits of tiger’s eye mining by creating a marketing platform that will link the miners to international markets. Available: <https://prieskaprotocol.org/#:~:text=The%20Prieska%20Protocol%20is%20an,chain%20and%20support%20artisanal%20miners> [Accessed : 15 June 2020].

to illegality and how it is addressed in public. A combination of factors that include labelling the sector's activities as criminal, punitive arrests, inhumane working conditions, involvement of syndicates, and negative connotations— all these have contributed to the negative perceptions around the sector's activities and the stigma attached to the miners.

- Victimisation and abuse are amongst the main issues in the sector resulting from the interaction between the miners and police. The practitioners raised concerns about harassment and torture, punitive arrests, police stealing from the miners, police demanding bribes, and police forcing the miners to work. The victimisation of the miners is also at the centre of the risks associated with the involvement and control of the sector's activities by criminal syndicates.
- Several issues pertaining to the participation of women in the sector were also alluded to and these include challenges relating to gender-based violence, lack of social support and basic services, health, safety, and security risks. Amongst the insights that came from the case of Kimberley was the presence of a considerable percentage of women who are staying at mining camps and are not directly involved in ASM activities. Their association with the miners (i.e., through various relationships) exposes them to the risks associated with mining activities.
- The other issues that were highlighted relate to the complexities surrounding the participation of foreign nationals in the sector and *associated* vulnerabilities. These cover risks associated with immigration status and interaction with criminal syndicates characterised by forced labour, victimisation and abuse, and fear of arrests and deportation. The issue of child labour also came out in the

discussion with emerging evidence of children being pushed to work in ASM because of poverty.

10.3.2. Institutional framework and related challenges

As noted above, this category of challenges encompasses the shortcomings of the interventions and support programmes that were put in place to foster the development of the ASM sector. The submission from the miners and practitioners was that there is a lack of support in the sector, and this is affecting how the challenges in the sector are dealt with. The objective of this section is to connect back the outcomes of the programmes to the implementing agencies to understand the shortcomings underlying the unsatisfactory progress that has been made in the sector from their side. The issues raised by the practitioners who have been involved in the implementation of ASM programmes converge into eight thematic areas and these are elaborated on below.

National strategic direction – Linking the ASM sector to national development priorities is regarded as being important in ensuring the successful implementation of support programmes. To this end, national strategic direction is seen as a proxy of political will and the comprehension of the “bigger picture” in terms of how ASM fits into the Minister’s agenda and the country’s development agenda. Based on this interpretation, the unsatisfactory performance of ASM intervention has been linked to the failure of the DMRE to provide strategic direction in terms of what the projects should address, the roles and responsibilities of the different SOEs, and the relationships between each other to ensure that the outcomes of the project feedback to the national priorities and needs.

With an explicit directive from the DMRE, the view is that ASM projects would have received support from a wide range of stakeholders outside of the related SOEs thereby

increasing footprint and impact. Amongst the lessons learnt in this regard, is that, while interventions need to be informed by issues on the ground, they must also be aligned to national strategic objectives and there should be a clear strategy that supports the implementation of ASM interventions.

Coordination and collaboration between stakeholders – Likewise, it is important that the strategy defines the roles and responsibilities of the different stakeholders and the relationships between them. The lack of coordination and collaboration were singled out as other major challenges that affected the performance of support programmes. This was raised in terms of coordination and collaboration within and between government agencies. In explaining this, an example of the NSC programme was noted in that it provided avenues for collaboration as it comprised of various government agencies working on the same projects. As raised in the submission, this interaction stopped with the introduction of the SSM directorate in the DMRE which took the leading role in the implementation of ASM projects. This then led to cases where certain projects involved selected SOEs as opposed to an “extended team” as was the case in the NSC programme.

Several projects implemented by the DMRE were unsuccessful in this regard because only the Council for Geosciences (CGS) was involved in the implementation together with the DMRE. From the analysis that was made, it was indicated that the projects failed because some of the challenges were outside the CGS’s area of support and required inputs from other stakeholders. Likewise, in-house projects implemented by the different SOEs did not perform well because of the silo approach and lack of involvement of other agencies. The lack of implementation structure was also raised in terms of vertical coordination between SOEs and relevant departments at provincial and

local levels to support the implementation of projects. The submission is that ASM projects are affected by the lack of channels that are important in ensuring that there is adequate support, stakeholder uptake and knowledge sharing at implementation levels.

Related structures and representation of SOEs at the local level – Linked to vertical relationships and stakeholder involvement, the poor performance of ASM projects has also been linked to the lack of representation of the SOEs at provincial and local levels. It was raised that while the DMRE has offices in all provinces and CGS has satellite offices as well; the performance and sustainability of projects are also affected by inadequate monitoring and evaluation. This is because most of the SOEs sit at the national level with limited representation at provincial and local levels. While periodic site visits are included in the monitoring and evaluation plans, there are usually challenges that need immediate attention.

With the absence of supporting stakeholders, it becomes difficult to sustain the projects. As it stands, there are few organisations that have supported ASM projects at local level. Giving an example of the tiger's eye project, it was noted that most of the responsibility fell on Mintek as the implementing agency. The other stakeholders that were involved were the local municipality (which provided a building) and the National Youth Development Agency (NYDA) which provided funding to cover stipends for the beneficiaries. Outside of that, Mintek had to take the lead in addressing the challenges that emanated from the project, which covered a myriad of issues, some of which were outside its area of work, and some required local stakeholder attention.

Role of local municipalities – It was raised that projects that performed better were as a result of the involvement of local municipalities. While this was the case, very few municipalities have been involved in ASM projects. Some of the key challenges that

were noted regarding the role of municipalities relate to capacity issues and lack of knowledge and required skills to contribute to mining projects. The perspective is that these aspects have resulted in ASM activities being isolated at the local level. In talking to the practitioners working in municipalities, the limited role of the municipalities in ASM development was acknowledged. From their perspective, the competencies required to deal with the main challenges in the sector are outside of their mandate. This was specifically directed to the legal requirements as the main bottleneck in the sector.

To this end, it was noted that the exclusion of ASM projects from the Integrated Development Plans (IDPs)⁶⁵ was tied to the lack of capacity to deliver and the need for multi-stakeholder involvement. The view coming from municipalities is that they cannot put in projects in the IDP that they will not be able to deliver.

Funding and operational models of SOEs – On the issue of funding, it was noted that the funding allocated to SOEs was sufficient. This was raised in evidence of the research and development (R&D) budget that was allocated to Mintek (i.e., it was reported that there was a time when the budget allocated was increasing). The main challenges, as was highlighted, emanated from the conditions attached to the funding in terms of what it can be used for. It was indicated that the funding was solely for research and could not be used to set up ASM projects. As such, following research and the assessment of potential projects, Mintek was required to source external funding to support the implementation of the projects.

This created challenges in that, while most of the community projects that were identified were underpinned by the potential to contribute to poverty alleviation, they

⁶⁵ The Integrated Development Plans are g tools used by local municipalities for planning and implementation programmes aimed at socioeconomic development of their communities.

fell short in terms of their business case and prospects of being self-sufficient to survive beyond allocated resources and intervention. It was noted that this affected the level of stakeholder uptake and the implementation of projects. Amongst the factors that affected the business case of ASM projects was market access, which was outside the area of work of Mintek.

The other restrictions that were raised was the expectation to make profits from community projects and the top-down approach to the implementation where the funder will provide directives in terms of where the projects should be located. Using skills and training programmes (i.e., led by Mintek) as an example, it was raised that most of the projects that were implemented were not linked to existing ASM projects or the people that were already working in the sector. A considerable number of the people that underwent training were those that had an interest in becoming miners. The outcome of that was that only a few entered the sector and as a result, the envisaged impact of training programmes was not achieved.

Capacity and skills within implementing agencies – The capacity issues within implementing agencies were also highlighted in the discussion. Starting at the DMRE and moving across the various SOEs. This was also raised in looking at external agencies that are brought into projects for implementation. In particular, in talking to the practitioners working with the MQA, it was noted that training and skills development are affected by limited-service providers. It was noted that there are currently two service providers in their database that can provide the required training. The other bottleneck that was highlighted was the skills and knowledge of the personnel that are leading the implementation of ASM projects. Most of them have technical backgrounds which comes with an inadequate understanding of the social issues that

have implications on the needs of the miners. This then leads to social aspects not being integrated into ASM interventions with the consequence being the implementation of projects that are not in tune with the realities of the miners.

Implications of legal requirements – the legal requirements as barriers to ASM support and intervention also came out in the submissions. These were highlighted in terms of the implication of licensing (i.e., difficulties obtaining licenses and the time it takes for the government to grant mining permits) on the implementation and feasibility of projects. Giving an example of the Tiger’s Eye Beneficiation project, it was raised that the project was structured such that it will include all stages of the mining value chain. The project was funded on the basis that the establishment of the beneficiation plant will support mining activities as stones will be sourced from ASM operations as a way of contributing towards addressing the challenges facing the miners. To meet these objectives, amongst the first processes that were undertaken was the application for mining permits because it was a requirement that the ASM operations are legal. The project team struggled to obtain the licenses and hence resorted to sourcing Tiger’s eye from the few miners that already had permits. This affected the feasibility of the project and the overall impact in the community.

Scope of the ASM projects – The other oversight that was mentioned was the skewed focus on SSM projects as opposed to artisanal mining projects. It was highlighted that the decision to support SSM projects was based on the likelihood of impact in terms of the contribution to GDP, employment, and revenue generation. It was shared that the perception then was that the benefits associated with SSM projects will be a good story to tell, as opposed to artisanal mining that took place at a lower scale.

10.3.3. Wider stakeholder challenges

As is the case with other economic activities, ASM does not take place in isolation. As noted, the impacts of ASM activities can be positive and negative. For both outcomes, there are reverse links that can affect the sector positively or negatively. Within this view, it is important to capture and consider the impacts of ASM activities on various stakeholders as these have a bearing on the development of the sector through their influence on formalisation decisions and the outcomes thereof. ASM interfaces with a range of activities and stakeholders, both directly and indirectly. The two main stakeholders that have been affected by the sector's activities are communities where ASM activities are taking place and large-scale mining operations.

The perspectives of community members on ASM and various aspects were discussed in Chapter 9 (i.e., see section 9.3). The main issues that were raised were health and safety risks, security concerns, links with criminal activities, environmental impacts, social issues, and impacts on basic services. For mining companies, the various issues included impacts on junior mining and exploration projects, and specific challenges affecting large-scale operations. These include damage to property, the health and safety of employees, operational delays, and security of tenure. The other aspects that were highlighted were consequences on health, safety and environment obligations and compliance, and social license to operate as stakeholder relationships become affected.

10.4. Identifying areas of intervention

In unpacking the challenges in ASM, a range of issues were identified which affect the growth and contribution of the sector both directly and indirectly. Figure 10.8 provides a summary of the challenges based on the classification framework presented in the Chapter. The ASM-specific challenges cover those highlighted by the miners in the

three study locations and insights provided by the practitioners based on their interaction with the sector's activities. The issues raised from both ends link to each other with the major challenges facing the miners being; policy and legislation (i.e., the illegality of the activities), mining land and mineral resources (i.e., access, viability, and availability of mining sites), value chain constraints (i.e., extension services encompassing equipment and machinery, market opportunities and access thereof, skills and training, basic services), attendant issues (i.e., in-fighting, police abuse, stigmatisation, safety and security, and gender issues).

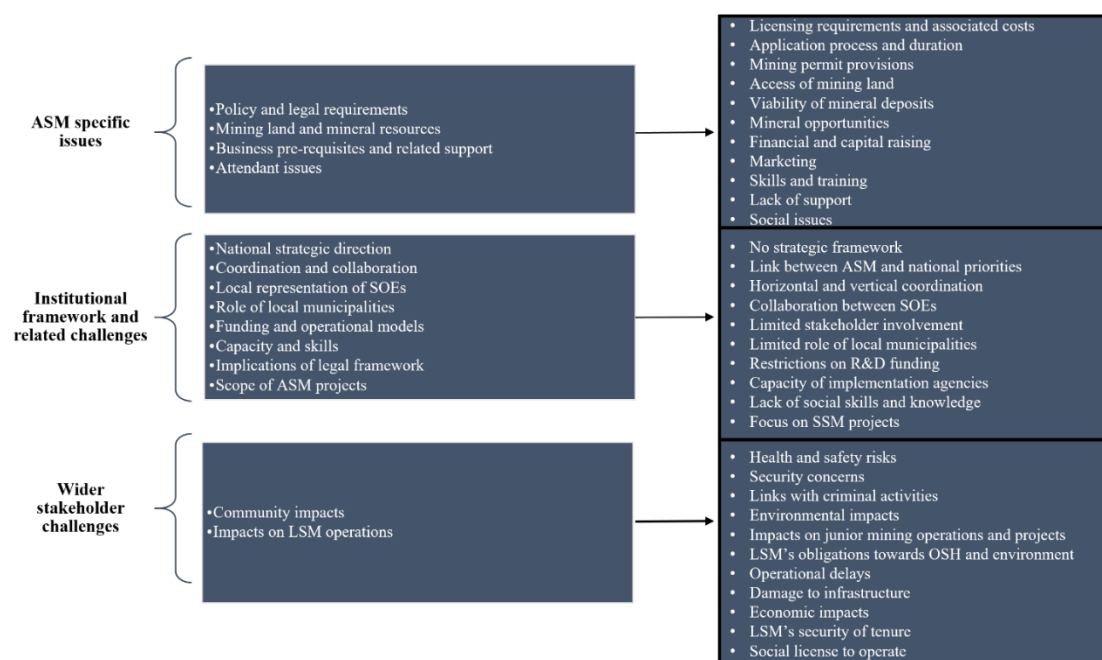


Figure 10:8: A summary of the challenges in the ASM sector

Source: Author's interpretation (i.e., from literature), 2021

The last two categories of challenges encompass aspects that indirectly affect the growth and contribution of the sector. This was marked in terms of the interventions that have been put in place to foster development and address the bottlenecks in the sector. The other link that was made was in relation to the consequences of the ASM

sector as affecting those that interface with the sector's activities (i.e., stakeholder influence and/or perception about ASM as underpinned by impacts of the sector). All these aspects have bearing on the growth and contribution of the sector and hence are taken as areas of interventions needed in the sector to ensure that the developmental potential of ASM is leveraged in the country.

10.5. Chapter summary

The need to understand the challenges in the ASM sector forms part of the second overarching goal of the Thesis which is to develop a strategy for the sector. The main challenges identified in the Chapter can be categorised into three, and these are those affecting the miners and/or ASM operations; institutional arrangements to support the sector's development; as well as those affecting external stakeholders who are interfacing with the sector's activities.

CHAPTER 11: DEVISING A STRATEGY FOR THE ASM SECTOR

11.1. Introduction

The objective of this Chapter is to develop a strategy for the ASM sector in South Africa. The strategy aims to provide recommendations on how the challenges in ASM can be addressed to leverage the developmental potential of the sector in the country. The Chapter comprises of five sections discussing the principles underpinning the strategy, elements of the strategy, proposed strategy interventions, and avenues to support the implementation of the strategy.

11.2. Principles underpinning the ASM strategy

Chapter 4 of the Thesis provided a discussion on the interface between ASM and development. One of the sections in the Chapter was a discussion on the ASM developmental gaps looking at the shortcomings of formalisation efforts in addressing the challenges in the sector. Several factors have been linked to the unsatisfactory performance of formalisation efforts and interventions. These factors can, broadly, be categorised into two aspects. The *first* is the poor understanding of the sector's activities. *Secondly*, the “disconnect” or “mismatch” between interventions and the characteristics of the sector and/or realities on the ground.

Leading from these two gaps, the proposed ASM strategy adopts the holistic approach to strategy formulation which embraces the importance of understanding the encompassing issues in the sector. The ASM strategy also adopts an integrated strategy approach. These two overarching principles are elaborated on below.

11.2.1. A holistic approach to the ASM strategy

A holistic approach to strategy formulation involves consideration of the whole sector, its components, and how they connect. Chapter 10 unpacked the challenges in the ASM sector, and these were classified into three categories: ASM-specific challenges, institutional framework, and related challenges, and *wider* stakeholder challenges. The basis of this categorisation was that the transformation of the ASM sector does not only depend on addressing the challenges faced by the miners (i.e., direct challenges). The indirect challenges resulting from the interface between ASM, and other stakeholders are equally important because they have a bearing on the transformation of ASM in South Africa.

This is particularly important, given the widespread focus on the negative impacts of the sector's activities. The feedback or perspectives drawn from the ASM-stakeholder interface influences how the sector is treated and managed. As such, it is important to look inside as well as outside of the sector to remove the bottlenecks affecting the realisation of the developmental potential of the sector. The ASM strategy takes from this perspective recognising that interventions need to be at the centre and takes into account the challenges in the section. Figure 11.1 is a broad illustration of the positioning of the ASM strategy.

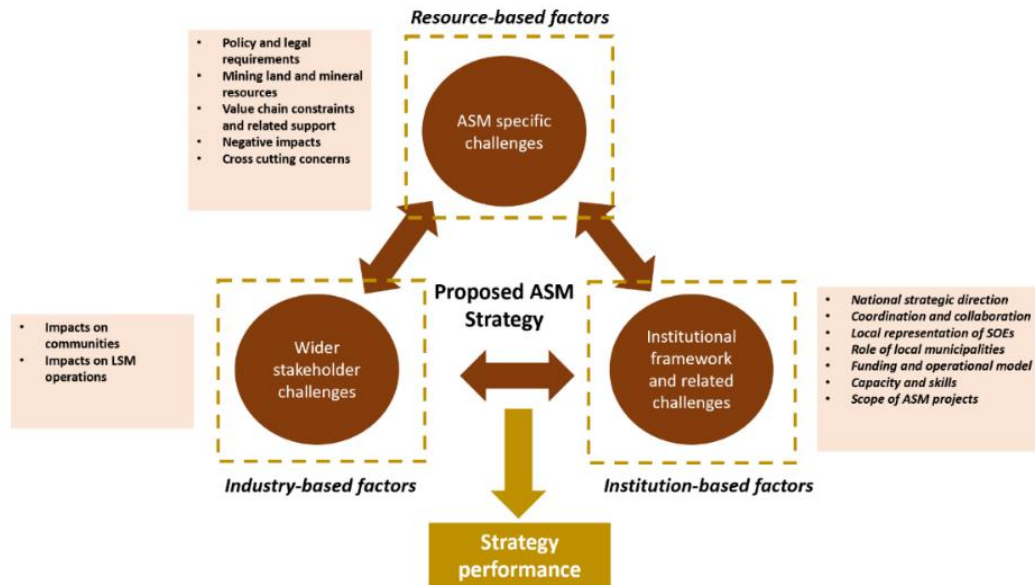


Figure 11:1: Positioning of the ASM strategy

Source: Author's own, 2021

This framing can be linked to the strategy tripod framework, which is a theory that hinges on strategy understanding and performance on three aspects, namely, industry-based, resource-based, and institution-based components (MacLennan and Olivia, 2017). The industry-based components include the conditions within the industry which influences the strategy performance of a particular organisation (Peng *et al*, 2008; Su *et al*, 2015). The model, therefore, accentuates the importance of understanding the external environment as a pre-requisite to positioning a strategy based on competitive advantage. The second component includes resource-based aspects which link strategy performance to the internal environment and specific attributes of the organisation (MacLennan and Oliva, 2017).

The resource-based component looks inward and advances that strategy performance is connected to capabilities and resources that are intrinsic to an organisation (Xie *et al*, 2011). As such, it is important to develop strategies that are in tune with internal

capabilities and resources. MacLennan and Oliva (2017) provided examples of resources including financial, physical, technological, human resources, organisational culture, and networks.

The third component encompasses institution-based views. According to Peng *et al* (2008), the institutional context sustains the strategy tripod because it brings the “rules of the game” that shape strategy performance. The institution-based model links the local institutional environment to strategy performance (MacLennan and Oliva, 2017). It is based on the premise that institutions influence interactions between organisations and the industry, and hence affect behaviour and overall performance of strategies. Institutions are described as comprising of an interconnected network of formal and informal rules that can be translated into legal, economic, and political systems (MacLennan and Oliva, 2017). These systems have a bearing on the quality of the operating environment on which strategy performance depends.

Institution-based factors also have a bearing on the organisational structure that is established to support the set strategy and its objectives. In this context, organisational structure encompasses the definition of roles and responsibilities and subsequent interactions in the implementation of a strategy. According to Peng *et al* (2008), the combination of the three aspects provides a holistic platform on which a comprehensive strategy can be crafted thereby resulting in improved performance.

This contextualisation can be matched to the categories of challenges in the ASM sector. From figure 11.1, the three categories of challenges are embedded within the three legs of the strategy tripod framework. The resource-based factors constitute direct challenges affecting the performance and contribution of the ASM sector. The industry-based factors cover the external environment, and the issues that emanate from the

interaction between ASM and other stakeholders. The institution-based factors capture rules and norms that surround how stakeholders interact with each other and how the working relationships and/or established working structure influence the implementation of ASM interventions. In line with the premise of the strategy tripod perspective, it is recognised that mechanisms of change depend not only on the miners and the challenges that they are facing, but also on the challenges that other stakeholders encounter in responding and/or interfacing with the sector's activities.

11.2.2. An integrated approach to the ASM strategy

The integrated approach (i.e., also referred to as mixed method approach, bidirectional or countercurrent planning approaches) is a strategy process that combines the top-bottom and bottom-up strategy options (Klein, 2000). The approach recognises the strengths and weaknesses of the two models and brings them together for optimal strategy planning and decision-making. Amongst the advantages of this approach is that it allows circular exchange between the top and operational levels. Bringing this to the context of ASM, as noted above, the dominant view in the sector regarding formalisation efforts is that most have had minimal impacts on the sector's transformation because of failure to incorporate the realities surrounding the sector's activities.

The “disconnect” has been linked to the top-down design of the interventions implemented in the sector. In view of these shortcomings, there are growing calls for bottom-up, and more participatory processes to ensure that ground-level issues and specific characteristics of ASM activities form the basis of interventions implemented in the sector. The view is that, through this process, interventions will be aligned to ASM issues, and this will lead to proper management of the sector's activities. While

this perspective is supported, it is important to note that ASM activities take place in a multistakeholder environment with other economic sectors. The South African case has shown the importance of considering the views and expectations of stakeholders that interface with the sector's activities.

Stakeholders' responses toward ASM have a bearing on how the sector is treated and managed. The consideration of the broad environment can be done through the government as an agent of public policy to ensure that the needs of various sectors/actors are accommodated for the benefit of the country. Through the same lens, the role of the government is important in ensuring that the ASM sector is afforded a platform through which it can benefit the country. For most countries, policy planning and decision-making take place at the national level. In view of this, the government's top-down processes are equally important in realising the transformation agenda of the ASM sector.

This is because these processes can create avenues through which the ASM sector can be linked to the national development agenda. Also, it is through top-down processes that sectors' roles are recognised and political will is afforded to the economic activities with the potential to contribute to the country's developmental objectives. The high-level support that comes with top-down strategic options also provides platforms for stakeholder recognition, which can lead to broader support for the ASM sector (i.e., it is at the national level where resources are partitioned to the different sectors in the country). In this regard, the ASM sector needs to align with countries' broader developmental objectives.

It is in view of the benefits of the two approaches that the ASM strategy is positioned in the integrated framework. Figure 11.2 provides a conceptual framework of the integrated approach as supporting the ASM strategy.

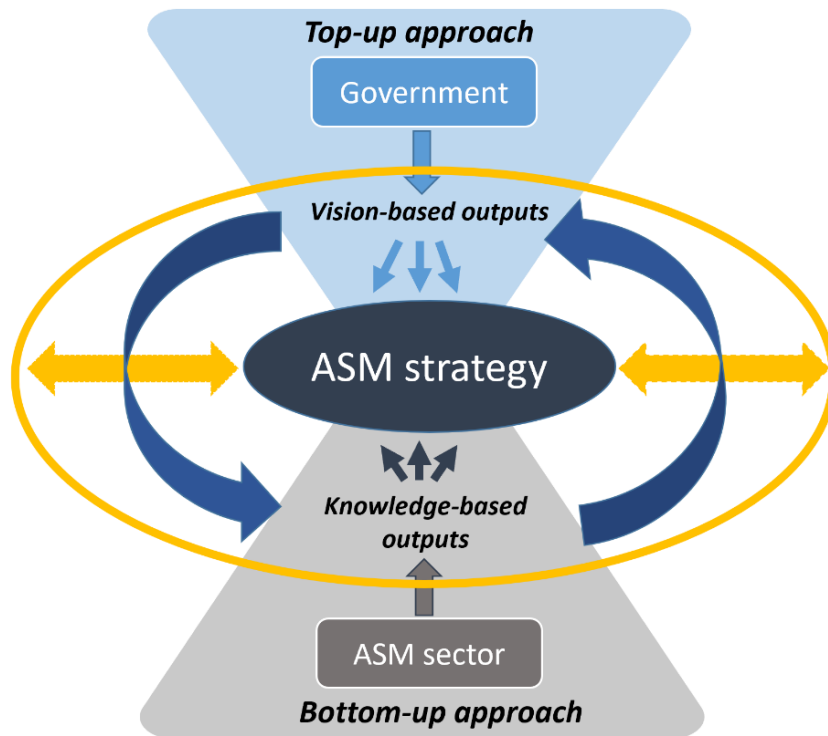


Figure 11.2: Integrated approach to the ASM strategy

Source: Author's own, 2021

As shown in the figure, the framework combines the top-down processes coming with country vision-based objectives with the bottom-up processes comprising of knowledge of the specific issues in the sector. The components that are critical to note in the framework are the side arrows (i.e., blue arrows) which represent the circular exchange of issues between the ground and top levels. These arrows highlight the importance of planning and decision-making taking place at the national level to consider the contextual issues in the sector, particularly when it comes to specific rules that are

targeted at the sector's activities. The same applies in the opposite direction for locally designed processes to consider national objectives.

The other aspects captured in the framework are the external environment and interaction with the ASM sector (i.e., these are illustrated by the yellow graphics). Through these components, the framework recognises the influence of the external environment and perspectives of various stakeholders in shaping the transformation of the ASM. As depicted in the figure, the external environment needs to be considered in building the knowledge base of the ASM sector as well as in the national, strategic objectives and expectations made towards the sector – as incorporated in the ASM strategy.

Lastly, there are two arrows connecting the ASM strategy and the external environment. These have been included to mark points of interaction between ASM and the various stakeholders. These arrows highlight the importance of integrating the ASM strategy outputs in the interventions implemented by stakeholders interfacing with the sector – these could be in terms of managing the impacts from the interface for *own* benefits and/or to contribute towards the sector's transformation agenda.

11.3. Elements of the ASM strategy

This section outlines the elements of the strategy and objectives as leading points in identifying the possible solutions and interventions to address the challenges in the sector. In strategy formulation, defining the objectives of the strategy is important because they provide a bridge between interventions and the vision that is driving the strategy. The strategic objectives also help establish boundaries that mark priority areas to ensure the realisation of the overarching vision. For the ASM strategy, the elements

of the strategy were crafted from the challenges identified in the sector. Table 11.1 presents the six elements of the ASM strategy with corresponding objectives.

Table 11:1: ASM strategic objectives

Elements of the strategy	Strategic objectives
<i>Regulation of the sector</i>	A legal framework that supports access and participation across the ASM value chain, provides for opportunities and benefits and addresses the negative impacts of the sector's activities
<i>Mining land and mineral resources</i>	Equitable exploitation of viable mineral deposits in ASM sector.
<i>Value chain constraints</i>	Value creation across the ASM value chain leading to the maximisation of benefits and contribution of the sector.
<i>Responsible practices</i>	Responsible practices within and outside the sector keeping to the objectives of the country's development plan and sustainable development goals.
<i>Institutional framework and support</i>	An institutional framework that recognises and supports the role of ASM in the country's development agenda and translates this into appropriate, well-capacitated and coordinated institutional arrangements in the sector.
<i>ASM stakeholder relationships</i>	Positive relationships between ASM and stakeholders that interface with the sector's activities.

Source: Author's own, 2021

Table 11.2. presents the identified elements with key questions to guide the identification of the appropriate interventions. Two lines of enquiries are provided in the table. The “*how-questions*” which guide “*process-related*” interventions and the “*what-questions*” which guide the “*application-type*” interventions.

Table 11:2: Elements of the strategy with lines of enquiry for potential interventions

Elements of the strategy	How questions?	What questions?
Regulation of the sector	- How to create a legal framework that ensures access and participation in the sector? - How to ensure that the legal framework creates opportunities and benefits in the sector? - How to ensure responsible mining in the sector? - How to balance the management of negative impacts with the promotion of access and participation in the sector?	- What approaches can be adopted to ensure access and participation in the sector? - What benefits and opportunities can be provided in support of legal participation in the sector? - What measures can be put in place to reduce the negative impacts of the sector on the environment and communities? - What approaches can be implemented to balance between the objectives of responsible mining and ensuring access and participation in the sector?
Mining land and mineral resources	- How to ensure that viable mining land is available to the ASM sector? - How to ensure equitable access to mining sites for the ASM sector?	- What approaches can be used to ensure availability and access to mining sites that are viable for the ASM sector? - What platforms can be used to make geological data available and accessible in the ASM sector?
Value chain constraints and related support	- How to address the bottlenecks across the ASM value chains? - How to create value across the ASM value chain?	- What mechanisms can be put in place to address the challenges across the ASM value chains? - What are the opportunities across the ASM value chain? - What mechanisms can be put in place to leverage the opportunities to increase value and benefits in the sector?
Responsible practices in the ASM sector	How to foster responsible practices in ASM while maximising the sector's contribution to developmental objectives?	What approaches can be employed to ensure the management of the negative impacts resulting from the sector's activities?
Institutional arrangements and sector support	- How to align the role of ASM in the country's development to support interventions in the sector? - How to increase the footprint and impact of support in the ASM sector? - How to ensure that there is an adequate administrative structure to oversee the development of the ASM sector?	- What approaches can be adopted that connect ASM support to national development priorities? - What approaches can be used to ensure that appropriate support is delivered in the ASM sector? - What restructuring measures are needed to improve efficiency in ASM service delivery?
ASM stakeholders' relationships	How to forge positive and beneficial relationships between ASM and other stakeholders that interface with the sector's activities?	What platforms can be used to provide feedback and exchanges between the stakeholders?

Source: Author's own, 2021

11.4. Proposed strategy interventions

This section discusses the interventions proposed to address the challenges in the ASM sector in South Africa. The discussion covers three aspects; a recap of the main challenges (i.e., with references made to Chapter 10), key considerations (i.e., aspects that need to be considered given the sector's contexts) and context-guided interventions (i.e., proposed interventions based on the challenges identified in the sector).

11.4.1. Regulation of the sector

Recap of the challenges and key considerations

The challenges relating to the regulation of the sector (or the adequacy thereof) converge into three aspects and these are access and participation, benefits and opportunities, and responsible mining. The *first* aspect (i.e., access and participation) encompasses the barriers to entry and the inability to fully participate in the sector. The *second* aspect (i.e., benefits and opportunities) covers the expectations that have been attached to the legality of ASM activities. This is both from the perspectives of the miners (i.e., raised as envisaged benefits expected to come with working within the law) and the government (i.e., interpreted as the potential contribution of the sector when working within the law). Amongst the expectations highlighted by the miners were access to support, access to mining land, and security/protection.

The *third* aspect captures the negative impacts of the sector and the management thereof. This has been raised in terms of the barriers of entry resulting from the requirements that have been attached to environmental management (i.e., this is from the perspectives of the miners). From the government's perspective, environmental requirements are important to safeguard the environment in keeping with the country's general laws.

The challenges results from the gap between the sector and the current legal framework. To this end, several perspectives noted in the submissions raised the importance of aligning the legal framework to the sector's characteristics. It was raised that legal requirements need to consider the landscape and spectrum of ASM activities. It was also highlighted that the legal requirements need to match the size and capacity of the miners and that they need to be developed from what is existing in the sector. Specific recommendations were also made toward the environmental requirements. It was noted that they need to be scaled down and take into account that there is a spectrum of ASM activities and hence impacts on the environment will differ.

The specific characteristics that are deemed important in making the legal framework suitable for the ASM sector (and needs to be interrogated in this regard) include; type and scale of activities, profile and socio-economic status of the miners, the inclusion of foreign nationals, working arrangements, drivers of ASM and type of miners (i.e. temporary versus permanent miners), type of minerals exploited, the locations where the activities are taking place, the actors across the value chain, and relationships thereof.

Context-guided interventions

Several recommendations were made in the submissions toward the objectives that the legal framework governing the ASM sector needs to meet. These objectives are summarised in table 11.3 alongside the aspects noted above. At the core of the legal framework is the licensing of the sector's activities. The key elements that need to be looked at against the characteristics of the sector are licensing requirements (i.e., how to become a license holder), licensing provisions (i.e., what license holders are allowed to do) and compliance requirements (i.e., what license holders are required to do?). As

the primary intervention, it is proposed that a licensing system that considers the characteristics of the ASM sector is established. The view is that a tailored ASM licensing system will provide a foundation for ensuring access and participation, addressing the negative impacts, and providing opportunities and benefits in the sector.

Table 11:3: Overarching objectives of the legal framework

Broad aspects	Overarching interventions
Access and participation	• There is a need for a legal framework that promotes access and participation of South Africans while also embracing inclusivity in the sector. • There is a need for a legal framework that supports access and participation of people with poor socio-economic status in the sector. • There is a need for a legal framework that accommodates access and participation of individuals, groups, cooperatives and/or any other form of organisation in the sector. • There is a need for a legal framework that recognises and caters to a spectrum of ASM activities considering the defining characteristics thereof.
Benefits and opportunities	• There is a need for a legal framework that maximises participation and benefits across the entire value chain. • There is a need for a legal framework that makes provisions toward institutional arrangements and support in the sector. • There is a need for a legal framework that maximises the contribution of the sector to the country's development objectives.
Responsible mining	• There is a need for a legal framework that fosters responsible practices in the sector. • There is a need for a legal framework that balances between access and participation and requirements of environmental management.

A six-step process is proposed to develop a tailored ASM licensing system. The process is depicted in figure 11.3 and the descriptions of the steps are provided below.

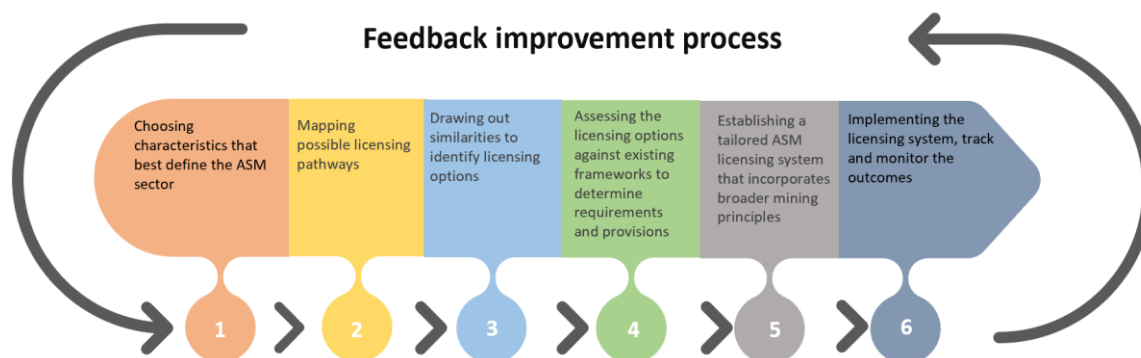


Figure 11:3: A six step process to identifying suitable licensing options

Source: Author's own, 2021

Step 1 – The first step in the process requires an understanding of the ASM sector. This is part of the knowledge base outputs of the bottom-up process (i.e., as noted in figure 11.2). In understanding the contextual issues in the ASM sector, the defining/unique characteristics of the sector can be extracted to serve as a base for identifying suitable licensing options for the ASM sector (i.e., considering the spectrum of activities in the sector). The dominant perspective (which has been re-emphasised in several Chapters) is that the characteristics of the sector have a bearing on licensing and *legal* participation in the sector.

To illustrate this step, the following characteristics are used to form the base of licensing options; type of operation, type of deposits, type of minerals, and working arrangements. In view of the ASM activities in the country, the type of operation covers surface and underground operations, and the type of deposits include primary and secondary deposits. Secondary deposits capture the sites where mining has already taken place (usually by large-scale operations) and the miners are working there. These include mine dumps, tailings, and floors (i.e., as the case in Kimberley). The minerals being mined by ASM in the country can be broadly categorised as high-value minerals

(i.e., gold, diamonds, semi-precious stones) and low-value minerals⁶⁶ (industrial minerals and construction materials, for example sand, sandstone, clay, salt etc.). In recent years, there has been an increase in the exploitation of chrome by ASM miners. Chrome and other base minerals (i.e., copper, zinc, nickel, and others) are categorised as having a lower value compared to gold and diamonds. However, rank higher compared to industrial minerals and construction materials. For the purposes of the illustration, they are categorised under high-value minerals. In terms of working arrangements, there is a continuum from miners that are working alone and those working in groups.

In addition to the technical characteristics of the sector, another aspect that needs to be interrogated and decided upon is who the applicant is. This is currently under debate with the question of *who the artisanal miners are or who should the artisanal miners be* posed. This question has also been raised in terms of interrogating the role of the ASM sector in the country equating this to who should participate in the sector and/or who should be targeted for ASM interventions. Two aspects have come out in current debates.

The *first* issue pertains to whether ASM should be reserved for South Africans thereby excluding foreign nationals or to develop a legal framework that accommodates both South Africans and foreign nationals⁶⁷. The *second* issue leads from the *first* area of debate and relates to whether ASM should be reserved for specific population groups

⁶⁶ Low value minerals are also referred to as Development minerals. These minerals are described as “minerals and materials that are mined, processed, manufactured and used domestically in industries such as construction, manufacturing, and agriculture (i.e., see <http://developmentminerals.org/index.php/en/>)

⁶⁷ This is in consideration that in most African countries, ASM is reserved for locals. The participation of foreign nationals is through joint ventures or shareholding that is set to ensure that the sector is dominated by locals (Ledwaba and Mutemeri, 2018).

in South Africa. It is important that these two aspects are interrogated and decided upon as the base of the legal framework and what it seeks to achieve.

There are mixed views on the reservation of ASM to South African nationals. Those who are in favour of restricting ASM to the country's citizens have linked this to the role of the sector in the country's development priorities (i.e., with references made to high unemployment and poverty levels amongst South Africans) as well as the apartheid redress agenda (i.e., the need to increase the participation of historically disadvantaged South Africans in the mining industry). There is another group of stakeholders that calls for inclusivity in the ASM sector and has raised that foreign nationals need to be included in the legal framework supporting ASM activities. This argument is raised at the back of the historic participation and discrimination of foreign nationals (through migrant labour systems) alongside South Africans. Some stakeholders are of the view that foreign nationals need to be included in ASM because they were also affected by past injustices.

While there are divergent views on the inclusion of foreign nationals, most practitioners are of the view that only foreign nationals who are in the country legally must be considered. On the second issue (i.e., reserving ASM to particular population groups in the country); this was raised in assessing the profile of the mining permit holders. The government's stance on the current legal framework governing ASM activities has been that the sector has been accommodated through the provisions of a mining permit. Though not explicitly stated in the MPRDA, the "lower requirements" attached to mining permits (i.e., compared to mining rights) were intentional to support the development of the ASM sector. Leading from this, the growth of the sector has been measured using the number of mining permits that have been issued.

To this end, the increasing number of permits has been used to support the arguments that the mining industry is accommodative of those engaging in ASM activities. It has come out that a considerable percentage of the mining permit holders do not match the profile of typical miners. As such, amongst the submissions is that ASM needs to be reserved to specific population groups in the country. References have also been made that ASM needs to be reserved to “poor people” or those with poor socioeconomic status.

The other submission was that ASM should be reserved for mining communities. The interrogation of these aspects will require an understanding of the sector’s activities, and as alluded, the envisaged role of the sector in the country. Examples of the factors that can be interrogated leading to the appropriate decisions are (i.e., these are taken from the findings of the study):

- There is a considerable percentage of both South Africans and foreign nationals that are engaging in ASM activities across the country. While this is the case, most of the foreign nationals are found in gold and diamonds, with few working in other minerals (i.e., those covered in the study). The type of mineral can be amongst the factors that are interrogated to decide on the participation of foreign nationals. The working arrangements in the sector also provide information that can be used to form the basis of the decision.
- On reserving ASM for *particular* population groups, the demographic profile of the miners can be used as a foundation to decide on targeted groups. Should the decision be taken to restrict the sector’s activities to *particular* groups, this will need to be clearly stated in the legal framework.

Step 2 – Once the defining characteristics of the sector have been marked, the next step is to map the licensing pathways. The licensing pathways in this context are possible routes that applicants can take to obtain mining licenses considering the spectrum of activities and characteristics defining them.

Figure 11.4 shows the characteristics noted above (i.e., these are marked in red) and the categories under each (i.e., marked in blue). The rationale is to map possible routes that people that engage in ASM (i.e., marked as applicant) are likely to take. This in essence marks the options that will need to be catered for in the licensing system to ensure that the spectrum of activities in the sector is accommodated.

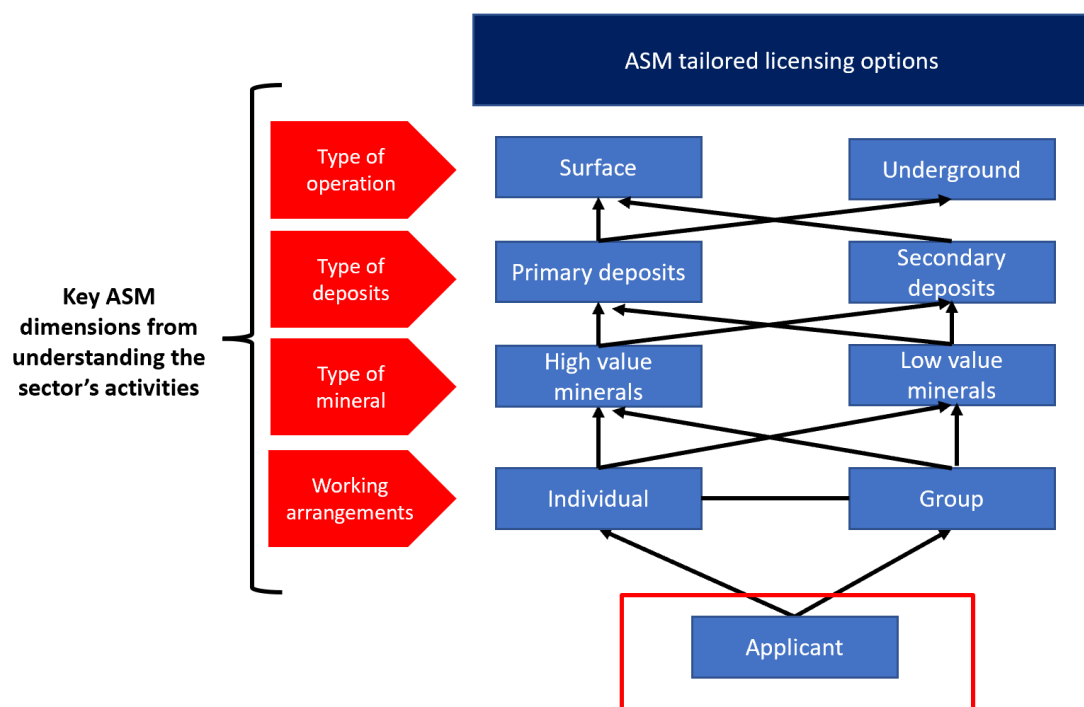


Figure 11:4: Process of mapping licensing pathways

Source: Author's own, 2021

Table 11.4 provides a summary of the licensing pathways as marked by the arrows in figure 11.4. From the table, nine pathways were captured. For example, pathway 1 captures an individual who is mining a high-value mineral from the secondary deposit on the surface. Pathway 6 captures a group of miners who are mining high-value minerals also from secondary deposits on the surface.

Table 11:4: Resulting licensing pathways

Pathways	Working arrangement	Type of minerals	Type of deposit	Type of operation
Pathway 1	Individual	High value minerals	Secondary deposit	Surface
Pathway 2	Individual	High value minerals	Primary deposit	Surface
Pathway 3	Individual	Low value minerals	Primary deposit	Surface
Pathway 4	Individual	Low value minerals	Secondary deposit	Surface
Pathway 5	Group	High value minerals	Primary deposit	Surface
Pathway 6	Group	High value minerals	Secondary deposits	Surface
Pathway 7	Group	High value minerals	Primary deposits	Underground
Pathway 8	Group	Low value minerals	Primary deposits	Surface
Pathway 9	Group	Low value minerals	Secondary deposits	Surface

Source: Author's own, 2021

Step 3 – Once licensing pathways have been mapped, the next step is to compare them to draw out similarities and licensing options that will accommodate the spectrum of activities ensuring access and participation in the sector, and defined boundaries that will enable the management of the sector. For the purpose of the illustration, working arrangement (i.e., type of applicant) and type of operation are taken as the two overarching characteristics. Figure 11.5 is an outcome of the assessment.

From the broad categories that have been selected, sub-categories can be included to further distinguish between the licensing options. Examples of the sub-categories are

included in figure 11.5. Once the overarching dimensions are extracted and sub-categories selected, the licensing options can be identified. From the assessment provided, three licensing options emerge. There is **license A**, which caters to individuals' applicants exploiting primary and secondary deposits on surface. There is **license B** which caters to applicants working in a group exploiting primary and secondary deposits on surface, and **license C** that provides for applicant working in a group exploiting primary deposits working in underground operations.

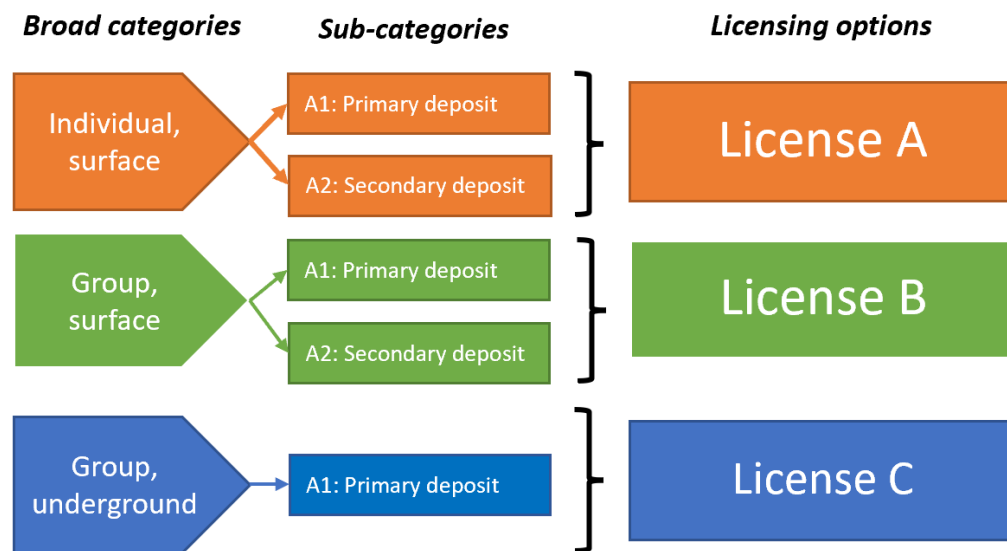


Figure 11:5: Licensing options for the spectrum of ASM activities

Source: Author's own, 2021

While it is acknowledged that there are individuals who work on their own in underground operations (i.e., this is captured in figure 11.4), the recommendation towards issuing an underground mining license only to the miners working in a group was informed by the nature of the activities and requirements thereof. These are underpinned by the need for the miners to work together to ensure that mining is

productive, and that the legal standards (i.e., in terms of health and safety, environment and others) are adhered to.

Step 4 – Once the licensing options have been identified, the next step is to determine the appropriate requirements and provisions of the individual licenses. Given that the licensing options have been developed from the characteristics of the sector, the base is that requirements and provisions as will be determined will need to consider the dimensions underlying the different licensing options. This step comes through as an outcome of the top-down process where the identified options are assessed alongside the general laws in the country. The purpose of this step is two-fold. *First*, it aims to ensure that the general laws as implemented in the sector consider the characteristics of the sector. *Secondly*, this step is important in ensuring that the sector complies with the general laws that are tied to the broader government objectives.

Step 5 – This step is an outcome of the previous step where a tailored ASM licensing system is developed. It is important that the licensing system not only aligns with the sector's characteristics but also with the general laws employed in the country that are governing mining activities. Figure 11.6 is a conceptual framework providing guidance on how to move from identifying licensing options to determining appropriate requirements and provisions in keeping with the general laws subjected to the mining industry (i.e., considering the nature of activities and impacts on the environment and surrounding communities).

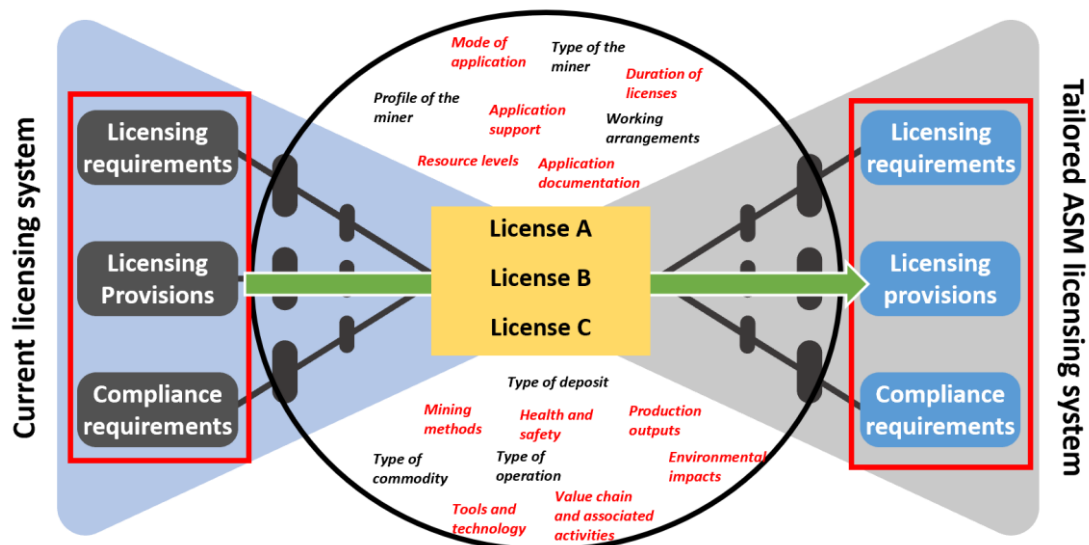


Figure 11:6: Key considerations in developing a tailored ASM licensing system

Source: Author's own, 2021

There are several components on the framework that is presented. The left-hand side depicts the current licensing system, and the right-hand side is the envisaged tailored licensing system. As noted above, the key aspects of the current licensing system that have been criticised are the licensing requirements, licensing provisions, and compliance requirements. The red block covering these three aspects are broader principles/general laws subjected to the mining industry in the country which needs to be considered in the licensing system. Moving from the left-hand side to the right-hand side requires consideration of the characteristics of the different licensing options.

The importance of the base characteristics as the foundation of the licensing options is that critical information can be extracted from them leading to the selection of appropriate requirements and provisions. The secondary information coming from the base characteristics are captured in red on the figure. For instance, the profile of the miner can provide input information that can guide decisions on the appropriate mode

of application and documentation that is required. Amongst the bottlenecks that were noted in Chapter 10 was the documentation required during the application process. It was noted that the several documents needed to be completed and the separation of the mining license application and the Environmental Authorisation application further complicates the process.

From the findings, it was highlighted that most of the miners only have middle school education. Moving from an understanding of the demographic profile of the miners, the process must be simplified to accommodate the majority of the miners. The other bottleneck that was noted that needs consideration of the profile of the miners is the SAMRAD system (i.e., the online portal used to lodge mining license applications). The suitability of the system needs to be looked at alongside understanding of the profile of the miners where information such as access to electronic devices (i.e., computers, laptops, smart phones) and internet, computer skills, language proficiency can be extracted and used as a base to determine appropriate system and/or avenues to lodge mining license application.

The other bottlenecks that will need to be interrogated alongside the characteristics of the sector (i.e., across the different license options) are the requirements attached to environmental authorisation. In particular, the costs associated with bringing in an EAP (i.e., Environmental Assessment Practitioner) and the completion of the Basic Assessment Report, which may require specialist studies depending on where the mining activities are taking place. There is also the requirement that the financial provision for rehabilitation must be made before a mining license is granted by the Minister. These EA requirements are deemed to be above the means of most miners.

Amongst the recommendations made on improving the regulation of the sector was that the environmental requirements needed to be scaled down to accommodate the ASM activities. The other recommendation that was noted was the need for environmental requirements to consider the different types of ASM activities and characteristics that have a bearing on environmental impacts and management thereof. While mining has negative impacts on the environment, the scale of the impacts differs across operations. The environmental impacts depend on several factors including type of mining operation, size of the operation, minerals being exploited, value chain activities, and the receiving environment. The last component covers aspects of the environment that will be affected by mining activities (i.e., water, land, atmosphere, biodiversity, and other components).

The other aspect to consider when deciding on the environmental requirements (i.e., outside of the technical components noted above) is the profile of the miners. It is noted that this should not be used as a basis for reducing the environmental requirements to a point where environmental management is compromised. It should, however, be taken into account when assessing the capacity of the miners to meet the set requirements and can be used as input in identifying the support that the miners will need to be able to meet the prescribed requirements.

A strategy option that has been highlighted as having the potential to ensure that ASM operations comply to the legal requirements, particularly those pertaining to environmental protection is the designation of ASM zones. Amongst the key features of this strategy is its ability to drive targeted support and create platforms for collaboration among the miners and other ASM stakeholders. This could be collaboration involving the pooling resources to support production, compliance of

legal requirements, and others. In providing for the designation of ASM zones in legal frameworks, provisions can be made to support and lessen the burden of compliance by ASM operations (i.e., for example, instead of the requirement for operations to submit individual EIAs/EMPs, the legislation can provide for aggregated EIAs/EMPs in designated zones).

The other aspects that will need to be interrogated alongside the characteristics of the sector as noted in Chapter 10 are the duration of the application process, licensing provisions, and compliance requirements once the license has been granted. The specific provisions that were deemed to be constraints include the duration of the license, size of the concession and transferability provision. The compliance requirements include obligations towards the environment, health and safety, labour, and other regulations. Without compromising compliance with the various laws governing the mining industry, the obligations set for the sector must consider the characteristics of the sector, and capacity of the miners to ensure compliance.

This is coming from the view that stringent requirements work against both government and the miners. On one hand, it becomes difficult for the miners to comply leading to the government's objectives not being met on the other end. Also, the compliance and enforcement thereof of the applicable laws are responsibilities of both the miners and the government as such it is important that roles and responsibilities as attached to the licensing options are clearly defined.

Step 6 – Once the suitable requirements and provisions have been determined, the last step covers the implementation of the licensing system alongside monitoring and evaluation. The feedback process must be supported by performance indicators to

enable proper assessment of the outcomes. These would include aspects coming from the bottom-up and top-up processes.

The benefits of the tailored licensing system are that the licensing options are grounded within the characteristics of the sector. This means that the prescribed requirements and provisions of the licensing options align with the characteristics of the sector thereby addressing the base challenges relating to the regulation of the ASM sector. In summary, devising a tailored licensing system for the ASM sector will depend on understanding the ASM sector and identifying base characteristics that best capture the spectrum of activities found in the country.

The process will require an exchange between the government, the miners, and other relevant stakeholders in mapping the licensing pathways, selecting appropriate licensing options, and deciding on requirements and provisions that are suitable to the different licenses considering the capacity of the miners, and where there are shortcomings, appropriate support mechanisms are identified to ensure successful implementations of the licensing system.

11.4.2. Mining land and mineral resources

Recap of the challenges and key considerations

The challenges relating to mining land and mineral resources include the availability of the mining land, viability of mineral deposits, accessibility of mining sites, land disputes and *associated* negative impacts affecting communities, large-scale mining operations, government, and other stakeholders. To these challenges, the following aspects need to be taken into account:

- ASM activities are already taking place across the country and exploiting a variety of mineral deposits that are accessible to them. There is an existing base of mineral deposits and/or mining sites where ASM activities are taking place;
- There is a considerable percentage of ASM activities that are taking place in abandoned underground mines. This reality is among the contentious issues in the sector with debates on whether to allow ASM activities to take place in abandoned mines or not. This question was posed to the key informants to obtain their views on this and how it can be tackled;
- The other aspects that need to be considered are the mineral opportunities that have been put forward as having the potential to support the ASM sector; and
- *Lastly*, as a source of negative impacts affecting various stakeholders, proposals on mining land and mineral resources need to consider the implications of mineral exploitation in particular locations on health, safety, security, and environment.

Context-guided interventions

The overarching interventions on mining land and mineral resources encompass the need to; (1) identify and secure mining sites for the ASM sector, (2) determine the viability and suitability of mining sites for ASM, and (3) ensure fair and equitable access to the mining sites. The process depicted in figure 11.7 is proposed as a framework for establishing a mineral base for the ASM sector. The process comprises of four components, which involve mapping potential mineral deposits and /or sites, assessing the viability and suitability of the deposits/sites, establishing a system to ensure fair access to the sites and management thereof, and *lastly*, dissemination of information on available mining sites. The four components are elaborated on below.

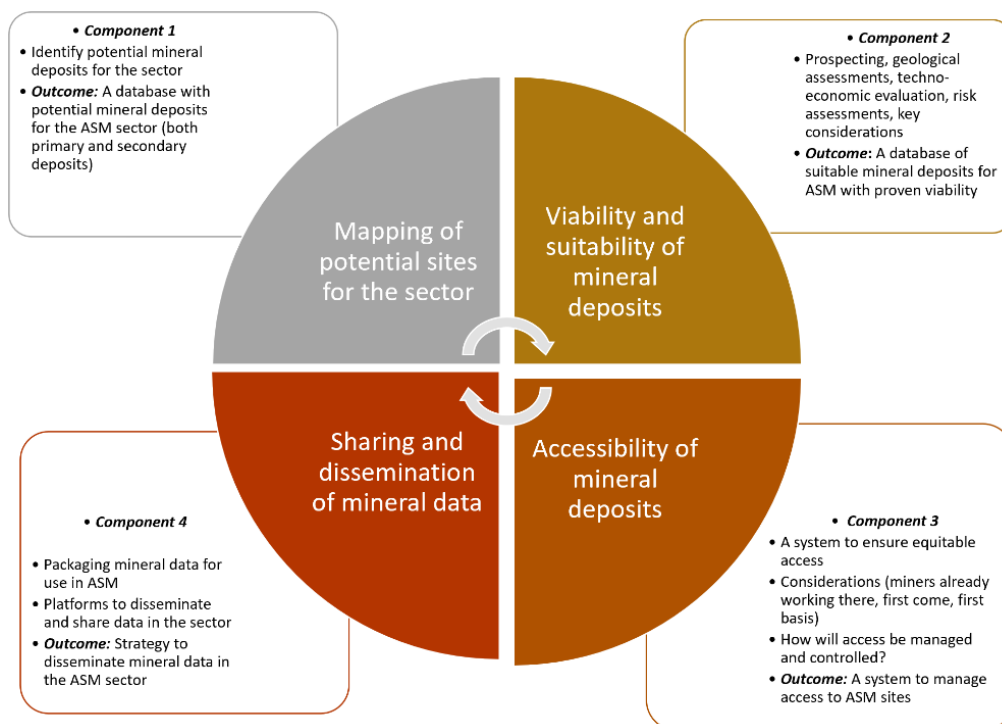


Figure 11:7: Establishing a mineral base for the ASM sector

Source: Author's own, 2021

Component 1: The starting point to creating a mineral base of the sector is mapping potential deposits/sites that can be worked by the ASM sector. This will require an understanding of the landscape of ASM in various provinces in terms of where the activities are taking place and the type of minerals that are being exploited. The process will also require an understanding of the geology and mineral opportunities that are available in various provinces. Sources of information that are important and should form the base of this component are records of past and current large-scale mining operations, exploration projects, derelict and ownerless mines, and mine dumps. The outcome of this component should be a database of potential mining sites that can be worked by ASM operations in the various provinces.

Component 2: Once a database has been created, the next process involves collecting information that is important in establishing the viability and suitability of the identified sites for exploitation by ASM operations. There are two aspects to note, the viability of the mineral deposits/sites and the suitability of the sites. The former aspect speaks to the ability of the miners to work the deposits to generate income that will support their livelihoods. This is considering the geology of the mineral deposits and how that affects mining, processing, and sale of the mineral product (i.e., this is from a cost/benefit perspective).

The latter aspect takes into consideration the receiving environment and the potential risks that will be associated with mining taking place in the identified locations. This aspect incorporates the negative impacts resulting from where ASM activities will be taking place. This is considering that there is an already existing landscape of mining operations and negative legacies that the mining industry and the country (as a whole) are trying to address.

This process will need to be supported by country-wide mapping and prospecting activities to collect the required input data. For the first aspect, technical information (i.e., geology, mining, processing, marketing) will be required to carry out the viability studies. For the second aspect, information on the hosting environment will need to be collected (i.e., data on the biophysical environment, the current and planned land use practices). The suitability of deposits to be worked by ASM operations will need to be assessed according to a framework developed by ASM stakeholders to define “*what is suitable*” considering all their contexts. The outcomes of this component should be, (1) a guideline/framework to assess the suitability of mining sites for the ASM sector, and

(2) a working database of suitable mineral deposits with proven viability for the ASM sector.

Component 3: Once a working database has been created, the next process will be to develop a system that will ensure that the available sites are allocated appropriately. This system should encompass information that will address the following questions - *how the sites will be allocated, how access will be granted, and how the sites will be managed*. These series of questions will need to be looked at alongside the potential strategy options that can be adopted considering the landscape of ASM activities, and broadly, the ability (i.e., of relevant stakeholders) to meet the requirements needed to operationalise the system and fulfil its envisaged objectives. In understanding the landscape of ASM activities in various provinces, specific questions may arise that will also need to be interrogated.

Example of questions may be *if identified mining sites should be reserved for ASM, if the sites should be designated as ASM areas, if mining sites should be reserved for locals (i.e., the miners coming from locations where the sites are found), or those that are already mining*. These questions will need to be interrogated when coming up with a system that will guide how the sites are allocated and accessed. Also, it is important that during this stage the requirements pertaining to accessing the sites and roles and responsibilities of the relevant stakeholders are defined. For example, the role of government and associated institutions in carrying out exploration activities to support the establishment of a mineral base for the ASM sector.

In developing this framework, it is also important that links are made to the different types of licenses as well as the overarching aspects of the regulation of the sector and institutional arrangements and related support. The outcome of this process should be a

system/framework detailing how the available mining sites will be accessed by the sector. Amongst the strategies that were pointed out was, again the designation of ASM areas as an avenue to address the challenges pertaining to mineral availability, access and viability.

Component 4: The last component of the process involves developing a strategy for sharing and dissemination of mineral data in the ASM sector. The key elements of the strategy should include packaging the data in the form that is understandable by the miners (i.e., considering the demographic profile of the miners), and identifying platforms that can be used to disseminate mineral data and associated information. The outcome of this process should be a dissemination strategy to ensure that the miners are aware of available mineral opportunities in the various provinces.

Operationalising the proposed framework will require a multistakeholder approach, where the different stakeholders bring forth the information that can be collated to create a database of potential mining sites for the ASM sector. The exchanges between the ASM stakeholders will also be required when developing a framework for assessing the suitability of mining sites for ASM considering the landscape of where the various sites are located. The proposed framework will also require dedicated funds, expertise, and resources to enable nationwide mapping and geo-prospecting activities to collect the data required to establish a mineral base for the sector.

Given that ASM activities are already taking place across the country, to initiate the proposed framework, a dedicated research programme will need to be established to assess the mineral opportunities noted to have the potential to support the ASM sector. These opportunities (as noted in Chapter 10) include derelict and ownerless mines, mine dumps, “dormant” large-scale mining concessions, small deposits not attractive to

large-scale operations, and industrial minerals and construction materials. These are elaborated below.

- ***Derelict and ownerless (D/O) mines*** – The submissions regarding the potential of D/O mines to support mineral exploitation in ASM take from the fact there is a considerable percentage of ASM activities that are taking place in these mines. The inference made by several practitioners is that these sites contain mineral resources that can be mined economically by ASM operators. There are mixed views regarding the proposal to allow ASM activities to take place D/O mines. While this is the case, the standing view is that underground ASM should not be ruled out because of the implication on the formalisation of the ASM sector. The recommendation coming from the submission is that an assessment of underground workings needs to be conducted to identify the sites that could be potentially worked by ASM operators and those that cannot be worked. The outcome of this study should include the classification of abandoned underground mines according to the criteria that would have underpinned the assessment. This will then form the basis of the decisions that are made regarding ASM and underground mining.

Several aspects have been noted that could form part of the assessment criteria and these are techno-economic aspects, health and safety risks, the government's capacity to manage operations, knowledge, and experience of the miners, environmental impacts, presence of criminal syndicates and

perspectives of communities, large-scale operations and other affected stakeholders⁶⁸.

- **Mine dumps** – The view on mine dumps is that the country has a large footprint of mine dumps that can be re-mined and re-processed by ASM operators. There are several issues regarding mine dumps which were discussed in Chapter 10. However, the main bottlenecks pertain to the ownership of the dumps and the provisions in the current legislation. Given that most of the dumps were created prior to the enactment of the MPRDA, government does not have control over those dumps. As it stands, the ownership and the decision to transfer them to ASM operators lie with large-scale mining operations (Badenhorst and van Heerden, 2018). Until there is a change in legislation, interventions relating to mine dumps must be facilitated through large-scale mining operations.

From the Petra diamonds' case study, several bottlenecks were noted, and these have a bearing on the decision made by large-scale mining operations. The *first* recommendation is that lessons should be drawn from the Petra diamonds case and secondly, through engagements between the government, large-scale mining operations, miners, and communities (other relevant stakeholders), a framework must be developed to guide the potential transfer of mine dumps to the ASM sector. The outcome of this framework should inform strategy options

⁶⁸ Rupprecht and Pieters (2018) have developed a framework that can be used to assess the potential of re-opening closed shafts for small scale mining. The framework looks at various aspects that need to be considered with the broad areas of assessment covering the evaluation of existing assets and available mineralisation, mine design, operational requirements, financial valuation, risk assessments, legal requirements, and aspects relating to social licence to operate. The conclusion from the study is that there is potential to re-open some of the abandoned gold mines to support small-scale mining, thereby creating benefits for communities and government. According to Rupprecht and Pieters (2018), many of the abandoned gold mines have mineral resources that could be exploited by ASM operators for 10 years. A recommendation coming from the study is that research needs to be commissioned to determine the available mineral resources and potential for exploitation considering the characteristics of small-scale mining in the country.

as well as the provisions that may be required in law to support the formalisation of the ASM sector. A finding from the submissions is that, while the government does not have control of mine dumps, there are dumps whose owners are unknown. In support of the allocation of mine dumps to ASM, the government can make decision on the dumps that do not have owners⁶⁹.

- ***Large-scale mining operations that are “dormant”*** – With some ASM activities taking place in mining sites that belong to large-scale operations, among the recommendations made is that these sites should be demarcated and given to the ASM sector. Similarly, to the mine dumps, this proposal needs to be explored with large-scale operations given the provisions of the current mining legislation. There is an example case study (i.e., Petra Diamonds’ ASM Initiative) that can be used to draw lessons and provide a base for engagements between large-scale mining operations, government, and miners. In addition to legislative requirements, the technical aspects that will have a bearing on the ability of the ASM operators and the required capacity and capability to work deposits that had initially been earmarked for large-scale mining need to be interrogated.
- ***Industrial minerals and construction materials*** – These types of minerals are considered suitable for the ASM sector because of the ease of mining and processing as well as availability of the local markets for the products. A considerable percentage of the miners are already exploiting these minerals. It

⁶⁹ Amongst the recommendations in the Mineral and Petroleum Resources Development Act (as amended in 2013) was for government to extend the definition of residue stockpile to include waste generated by historic mines as well as dumps created before the implementation of the Act (DMR, 2013). In doing so, the government would have control over the management of historic mine dumps. As it stands, the proposed bill was withdrawn for consideration by Parliament in 2018. With an increasing number of ASM activities taking place in historic mines as well as mine dumps, it is expected that this recommendation is brought forth for consideration by the government.

is therefore recommended that a targeted strategy framework be developed to ensure that the ASM sector becomes more involved in the mining value chains of industrial minerals and construction materials.

- ***Small deposits not attractive to large-scale mining operations*** – References have been continuously made to “small deposits” that can be mined by ASM operators. Feeding into the assessment of mineral deposits that are viable and suitable for the ASM sector, a database of these deposits must be created.

11.4.3. Value chain constraints and related support

Recap of the challenges and key considerations

The value chain constraints encompass three areas, and these are challenges that affect the income generated from the sector’s activities, opportunities in the sector and support mechanisms available in the sector. The income generated in the sector is a factor of production output and market arrangements (i.e., saleability of the mineral product). Several factors have an impact on the production, and these are mineral deposit being worked, capital and operational costs, skills and knowledge, tools and equipment being used, supporting infrastructure, resources, and inputs, and working arrangements and relationships. The factors affecting the saleability of the mineral product include availability of buyers, access to buyers, knowledge of markets, relationship with middlemen and buyers, and the presence of criminal syndicates in the sector.

The second area which encompasses the opportunities in the sector covers linkages that the sector has with other actors/sectors which have the potential to maximise benefits and contribution of the sector to poverty alleviation. The third area speaks to the support (or lack thereof) in terms of addressing the challenges facing the miners and leveraging the opportunities in the sector.

Amongst the key aspects that the proposed interventions need to consider is that there are other actors that participate in the ASM value chains (i.e., that support ASM activities). The interventions in the sector need to recognise the linkages in the ASM sector and consider the different actors involved in the sector, whether directly or indirectly. It is also important that the interventions take into consideration the relationships/networks that exist in the sector.

There are mixed views in terms of how to deal with the relationships in the sector. Some of the submissions are proposing that the relationships between miners and middlemen or miners and buyers should be dismantled, and this is taking from the exploitative nature of these relationships resulting in the miners receiving minimal benefits from the sector's activities.

The other viewpoint on this, is that there is a need to recognise the role that these relationships play and the avenues that they provide which currently "support" the sector and ensures that the miners generate some income. The premise is that these relationships have the potential to support the value creation prospects in the sector if included in the formalisation of the sector. Because of these varying insights (i.e., which both have merit), the interventions in the sector must understand the types of relationships/networks that exist in the sector.

This is understanding in terms of the role of these relationships in the sector, how they affect benefits and potential contribution of the sector in the country, which relationships are beneficial to the sector or have the potential to support the sector, and which ones hinder the sector. These aspects will assist in unbundling the criminal-illegal-informal constructs that are used to characterise ASM activities. Distinguishing between these categories and classifying ASM activities and relationships accordingly

will provide a base that informs responses that are taken and interventions that are implemented in the sector.

Context-guided interventions

The proposed intervention to address the value chain constraints encompass establishing support programmes that will; (1) align to the needs in the sector, (2) leverage the opportunities in the sector, (3) cater for the different actors that are involved in the sector (i.e., whether directly or indirectly), (4) be accessible to the sector, and (5) foster collaboration and build networks to maximise benefits in the sector. Figure 11.8 provides a framework that can be used to identify the specific “areas of support” or “support programmes” needed in the sector.

The framework starts with the need to understand the value chains of the minerals exploited in the sector and the requirements thereof. These are requirements in terms of production (i.e., see factors of production) as well as the sale of the mineral product (i.e., see factors that affect the saleability of the mineral products). Using these requirements as a base, the next process/stage is to assess the status of ASM operations (i.e., looking at different mineral commodities). The outcome of this assessment will be identifying the bottlenecks in the sector - across the different stages of the value chains.

The other output of this stage will be an understanding of the linkages (i.e., downstream, upstream, side stream) in the sector. In building an evidence base on the linkages, it is important to collect data on the actors that are involved, benefits obtained from ASM, type of relationships, and the current and potential role in ASM. An assessment of the bottlenecks in the sector must consider the need to understand the specific challenges, the extent of the challenges, how they affect performance (i.e., production/sale of the mineral products), existing avenues of support, value chain relationships etc.). A key

aspect to note in the framework encompasses the opportunities for collaborations, which may be identified from understanding the networks surrounding ASM activities. The outputs of the assessment of the bottlenecks and potential opportunities will feed into identifying areas of support which will form the basis of the institutional framework and arrangements that are put in place to support the sector.

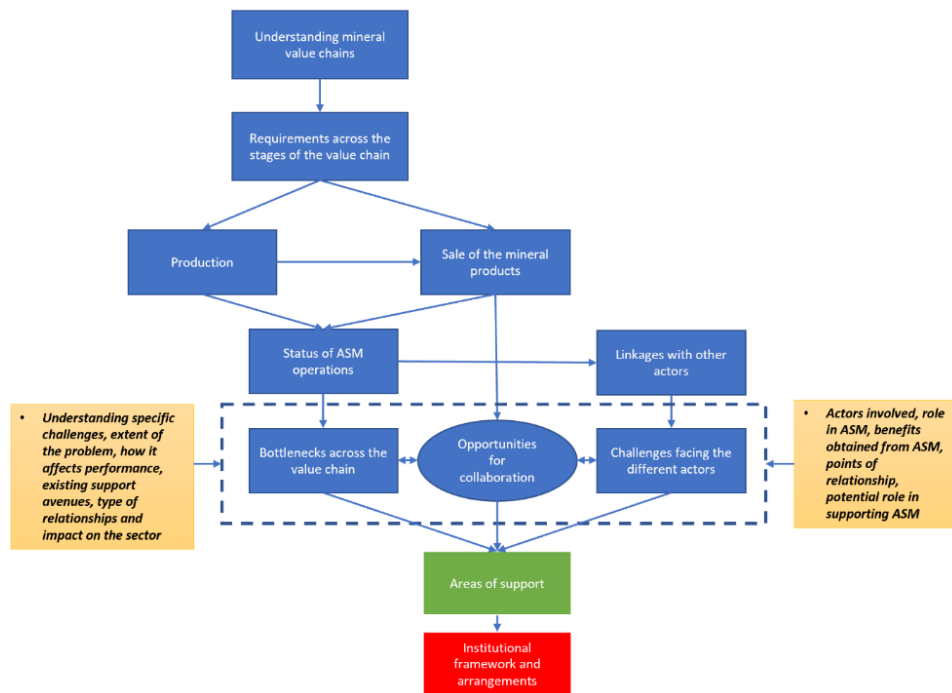


Figure 11:8: Framework for ASM support

Source: Author's own, 2021

From the study submissions, recommendations were made toward interventions needed to address the identified challenges. These proposed interventions are summarised in table 11.5.

Table 11:5: Proposed support interventions in the sector

Areas of support	Proposed interventions
Finance and capital raising	• Develop funding models for the ASM sector • Establish a state-private fund to support the sector • Provide a start-up funds for technical assistance and services • Provide subsidies and sponsorship funds for the sector • Establish funding mechanism that will be created from the contributions of the sector
Operational challenges	• Establish ASM associations • Create platforms that will foster cooperation/collaboration amongst the miners • Establish a system that will ensure the provision of equipment and infrastructure in ASM sites
Marketing	• Establish beneficiation programmes in the country • Identify opportunities in the export markets • Identify market opportunities through bilateral agreements • Identify market platforms provided by government departments and agencies • Establish central buying agencies • Establish provincial buying platforms • Assess the involvement of regional buyers in ASM • Regulate trading of minerals • Simplify mineral export license requirements
Skills and knowledge	• Provision of skills and training through extension services • ASM associations to work with SOE in capacity-building initiatives
Support and related services	• Provide technical assistance to the miners through extension service • The role of large-scale mining companies through socioeconomic obligations • The role of trade unions in the sector

11.4.4. Responsible practices in the sector

This element of the strategy encompasses the negative impacts in the sector as well cross-cutting issues associated with the sector's activities. The negative impacts relate to how activities are conducted and the consequences thereof and these include

environmental, health and safety, and security issues. The cross-cutting issues include the challenges experienced by the miners as a result of their involvement in ASM activities and examples are violations by criminal syndicates, police abuse, stigmatisation, and other issues.

These categories of challenges also include specific issues affecting women, youth, the elderly, and other vulnerable groups engaging in the sector's activities as well as communities and other local stakeholders. Responsible practices as they relate to the environmental impacts were discussed in section 11.4.1 when looking at the regulation of the sector and developing a tailored licensing system for the sector. The health and safety aspects were also noted as part of the process of establishing appropriate licensing requirements for the sector. The key aspects that were highlighted in the discussion were ensuring that the health, safety, and environmental requirements are practical and attainable by the ASM sector, and where there are shortfalls, appropriate support programmes should be established to ensure compliance.

The previous section (i.e., 11.4.3) provided a framework of support that can be used to identify programmes needed in the sector. Through this process, specific programmes on health, safety, and environment can be identified. Broadly, the overarching interventions on these aspects include, (1) the need for a legal framework that will promote health, safety, and environmental standards in ASM while also creating conducive conditions that will enable self-compliance in the sector, and (2) the need for support programmes aimed at reducing the health, safety, and environmental impacts in ASM. As the case with other challenges, a set of specific recommendations were noted in the study submissions, and these are summarised in table 11.6.

Table 11:6: Interventions to address health, safety, security and environmental impacts

Challenges	Proposed interventions
Health and safety	• Provide training on health and safety • Capacity building of health officers in ASM sites • Provide personal and protective equipment (PPE) • Recruit technical experts to assess the working areas • Provide basic infrastructure to support mining activities
Environmental impacts	• Role of miner's associations in environmental protection • Role of communities in environmental management • Rehabilitation as a precondition for renewal of mining license

On the cross-cutting issues, the base that is informing the proposed recommendations encompasses the importance of recognising the vulnerabilities that exist in the sector to ensure that targeted interventions are implemented and that unique challenges facing particular groups of miners are addressed. From figure 11.8, recognising the linkages in the sector was highlighted as being important in identifying the support programme that will not only address the challenges but also maximise the benefits and contribution of the sector.

With the same understanding, it is important to recognise that ASM interfaces with various stakeholders that are not involved in the sector's activities but may be affected by the sector. As such, there is a need to extend support programmes to them in order to build positive relationships between them and the sector. The overarching interventions linked to these two aspects include (1) support programmes to promote the participation of women and vulnerable groups in ASM, (2) support programmes to address the needs of women and vulnerable groups in ASM, (3) dedicated programmes

to address the involvement of children in ASM, (4) education and sensitisation programmes to improve understanding of ASM, (5) national programme to deal with criminality in the sector, and (6) dedicated platforms to facilitate exchanges between the miners and various local stakeholders.

11.4.5. Institutional arrangements and sector support

Recap of the challenges and key considerations

The challenges relating to institutional arrangements and sector support were looked at from the perspective of the organisations/institutions providing support to the sector. This was linked to the premise that several programmes have been implemented in the sector, however, there has been minimal positive changes in the sector when looking at the role that it currently plays against its envisaged potential. This prompted the need to understand the bottlenecks affecting the implementation of the support programmes and the impact thereof. Several challenges were identified, and these include national strategic direction, coordination and collaboration between stakeholders, representation of implementing institutions at the local level, the role of local municipalities, funding and operational models, capacity and skills and others.

To address the challenges, it is important to recognise that there are institutions/organisations that are still implementing support programmes and/or offering assistance in the ASM sector. It is also important to note that, there are programmes that have been implemented and disbanded. Against these two aspects, it is important to recognise that there is an existing base through which institutional arrangements can be evaluated to improve the implementation of future interventions and the impacts thereof in the ASM sector.

Context-guided interventions

Section 11.4.3 provided a framework for ASM support that encompasses understanding the challenges across the value chain of the sector's activities. The output of the framework is the identification of areas of support (or support programmes) needed to address the challenges in the sector. Figure 11.9 shows a process that can be followed to assess the support programmes implemented in the sector. As captured in the figure, the objective of the process is to determine the "areas of success" (i.e., what is working or has worked) and "areas of failure" (i.e., what is not working or has not worked).

These will then provide a base to identify areas of improvement leading to avenues of support that align with the needs in the sector. Further to establishing the avenues of support, the next stage of the process involves determining institutional arrangements, which will involve the identification of stakeholders capable of providing the required support ensuring that ASM support is coordinated and delivered efficiently and that the roles and responsibilities of the stakeholders are clearly defined considering their mandates and the work that they do.

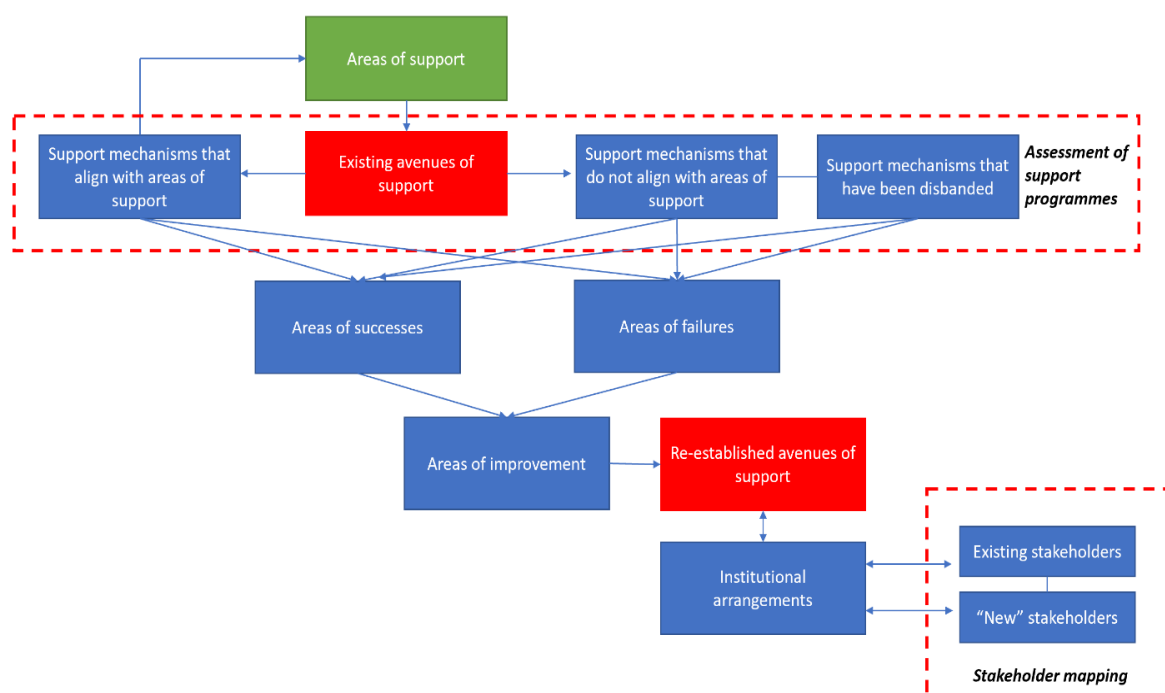


Figure 11:9: Framework for assessing the adequacy of avenues of support

Source: Author's own, 2021

Table 11.7 provides the overarching interventions on the institutional arrangements and sector support. In summary, the characteristics of the institutional arrangements include:

- Understanding the role of the ASM in the country's development and establishing programmes that will support the sector in meeting its developmental objectives;
- Aligning the institutional framework with the legal framework to ensure that it creates an environment that will promote participation in the sector as well as compliance with general laws governing the mining industry in the country;
- Involving all relevant institutions and stakeholders across different levels to ensure that there is adequate and accessible support to the sector;

- Providing clear roles and responsibilities according to the avenues of support and the mandates of the different institutions or stakeholders in order to avoid duplication of effort and manage delivery expectations;
- Establishing channels of communication, mechanisms of coordination and platforms that will facilitate information sharing and transfer of knowledge about the sector and programmes implemented in the sector;
- Ensuring that the institutions are well capacitated and resourced to meet their objectives and that there are dedicated funds to implement ASM programmes;
- Institutional arrangements and sector assistance must be supported by ongoing evidence-based research and continuous monitoring and evaluation according to set key performance areas; and
- There must be anchor institutions that are responsible for coordinating sector support as well as monitoring and evaluating of the programmes that are being implemented.

Table 11:7: Proposed interventions on institutional arrangements and sector support

Areas of intervention	Proposed interventions
National strategic direction as an overarching framework of support	• Institutional framework that is underpinned by the landscape of the ASM sector and recognises the role of the sector and translating these into the key performance indicators aligned to the country's development priorities • Clearly defining institutional arrangements alongside the role of DMRE as the anchor organisation responsible for the development of the ASM sector
Improving coordination and collaboration in the sector	• Identifying the stakeholders with mandates to contribute to poverty alleviation and development priorities that ASM has links with (i.e., Using the NDP as a base to identify the stakeholders to support the sector) • Assigning roles and responsibilities to stakeholders identified through mapping • Identifying synergies and points of collaboration between stakeholders • Defining arrangements and working relationships of the core stakeholders • Creating platforms that will enable collaborations and information exchange thereby building networks in the sector at different levels
Building local representation of SOEs	• The working relationships between core stakeholders should be cascaded down to the provincial and local levels • Identifying stakeholders interested and affected by ASM activities and creating platforms to foster collaborations and information exchanges thereby building ASM stakeholder networks
Increasing the role of local municipalities in ASM	• Local municipalities as core stakeholders to enable information exchange, capacity-building, and collaborations in the sector • There is a need for local municipalities to create a conducive environment to support the development of the ASM sector • Exploring the decentralisation of arrangements in the sector to local municipalities • The local municipality to play a role in monitoring and evaluation of ASM operations
Improving the funding and operational models of SOEs (including the scope of projects)	• Funding mechanism that considers the characteristics of the sector and caters for the needs across the ASM value chains • State funding that is accessible and transparent • Incentive strategy to attract the contribution of stakeholders to support the development of the sector • Funding model that supports research and development, and the implementation of projects • Ongoing research to understand the spectrum of ASM activities • Nationwide research on ASM • Operational model developed at the back of the sector's needs
Building capacity and skills in implementing agencies	• Adequate number of professionals in the core organisations that are leading ASM support and implementation • Attracting professionals with requisite skills and experience in the various dimensions of ASM • Establishing ASM stakeholder networks to enable collaboration and information/knowledge exchanges

Figure 11.10 illustrates the current institutional structure with institutions/organisation that offer assistance in the sector. From the figure, the DMRE is the principal institution that is mandated to manage the sector in the country. The DMRE has offices in all provinces across the country, and in each, there is a department that is responsible for the ASM sector. At the national level, there are state-owned enterprises that have dedicated programmes on ASM, and these include MQA, CGS, and Mintek. At the provincial level, there are DMRE provincial offices and CGS satellite offices in some provinces (i.e., five provinces)

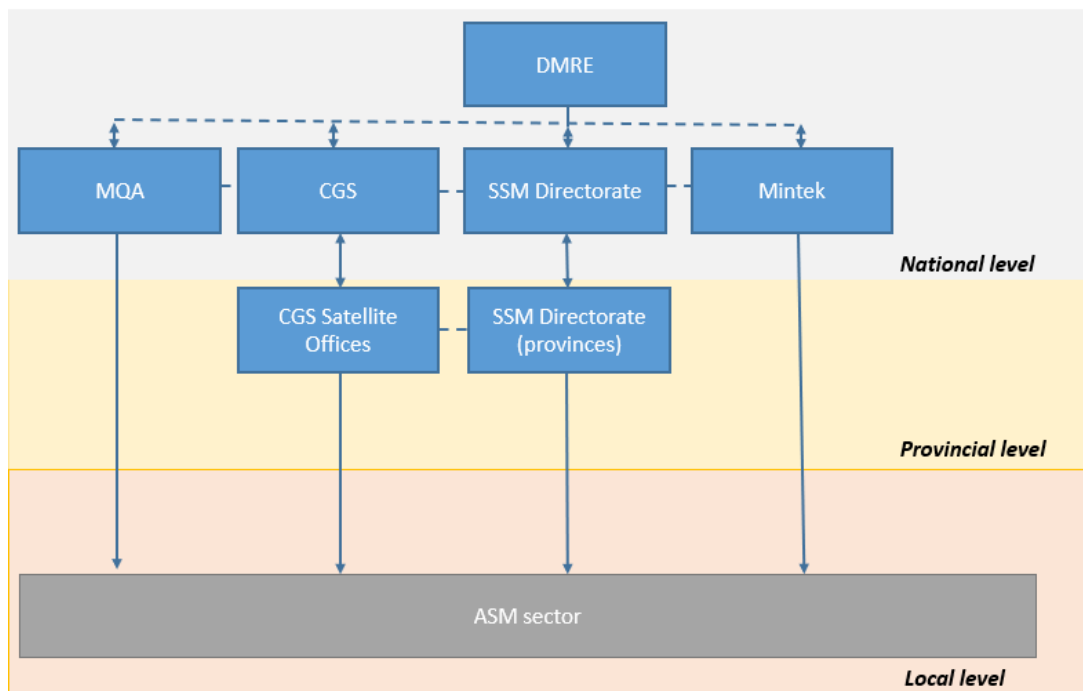


Figure 11:10: Current institutional structure supporting the ASM sector

Source: Author's own, 2021

The other institutions do not have a presence at the provincial level. At the local level, none of the institutions have presence. It was noted from the study submissions that local stakeholders (i.e., mostly local municipalities) have been brought into some of the ASM projects. It was also highlighted that while MQA, CGS and Mintek report to the

DMRE, there is no coordination between the work/projects that they undertake (i.e., hence the use of dotted lines).

Building representation to increase the footprint and accessibility of ASM support is a critical component of the institutional framework. As such, stakeholder mapping (i.e., as noted in figure 11.9) will need to be conducted to identify the stakeholders that can play a role in the sector. Figure 11.11 proposes an institutional structure for the sector. The structure identifies two categories of stakeholders that are labelled, core stakeholders and non-core stakeholders. The former category consists of stakeholders that are or can be mandated to play a particular role in the ASM sector. This is because of their mandates towards the country's development plan.

The non-core stakeholders, on the other hand, are stakeholders that are affected by ASM activities and those that interface with the sector's activities because of the work that they perform. From the figure, the core stakeholders are divided into two, the existing core stakeholders (i.e., MQA, CGS, Mintek) and the "new" core stakeholders. The latter group cover the stakeholders that should be identified through the stakeholder mapping and may include government departments and supporting institutions with mandates linked to the avenues to support needed in the sector. The non-core stakeholders as captured could be NGOs, CSOs, CBOs, and other stakeholder groups that have programmes in the sector and/or interface with the sector's activities through the work that they do at provincial and local levels.

A key aspect of the proposed structure is the recommendation that local municipalities play a central role in coordinating local stakeholders and connecting miners to the DMRE. It is proposed that the central role of the DMRE in terms of leading implementation and coordinating and monitoring and evaluating support programmes

be anchored in the provincial offices. As such, the required capacities within the DMRE provincial offices and in local municipalities will need to be established.

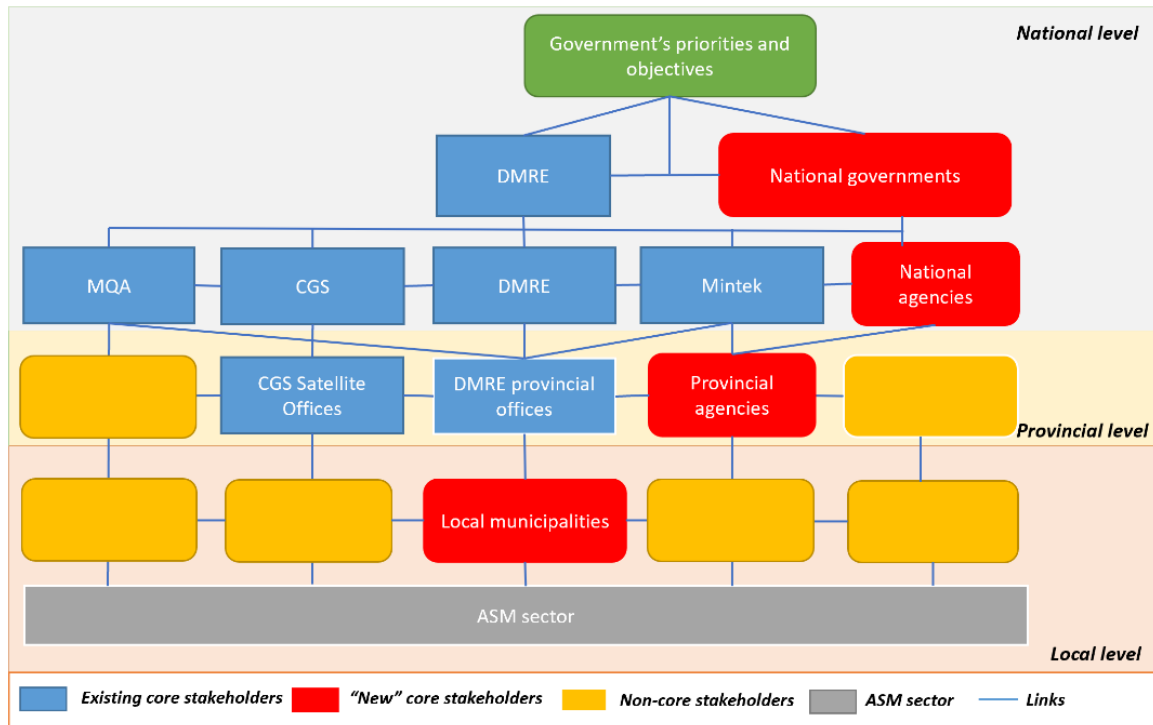


Figure 11:11: Proposed institutional structure for the ASM sector

Source: Author's own, 2021

11.4.6. ASM stakeholder relationships

Recap of the key challenges and key considerations

The need to build positive relationships between the ASM sector and other stakeholders is because of the negative impacts resulting from the sector's activities which adversely affect other stakeholders. It is also important because these various stakeholders have a bearing on the formalisation of the sector. The challenges that were discussed resulting from the interface between ASM and other stakeholders covered community issues as well as the impacts of ASM on large-scale mining operations. Examples of these are health and safety issues, security concerns, environmental impacts, damage to

infrastructure, financial impacts, and threats to the security of tenure and social license to operate.

Context-guided interventions

Fostering positive relationships between communities and ASM, as well as large-scale mining operations and ASM will depend on addressing the challenges in the sector with some of the interventions requiring multistakeholder and collaborative approaches involving communities, large-scale mining operations, and other affected stakeholders. The broad process in addressing the impacts of ASM on other stakeholders and fostering relationships can encompass; (1) assessment of the positive and negative links that are characterising the particular interactions, (2) identification of areas of interventions targeting both positive and negative impacts, (3) establishing required support/stakeholders, (4) establishing a framework of implementation with roles and responsibilities clearly defined and platforms for coordination, monitoring and evaluation, accountability and reporting established.

In addition to addressing the particular challenges, the overarching interventions proposed to improve the relationship between ASM, and communities are (1) awareness and education programmes on ASM, and (2) establishing platforms for engagements, feedback, and mechanisms that will allow communities to benefit in the sector's activities and also contribute to the formalisation of the sector. For large-scale mining and ASM operations, the overarching intervention is developing the co-existence strategy for ASM and large-scale mining which will aim to; (1) manage the relationships between the two sectors and (2) forge positive relationships between the two sectors to maximise the contribution the mining industry to the country's development plan.

Figure 11.12 provides a framework with broad aspects that need to be considered when developing the co-existence strategy.

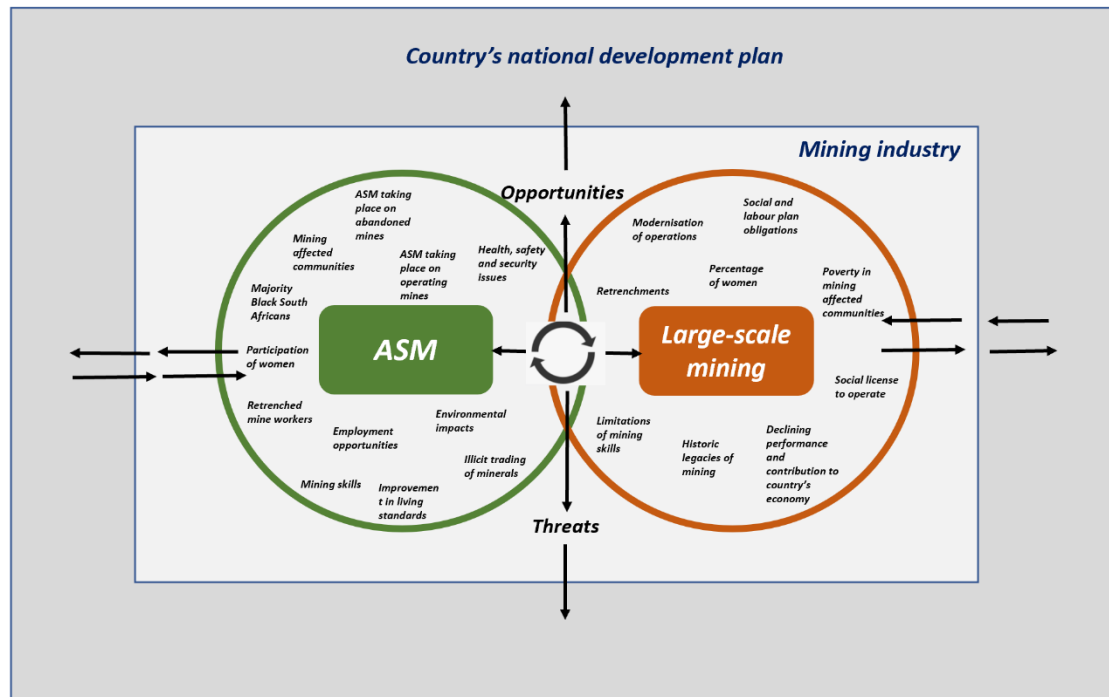


Figure 11:12: Aspects that should underpin the co-existence strategy

Source: Author's own, 2021

The strategy must consider the following: (1) the drivers of ASM linked to the large-scale mining industry, (2) opportunities that the ASM sector provides that complement the benefits from large-scale mining operations, (3) the threats associated with ASM affecting large-scale mining operations (and vice versa), (4) landscape of the mining industry and outlook, (5) current role of the mining industry and expected contribution to the country's NDP. The arrows pointed outwards depict impact (i.e., the impact of ASM-large-scale mining on the mining industry and country), and those looking inwards denoted expectations/envisaged role (i.e., country's development objective towards the mining industry, which can be cascaded to the two mining categories).

Building on this framework, some of the components that the strategy will need to cover include the roles of the two sectors in the mining industry, boundaries between the two sectors, legal requirements and provisions, avenues for collaboration and support, platforms for engagements and feedback, resource mechanisms, transitioning models, the role of government and other stakeholders.

11.5. Levers of implementation

The overarching objective of an implementation plan is to operationalise strategy objectives by translating them into implementable activities. The implementation plan, therefore, combines strategy, process, and action. The focus of this section is on the last component of the Chapter with attention directed to existing policies, legislation, support programmes institutions and stakeholders, and existing mechanisms/platforms in terms of the role they can play in supporting the implementation of the proposed ASM strategy. This is coming from the premise that there are institutions that are doing work in the sector, those whose work links to the sector and those who have an interest in the sector.

There are also platforms and programmes that have been established to support the sector and those that have the potential to action some of the proposed strategic interventions. Essentially, there is a base that provides avenues to operationalise the ASM strategy. This base must be looked at with the intention of leveraging from what already exists.

Regulation of the sector

The main intervention in improving the regulation of ASM is developing a tailored licensing system for the sector. Part of the process is establishing requirements and provisions of the licensing options considering the characteristics of the sector as well

as general laws applicable to the mining industry. These include laws that cover mining, health and safety, environment, labour, skills, mineral trading, land use practices, and other aspects. Various standing laws need to be reviewed to ensure that the licensing system is suitable for the sector, and these include the Minerals and Petroleum Resource Development Act, the National Environmental Management Act, and supporting legal frameworks (i.e. dealing with water, atmosphere, biodiversity, heritage resources and other aspects of the environment), Mine Health and Safety Act, Occupational Health and Safety Act, Labour Relations Act, Mining Charter, Skills Development Act, Mineral and Petroleum Resources Royalty Act, Precious Metals Act, Spatial Planning and Land Use Management Act and other applicable legislation.

Because ASM activities are required to adhere to the different pieces of legislation, the first option in creating a legal environment that will support the tailored licensing system is to review all relevant legislation to add specific provisions that align to the needs of the sector. For example, this may entail reviewing section 27 of the MPRDA which makes provision for granting mining permits that have been developed specifically for the ASM sector.

The second option in creating a favourable environment may be to develop a separate policy for the ASM sector that will consider the various aspects of the legislation that are applicable to the mining industry. The DMRE as the principal authority in the regulation of the mining industry will have to take a lead and facilitate the process of selecting an appropriate route for the sector. This must be done in consultation with other government departments and all relevant stakeholders. It is important to note that if option 2 (i.e., selecting a separate policy/legal framework for the sector) is selected, the various pieces of legislation will still need to be reviewed and updated to ensure that

requirements/provisions linking large-scale mining to ASM align to the objective of improving the regulation of the ASM sector and *vice-versa* in terms of legal environment needed to support the LSM sector.

Mining land and mineral resources

The proposed interventions to address the challenges relating to mining land and mineral resources include establishing a mineral base for the sector. There is an existing knowledge base on mineral resources and opportunities that are or may be suitable for the ASM sector. Several institutions have done work in the ASM sector including studies providing geological assessments, mineral testing, site assessments, and others. The three main institutions that have done considerable work are the Council of Geosciences, Mintek, and DMRE. Mintek is currently leading the D/O project and has considerable data that can be used to provide a base for assessing the status of underground mines and suitability for ASM operations. Also, through its Small-Scale Mining and Beneficiation Function, there is an established database of site assessments conducted in various ASM sites across the country.

The Council of Geosciences also has several programmes targeting the ASM sector and mineral databases that can be used to initiate the proposed framework. The DMRE, as well, through their SSM Directorate represented in all the provinces has conducted assessments on different ASM sites. There is also information from large-scale mining operations, miners and their associations, academia, and independent consultants. On 18 May 2021, the Minister of Mineral Resources announced that the department is in the process of developing an exploration strategy aimed at increasing the mineral base of the country. Such initiatives could serve as opportunities to contribute towards

building a mineral base for the ASM sector in the country (South African Government, 2021; DMRE, 2022a).

Value chain constraints and institutional support

The proposed interventions on value chain constraints and institutional support cover the support programmes that will provide for the needs of the sector and maximise opportunities in the sector. There are several stakeholders that provide assistance and have implemented support programmes in various areas linking to the challenges in the sector.

These stakeholders include; DMRE, Department of Science and Technology, Department of Trade and Industry, National Youth Development Agency, Developmental Funding Agencies (e.g. Industrial Development Corporation, Small Enterprise Finance Agency, Eastern Cape Development Corporation, Limpopo Economic Development Agency), State-Owned Enterprises (Mintek, Council and Geosciences, Council for Scientific and Industrial Research, Mine Health and Safety Council), skills education training authority (i.e. Mining Qualification Authority), mining associations (South African Mining Development Association, National Association of Artisanal Miners), Civil Society Organisations and Community Based Organisations, and large-scale mining operations.

While there are several government departments (i.e., apart from the DMRE) that have implemented programmes in the sector, the proposed institutional structure is calling for an increase in the number of government departments to play a role in addressing the challenges in the sector. This is because of the link between the mandates of the different departments and the corresponding aspects in the ASM sector. These include departments of education, health, small business development, home affairs,

employment and labour, environment, forestry and fisheries, agriculture, land reform and rural development, water and sanitation, cooperative governance and traditional affairs, social development, women, youth and person with disabilities, police, finance, science and innovation, and planning, monitoring, and evaluation.

Responsible practices in the sector

The proposed interventions on responsible practices in ASM link to the need to address the negative impacts and cross-cutting issues associated with the sector's activities. There are various stakeholders whose work focuses on impacts on the environment, health and safety, security/criminal issues that are affecting the miners, communities, and other stakeholders. These include government departments (i.e., mineral resources, environment, police), state-owned agencies (Water Research Council, Mine Health and Safety Council), large-scale mining operations, civil society organisations, community-based organisations, and miners' associations.

ASM stakeholder relationships

The proposed interventions on stakeholder relationships relate to the need to forge positive relationships between ASM and communities, as well as ASM and large-scale mining operations. There are various platforms that are used to engage communities established by local municipalities, CSOs, CBOs, NGOs and other stakeholders working in communities. These platforms (or similar ones) can be established to facilitate engagements between ASM and communities. The aspects covering ASM, and community issues can be integrated into the work that the various stakeholders are doing in communities.

The large-scale mining industry also has platforms that they use to engage with communities and various other stakeholders. An example of a platform is the National Coordination and Strategic Management Team, which was established to address illegal mining in the country. The committee comprises of DMRE, South African Police Service, Intelligence Services, Department of Home Affairs, and large-scale mining operations. Similar multistakeholder platforms can be established to facilitate engagements between large-scale mining, ASM and relevant stakeholders.

11.6. Chapter summary

The objective of the Chapter was to develop a strategy for the ASM sector with the core of the framework comprising of recommendations on how the challenges in the sector can be addressed. Figure 11.13 provides a high-level summary of the key aspects that form part of the overall ASM strategy.

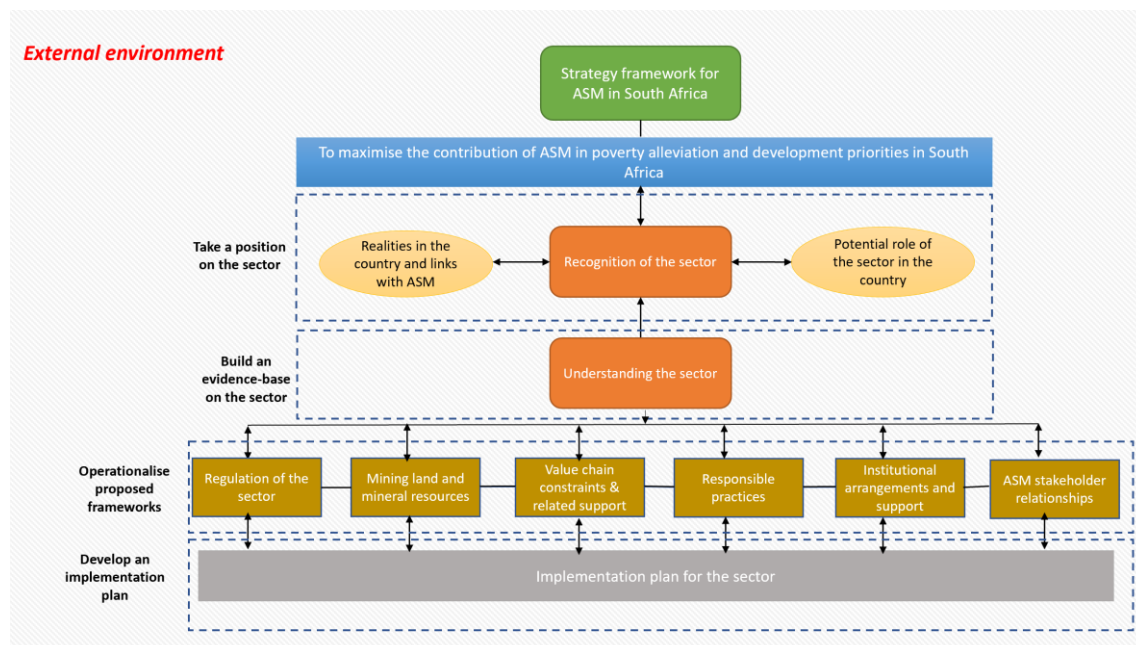


Figure 11:13: Summary of the requirements needed to support the proposed ASM strategy

Source: Author's own, 2021

The figure also provides a sequence of activities that need to take place to create an environment that supports the operationalisation of the strategy, implementation thereof, and how this links back to the objective of the strategy which is to maximise the contribution of the ASM sector in development priorities in the country. Addressing the challenges in the sector will depend on government taking a position on the sector. This is in terms of recognising the sector given the socioeconomic challenges in the country and potential role of the ASM in addressing some these concerns.

The recognition of the sector is also important in providing an overarching direction needed to guide the sector's formalisation agenda. It is also important as it will provide a platform for establishing common ground that the different stakeholders can work from to ensure that the developmental objectives of ASM are achieved, while also accommodating the needs of various stakeholders that are also contributing to the country's development plan.

Once the government's ASM agenda is clear and stakeholders have a common understanding of the direction that the country is taking as far as ASM is concerned, the next step is to build an evidence-based on the sector to feed into the proposed strategy. As noted, having an adequate understanding of the sector provides foundation on which context-guided interventions can be crafted thereby providing the link between ASM challenges and interventions that are put forward. It is important to note that, while the ASM sector has a long history in the country, current knowledge on the sector is inadequate to action the strategy options that have been presented.

The landscape of the sector has changed with the evolution of the mining industry and dynamics in the country, and as such the sector cannot be treated or managed through the same lens as employed post-1994. In understanding the sector, appropriate

interventions can be identified and implemented taking from what is already existing in the country. The key features to note in figure 11.13 are arrows indicating an iterative process that considers the feedback that will come from the implementation of interventions.

CHAPTER 12: CONCLUSIONS AND RECOMMENDATIONS

12.1. Introduction

To conclude the Thesis, the Chapter provides a recap of the study objectives. This is followed by a synthesis of key findings in response to the overarching objectives. The Chapter also highlights the contribution of the study and makes recommendations for future research work in view of the shortcomings and/or aspects that need further elaboration from the study to increase the evidence base on the sector's activities in the country.

12.2. Recap of the study objectives

The study was guided by two objectives, which were to establish the developmental potential of the ASM sector. This was underpinned by the argument that the sector has the potential to contribute towards the attainment of the country's development agenda. The second objective was to develop a strategy for ASM in South Africa and this links to the second part of the argument that, if the developmental potential of ASM is established, the sector must be supported in line with proposed areas of interventions.

The first objective was translated into building a profile of ASM to ascertain the socioeconomic status of people that work in the sector. The drivers and prospects of the sector were also unpacked with to understand the environment in which ASM activities are taking place. Another component of the first objective was an assessment of the role of ASM and this was interrogated against the country's developmental objectives. The second objective was addressed by unpacking the challenges in the sector and these formed the base for identifying key areas of interventions which underpin the proposed strategy for ASM in the country.

12.3. Responses to the study objectives

Objective 1: Developmental potential of the ASM sector

Against the question on the developmental potential of ASM, the findings support the premise that the sector has the potential to play a sizeable role in the country's development agenda. This is based on the following evidence:

- 1) The primary objectives of the country's development plan are to eradicate poverty and reduce inequality (i.e., Vision 2030). In unpacking the socio-economic challenges facing the country, it was found that there is a clear link between the country's demographic structure and levels of poverty and unemployment. It was established that the population group that is most vulnerable to the two social ills comprises largely of Black South Africans, female-headed households, youth, those with low levels of education, and those residing in rural areas. In juxtaposing the profile of the miners with this population group, it was concluded that the majority of the people that participate in ASM activities are part of the population group that is characterised as poor who are the primary focus of the country's development agenda. To this end, ASM activities are contributing to the country's development priorities by providing livelihoods to those living in poverty.
- 2) With the NDP working towards reducing the percentage of households with an income below R419 per person per month, the insights from the study are that the poverty status of most of the miners measures above the stated poverty line. The findings show that miners, through the income generated from ASM can take care of their families. Another finding from the study was the improvement in the living standards when comparing the lives of the miners before and during

participation in ASM. Most of the miners moved from LSM 3 to LSM 5 and 6 as a result of engaging in ASM. In establishing factors that have a bearing on living standards, a direct correlation was found with the level of income earned. As such, ASM offers an avenue to improve the well-being of the communities that participate in the sector's activities.

- 3) Amongst the key intervention areas marked to support the attainment of the national development plan is increasing levels of employment in the country. The government has set out a target of creating 24 million jobs by 2030. The lack of economic opportunities was identified as the main driver of ASM activities. A key finding from the study was that the majority of the miners were unemployed before moving into ASM. Of those that were working, some of them were retrenched and struggled to find employment while some used to survive on temporary contracts. Some of the miners indicated that they resigned from their jobs because of low remuneration and the inability to support their families while employed. Against these findings, the ASM sector has been able to accommodate those that are unemployed and those that struggle to re-enter the labour market even with working experience. ASM is also coming out as an alternative employment opportunity that offers better remuneration and working conditions. These two aspects were highlighted as reasons most miners indicated that they will not leave ASM if offered alternative employment.
- 4) The mining industry is expected to create 300,000 jobs in line with the employment target set out in the NDP. In assessing the performance of the industry, the conclusion reached was that it is unlikely to meet the set target given the challenges that it is facing. The contribution of the mining industry to the NDP depends on expanding opportunities to complement large-scale mining

as the main component of the industry. The findings from the study show ASM offers benefits that address some of the shortcomings of large-scale mining. ASM provides an economic option to retrenched mineworkers thereby accommodating the use and transfer of mining skills which can otherwise be redundant as they cannot be used in other business sectors. The insights for the study show that most retrenched mineworkers are able to maintain their living standards with income generated from ASM. The other benefits of ASM include providing avenues in which mining communities can directly participate in the mining industry. The participation of women in ASM also contributes to the industry's transformation agenda. ASM also has the potential to contribute to mineral diversification thereby increasing mineral outputs and government's revenue generated from mining.

- 5) Overall, there are positive links between ASM and the country's development plan particularly in the areas of economy and employment, building rural economies, education, and training, building safer communities, social protection, and transformation of society. While this is the case, the sector also has the potential to threaten the efforts made to attain the country's development objectives. This is because of the negative impacts emanating from the sector's activities and these may adversely affect objectives towards economy and employment, health and safety of communities, and environmental sustainability. In view of both the positive and negative impacts of ASM, the conclusion from the Thesis is that maximising the contribution of the sector to the NDP will depend on addressing the negative impacts and associated consequences.

Objective 2: A strategy for the ASM sector

As unpacked in the Thesis, the negative impacts associated with ASM arise not only from the challenges in the sector but also from interactions that it has with various role players. Three layers of challenges that affect the development and growth of ASM were discussed and these include ASM-specific challenges, institutional framework, and related issues, as well as stakeholder-wide concerns. The first category of challenges has a bearing on entry and participation as well as the overall position of the ASM sector in the mining industry. The specific challenges experienced by the sector also influence how the miners conduct their activities given the means and access that they have. These challenges include aspects related to the: regulation of ASM (i.e., inadequacy thereof), mineral resources and mining land (i.e., issues of availability, viability, and accessibility), value-chain constraints (i.e., lack of means and support), and other attendant issues.

The second category of challenges covers aspects related to the institutional framework established to facilitate the development and growth of the ASM sector. These are critical because they have a bearing on how the specific challenges facing the miners are addressed and the consequences thereof. In assessing the impact of support programmes on the development of the ASM sector, the overall conclusion is that, while there is a record of positive outcomes, the combined interventions failed to transform the sector in line with the objectives set out in the Mineral and Mining Policy.

When looking inwards, it was revealed that there were a series of challenges that affected the implementation of ASM interventions. These included a lack of national strategic direction (i.e., failure to recognise and position ASM within the country's development agenda); poor coordination and collaboration between ASM stakeholders;

lack of structures and support at local level; non-existent role of local municipalities; restricted funding and operational models; lack of capacity and skills; and the challenges connected to existing legal frameworks governing the ASM sector.

The last category of challenges involves wider ASM stakeholders and these result from the interactions that the sector's activities have with the external environment. ASM activities interface with a range of stakeholders, both directly and indirectly. The discussion in the Thesis brought forth concerns raised by communities in which ASM activities are taking place as well as responses from large-scale mining operations. The main issues that were highlighted were: health, safety, and security aspects, environmental impacts, financial losses, legal concerns, and social issues.

With insights into the challenges affecting the development and growth of the ASM sector, a strategy framework was developed with recommendations on areas of intervention that need attention.

- 1) There is a need for a tailored licensing system for the ASM sector that will support participation and management of the sector's activities in the country.
- 2) A mineral base should be established to support the development and growth and the sector. This should take into account the current landscape of ASM activities as well as the sector's requirements in terms of access and viability.
- 3) The specific challenges in the ASM sector are known. As discussed, interventions that have been implemented have focused on addressing individual challenges without an adequate understanding of the value chains of minerals exploited by the miners as well as environments in which ASM activities are taking place. In developing an institutional framework for the sector, the challenges facing the miners must be understood alongside the

mineral value chains that exist to identify opportunities as well as potential collaboration with actors found within environments in which ASM is taking place. These aspects must form the base of the institutional structure and arrangements put forward to lead the development of the ASM sector in the country.

- 4) There is a base on which the proposed interventions can be actioned. Against the shortcomings of past efforts, government must take a clear position on ASM, and this must be informed by the role that the sector can play in the country's development agenda. This Thesis provided evidence of the contribution of the sector which can be leveraged towards addressing some of the socioeconomic challenges that need urgent intervention in the country.

12.4. Contribution of the Thesis

The following is a summary of the contribution of the research conducted as part of the Thesis:

- ***Evidence-base on ASM to address misconceptions about the sector*** – The research conducted improves understanding of the ASM sector in the country and provides insights that can be used to settle some of the misinformation and biased perspectives about the people that engage in the sector's activities. Some of the misconceptions that have been noted are that all artisanal miners are foreign nationals, they are illegal immigrants, they are men, they are retrenched mineworkers, they are part of criminal syndicates, are responsible for the criminal activities taking place in communities, and they do not want to be legalised. The problem with these misconceptions is that they have influenced how the sector is characterised and the narratives about its activities.

- This has affected how the sector is being treated particularly when looking at the responses that have been implemented in the sector. The need to understand who the miners have been amongst the recommendations put forward by stakeholders that are supporting the formalisation of the sector. This is deemed important in laying a foundation for policymaking and interventions. The contribution of the Thesis in this regard is collecting data that enabled the profiling of the sector. There appears to be no study that provides the profile of the miners to a level that the Thesis did. Another output of the Thesis is the categorisation of miners which provided a picture of the groupings that exist in the sector. This is important information in informing targeted interventions in the sector.
- ***Representation and voice of the miners*** – Most of the research was conducted with the miners and this was to ensure that they are adequately represented in the study and that their perspectives on ASM are known. It has been found that most of the research conducted on ASM tends to focus on collecting data from the stakeholders that are working with the miners and/or those interfacing with the sector's activities. The viewpoints of these stakeholders are recognised and hence the inclusion of both their perspectives (i.e., because they normally have a broad understanding of the sector having worked in multiple sites) and those of the miners. From the results, there were similarities in the submissions from the stakeholders and the miners. There were also “new” insights provided by the miners which enhanced the understanding of the sector, particularly in terms of how the miners view the sector, their participation in the sector, their outlook on the sector, the challenges that they face, and where they stand in terms of the formalisation of the sector. This information is particularly important in

informing interventions implemented in the sector to ensure that there is alignment with the position of the miners on certain aspects that the interventions will be targeting.

- ***Representation and views of communities hosting ASM activities*** – The key stakeholders that are often ignored in debates on the ASM sector are communities where the activities are taking place. While the impact of ASM on communities is used to support both ends of the criminalisation/decriminalisation debates, the voice of communities has not been established to understand how they see ASM, how they are affected by the sector's activities, and how they want the sector to be managed. This research appears to be the first study to bring forth the perspectives of the communities thereby providing an understanding of the relationships between communities and the miners. Also, the insights provided by the community members provide a base for assessing some of the assumptions that have been made about communities and their position on ASM.
- ***Cross-commodity study*** – Another contribution of the research is that it has provided insights into the landscape of ASM activities in different mineral commodities and locations. The research provided an understanding of the issues and challenges in the different commodities and parallels could be drawn across the sites (i.e., for example, there are concerns around the illegality of their operations, access to mining sites, health, safety, and security). It was also found that there are different aspects that will require different approaches and strategies. The findings from the research challenge the blanket generalisation that has been directed to the ASM activities that are taking place across the country (i.e., some of these characterisations are that; ASM operators are men,

foreign nationals, and that they are ex-mine workers having been employed by large-scale mining operations).

- ***Quantitative analysis of the role of ASM in poverty alleviation*** – While there is evidence to support the role of ASM in poverty alleviation and development priorities, this is the first study to provide a quantitative assessment of this role using indicators that are recognised and understood by government and are used to measure and track poverty status of the country’s population. Essentially, the Thesis provides evidence that can be used to bring the government to the table and to build a case for the sector in the country’s development plan.
- ***Research work to support formalisation debates*** - Overall, the Thesis provides a base for informed engagements and discussions that are currently taking place in the country. On 26 April 2021, the DMRE published the *Draft Artisanal and Small-Scale Mining Policy*⁷⁰ for public comment. Amongst the areas of concern that have been raised regarding the proposed policy is the lack of research to support/ the submissions made by the DMRE (i.e., research on the ASM in the country). This was pointed out on the back of the submission that the proposed policy appeared to be premised on how the ASM sector is managed in other countries. The position of the Thesis is that, while most of the challenges seen in the ASM sector in South Africa are those being experienced (or have been experienced) by other countries, there are differences in terms of contexts in which these challenges emanate or affect the ASM sector. As such, interventions must speak to the specific realities found in various locations where ASM activities take place. The solutions aimed at the sector are homegrown from the

⁷⁰ Department of Mineral Resources and Energy. (2021). Publication on the draft of artisanal and small-scale mining policy 2021 for public comment. Notice 258 of 2021, 26 April 2021.

evidence that is coming from the ground as well as the environment hosting the sector. The references to other countries should come in as lessons and learnings to improve the “context-guided interventions” to avoid challenges during implementation. Apart from the submissions of the various stakeholders, the proposed policy appears not to be supported by evidence-based research. As such, this Thesis provides research that can be used to assess the draft policy and the proposals made towards the sector.

- ***Overarching contribution to the ASM body of work*** – There is growing scholarly work on ASM globally. Apart from increasing understanding of the ASM sector in South Africa, some of the research outputs can be used to structure research studies in other countries. In particular, the different frameworks developed in the Thesis can be used in other countries to collect similar information on the sector. Also, the Thesis brought tools or methods that can be used to enhance the quantitative assessment of the data collected on the sector. This is referring to the clustering method that was used to profile the ASM sector, poverty indicators that were used to quantify the role of ASM in development, and statistical measures that were used to analyse the results that were coming out. Through a mixed-method approach, the Thesis was able to Collect qualitative data from several stakeholders in the ASM sector thereby providing an in-depth understanding of the sector in the country.

12.5. Areas for future research work

While the Thesis provided broad coverage of the ASM issues in the country, there is a need to expand on several aspects that were not adequately covered. The following are recommendations for future research work:

- The first recommendation is that the work completed in the Thesis be extended to other study locations where different mineral commodities are being exploited. The objective of this work should be to contribute towards establishing an adequate representation of “what the ASM sector is” in South Africa.
- The second recommendation is to conduct research that aims to unpack the contentious issues that are at the centre of debates in the sector. These include dedicated research on ASM and underground mining taking into account mining in abandoned and operating shafts as well as the use of underground mining method in newly established ASM operations within the limits that the miners can manage. Another area of research that needs to be looked at involves understanding the participation of foreign nationals in ASM. This research must also aim to address the misinformation that is often put forth regarding foreign nationals and involvement in ASM. The other critical issue that needs to be unpacked is the criminality associated with the sector’s activities. This needs to be looked at holistically to provide a base for differentiation of the categories of ASM leading to the characterisation of the “ASM sector” as best aligns with the envisaged role of the sector. This research is also important in informing the varied responses that may be required to address criminality in the sector. The last area of research is on the co-existence of ASM and LSM and how that can be accommodated considering the current and future landscape of the mining industry.
- The third recommendation is to conduct research on the past and existing interventions that have been implemented in the sector. While there are records of the various interventions initiated by the government, state-owned

enterprises, and other stakeholders to address the challenges in the sector; there is limited information on the performance of these initiatives and the results that were obtained. For those that have been disbanded, there is limited information in terms of why they were discontinued. It is not known what worked and what did not work. These insights are also not available on existing programmes that continue to be implemented in the sector. There is a need for research that will take stock of these interventions/programmes and assess their performance and impact in the sector to establish where the areas of improvement are thereby building this into the support framework of the ASM sector.

- The fourth recommendation is to conduct additional research on women in ASM. While the research provided insights into the participation of women in ASM, experiences working in ASM, challenges that they face and interventions that they require; there is a need to delve more into the issues that were raised. Not much attention has been given to women that are supporting ASM activities through their relationships with the miners. This came out during research in Kimberley where the male miners are staying with their wives/girlfriends/partners. Some of the women are working with their partners on ASM sites, while others stay at home when male miners go to the sites to work. Various aspects need to be unpacked to understand these relationships and how they affect women in ASM (i.e., encompassing those involved and those supporting ASM activities).

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APPENDICES

Appendix A: Pictures taken at study locations

Kimberley, Northern Cape – Diamond mining



A



B

Picture A: Miners sieving soil that has been scrapped and dug from the surface (i.e., The mining process starts with clearing of vegetation and removal of top-and-sub soil. The soil material is loaded into the buckets as shown on the pictures. Once the miners have sufficient material, they start sieving and screening the material. The gravel material is then stockpiled for sorting which is shown on picture B).

Picture B: Miners sorting gravel to find diamonds⁷¹

Carletonville, Gauteng – Gold mining



C



D

Picture C: A miner panning gold-bearing material (i.e., This is done as the first step to check the viability of deposit before a decision is made to work on a particular area).

⁷¹ With the miners having received mining permits, they sell the diamonds through Bathopele Cooperative in the tendering process. The miners bring their diamonds to Bathopele, who takes them to the tender process. Once an offer has been made, the sale price is communicated to the miners who decide to take it or not. If they take the price, the sale amount is paid into their accounts. Bathopele deducts 1.5% as an administration cost from the sale price. If they decide not to take the offer, the diamonds are returned to them. While there is a formal channel for miners to sell their diamonds, there are miners who still sell their diamonds through the black market. During the period February to November 2019, Bathopele facilitated the sale of more than R2 million diamonds. While there is a formal channel for miners to sell their diamonds, there are miners who still sell their diamonds through the black market.

Picture D: A gold processing site (i.e., Soil material is dug from the surface and stockpiled. The miners construct ‘sluice’ using rocks and soil and place towels on top. Through the use a perforated basin and tray (i.e., this is used as a screen), they wash the soil down the ‘sluice’. Heavy material is trapped in the towels, which are washed in buckets to release the concentrate. Panning takes place and it is followed by the mercury amalgamation process, which takes place in the miners’ homes. The miners shared that they sell the gold for R700 per gram. When working alone, the miners can produce 1 to 2 grams per day. The gold is sold to local buyers who are known in the community).

Ermelo, Mpumalanga – Coal mining



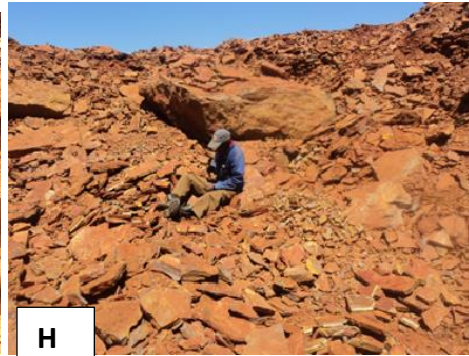
Picture E: A miner travelling underground (i.e., The mining process starts with coal extraction which is done by “*blasters*” who remove the coal from the pillars using picks. The coal is then loaded into wheelbarrows to be transported to surface by “*shatterkars*”⁷².

Picture F: Coal market place (i.e., The miners stockpile their coal on surface to be sold)⁷³.

⁷² The miners referred to as “*shatterkars*” are named after shuttle cars which are equipment used in underground mining to move the coal from the face to the loading area. The “*shatterkars*” or miners who transport the coal from underground to surface usually work in pairs. In one of the mining sites visited, the working area was between 0.7 to 0.8 metres in height and the road from the entrance of the mine to the market area (i.e., this is where the miners stockpile their coal) is quite steep. As such, while one “*shatterkar*” pushes the wheelbarrow up the road, the other one pulls the wheelbarrow from the top with a rope. In another mining site called “*Esitapsini*” (i.e., directly translated as at the staircases), the coal is transported using sacks which the miners carry on the backs. It was shared that the miners must climb 83 stairs to reach the surface where they stockpile the coal. This is a frequent activity that the miners undertake to move the coal from underground to the surface.

⁷³ As seen on the picture, there are customers usually community members who own coal yards coming to buy the coal. The coal is also sold directly to individual community members. The miners shared that coal is sold for R500 per tonne. Additional R200 is paid by the customer to transport the coal from the mine.

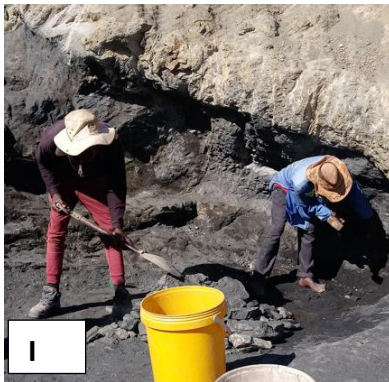
Prieska, Niekerkshoop and Griekwastad, Northern Cape – Tiger's eye mining



Picture G: A miner extracting a block of rock using a chisel and hammer (i.e., Mining takes place using basic tools. There are sites where an excavator is used to open pits and extract the stones. According to the miners, they pay R1100 per hour to lease the excavator. It was also mentioned that the excavator belongs to one of the local buyers who leases it out with an agreement that the miners will sell to him.)

Picture H: A miner dressing the tiger's eye to remove waste rock (i.e., There are six different grades that the miners produce, with A-grade being the highest quality and X-grade having the lowest quality. The quality of the stone is a factor is the colour, thickness and chatoyancy. The A-grade (i.e., usually 15mm to 50+mm thickness) sells for between R10 and R18 per kg. The X-grade (i.e., has waste inclusions) sells for between R0.50 and R1.00 per kg. The tiger's eye is sold to local buyers who then export it to China and India.

Burgersfort, Limpopo – Chrome mining



Picture I: Miners extracting chrome from the host rock (i.e., Chrome is mined using mostly basic tools (i.e., chisel and hammer). There are miners that have jack hammers which make it easier to break the hosting rock and chrome deposit. From the picture, a chrome belt can be seen as well as the hosting rock. Amongst the main challenges in chrome mining is the removal of the overburden to expose the chrome. The miners usually work alone or in pairs.)

Picture J: Stockpiles of chrome on the mining site (i.e., After mining the chrome, it is stockpiled to be sold. The miners shared that they sell one wheelbarrow of chrome (i.e., 0.2 tonnes) for R100. There are different grades of chrome that the miners mine (i.e., the grade ranges from 38% to 42% Cr_2O_3). The selling price is the same across all grades as well as across miners who are working in the same sites. According to the miners, the buyers usually buy 150 wheelbarrows (i.e., about 30 tonnes of chrome) when they come. The miners would share the sale to ensure that all of them benefit).

Vlakfontein, Gauteng – Gold mining



Picture K: A ‘sluice’ created and used by miners to concentrate gold (i.e., The mining process is similar to ASGM activities in Carletonville).

Picture L: A water pond created from gravity concentration

Appendix B: Baseline survey questionnaire

This questionnaire is designed to collect baseline information from individual miners and/or workers in ASM operations in the targeted areas for the research. The study participants should be above the age of 18 years.

Summary of objectives:

The ASM Baseline Survey aims to collect information on:

- The profile of those that participate in ASM activities;
- The circumstances that pushed/pulled people into ASM;
- Socio-economic status of the participants; and
- General perceptions and aspirations towards ASM activities.

Interviewer	
Name of area/site	
Date	

Section A: Demographics

Designation	
Age	
Gender	Male ☐ Female ☐
Race	Black ☐ Coloured ☐ Indian ☐ White ☐
Nationality	South African ☐ Other ☐(specify)
Place of residence	Local ☐ Other ☐(specify)
Primary language	Afrikaans ☐ Tswana ☐ Xhosa ☐ Other ☐(specify)
Marital status	Married ☐ Single ☐ Other ☐(specify)

Section B: Socio-economic situation

Do you have dependents?	Yes ☐ No ☐
How many dependents do you have?	Between 1 and 3 ☐ Between 4 and 6 ☐ Between 7 and 9 ☐ 10 and more ☐
Are you the breadwinner at home?	Yes ☐ No ☐
What is your highest level of education?	No formal education ☐ Primary school (grade 1 to 6) ☐ Middle school (grade 7 to 11) ☐ Matric ☐ Further education ☐
What attracted you to mining?	Limited jobs in the area ☐ High income in ASM ☐ Quick income in ASM ☐ Other ☐(specify)
Have you worked in the mines before?	Yes ☐ No ☐ (if yes, how long?)
Do you know someone who has worked in the mines?	Yes ☐ No ☐
Have you been exposed to mining before?	Yes ☐ No ☐
Is mining your only source of income	Yes ☐ No ☐ (If no, what other sources of income do you have?)
Are you working in this operation full time?	Yes ☐ No ☐ (If no, what other jobs do you have?)
How long have you been working in this operation?	Less 1 year ☐ Between 1 and 3 years ☐ More than 3 years ☐ (specify)
How much do you make monthly from mining?	Less than R1000 ☐ Between R1000 and R2000 ☐ Between R2001 and R5000 ☐ Between R5001 and R10000 ☐ More than R10000 ☐
How do you spend your income from mining?	Basic necessities e.g. food, clothes etc. ☐ Accommodation e.g. renting ☐ Children's education ☐ Send money home ☐ Personal savings ☐ Invest back into the business ☐

	Entertainment e.g. alcohol ☐ Other ☐
Do you work alone or with other people?	Alone ☐ Other people ☐
Are these people family members?	Yes ☐ No ☐ Some ☐ (specify)
Were you employed before working in this operation?	Yes ☐ No ☐ (If yes, where?)
What happened to your previous job?	Resigned ☐ Retrenched ☐ Contract ☐ Other ☐ (specify)

Section C: Perceptions and aspirations towards ASM in the context of socio-economic development⁷⁴

Do you enjoy working in mining?	Yes ☐ No ☐ Somewhat ☐
If you get another job, would you leave mining?	Yes ☐ No ☐ Not sure ☐
Are you looking for a job at present?	Yes ☐ No ☐ Somewhat ☐
Would you like to own a mine one day?	Yes ☐ No ☐ Somewhat ☐
Has working in ASM improved your life?	Yes ☐ No ☐ Somewhat ☐
Do you regard being a miner a proper job?	Yes ☐ No ☐ Somewhat ☐
Is being a miner a respected job in the community?	Yes ☐ No ☐ Somewhat ☐
Do you think ASM has created employment opportunities in the community?	Yes ☐ No ☐ Somewhat ☐
Do you think ASM contributes to poverty reduction in the community?	Yes ☐ No ☐ Somewhat ☐
Do you think ASM has created opportunities for the establishment of small businesses?	Yes ☐ No ☐ Somewhat ☐
What is the relationship between ASM and other economic sectors in the community?	Positive ☐ Negative ☐ Both ☐ Not sure ☐
How do you think the community perceive ASM?	Positive ☐ Negative ☐ Both ☐ Not sure ☐
Do you think ASM should be promoted or discouraged?	Promoted ☐ Discouraged ☐ Both ☐

⁷⁴ The objective of this is to obtain a generic understanding of the impact of ASM on the well-being of the miners. The OECD Framework measures well-being in terms of material conditions, quality of life and sustainability using 11 dimensions e.g. income and wealth; jobs and earnings; housing conditions; health status; work-life balance; education and skills; environmental quality; personal security etc. Can we use this to understand real impact of ASM activities?

Appendix C: Living standard measure questionnaire

No.	Do you own the following at home?	BEFORE		AFTER	
		Yes	No	Yes	No
1	Hot running water from geyser				
2	Computer -desktop or laptop				
3	Electric stove				
4	Domestic worker or helper or gardener				
5	0 or 1 radio set				
6	Flushing toilet in or outside the house				
7	Motor vehicle				
8	Washing machine				
9	Refrigerator (with freezer)				
10	Vacuum cleaner				
11	Pay TV (DSTV/Top TV)				
12	Dishwashing machine				
13	3 or more cellphone				
14	2 cellphones				
15	Home security service				
16	Deep freezer				
17	Microwave oven				
18	Do you live in a non-urban area?				
19	House/cluster house/townhouse				
20	DVD player/Blu ray player				
21	Tumble dryer				
22	Home theatre system				
23	Home telephone (landline)				
24	Swimming pool				
25	Tap water in the house/yard				
26	Built-in kitchen sink				
27	TV set				
28	Air conditioner				
29	Do you stay in a metropolitan area? (Population of more than 250000)				

Appendix D: Interview questionnaire

Questionnaire 1: Interviews with the miners

Please note that there are no direct benefits from participating in the study, and there are also no penalties for not participating either. Your participation in this study is entirely voluntary and you are free to withdraw yourself and data you provided at any time. You are not obliged to answer the questions you are not comfortable with. Your responses will remain confidential and anonymous. If you have any additional questions, you can contact Pontsho Ledwaba on xxxxxxxx.

- 1) Do you give consent to participate in the research?
- 2) Do you give permission for the interview to be audio recorded?

Interview questions

- 1) How old are you? Are you originally from Kimberley? Were you born in South Africa?
- 2) What were you doing before becoming an artisanal miner?
- 3) What made you decide to work as an artisanal miner?
- 4) How long have you been working as an artisanal miner?
- 5) Do you have other sources of income or you are only depending on artisanal mining for income?
- 6) Do you work alone or with other people? If with other people, how many? If you get diamonds, how do you share the money?
- 7) Has working as an artisanal miner changed your life and that of your family? Did it change it in a good way, bad way or there is no change? (I.e. the miner must provide details. You must ask them for details i.e. what things have they bought from income from artisanal mining, what have they achieved from working as artisanal miners)
- 8) Are you a breadwinner at home? How many dependents do you have?
- 9) What do you like about artisanal mining?
- 10) What don't you like about artisanal mining?
- 11) What challenges have you experienced working as an artisanal miner?
- 12) Do you see artisanal mining as a short-term or long-term employment opportunity?
- 13) If you are given an alternative employment opportunity, would you leave artisanal mining? (the miner must explain why)
- 14) Artisanal mining is considered a dangerous and risky job – do you see it as a dangerous job?
- 15) What has been the impact of COVID-19 on your source of income and survival of your family? What challenges did you face during the lockdown?
- 16) What did you do to survive during the lockdown? Did you have savings put away to assist in times of crisis?

17) What kind of support and interventions do artisanal miners need from government?

Questionnaire 2: Views and perceptions of communities towards Artisanal and Small-Scale Mining (ASM) e.g. Zama-Zamas

This questionnaire is developed to solicit the views and perceptions of local communities on illegal mining. While zama-zamas are an integral part of local economies and contribute to local economic development; the sector's activities can also perpetuate social, economic and environmental challenges found in communities. For example, there have been cases where the criminal activities linked to zama-zama activities have spread to local communities posing safety and security risks. More so, there are numerous cases where communities have been caught in the crossfire and put in danger because of zama-zama activities. Given the current debates and discussions on Free, Prior and Informed Consent (FPIC), it is important to establish the position of local communities on illegal mining considering the positive and negative aspects of the sector. The questionnaire aims to solicit views from community members on:

- 1) Zama-zamas and local economic development (e.g. jobs, small businesses etc.)
- 2) Zama-zamas and community well-being
- 3) Zama-Zamas and community safety and security
- 4) Zama-zamas and impacts of the environment (e.g. land, water etc.)

Name of community	
Age	
Gender	
Nationality	
Race	
Category	Resident Business owner (specify) Other (Specify)
Designation	
Were you born here?	
If No, when did you move here and why did you move here?	

Do you give me permission to record the interview??

Section A: Zama-zamas and local economic development

- Does zama-zama mining contribute to the economy of the area?
- How is zama-zama contributing to the community?
- Has it created jobs for communities?
- Has it created opportunities for small businesses?
- How is the relationship between small businesses and zama-zamas?

Section B: Zama-zamas and community well-being

- Has zama-zama mining changed the lives of people here?
- If yes, did it change their lives in a good and bad way?
- How did it change the lives of the community?

Section C: Zama-Zamas and community safety and security

- How is the level of crime in the area? Do you feel safe in the area?
- Have the zama-zamas brought crime into the area?
- If yes, what kind of criminal activities?
- How is the community dealing with these crimes?

Section D: Zama-zamas and impacts of the environment

- What has been the impact of zama-zama on the environment?
- For example, the impact of land, water?

Section E: Community recommendations

- What do you like about zama-zama mining?
- What don't you like about zama-zama mining?
- Do you think the community has problems with the zama-zamas?
- Do you think zama-zamas should be stopped or supported by government?

Questionnaire 3: Key informant interviews with ASM practitioners

The following is a pool of questions that were posed to ASM practitioners. As defined in the Thesis, practitioners include professionals who are either working in the ASM sector or have interfaced with the sector's activities through their work. These include professionals working for government, civil society organisations (CSOs), community-based organisations (CBOs), academia, large-scale mining companies, trade unions, and those with own consultancy companies. Some of the questions were posed to all key informants, while some were directed to specific practitioners given the coverage of their work and interaction with the ASM sector.

- 1) How do you define ASM and illegal mining?
- 2) How widespread are ASM activities in the country?
- 3) What are the main driving factors pushing/pulling people into ASM in South Africa?

- 4) Do you think ASM is playing a role in the country's socio-economic development? (it is positive, negative or both?)
- 5) Do you think ASM has the potential to contribute to the National Development Plan?
- 6) How does the ASM sector fit into the South Africa's mining industry and its development/transformation agenda?
- 7) In your opinion, has ASM changed the lives of the miners and of communities?
- 8) How do the miners integrate in local communities? Are they considered part of communities?
- 9) Apart from the miners, who else benefit from ASM activities?
- 10) What are the opportunities for ASM development in South Africa?
- 11) What are the bottlenecks for ASM development in the country?
- 12) What are some of negative characteristics/impacts of ASM sector that needs to be addressed?
- 13) What are the main challenges facing ASM in South Africa?
- 14) Can ASM coexist with large-scale mining in South Africa?
- 15) What has been the impact of ASM/illegal mining on large-scale mining operations?
- 16) How are large-scale mining companies addressing the impacts of ASM on their operations?
- 17) What role/s do you play in the ASM sector and what work have you done in the sector or that links to the sector?
- 18) In some African countries, there are mining companies that have entered into agreements with ASM operations, what are some of the key considerations that should underpin these agreements/relationships? What have been the experience of large-scale mining companies in terms of what has worked and what is not working?
- 19) You work with various stakeholders including government, local municipalities, mining companies and others, what has been the views of the different stakeholders on ASM in South Africa?
- 20) The DMRE in collaboration with various state-owned enterprises (i.e., Mintek, Council for Geosciences, Mining Qualification Authority and others) have implemented several projects to support the development of the ASM sector, in your opinion, what has worked and what has not worked? What has been the impact of these projects/programmes on the sector?
- 21) What has been some of the shortcomings of ASM support and intervention?
- 22) What has been some of the challenges to ASM support and intervention?
- 23) What are your views on current legal frameworks and ASM development in the country?
- 24) There are several contentious issues surrounding ASM activities and these include: (1) ASM and its links to criminality/criminal syndicates, (2) participation of foreign nationals in ASM, and (3) ASM taking place underground., (4) the relinquishment of large-scale mining concessions for ASM

development. What are your views on these policy issues and how should government deal with them?

25) What is your perspectives on ASM formalisation? Should the sector be formalised?

26) What is your vision (or that you support) for the ASM sector in the country?

27) The DMRE is in the process of developing an ASM Bill, what key issues should be given attention in the policy.

28) What is your vision for the ASM sector in the country?

Appendix E: ASM profiling data

Table A: Age distribution

Age groups	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
18 - 25	170	13%	81	13%	51	10%	17	21%	14	19%	3	6%	4	18%
26 - 35	446	33%	228	38%	137	26%	28	34%	18	25%	25	51%	10	45%
36 - 45	415	31%	197	33%	163	31%	19	23%	16	22%	17	35%	3	14%
46 - 55	171	13%	51	8%	97	18%	2	2%	14	19%	4	8%	3	14%
56 - 65	86	6%	20	3%	54	10%	1	1%	9	12%	0	0%	2	9%
More than 65	35	3%	8	1%	24	5%	1	1%	2	3%	0	0%	0	0%
Unknown	32	2%	16	3%	2	0%	14	17%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table B: Gender profiles

Gender	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	1156	85%	497	83%	467	88%	72	88%	64	88%	43	88%	13	59%
Female	194	14%	101	17%	60	11%	9	11%	9	12%	6	12%	9	41%
Unknown	5	0%	3	0%	1	0%	1	1%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table C: Race patterns

Race	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Black	1225	90%	584	97%	478	91%	79	96%	13	18%	49	100%	22	100%
Coloured	104	8%	2	0%	42	8%	0	0%	60	82%	0	0%	0	0%
Unknown	26	2%	15	2%	8	2%	3	4%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table D: Place of residence (i.e., where the miners come from?)

Place of residence	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Local	574	58%	224	63%	182	40%	61	88%	64	88%	24	100%	19	86%
Non-locals	411	41%	130	37%	262	58%	7	10%	9	12%	0	0%	3	14%
Unknown	11	1%	1	0%	9	2%	1	1%	0	0%	0	0%	0	0%
Total	996		355		453		69		73		24		22	

Table E: Nationality

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
Nationality	n	%	n	%	n	%	n	%	n	%	n	%	n	%
South African	996	74%	355	59%	453	86%	69	84%	73	100%	24	49%	22	100%
Foreign nationals	348	26%	242	40%	71	13%	10	12%	0	0%	25	51%	0	0%
Unknown	11	1%	4	1%	4	1%	3	4%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table F: Foreign nationals by country

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
Foreign nationality	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Lesotho	159	46%	98	40%	52	73%	0	0%	0	0%	3	12%	0	0%
Mozambique	105	30%	81	33%	2	3%	4	40%	0	0%	12	48%	0	0%
Zimbabwe	47	14%	40	17%	1	1%	1	10%	0	0%	8	32%	0	0%
Other	19	5%	13	5%	5	7%	1	10%	0	0%	2	8%	0	0%
Unknown	18	5%	10	4%	11	15%	4	40%	0	0%	0	0%	0	0%
Total	348		242		71		10		0		25		0	

Table G: Levels of education

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No formal education	123	9%	75	12%	30	6%	3	4%	7	10%	7	14%	1	5%
Primary school	324	24%	135	22%	144	27%	10	12%	21	29%	13	27%	1	5%
Middle school	609	45%	268	45%	226	43%	40	49%	33	45%	29	59%	13	59%
Matric	245	18%	96	16%	111	21%	22	27%	11	15%	0	0%	5	23%
Further education	39	3%	20	3%	14	3%	3	4%	1	1%	0	0%	1	5%
Unknown	15	1%	7	1%	3	1%	4	5%	0	0%	0	0%	1	5%
Total	1355		601		528		82		73		49		22	

Table H: Do you have dependants?

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
Dependants	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	1213	90%	544	91%	474	90%	64	78%	64	88%	46	94%	21	95%
No	134	9%	55	9%	52	10%	14	17%	9	12%	3	6%	1	5%
Unknown	8	1%	2	0%	2	0%	4	5%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table I: Are you a breadwinner?

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
Breadwinner	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	1182	87%	518	86%	466	88%	72	88%	64	88%	44	90%	18	82%
No	131	10%	75	12%	32	6%	6	7%	9	12%	5	10%	4	18%
Unknown	42	3%	8	1%	30	6%	4	5%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table J: Number of dependants?

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
Number of dependants	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Between 1 and 3	698	58%	333	61%	246	52%	35	55%	36	56%	37	80%	11	52%
Between 4 and 6	395	33%	171	31%	169	36%	16	25%	22	34%	7	15%	10	48%
Between 7 and 9	96	8%	29	5%	51	11%	9	14%	5	8%	2	4%	0	0%
10 and more	20	2%	9	2%	7	1%	4	6%	0	0%	0	0%	0	0%
Unknown	4	0%	2	0%	1	0%	0	0%	1	2%	0	0%	0	0%
Total	1213		544		474		64		64		46		21	

Table K: Previous employment (i.e., if miners were employed before working in ASM?)

	Aggregated		Carletonville		Kimberley		Ermelo		Prieska		Vlakfontein		Burgersfort	
Employment status	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Employed	621	46%	227	38%	281	53%	41	50%	52	71%	11	22%	9	41%
Unemployed	642	47%	351	58%	181	34%	38	46%	21	29%	38	78%	13	59%
Unknown	92	7%	23	4%	66	13%	3	4%	0	0%	0	0%	0	0%
Total	1355		601		528		82		73		49		22	

Table L: Reasons for leaving previous employment (i.e., what happened to the miners' previous jobs?)

	Agriculture		Construction		Mining		Retail	
Reason for leaving	n	%	n	%	n	%	n	%
Resigned	17	52%	13	23%	25	12%	14	36%
Retrenched	3	9%	11	20%	107	51%	10	26%
Contract	2	6%	24	43%	54	26%	10	26%
Other	10	30%	6	11%	22	11%	4	10%
Unknown	1	3%	2	4%	1	0%	1	3%
Total	33		56		209		39	

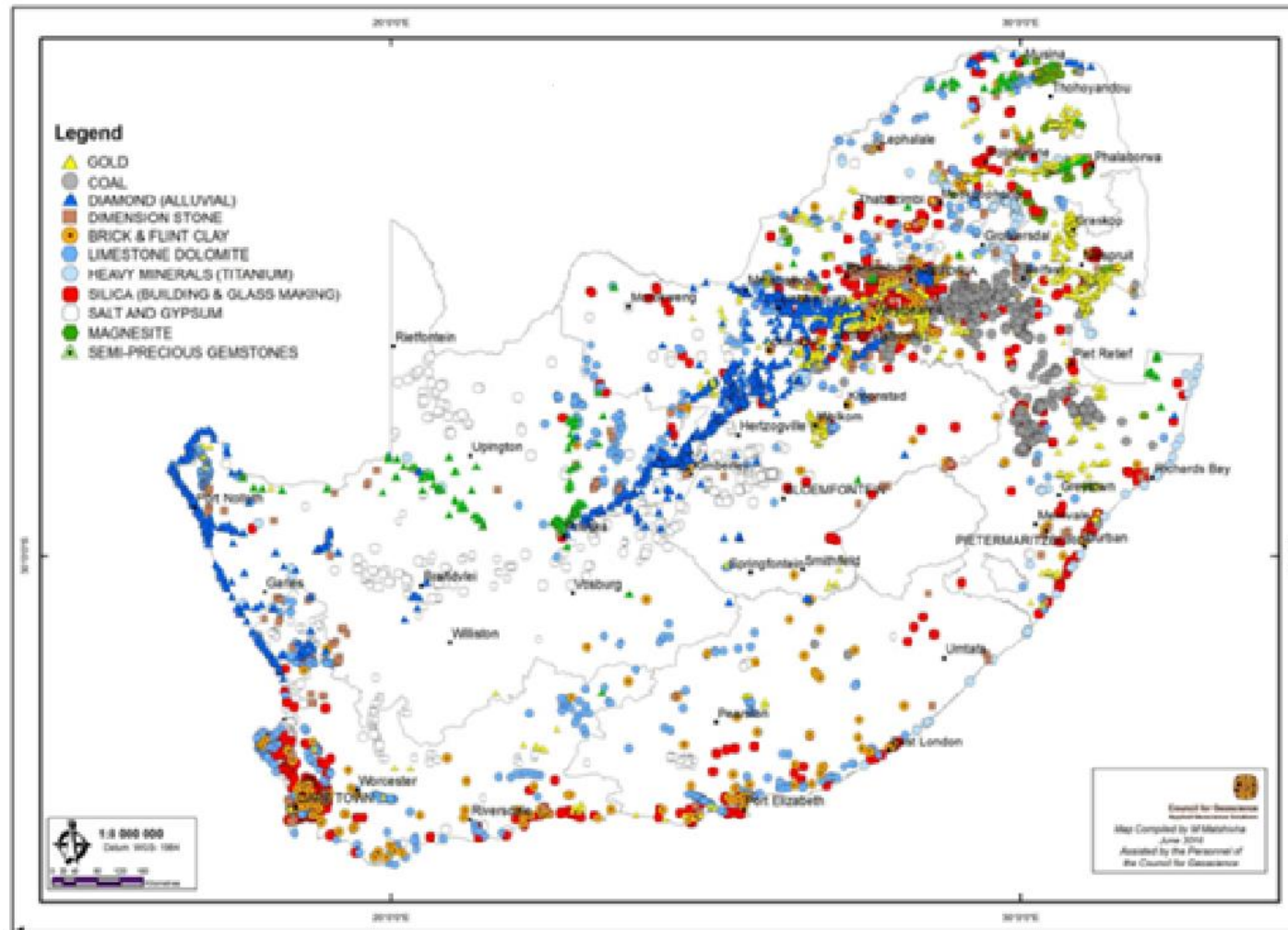
Table M: Categories of employment

Categories of employment	Number	Percentage
Agriculture	33	5%
Construction	56	9%
Domestic work	22	4%
Education	2	0%
Energy	6	1%
Government	16	3%
Hospitality	2	0%
Manufacturing	3	0%
Media	1	0%
Mining	209	34%
Retail	39	6%
Security	12	2%
Self-employed	8	1%
Services	15	2%
Tourism	5	1%
Transport	7	1%
Unknown	185	30%
Total	621	100%

Table N: Statistical measures for LSM trends

Category	Sub-category	PSI	Mean/B	Mean/A	Mean difference	Std deviation/B	Std deviation/A	Weighted average	Pooled Std Dev	Mahalanobis (MD)
Aggregate results		0,826	4,144	5,414	1,270	1,441	1,660	1,300	1,207	1,052
Carletonville		1,438	3,764	5,320	1,556	1,229	1,741	1,560	1,135	1,371
Kimberley		0,112	5,355	5,477	0,122	1,454	1,416	0,122	1,030	0,119
Ermelo		2,007	4,469	6,235	1,765	1,666	1,866	1,770	1,565	1,128
Gender	Male	0,895	4,047	5,398	1,351	1,409	1,672	1,351	1,195	1,130
	Female	0,117	5,432	5,703	0,270	1,259	1,199	0,270	0,756	0,358
Age	18 - 25	1,340	4,107	5,339	1,231	1,459	1,584	1,231	1,160	1,062
	26 - 35	1,054	4,038	5,299	1,261	1,466	1,603	1,261	1,179	1,069
	36 - 45	0,811	4,083	5,512	1,429	1,463	1,845	1,429	1,386	1,031
	46 - 55	1,137	4,545	5,670	1,125	1,508	1,460	1,125	1,101	1,021
	56 - 65	4,119	4,162	5,486	1,324	1,118	1,193	1,324	0,669	1,981
	More than 65	6,146	4,583	5,750	1,167	1,443	1,603	1,167	1,163	1,003
Highest education	No formal education	1,466	3,892	5,280	1,387	1,355	1,535	1,387	1,048	1,324
	Primary school (grade 1 to 6)	0,811	3,699	4,623	0,923	1,140	1,473	0,923	0,578	1,597
	Middle school (grade 7 to 11)	0,991	4,125	5,429	1,305	1,442	1,546	1,305	1,118	1,167
	Matric	2,382	4,345	6,131	1,786	1,460	1,684	1,786	1,242	1,438
	Further education	16,147	4,840	7,680	2,840	1,841	1,547	2,840	1,446	1,964
Nationality	South African	0,856	3,902	5,593	1,692	1,259	1,774	1,314	1,183	1,430
	Other	1,093	3,742	5,020	1,278	1,312	1,702	1,278	1,155	1,106
Foreign nationality	Lesotho	2,124	3,404	4,556	1,152	0,968	1,520	1,152	0,812	1,418
	Mozambique	0,767	3,876	4,969	1,093	1,348	1,655	1,093	1,139	0,959
	Zimbabwe	4,480	3,771	6,021	2,250	1,225	2,047	2,250	1,423	1,582
	Other	8,850	3,867	5,333	1,467	1,060	0,900	1,467	0,483	3,034
Dependants #	None	1,886	3,859	5,705	1,846	1,509	1,866	1,846	1,440	1,282
	Between 1 and 3	0,903	3,914	5,219	1,305	1,343	1,635	1,305	1,119	1,165
	Between 4 and 6	0,841	4,370	5,520	1,150	1,480	1,560	1,150	1,156	0,995
	Between 7 and 9	1,437	4,648	5,803	1,155	1,475	1,754	1,155	1,312	0,880
	10 and more	3,870	4,350	5,950	1,600	1,694	1,761	1,600	1,493	1,071
ASM work experience	Less than 1 year	1,076	4,360	5,506	1,146	1,524	1,341	1,146	1,031	1,112
	Between 1 and 3 years	0,978	4,250	5,492	1,242	1,472	1,506	1,242	1,108	1,120
	More than 3 years	0,980	3,911	5,338	1,427	1,371	1,837	1,427	1,313	1,086
More than 3 years experience	Between 4 to 7 years	2,023	3,707	5,101	1,394	1,106	1,808	1,394	1,123	1,241
	Between 8 and 11 years	2,343	3,815	5,617	1,802	1,305	1,875	1,802	1,304	1,382
	Between 12 and 15 years	6,119	3,676	5,595	1,919	1,564	1,992	1,919	1,604	1,196
	More than 15 years	6,274	3,821	6,071	2,250	1,124	1,884	2,250	1,203	1,870
ASM only source of income	Yes	0,886	4,021	5,333	1,312	1,388	1,618	1,312	1,136	1,155
	No	1,523	4,947	6,105	1,158	1,646	1,848	1,158	3,062	0,378

Appendix F: Distribution of minerals amenable to ASM



Source: Council for Geosciences, 2016