



International
Labour
Organization

► Skills Development
for Increased Employability
Programme in Zambia

Mining Sector Review Report

Picture courtesy of ZCCM-IH

► December 2025

© International Labour Organization 2025.

First published 2025.



Attribution 4.0 International (CC BY 4.0)

This work is licensed under the Creative Commons Attribution 4.0 International. See: creativecommons.org/licenses/by/4.0. The user is allowed to reuse, share (copy and redistribute), adapt (remix, transform and build upon the original work) as detailed in the licence. The user must clearly credit the ILO as the source of the material and indicate if changes were made to the original content. Use of the emblem, name and logo of the ILO is not permitted in connection with translations, adaptations or other derivative works.

Attribution – The user must indicate if changes were made and must cite the work as follows: ILO. Title, Mining Sector Review Report, subtitle, Skills Development for Increased Employability Programme and subtitle, Geneva: International Labour Office, 2025. © ILO.

Translations – In case of a translation of this work, the following disclaimer must be added along with the attribution: *This is a translation of a copyrighted work of the International Labour Organization (ILO). This translation has not been prepared, reviewed or endorsed by the ILO and should not be considered an official ILO translation. The ILO disclaims all responsibility for its content and accuracy. Responsibility rests solely with the author(s) of the translation.*

Adaptations – In case of an adaptation of this work, the following disclaimer must be added along with the attribution: *This is an adaptation of a copyrighted work of the International Labour Organization (ILO). This adaptation has not been prepared, reviewed or endorsed by the ILO and should not be considered an official ILO adaptation. The ILO disclaims all responsibility for its content and accuracy. Responsibility rests solely with the author(s) of the adaptation.*

Third-party materials – This Creative Commons licence does not apply to non-ILO copyright materials included in this publication. If the material is attributed to a third party, the user of such material is solely responsible for clearing the rights with the rights holder and for any claims of infringement.

Any dispute arising under this licence that cannot be settled amicably shall be referred to arbitration in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL). The parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of such a dispute.

For details on rights and licensing, contact: rights@ilo.org. For details on ILO publications and digital products, visit: www.ilo.org/publns.

ISBN (9789220416785 print + PDF + any other formats)

ISSN (9789220416785) here (print + online)

DOI www.ilo.org/publns

CIP data (if applicable)

If the publication exists in several languages, add:

Also available in [language]: *title*, ISBN (print + PDF); [language]: *title*, ISBN (print + PDF), etc.

The designations employed in ILO publications and databases, which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the ILO concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers or boundaries. See: www.ilo.org/disclaimer.

The opinions and views expressed in this publication are those of the author(s) and do not necessarily reflect the opinions, views or policies of the ILO.

Reference to names of firms and commercial products and processes does not imply their endorsement by the ILO, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

Printed in [Zambia]



► **Skills Development for Increased Employability
Programme in Zambia**

Mining Sector Review Report

► **December 2025**

Acronyms and Abbreviations

AfDB	African Development Bank Continental
AFC	African Finance Corporation
ASM	Artisanal and Small Scale-Mining
AZWIM	Association of Zambian Women In Mining
BESS	Battery Energy Storage System
COMESA	Common Market for Eastern and Southern Africa
CSR	Corporate Social Responsibility
DR Congo	Democratic Republic of Congo
ESG	Environment Social Governance
EU	European Union
GDP	Gross Domestic Product
GEI	Gender Equity Index
GNP	Gross National Product
HS	Harmonised System (codes)
ICLG	International Comparative Legal Guide
IGF	International Governmental Forum on Mining, Minerals, Metals and Sustainable Development
ILO	International Labour Organization
IMF	International Monetary Fund
ISIC	international Standard Industrial Classification
ISO	International Organisation for Standardization
ITC	International Trade Centre
KW	Kilowatt
LSM	Large-scale Mining
MFEZs	Multi-Facility Economic Zones
MFNP	Ministry of Finance and National Planning
MGE	Ministry of General Education
MLSS	Ministry of Labour and Social Security
MSTF	Mining Skills and Training Framework
MTS	Ministry of Technology and Science
MMDA	Mines and Minerals Development Act
MMMD	Ministry of Mines and Minerals Development
MTE	Mining and Technical Exhibitions
MW	Megawatt
NTE	Non -Traditional Exports
NVA	Net Value Added
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
SADC	Southern African Development Community
SDEP	Skills Development for Increased Employability Programme
SDF	Skills Development Fund
SMEs	Small and Medium-sized Enterprises
SPEED	Skills for Productivity, Environment, and Economic Diversification
STED	Skills for Trade and Economic Diversification
STEM	Science, Technology, Engineering and Mathematics

STI	Science, Innovation and Technology
SWOT	Strengths Weaknesses Opportunities Threats
TE	Total Exports
TEVET	Technical Education, Vocational and Entrepreneurship Training
TEVETA	Technical Education, Vocational and Entrepreneurship Training Authority
UAE	United Arab Emirates
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organisation
USD	United States Dollar
USTDA	United States Trade and Development Agency
WCO	World Customs Organisation
ZAFESSM	Zambia Federation of Small-scale Miners
ZAMITA	Zambian Industrial Training Academy
ZAMSET	Zambia Mining Skills and Education Trust
ZamStats	Zambia Statistics Agency
ZASMA	Zambia Artisanal and Small-scale Mining Association
ZCCM-IH	ZCCM-Investment Holdings
ZCM	Zambia Chamber of Mines
ZDA	Zambia Development Agency
ZEITI	Zambia Extractive Industries Transparency Initiative
ZEMA	Zambia Environmental Management Agency
ZMW	Zambian Kwacha
ZAQA	Zambia Qualifications Authority

Table of Contents

List of Tables.....	v
Foreword.....	vii
1. Introduction.....	1
2. Overview of the Mining Sector: Profile and Dynamics of the Sector.....	3
2a. Sector definition and scope.....	3
Scanning the Business Environment: Political, Economic, Social, Technological, Environmental, Legal (PESTEL) Factors.....	8
Main World, Regional and National Market Trends Relevant to Zambia's Mining Sector.....	11
Drivers of Change.....	11
Evidence of Comparative Advantage.....	13
2b. Sector performance and economic outlook.....	14
Growth and Investment.....	17
Direction of trade, patterns and trends.....	19
Exports and Imports.....	20
Future Prospects.....	26
2c. Employment in the sector.....	28
2d. Business profile in the sector.....	33
Large-Scale Mining.....	33
Artisanal and Small-Scale Mining.....	34
International firms.....	34
3. Government policies, strategies and interventions.....	35
Memorandum of Understanding EU-Zambia on sustainable raw materials (Oct 2023).....	37
3a. Policy focus areas for developing and improving the mining value chain.....	37
Local content policies.....	37
Financial instruments and payment terms.....	37
Understanding competencies of local suppliers and improving competitive environment.....	37
4. Value chain analysis of the mining sector.....	38
Value chain extension.....	40
Obstacles to extension of the mining value chain.....	42
5. Labour market analysis.....	43
Wages and Earnings compared with other Sectors.....	44
Wage Trends.....	44
Job vacancies.....	45
Employee Satisfaction and Retention.....	45
6. Skills demand in the mining sector.....	46
6a. Key occupations and skills.....	47
7. Skills supply in the mining sector.....	51
The State of Education.....	52
7a. Key institutions, formal programmes and qualifications relevant to the sector.....	56
7b. Mapping of Existing Actions on Skills.....	57
Government.....	57
Industry.....	58
Education and Training Providers.....	59
Development Partners.....	61

Informal sector training.....	62
7c. Key gaps and constraints in skills supply.....	63
8. Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the mining sector in Zambia.....	65
8a. Competitive Assets.....	66
8b. Challenges.....	67
SWOT Summary.....	68
9. Summary and policy implications.....	69
10. References.....	71
11. Appendix - Additional Statistical, Quantitative and Qualitative data.....	74

List of Tables

Table 1:	Country Snapshot.....	5
Table 2:	Factors Impacting Skills Development.....	12
Table 3:	Net Value Added and Production for Selected Mining Sectors, 2022.....	19
Table 4:	Direction of Trade Summary.....	20
Table 5:	Zambian Exports and Imports of Minerals and Metals, 2012-2022.....	21
Table 6:	Zambia Exports percent of Total Per Sector.....	21
Table 7:	Top Zambian Exports.....	21
Table 8:	Copper (HS74) and articles thereof, exports from 2013 to 2023.....	22
Table 9:	Export Value and Destinations.....	23
Table 10:	Import Products.....	25
Table 11:	Number and percentage Distribution of Employed Persons (15 years of older) by Occupation, Rural/urban and Sex.....	29
Table 12:	Number and percentage Distribution of the Employed Persons by Industry and Type of Employment (Formal/ Informal), Zambia 2022.....	30
Table 13:	Direct and Contracted labour per mining entity.....	30
Table 14:	Number and percentage Distribution of Employed Population (15 years or older) by Industry and Sex, Zambia 2022.....	31
Table 15:	Employed Persons in Mining Enterprises by Sex and Occupational Categories, 2022.....	31
Table 16:	Size Distribution of Enterprises.....	33
Table 17:	Value Chain for Mining.....	39
Table 18:	Obstacles to value chain extension.....	42
Table 19:	LSM skills focus areas, core purpose and key skills required.....	48
Table 20:	ASM skills focus areas and core purpose.....	50
Table 21:	Number and percentage distribution of youth employment by highest level of education attained, rural/urban and sex, Zambia 2022.....	52
Table 22:	Aspects of Talent Development Initiatives.....	59
Table 23:	Skills Activities.....	63
Table 24:	Number and percentage Distribution of Employed Persons 15 Years and Older, By Rural/ Urban, Age Group and Sex Zambia 2022.....	74
Table 25:	Number and percentage Distribution of Employed Population (15 years or older) by Industry and Sex, Zambia 2022.....	75
Table 26:	Occupational Distribution of Employed Persons by Educational Attainment - (Skills Mismatch), Zambia 2022.....	76
Table 27:	Skills Anticipation/Future Demand - List of occupations, key business capability gaps.....	76

List of Figures

Figure 1:	Country World Ranking 2023, Copper Production in 1000 metric tons.....	6
Figure 2:	Mineral deposits in relation locality of major mining companies.....	7
Figure 3:	Copper price fluctuations 2000 to 2024.....	8
Figure 4:	GDP and Poverty trends 2010 to 2022.....	15
Figure 5:	Sector specific GDP trends.....	15
Figure 6:	GDP trends by key sectors from 2010 to 2023.....	16
Figure 7:	Mining contribution to GDP in USD (Billions) for 2014 to 2024 Forecast.....	16
Figure 8:	Actualised investment per sector.....	17
Figure 9:	Mining ownership and production trends.....	18
Figure 10:	ITC 2022 annual growth of world imports between 2018 and 2022.....	23
Figure 11:	Export Localities and Value of Exports.....	24
Figure 12:	Import Localities and Value of Imports.....	25
Figure 13:	Expansion Projects.....	27
Figure 14:	Exploration projects.....	27
Figure 15:	Labour force distribution by sex and age group 2022.....	28
Figure 16:	percentage Share of Employed Persons by Industry , Zambia 2022.....	29
Figure 17:	Zambia Mining (Generic) Value Chain for LSM.....	40
Figure 18:	Value chain according to existing advantage and future potential development.....	41
Figure 19:	Figure percentage of Women Enrolled in STEM Fields.....	53
Figure 20:	ILO Education Levels of Males and Females Employed in Mining in 2019.....	54
Figure 21:	ASM Training Initiatives.....	62
Figure 22:	SWOT Analysis Sources: Inputs from stakeholders and sources in footnotes.....	68
Figure 23:	Regional Distribution of the Labour Force in 2022.....	74
Figure 24:	percentage distribution of youth employment by industry Zambia 2022.....	75

Foreword

“Skills development and lifelong learning is an investment in the future. Global drivers, including technological changes, environmental and climate change, changes in globalization patterns and demographic shifts, as well as crises such as the COVID-19 pandemic, are transforming societies, economies and the world of work” (The ILO strategy on skills and lifelong learning 2030).

The Mining Sector Background Review Study was undertaken in partnership with the Government of the Republic of Zambia, Mining sector stakeholders and with the support of the European Union.

Initiated by the International Labour Organization (ILO) with funding from the European Union, the Zambia Mining Sector Review Report is a vital component within the broader framework of the Skills Development for Increased Employability Programme (SDEP). This aligns with overarching ILO objectives to bolster employability, especially across genders, age and to contribute to the country's economic diversification.

In adopting the Skills for Productivity, Environment, and Economic Diversification (SPEED) methodology, derived from the ILO's Skills for Trade and Economic Diversification (STED) approach, the SDEP takes a sectoral approach for environmental sustainability and climate action. This report presents an application of the STED methodology of the mining sector.

The Sectoral Review Study is a cornerstone of the SPEED methodology and covers themes such as a detailed profile and trends analysis of the mining sector using a gender lens and considering gender disparities, an evaluation of the skills supply-side, the current business environment, a review of existing policy literature, and presents a tailored Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for the mining sector. An exploration of existing TEVET, university-level, and other training provisions has been undertaken, encompassing initial and continuing education and training.

The Sector Background Study is based on a combination of background research and consultations with sector organizations, leading sector enterprises,

relevant providers of education and training, and national stakeholders, including focus group discussions and in-depth interviews with a limited number of key stakeholders resulting in both statistical, whilst consulting the national statistical service, and qualitative aspects.

This background study has come at an opportune time to inform the develop the Mining Sector Skills Strategy, provide in-depth analysis of the sector in as far as skills as they impact of both employability and economic activity. The study and the Strategy have set out recommendations that will give a strategic direction for skills development in the mining sector.

It is hoped that this document will contribute to the body of knowledge and provide a reference point of understanding the sector from a skills anticipation point of view and basis for implementation by both primary mining sector players as well as other partners. project plans to follow up the reports by supporting implementation of a number of these recommendations in collaboration with stakeholders.

Sincere appreciation is extended to our partners who assisted in this highly participatory process. We are particularly indebted to European Union, the Government of the Republic of Zambia, mining sector players who committed time, financial recourse and technical support to ensure that successful completion of this study.



Wellington Chibebe
DIRECTOR

Acknowledgement

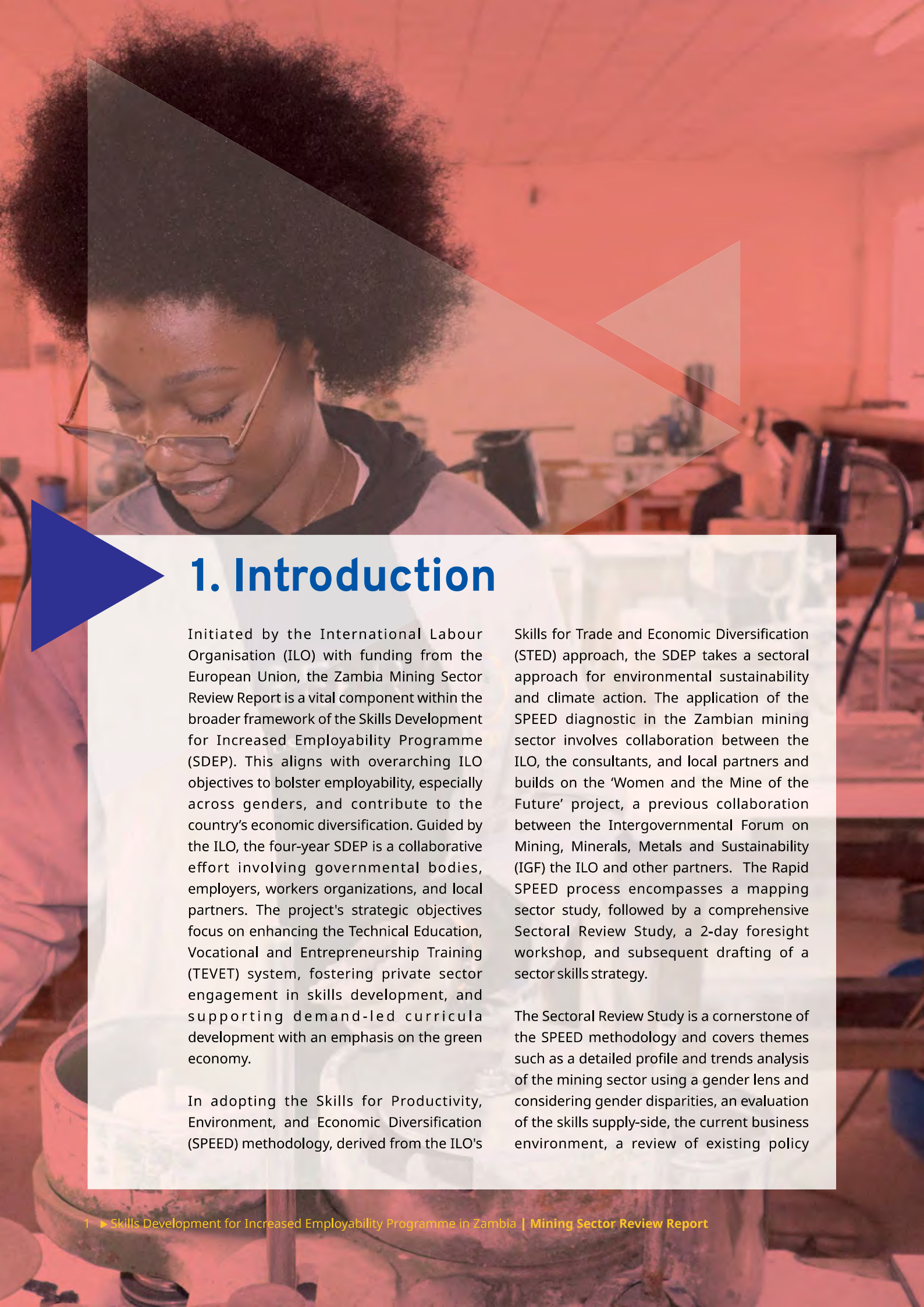
This report was written by the ILO Country Office of Lusaka with technical support from Bolormaa Tumurchudur Klok (Technical Officer, ILO Employment Policy Department, Geneva), Takaaki Kizu (Skills Development Officer, ILO Employment Policy Department, Geneva), Alice Vozza (Policy Specialist, Just Transitions, ILO Employment Policy Department, Geneva), Albert Okal (Skills and Lifelong Learning Specialist) Pretoria, Todini Marecha (Chief Technical Advisor, ILO Zambia), Musoli Muchima Kashinga (National Project Coordinator, ILO, Zambia), Mpulu Makayi (National Project Coordinator, ILO, Zambia). The work would not have been possible without the leadership and support of the Ministry of Technology and Science, the Ministry of Labour and Social Security, the Ministry of Mines and Mineral Development, Technical Education, Vocational Entrepreneurship Training Authority (TEVETA), the Zambia Qualifications Authority, the Zambia Congress of Trade Unions. and the Zambia Federation of Employers - for convening the meetings and its affiliate the Zambia Chamber of Mines. Particular thanks are also due to Mr Wellington Chibebe, Director Country Office Lusaka.

Background research was conducted by Mrs Theresa Anne Cooper and Dr Michelle Goliath. Logistical and administrative support was provided by Rose Lutele (Finance and Administrative Assistance, ILO Zambia) and Mr Chrispine Moono (ILO, Zambia),

Many industry stakeholders from government, chambers, private sector, training and education institutions, and trade unions, the civil society, the UN system through UNIDO and UNDP and the GIZ who generously gave their time and insights during workshops and interviews, reviewing the final draft report and through participating in meetings¹.

All errors and omissions remain the responsibility of the authors.

¹ Full list in the annex section

A woman with dark curly hair and glasses is focused on her work in a workshop. She is wearing a dark top and a necklace. The background is slightly blurred, showing various tools and equipment. A large, semi-transparent white arrow points from the left towards the right, partially covering the image. The overall color palette is warm, with reds and oranges.

1. Introduction

Initiated by the International Labour Organisation (ILO) with funding from the European Union, the Zambia Mining Sector Review Report is a vital component within the broader framework of the Skills Development for Increased Employability Programme (SDEP). This aligns with overarching ILO objectives to bolster employability, especially across genders, and contribute to the country's economic diversification. Guided by the ILO, the four-year SDEP is a collaborative effort involving governmental bodies, employers, workers organizations, and local partners. The project's strategic objectives focus on enhancing the Technical Education, Vocational and Entrepreneurship Training (TEVET) system, fostering private sector engagement in skills development, and supporting demand-led curricula development with an emphasis on the green economy.

In adopting the Skills for Productivity, Environment, and Economic Diversification (SPEED) methodology, derived from the ILO's

Skills for Trade and Economic Diversification (STED) approach, the SDEP takes a sectoral approach for environmental sustainability and climate action. The application of the SPEED diagnostic in the Zambian mining sector involves collaboration between the ILO, the consultants, and local partners and builds on the 'Women and the Mine of the Future' project, a previous collaboration between the Intergovernmental Forum on Mining, Minerals, Metals and Sustainability (IGF) the ILO and other partners. The Rapid SPEED process encompasses a mapping sector study, followed by a comprehensive Sectoral Review Study, a 2-day foresight workshop, and subsequent drafting of a sector skills strategy.

The Sectoral Review Study is a cornerstone of the SPEED methodology and covers themes such as a detailed profile and trends analysis of the mining sector using a gender lens and considering gender disparities, an evaluation of the skills supply-side, the current business environment, a review of existing policy

literature, and presents a tailored Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for the mining sector. An exploration of existing TEVET, university-level, and other training provisions is undertaken, encompassing initial and continuing education and training.

The report applies the ILO's SPEED methodology to Zambia's mining industry, with a gendered lens to addressing the sector's dynamic challenges and opportunities with a focus on strengthening the industry through skills development initiatives to enhance competitiveness amidst evolving industry demands and technological advancements. This aligns with Zambia's Eighth National Development Plan, the 2022-2026 National Minerals Development Policy and the 2022-2026 Mining Sector Strategic Plan, which emphasizes the country's strategic objective of creating a broad pool of highly skilled labour across all skill levels. It aims to propel local employment through the anticipated growth and development of the mining sector, underscoring the importance of a skilled

workforce. The collaborative insights generated through this Sectoral Review will inform the drafting of a strategic, demand-driven approach to skills development in Zambia's mining sector, fostering sustainability, economic growth, and enhanced employability.

For the purposes of this study, the research focuses on companies that are employers in the mining of metal ores and other mining and quarrying, which involves the exploration, extraction, processing, and trading of minerals and metals activities². It excludes the extraction of crude petroleum and natural gas and does not include specific information and data related to suppliers and ancillary industry services. However, where indirect or induced industry information is available, it has been mentioned³.

² As classified by ISIC, Rev. 4 - Code B - <https://unstats.un.org/unsd/classifications/Econ/Detail/EN/27/B>

³ While every effort has been made to gather and analyse the most current information and data available, it should be noted that in many instances official (both public and private sector) data is not collected and/or disaggregated in ways that can respond to the level of detail hoped for and all questions posed by the ILO terms of reference guideline. There may be other sources of data that come to light later in the process but as of writing these are not known or available to the authors to include in this study. In 2017, the Zambia Statistics Agency (ZamStats) adopted a new labour force framework based on the guidelines provided by the 19th International Conference of Labour Statisticians (ICLS) in 2013. This framework introduced changes in the way labour market statistics are measured and compiled, including work, employment, and labour underutilization statistics. Due to these changes, it is inadvisable to compare current statistics to those derived based on the previous labour force framework adopted at the 13th ICLS in 1982.



2. Overview of the Mining Sector: Profile and Dynamics of the Sector

The mining sector has been a key pillar of Zambia's economy since the discovery of its vast copper reserves in the 1920's. The dynamic nature of the mining sector, influenced by global demand, market fluctuations, and technological advancements, necessitates a forward-thinking approach to skills supply and demand based on a country appropriate and future-looking sector skills development strategy. A well-crafted skills strategy is crucial for effectively addressing Zambia's mining workforce challenges in order for the country to capitalise on emerging opportunities.

2a. Sector definition and scope

The International Standard Industry Classification (ISIC) Revision 4 – Code B Mining

and quarrying⁴ categorizes the mining sector as Mining coal and lignite (Division 05), Mining of metal ores (Division 07), Other mining and quarrying (Division 08), and Mining and support service activities (Division 09). As mentioned above, Extraction of crude petroleum and natural gas (Division 05) is irrelevant to this study.

Information related to the following are considered:

- exploration and extraction of copper, cobalt, gold, tin, tungsten, tantalite and other metal ores
- exploration and extraction of gemstones, industrial minerals, and other non-metallic minerals
- beneficiation of minerals and metals
- exploration, production and distribution

⁴ International Standard Industrial Classification of All Economic Activities (ISIC) - ILOSTAT

of energy minerals such as coal and petroleum products

- provision of services to the mining industry, such as drilling, blasting, surveying, testing, and engineering
- trading and exporting of minerals and metals, both domestically and internationally.

The Zambia Mining Investment and Governance Review by the World Bank contains some references to ISIC codes, as does the Zambia 2023 Mining report by PwC. These limited sources are used where possible in this study. The International Trade Centre (ITC) has several projects in Zambia aimed at enhancing export capacity, improving trade and investment performance, and increasing the participation of women in trade⁵. Specific trade data related to the

mining sector from ITC is included in the relevant sections of this report.

The United Nations Industrial Development Organisation (UNIDO) Mining & Utilities Statistics Database provides highly disaggregated data at the 2- and 3-digit level of ISIC fact or speculation-source?. This data include the number of establishments, number of employees, wages and salaries, output, value added, gross fixed capital formation and number of female employees. However, the specific data for the Zambian mining sector is not readily available and limited data is displayed up to 2017. To further define the mining sector in terms of trade classifications, it is necessary to refer to Chapters 26, 27 and 71 of the Harmonised System (HS) code⁶ (WCO, 2017) that define mineral and metal products.

The following are key classifications pertinent to the Zambian mining sector:

HS 74:	Copper and articles thereof
HS 7108:	Gold, incl. gold plated with platinum, unwrought or not further worked than semi-manufactured...
HS 7103:	Precious stones and semi-precious stones, whether or not worked or graded, but not strung, ...
HS 7102:	Diamonds, whether or not worked, but not mounted or set (excl. unmounted stones for pick-up ...
HS 25:	Salt, sulphur, earths and stone; plastering materials, lime and cement
HS 26:	Mineral fuels, mineral oils and products
HS 27:	Ores, slag and ash

⁵ Zambia | ITC (intracen.org)

⁶ HS Code Chapter 74 | Harmonized System Code Of Copper And Articles Thereof (cybex.in)

A high-level snapshot of country facts in Table 1 below is provided to contextualise the study.

► **Table 1: Country Snapshot**

Category	Information
Geography	Zambia is a large, land linked (land locked), resource-rich country in Southern Africa, sharing borders with eight neighbouring countries. It is largely rural and sparsely populated outside of main centres.
Population	The total population of Zambia has grown rapidly from 7.69 million in 1990 to 20.57 million as of end 2023 and is projected to reach 20.9 million in 2024. The majority of the population resides in urban areas and is young with a median age of 17,6 years ⁷ .
Economy	Zambia's economy rebounded in 2021, with real gross domestic product (GDP) growing at 4.6 percent after a contraction of 2.8 percent in 2020. However, the agriculture, mining, and construction sectors have slowed following post-Covid19 pandemic recovery challenges in 2022.
Currency	The Zambian Kwacha (ZMW) depreciated by 17,5 percent against the US dollar (USD) in the final quarter of 2023 and had further depreciated by 4,6 percent as of February 2024 ⁸ .
Inflation	The Bank of Zambia anticipates inflation to rise and remain above its target band of 6–8 percent over the next two years.
Poverty	Globally Zambia ranks among the countries with the highest levels of poverty and inequality.
Outlook	Zambia's economic recovery is expected to strengthen, with GDP projected to grow by around 4.5 percent annually over the period 2023–25.

Source: World Bank.org⁹

Zambia boasts some of the world's richest copper deposits and ranked as the ninth-largest copper producer globally and second in Africa after the Democratic Republic of Congo (DR Congo) in 2023 (Statista, 2023). Copper alone accounts for more than 70 percent of the nation's foreign export revenue while emerald production contributes to approximately 20 percent of the world's supply¹⁰. In addition, Zambia is endowed with exploitable reserves of cobalt, nickel, manganese, uranium, gold, coal, tungsten, tin, tantalite and gemstones.

The primary product exported is copper ore with some processing and smelting at large, integrated mines. Although the copper price has been historically unstable, the surge in demand for critical minerals¹¹, brought on by rising investments in green technology, predicts current prices will increase for some time. Figure 1 indicates Zambia's copper production ranking in comparison with other major copper producing countries.

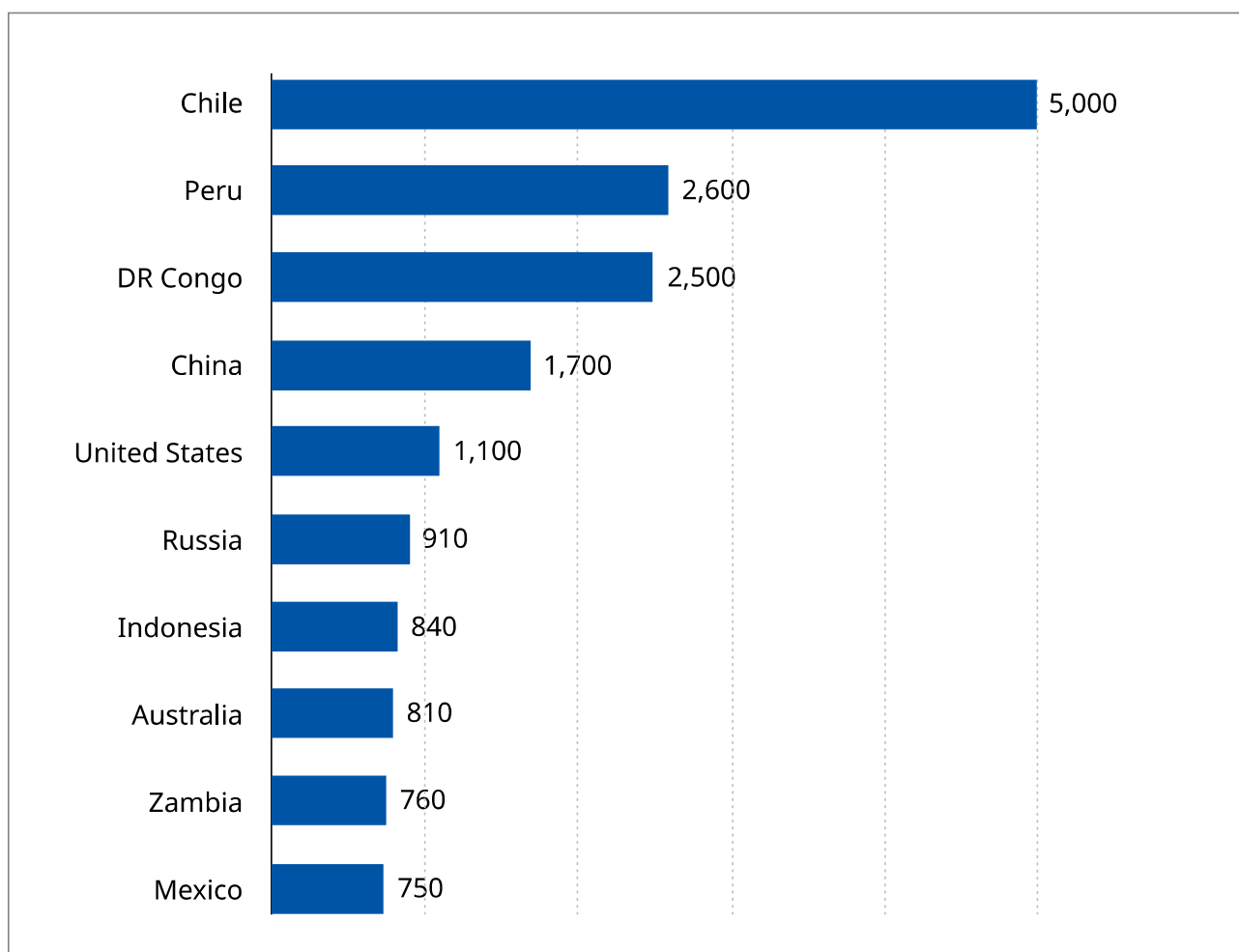
⁷ Zambia Population (2024) - Worldometer (worldometers.info)

⁸ The Daily Nation, February 13, 2024 Zambian Kwacha foreign exchange on the market (dailynationzambia.com)

⁹ Zambia Overview: Development news, research, data | World Bank

¹⁰ Rapid Mapping of Skills Development in Mining Sector Report, EM Associates Limited, September 2023

¹¹ The raw materials—minerals and metals—that are necessary for renewable energy, clean technology, and the transition to a more sustainable, low-carbon future are often referred to as critical minerals – Critical Minerals: A Primer, IGF, <https://www.igfmining.org/wp-content/uploads/2022/11/critical-minerals-primer-en-WEB.pdf>



► **Figure 1: Country World Ranking 2023, Copper Production in 1000 metric tons.**

Source: Copper production by country 2023 | Statista

The Zambian mining sector is predominantly divided into two major sub-sectors¹²: Large-Scale Mining (LSM) and Artisanal and Small-Scale Mining (ASM)¹³.

The LSM subsector has traditionally been dominated by large international companies, which account for over 80 percent of the copper and cobalt output¹⁴. These are typically multi-national companies that have the capacity and resources to explore, extract, process, smelt and refine minerals and metals, as well as to comply with the environmental, social, and fiscal standards and regulations. However, they also face challenges such as declining ore grades, high production costs, international metal prices

fluctuations and frequent changes in the mineral taxation regime.

The ASM subsector comprises a significant portion of the local mining workforce and production, especially in gold, gemstones, and industrial minerals. This subsector mainly produces for the local market with the exception of emeralds, which are an important export product. There are also smaller deposits of Copper, Tin, Tungsten and Tantalite (commonly referred to as the '3T's') that are mostly mined in the Southern and Central provinces, which are also exported. The ASM subsector generally involves surface-level mineral extraction by individuals, cooperatives, or small companies with

¹² U.S. Department of Commerce, International Trade Administration, 2022 - <https://www.trade.gov/country-commercial-guides/zambia-mining-and-minerals>

¹³ According to Zambia's Mines and Minerals Act, 2015 large-scale mining is defined as mining over an area of a minimum of one hundred and twenty-one cadastre units and not exceeding seven thousand four hundred and eighty-five cadastre units; small-scale mining means mining over an area covering a minimum of three cadastre units and not exceeding one hundred and twenty cadastre units; and artisanal mining means an artisan's mining operation undertaken by a citizen pursuant to a mining licence granted under Part III of the Act.

¹⁴ Rapid Mapping of Skills Development in Mining Sector Report, EM Associates Limited, September 2023

minimal capital investment and a reliance on manual labour. It is largely undocumented and informal.

Key factors that shape the capability of a mining entity to export is the ability to access and adapt to new technologies and innovations, which can improve the efficiency, quality, and sustainability of mining production. Here, LSM companies have an advantage as they are able to invest in research and development and adopt the latest mining equipment and techniques. Small-scale mining entities tend to lag in this area, and often rely on outdated and inefficient methods and tools.

LSM companies have direct access to end-user markets as well as offtake agreements with minerals traders (such as Glencore and Trafigura) so they are less likely to use intermediaries to sell their products.

Small-scale mining entities depend on other participants in the value chain with greater market power to get their production to market. Given their vulnerable situation, and competition from the large

number of ASM operators offering similar products, ASM producers are often forced to accept low prices that do not reflect the true value of their products.

Zambian copper production is mainly concentrated in the Copperbelt and Northwestern provinces, and comprises different types of mining operations, from major mining companies deploying capital-intensive and technology-driven production, to ASM operators utilising labour-intensive and informal traditional practices. Mining activity is primarily focused on exploration, extraction and early-stage refinement, with potential for growth in downstream and side-stream activities.

The mining sector is dominated by large multi-national companies, including Vedanta, Barrick Gold, First Quantum Minerals and China Nonferrous Mining Corporation. These companies operate both open-pit and underground mine sites and employ thousands of people directly and indirectly. The approximate localities of the largest mines are indicated in Figure 2.



► **Figure 2: Mineral deposits in relation locality of major mining companies**

Source: Kasempa Mining Ltd., *The Geology and Minerals Resource*¹⁵

However, as the copper ore grades in these mines diminishes, new mining operations are emerging in the adjacent Northwestern province. Currently, the three highest-producing mines are situated in Copperbelt province, leading to a concentration of output in this region. While the Copperbelt province is home to most

of the country's copper resources, with ten mine operations dedicated either entirely or partially to copper mining, future shifts in the sector's focus are anticipated following an updated geological surveying of the country's mineral resources.

¹⁵ <https://www.scribd.com/document/14253088/The-Geology-and-Mineral-Resource-of-Kasempa-Mining-Ltd-A-Management-brief>

The geological potential includes¹⁶:

- Base metals: copper, cobalt, lead, zinc, silver, tin, etc.
- Ferrous metals: manganese and iron
- Energy minerals: coal and uranium
- Critical minerals: Copper, cobalt, manganese, lithium, nickel, graphite
- Industrial minerals: limestone, dolomite, granite, sandstones, quartzites, shales, etc.
- Precious metals: gold
- Coloured gemstones: emeralds, amethyst, garnet, aquamarine, tourmaline, topaz, etc.
- Potential for: Hydrocarbon (oil and gas)

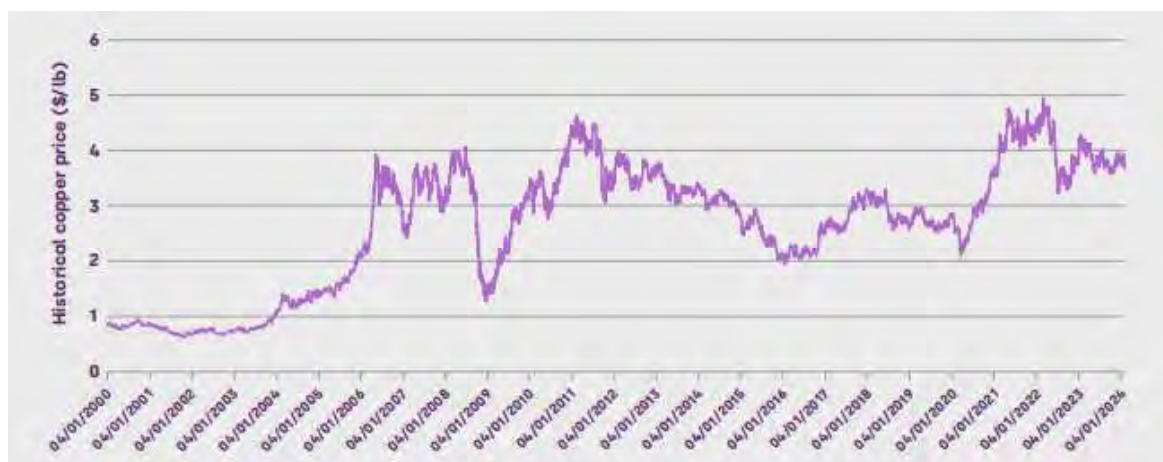
The current mapping of Zambia's mineral deposits is done through above-ground survey, which evaluates minerals that are visible from the surface geology. The

United States Geological Survey supplies data on deposits, potential sites, and permissible areas for copper resources, including predictions of undiscovered copper resources. However, more comprehensive surveys are required to assist the government in identifying new deposits of essential minerals and refining the precision of existing copper ore estimates (USGS, 2024). New geological maps for Zambia's total mineral deposits will greatly enhance government and investor knowledge of economic potential and the government is scheduled to commence a national mapping project in 2025 (MFZ, 2022). Zambia is well-positioned to benefit from growing global demand for copper and other critical minerals for the energy transition and green technologies, given its rich mineral endowment and its advantage in low labour and energy costs.

Scanning the Business Environment: Political, Economic, Social, Technological, Environmental, Legal (PESTEL) Factors

The Zambian mining sector has faced several challenges in recent years. Similar to other mining jurisdictions, one of the significant challenges is fluctuations in global commodity prices, which affects the profitability of mining companies and, in turn, their

investment and employment capacity. Employment in the mining sector has been somewhat volatile in recent years due to fluctuating commodity prices and other economic factors¹⁷. Figure 3 indicates copper price fluctuations from January 2000 to January 2024.



► **Figure 3: Copper price fluctuations 2000 to 2024.**

Source: Trading Economics 2024

¹⁶ From the "THE FUTURE OF MINING IN ZAMBIA – A PRACTITIONER'S PERSPECTIVE" by Dr Sixtus C Mulenga, Founder & Executive Chairman Musamu Resources Lt, ZIPAR Eminent Person's Forum (EPF) Public Lecture, Taj Pamodzi Hotel, Lusaka, November 2023

¹⁷ The current challenges of the Zambian Mining Sector: What is the way forward? – Zambia: News Diggers!

The ILO Employment Working paper for 2017 states that between 2015 and 2016, there was a significant decline in employment in the mining sector, with over 10 000 jobs lost.¹⁸ This was largely due to a decline in copper prices, which led to mine closures and job cuts.¹⁹ More recently, there has been a slight uptick in employment in the mining sector, driven in part by increased copper prices and production, which has led to new job opportunities²⁰ as is common in the cyclical nature of a 'boom-and-bust' industry²¹.

It is worth noting that the high level of ownership in Zambia's LSM sector by foreign-owned companies (see Section 2 Business Profile), has raised some concerns about the impact of mining on local employment and the economy more broadly. The Zambian government has taken steps to address these concerns through the Ministry of Mines and Mineral Development's (MMMD) 2022-2026 Strategic Plan, which includes by implementing a local content strategy that encourages mining companies to prioritize local suppliers and employment. However, the effectiveness of these policies in practice is still being evaluated.

Enterprises operating in priority sectors, such as mining, and special economic zones are entitled to a number of tax incentives. Businesses that operate in Multi-Facility Economic Zones (MFEZs) enjoy several benefits, which include withholding taxes on management fees, zero-rated imports of raw materials, supplies, machinery and equipment, and a five-year period of zero profits and dividend taxes. According to the Zambia Development Agency (ZDA), for local businesses, the minimum investment amount in an

MFEZ is USD 50,000; and for foreign businesses it is USD 500,000²². Financial incentives under the ZDA Act, 2006 (amended in 2014), are not just available to MFEZs but also to all businesses engaged in manufacturing, export-oriented businesses, agriculture, and tourism, which are all eligible to benefit from a variety of incentives and are subject to varied Corporate Income Tax rates.

However, the 2021 monitoring report by the ZDA and Ministry of Finance and National Planning (MFNP) indicated that a significant proportion of polled enterprises expressed their dissatisfaction with the incentives provided and requested improved infrastructure and services. In addition, investor confidence has been impacted by frequent changes to the mining tax regime, resulting in political uncertainty negatively impacting the development of the sector and assurance for foreign investors that the legal framework protects their interests.

The sector has also come under scrutiny and faced criticism for its adverse environmental impacts and social repercussions. Mining operations have resulted in the displacement of local communities and have caused significant environmental degradation, such as soil erosion, deforestation, and water pollution. There are heightened concerns surrounding the safety and well-being of workers, especially those employed in underground mines, where the risk factors for occupational hazards are particularly pronounced (Swedwatch 2019).

¹⁸ Effects of trade on employment and changing skills demand: Evidence from selected countries (ilo.org)

¹⁹ <https://www.industrial-union.org/3000-jobs-lost-from-mine-closures-expose-precarious-working-conditions-in-zambias-copper-mines>

²⁰ [zambia_local_content_for_mining_final_report_august_23_2022.pdf](https://www.afdb.org/en/documents/zambia-local-content-for-mining-final-report-august-23-2022) (afdb.org)

²¹ MINING REFORMS COMING IN ZAMBIA 2024 - Mining Law Blog (dentonsmininglaw.com)

²² Zambia Development Agency - <https://www.zda.org.zm/investment-incentives/>

The PESTEL analysis is summarised briefly here:

Category	Analysis
Political	The government's commitment to a stable mining tax policy has been a pivotal factor in attracting investments to the mining sector. However, persistent challenges such as pervasive corruption and a weak rule of law pose risks and require ongoing efforts for effective governance and regulatory frameworks. ^{23 24}
Economic	The mining sector is the backbone of the economy, contributing significantly to GDP and export earnings (12 percent and 71 percent respectively in 2022) as well as domestic revenue (on average 26-31 percent). Despite this, local value addition remains underdeveloped, and the country's heavy debt burden remains a pressing concern, necessitating strategic economic management to ensure sustainable development and financial stability. Value addition concerns revolve around the fact that the country's mineral resources are exported in their raw form, resulting in lost gains from local beneficiation ^{25 26} (see Section 2 Growth and Investment).
Social	The mining sector plays an important role in employment, contributing to social development (statistics in the Labour Force Survey Report ²⁷). However, concerns about the sector's impact on local communities, ²⁸ especially where youth unemployment remains high and many are informally employed, as well as the environment highlights the need for improved responsible and sustainable practices to mitigate potential social and ecological risks. ²⁹
Technological	Technological advancements in mining processes and equipment have the potential to revolutionize the sector by improving efficiency and reducing environmental impact. However, challenges such as inadequate infrastructure and a shortage of skilled labour may impede the integration of these technologies, requiring investments in technology infrastructure, workforce reskilling and upskilling, and the development of new skills with relevant education and training curricula. ³⁰
Environmental	Mining activities inherently carry environmental risks, including land degradation, water pollution, and biodiversity loss. Additional capacity and resources will be required to effectively manage these impacts as the industry expands into new areas. This is especially important for ASM necessitating rigorous environmental management practices and for LSM to adhere to global best practices (see footnote 14).
Legal	Zambia's mining sector operates within a legal framework that encompasses environmental protection, labour rights, and taxation. Strict adherence to these laws is essential for sustainable and responsible mining practices, ensuring the protection of workers, the environment, and the overall well-being of local communities (see footnote 14). Zambia has also ratified ILO Convention 176, which should be translated into law and practice.

Sources: As per footnotes

²⁵ The current challenges of the Zambian Mining Sector: What is the way forward? - Zambia: News Diggers!

²⁶ DESIGN MINERAL VALUE-ADDITION POLICIES, GOVERNMENT URGED – Daily Nation (dailynationzambia.com)

²⁷ 2020 Labour Force Survey.pdf (ZamStats.gov.zm)

²⁸ THE LAUNCH AND DISSEMINATION OF THE 2022 LABOUR FORCE SURVEY REPORT AND 2020 CHILD LABOUR REPORT – Ministry of Labour and Social Security (mlss.gov.zm)

²⁹ Zambia 2023 Mining Report (pwc.com)

³⁰ MBA PESTEL : Divesting the Zambian Mining Industry PESTEL / PEST Analysis (embapro.com)

Main World, Regional and National Market Trends Relevant to Zambia's Mining Sector

The global energy transition is key when envisioning the future of the mining sector in Zambia. It implies both a higher demand and greater opportunities for the supply of minerals and metals critical for low-carbon emissions in the green economy, such as copper, cobalt, nickel, and manganese. The energy transition also has an impact on innovation, as mining technologies and practices are being improved through greater automation, mechanisation, decarbonisation and digitisation.

The rate of economic growth, industrialization and, in some cases, diversification are also affecting the ways in which countries produce and consume energy and resources. Mining plays a vital role in enabling the transition to renewable and clean energy sources, and therefore the global demand for minerals and metals is expected to continue to grow rapidly. Zambian companies have an opportunity to take advantage of these trends to diversify, industrialise, increase their production, add value and export of high-quality minerals and metals.

Zambia's rich mineral endowment, strong mining skills and expertise, and competitive local labour and energy costs position it well for supplying the regional and global markets with affordable and sustainable products. Global trends will also have a significant impact on international, regional, national and local workforce dynamics, especially as LSM operations adopt new technologies and look to mitigate their carbon footprints. These potentials include enhancing the productivity and sustainability of ASM producers, supporting their integration and linkages in the mining value chain, and improving their access and adaptation to new technologies and innovations.

Exports within the Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA) regions are on a steady upward trend while overall exports to high income countries outside the region have been fluctuating. It is reasonable to think that ensuring a stable, attractive, and fair mineral fiscal policy could enhance this regional trend and drive significant growth in exports to Europe, North America, and Asia.^{31 32 33}

Drivers of Change

The direct impacts of enhancing the position of the mining sector in production and export markets will be increased output and value addition. Increased output will occur both because of the sector meeting the growing demand for minerals and metals in its target markets through improved productivity and sustainability; and through expanding its production capacity and diversification into new minerals and metals³⁴.

It is anticipated that this will directly benefit both LSM companies that dominate the export-oriented part of the sector as well as existing Small and Medium-sized Enterprises (SMEs) and mining cooperatives that might grow into larger-scale entities. ASM operators are also expected to benefit since these anticipated initiatives

will raise their access to finance, technology, markets, and formalization services. These improvements will make it more viable for ASM operators to comply with the quality and environmental standards consistent with export markets, thereby increasing their ability to participate in the mining value chain.

Under the government's vision of the future³⁵, improved competitiveness is expected to come about through:

- increased efficiency and sustainability throughout the mining value chain
- higher quality and environmental standards of products through improved compliance with technical regulations and standards required in

³¹ Strategies to future-proof Zambia's mining industry – The Mail & Guardian (mg.co.za)

³² Reforming Zambia's mines needs more change and support | Chatham House – International Affairs Think Tank

³³ THE ENERGY TRANSITION: WHAT DOES IT MEAN FOR ZAMBIA'S MINING SECTOR? - Zambia: News Diggers!

³⁴ Strategies to future-proof Zambia's mining industry – The Mail & Guardian (mg.co.za)

³⁵ Zambia's mining industry in 2023 - (miningforzambia.com)

target markets

- improved integration and linkages throughout the mining value chain, with better coordination and information flow between different mining entities and stakeholders
- enhanced access and adaptation to new technologies and innovations in exploration, extraction, processing, refining, and smelting
- improved diversification and industrialization of the mining sector and value chain
- improved branding, marketing, sales and channel management in relevant markets³⁶

It is anticipated that enhanced skills will make a major contribution to improving competitiveness. This is

partly by reducing the extent of constraints that a lack of or low level of skills place on competitiveness; and partly by focusing on skills development as an essential component of other aspects of development.

The overall approach is based on adoption of best international practices and standards in mining, including practices that involve safety, quality, innovation, and environmental management.

Key drivers of change are summarised in Table 2, which provides a structured overview of how each factor impacts the mining sector and the corresponding implications for skills development.

► **Table 2: Factors Impacting Skills Development**

Factors	Impact on Mining Sector	Implications for Skills Development
<i>Green Economy and Decarbonization</i>	Increased demand for critical minerals.	Skills development in sustainable mining practices and clean energy technologies.
	Emphasis on renewable energy.	Broadening of opportunities for current skills and development of new, relevant qualifications.
<i>Copper Production Massification</i>	Growing demand for copper in various industries.	Skills development in efficient extraction, processing, and sustainable mining practices.
	Need for optimized processing methods.	Integration of training on less environmentally harmful extraction and processing methods.
<i>Climate Change</i>	Risks from extreme weather events and resource scarcity.	Skills development in climate resilience, risk assessment, and mitigation strategies.
	Requirement for green mining technologies.	Training in emerging green technologies to reduce carbon emissions and resource consumption.
<i>Skills for a Sustainable Future</i>	Integration of renewable energy sources.	Training in renewable energy systems and their application in mining processes e.g. solar PV, green hydrogen, etc.
	Emphasis on circular economy practices.	Skills development in circular economy principles for responsible recycling and disposal of mining by-products.
	Need for climate-smart planning.	Training in climate-smart planning to consider long-term impacts on infrastructure, operations, and communities.
<i>Global Supply Chain and Market Dynamics</i>	Scrutiny on ethical and sustainable supply chains.	Skills development in responsible sourcing practices to meet ethical standards.
	Market fluctuations due to geopolitical and environmental factors.	Training in market analysis and risk management to navigate global market dynamics.

Source: Analysis of data

³⁶ First Quantum Minerals backs Zambia's mining growth strategy - International Mining (im-mining.com)

There may be scope for additional collaborative action, possibly extending to medium-sized mining companies and cooperatives, and to integrating networks of ASM operators. ASM operators require a development framework that facilitates formalization and empowerment in a range of areas, including accessing finance, technology, markets, and services, and in related areas including improving working conditions, environmental management, and social responsibility. An expansion of existing forms of collaborative training and mentoring could improve the ability of ASM operators to produce minerals and metals that meet quality and environmental standards. This, in turn, would enhance the collective capacity of mining communities to benefit from the mining value chain. The MMMD confirms that the development of ASM sector is considered a key driver of socio-economic development by the government and that a specific ASM bill is currently under review and expected to be approved by the parliament in 2024.

Additional developments that will drive change in the Zambian mining sector can be seen in cross border collaborations such as the development of the **Lobito Corridor and the Zambia-Lobito rail line**³⁷, which is

expected to facilitate regional integration and grow trade across the neighbouring countries of Angola, Zambia and DR Congo and beyond. The Lobito Corridor Transport Facilitation Agency Agreement signed by these three countries aims to accelerated growth in trade along the corridor through harmonised trade instruments, stronger coordination of development activities and more effective participation of small and medium-sized enterprises in value chains. When completed, the programme will expand an economic corridor connecting the host countries to global markets to enhance regional trade and growth, and advance the shared vision of connected, open-access rail from the Atlantic Ocean to the Indian Ocean³⁸. At a rough cost estimate of USD 1 billion, the project is funded by the African Development Bank (AfDB) and the Africa Finance Corporation (AFC). The AfDB is confident the corridor will attract investments in digital access, clean energy supply chains, and agricultural value chains, which will ultimately increase regional competitiveness and trade within the context of the African Continental Free Trade Area.

Evidence of Comparative Advantage

The global demand for copper is anticipated to nearly double by 2035.^{39 40} In this context, the Zambian mining sector is well-positioned to meet increasing demand, and the government intends to increase copper production to 3 million tonnes per annum by 2031. With 55 percent of the country's geology historically surveyed, the government is making a concerted effort to map the remaining 45 percent as well as resurveying the known geology utilising modern methods and new technologies. With the entire country surveyed, substantial discoveries of previously unknown reserves suitable for both LSM and ASM sector development are anticipated.

Zambia is experiencing significant growth in its mining sector, which saw substantial investment pledges in 2022 and 2023. Government initiatives, particularly tax incentives and a commitment to a stable mining tax policy⁴¹, have been instrumental in attracting investment to the mining sector. Fiscal consolidation measures have further instilled market confidence, supporting economic growth. GDP, which stood at 4.0 percent in 2023, is projected to grow to 4.2 percent in 2024. This growth, underpinned by the recovery in mining, services, logistics, and manufacturing, is central to the country's overall economic revival. This surge in mining investment is playing a pivotal role in

³⁷ A recent announcement by the Partnership on Global Infrastructure confirmed that a memorandum of understanding has been signed between the AfDB, AFC, the governments of the US, EU, Angola, DRC and Zambia – Engineering News <https://www.engineeringnews.co.za/article/partners-of-lobito-corridor-target-construction-completion-in-five-years-2023-10-31#:~:text=The%20Lobito%20Corridor%20is%20expected,and%20the%20DRC%20and%20beyond.>

³⁸ The works entail construction of a 550 km rail line in Zambia from the Jimbe border to Chingola in the Zambian Copperbelt, as well as 260km of main feeder roads within the corridor. The intension is to further to connect with other existing railway lines so that is useful for the countries involved and to ensure maximum economic benefits for all stakeholders, including society. Construction of the massive project is targeting full completion within 5 years and a test run of the railway from DR Congo to the port in Angola was successfully completed in late 2023.

³⁹ Mining Sector Set to Lead Economic Recovery in Zambia - IT News Africa | Business Technology, Telecoms and Startup News

⁴⁰ Strategies to future-proof Zambia's mining industry – The Mail & Guardian (mg.co.za)

⁴¹ Copper in Zambia (mining-technology.com)

the country's post-pandemic economic recovery as global demand for copper accelerates, fuelled by the energy transition and green technologies.

The country's abundance of copper reserves as well as other minerals such as cobalt, manganese, lithium, etc. are fundamental materials for electrification and renewable energy technologies, such as wind turbines, photovoltaic panels, heat pumps, electric vehicles, batteries and energy-efficient equipment. In terms of the green economy and the transition to renewable energy, local demand for reliable and efficient energy supply has grown exponentially due to rapid urbanisation. Zambia is positioning itself to implement local renewable energy projects, including battery storage, which will develop a new local manufacturing value chain. Several renewable energy projects have been implemented, such as the 60 kilowatt (KW) solar mini-grid in Mpanta and the 1 megawatt (MW) Shiwang'andu Small Hydropower plant⁴².

Significant strides have been made in the field of Grid-scale/Utility-scale Battery Energy Storage Systems (BESS). Zambia and DR Congo have signed a historical cooperation agreement to facilitate the development of

a value chain in electric vehicle batteries and for the clean energy sector. With almost 70 percent of global cobalt reserves found between these two countries, the aim is to maximise their role in regional and global value chains. This partnership to develop battery precursors is a good example of Zambia's ambitions to add more value to its mineral production⁴³. The first BESS in Zambia is currently under development for a capacity of up to 25MW. In addition, the US Trade and Development Agency is funding the assessment of a large-scale battery energy storage project, which may have potential to grow into a 400MW nation-wide rollout⁴⁴.

These initiatives are part of Zambia's efforts to transition to a green economy and capitalize on the global trends of decarbonization and the energy transition. The mining sector is not only a key player in Zambia's economic recovery but also a significant contributor to meeting the growing global demand for copper in the era of green technologies. The higher global copper prices and market confidence associated with ongoing fiscal consolidation measures also contribute significantly to this positive economic outlook.⁴⁵

2b. Sector performance and economic outlook

Zambia is a lower-middle income country with a GDP of USD 29.78 billion in 2023⁴⁶. The mining and quarrying sector also contributes around 26 – 31 percent to domestic revenue generation⁴⁷ and around 2 percent of the country's total employment⁴⁸. Zambia's economy has recovered relatively strongly in the wake of the pandemic, with GDP growing by 4.6 percent in 2021 compared to a contraction of 2.8 percent in 2020 when the disruption of supply chains and reduced economic activity caused the economy to shrink (PwC 2023).

Annual real GDP growth averaged around 5.03 percent in the 1990s⁴⁹, and reduced to around 4.03 percent in the decade before early 2010. Economic growth has remained weak since then, with real GDP growth averaging around 3.1 percent per annum during the last 5 years (2019 to 2023)⁵⁰. According to recent analysis, business confidence has improved and investment is increasing⁵¹. Assuming there are no political shocks, it is forecasted that economic growth will increase in future years, reaching 4.8 percent by 2027⁵².

⁴² Renewable Energy for Sustainable Development in Zambia | UNFCCC

⁴³ The DRC-Zambia Battery Plant: Key Considerations for Governments in 2024 | Natural Resource Governance Institute

⁴⁴ USTDA provides grant for feasibility study into 400MWh BESS rollout in Zambia - Pro Bid Energy

⁴⁵ A Copper Shortage Is Likely Coming for the Energy Transition (gizmodo.com)

⁴⁶ <https://www.statista.com/statistics/457690/gross-domestic-product-gdp-in-zambia/>

⁴⁷ PARLIAMENTARY-SUBMISSION-ECONOMIC-DIVERSIFICATION-4.pdf (ctpd.org.zm)

⁴⁸ <https://ctpd.org.zm/wp-content/uploads/2022/02/PARLIAMENTARY-SUBMISSION-ECONOMIC-DIVERSIFICATION-4.pdf>

⁴⁹ <https://www.macrotrends.net/countries/ZMB/zambia/gdp-growth-rate>

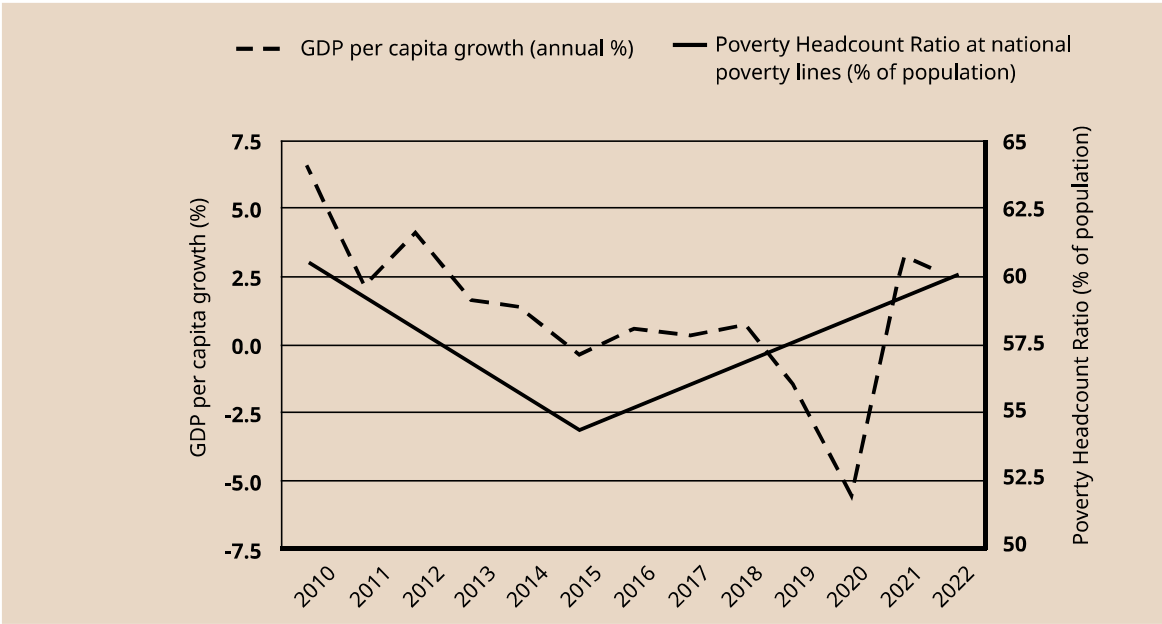
⁵⁰ <https://www.zambiainvest.com/economy/world-economic-outlook-report-imf-2022/>

⁵¹ <https://africa.businessinsider.com/local/markets/zambias-economy-would-develop-at-a-slower-rate-than-predicted-in-2023/wx6xv1w>

⁵² <https://www.zambiainvest.com/economy/world-economic-outlook-report-imf-2022/>

Figure 4 indicates that Zambia's average yearly GDP growth per capita from 2010 to 2022 was 1.56 percent and the country struggled to make headway in lowering the rate of poverty during that time. The proportion of

Zambia's population below the national poverty line only decreased by 0.5 percentage points from 2010 to 2022⁵³.

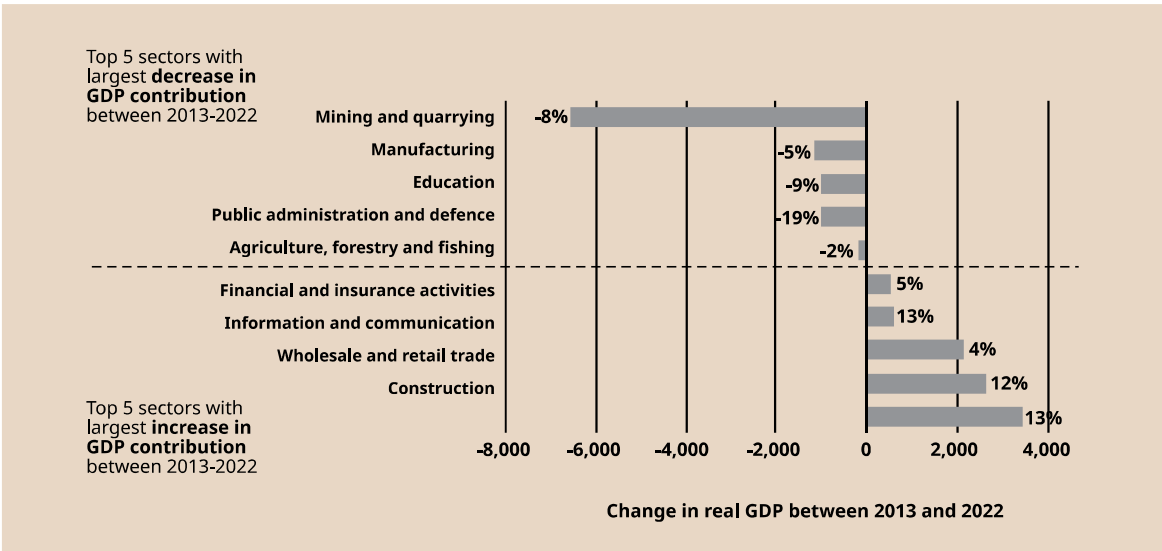


► **Figure 4: GDP and Poverty trends 2010 to 2022**

Sources: World Bank (2024) and Zambia Statistics Agency (ZamStats, 2023)

Figure 5 highlights the top 5 sectors with the largest increases or decreases in GDP contribution and includes the average annual real GDP growth rate between 2013 and 2022 by sector at the end of each bar. This indicates that Zambia's mining sector, along with

manufacturing, has been declining while sectors such as finance have increased their contribution along with construction and retail. The mining sector contributed approximately 12 percent to Zambia's GDP in 2022 (Trading economics 2024).



► **Figure 5: Sector specific GDP trends**

Source: ZamStats⁵⁴, World Bank⁵⁵

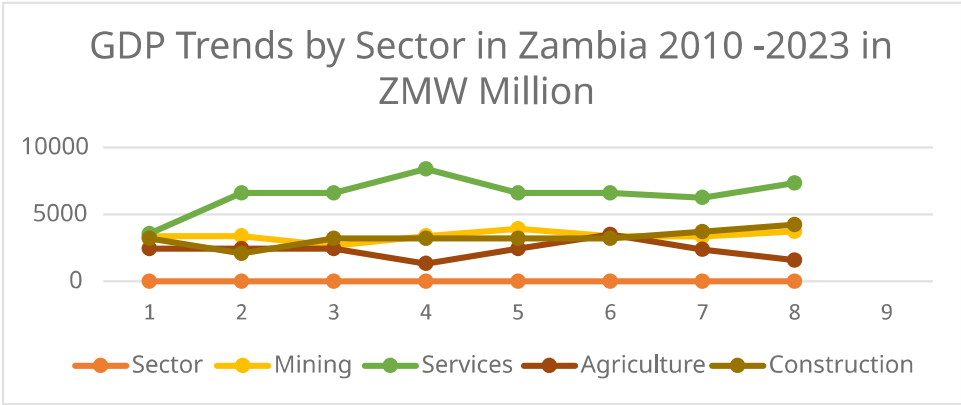
Note: Real GDP figures are shown in Zambian Kwacha, millions.

⁵⁴ ZamStats (2022) 'Provincial GDP Data'

⁵⁵ World Bank (2023) 'GDP deflator - Zambia'

Figure 6 compares GDP trends of key economic sectors with mining from 2010 to the third quarter of 2023. These sectors play a crucial role in shaping Zambia's economic landscape and contribute significantly to its GDP⁵⁶. This reveals that GDP from mining, which averaged ZMW 3380.11 million and along with the

construction industry (average ZMW 3203.59 million), has been relatively constant compared with fluctuations in agriculture and growth in the services sector, which averaged ZMW 2444.30 million and ZMW 6588.86 million respectively over the same period⁵⁷.

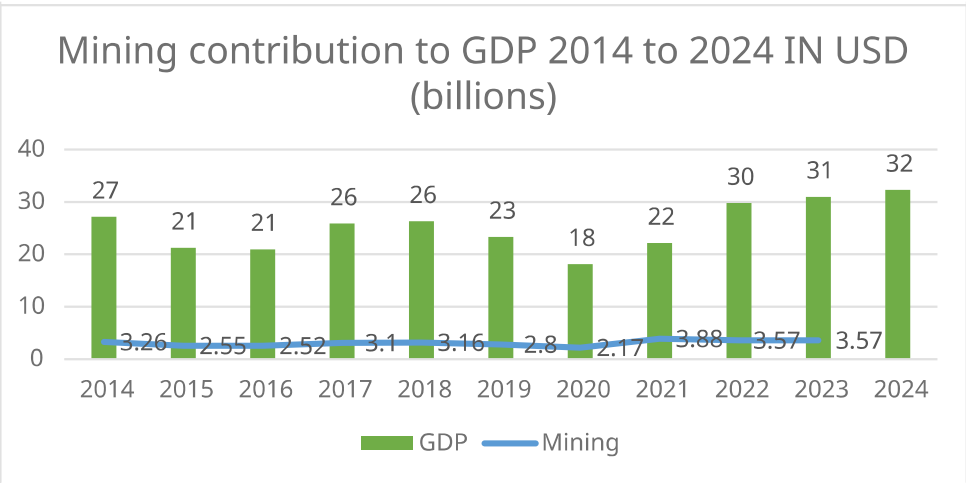


► **Figure 6: GDP trends by key sectors from 2010 to 2023**

Source: ZamStats

Figure 7 illustrates the contribution of the mining sector to GDP over almost a decade with a forecasted estimation for 2024. This highlights the following:

- In 2014, GDP from Mining in Zambia was at a record low of ZMW 2657.80 million.
- In 2022, the mining industry contributed about 12 percent towards GDP.
- In the third quarter of 2023, GDP from mining increased to ZMW 3728.50 million



► **Figure 7: Mining contribution to GDP in USD (Billions) for 2014 to 2024 Forecast**

Sources: Zambia GDP 1960-2023 Zambia Statistics Agency <https://www.ZamStats.gov.zm/>. Real GDP Per Capita for Zambia.

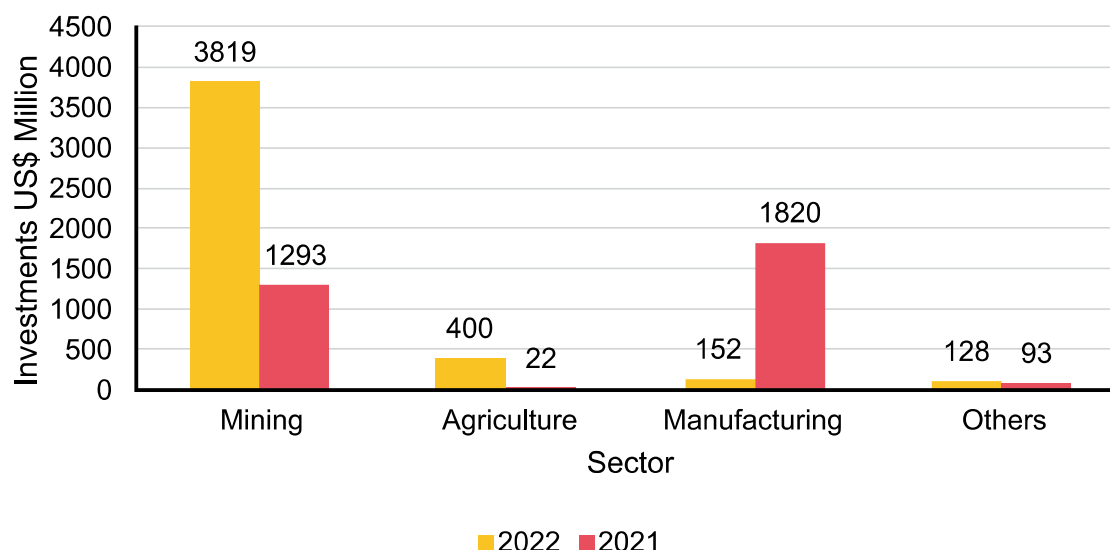
⁵⁶ Manufacturing – ZDA

⁵⁷ <http://www.ZamStats.gov.zm>

Growth and Investment

Over the past forty years Zambia's mining sector has been affected by policy changes due to different political ideologies, experiencing swings between privatisation and nationalisation. However, the country recently experienced good growth and increased production driven mainly by exploration and expansion in existing LSM operations. This has led to a significant increase in foreign investment attracting

approximately USD 8 billion since 2000 (Zambiainvest.com). Figure 8 shows actualised sectoral investments for 2021 compared with 2022 for key economic sectors. This shows that the mining sector recorded the highest investment of USD 3.82 billion in 2022 compared with USD 1.29 billion in 2021 (PwC 2023).



► **Figure 8: Actualised investment per sector**

Source: Zambia Development Agency

In 2023, the country attracted USD 3.4 billion in investment commitments⁵⁸ largely due to the introduction of various tax incentives in the new government's first budget and its commitment to maintaining a stable mining tax policy (PwC 2023).

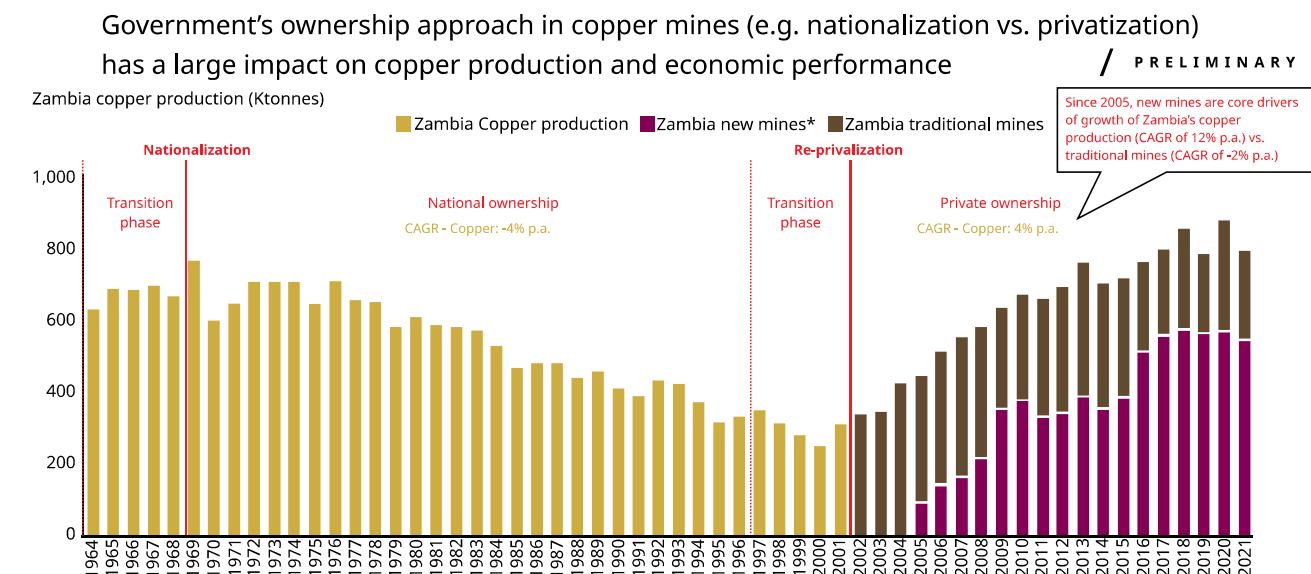
Notable projects, such as the AI exploration-backed Ming'omba copper project, First Quantum Mineral's nickel project and Barrick's Lumwana project, are already demonstrating a surge in exploration and expansion activities. Heightened investor interest is

evident through China Nonferrous Mining Corporation's USD 1.3 billion investment into its mine operations and Barrick Lumwana committed to investing USD 2 billion into a greenfield operation (Kamisengo) in Northwestern province. In addition, the recent sealing of an investment deal with International Resources Holding of Abu Dhabi for a 51 percent shareholding in Mopani Copper Mines adds momentum to the sector's positive trajectory⁵⁹.

⁵⁸ Zambia's mining industry in 2023 - (miningforzambia.com)

⁵⁹ The total investment was reported as USD 1.961 billion and will be used to fund Mopani Copper Mine's production expansion plan, provide working capital, and pay off part of the USD 1.5 billion debt owed to the previous owner, Glencore - IRH commits up to \$1.1bn for 50 percent interest in Mopani Copper Mines (miningweekly.com)

Figure 9 shows the economic impact of government nationalisation and private mine ownership of copper mines from 1964 to 2021. Mining production declined between 1984 and 2000, started to pick up in the transition period and increased during privatisation.



► **Figure 9: Mining ownership and production trends**

Sources: USGS; The World Bank; IMF –World Economic Outlook; Journal of Southern Africa Institute of Mining & Metallurgy: Copper Mining in Zambia – history and future; Copper Industry Statistics for 1966 (Frank Knight, Leonard Klein); mines.org.zm; GlobalData Consumer Macroeconomics database; Histories of Nationalization & Privatization: the cases of the Chilean & Zambian Copper Industries; Zambia Business Times; ZamStats; Mining weekly; Barrick website.

The Eighth National Development Plan indicates that over the past ten years the sectoral structure of the Copperbelt province's economy has undergone significant transformation, which is significant as this is traditionally the centre of Zambia's mining industry. In 2013, Mining and Quarrying contributed almost 40 percent of the province's GDP but today only makes up 19 percent of it. The province's manufacturing sector also saw a comparable downturn, dropping from 11 percent to 6 percent of GDP in the same period. In the Copperbelt, the construction, transportation, and storage sectors have had the largest growth. As the government intends to establish Zambia as a regional centre for logistics, the transportation and storage sectors' impressive performance is not surprising. The expansion of the construction industry was mostly fuelled by higher public sector infrastructure spending⁶⁰.

Furthermore, according to Mondaq (2018), the government is focused on building a diversified and export-oriented mining sector through regulatory

reform. Strategies are being embraced to promote the exploitation of gemstones and industrial minerals, increase local and foreign participation in mining value chains and industrialisation, and grow small-scale mining⁶¹.

Examining production trends, the mining sector has exhibited an annual average growth rate of 6.47 percent from 2002 to 2018. For the period between 2015 and 2023 the annual growth rate for mining was calculated at 4.86 percent. Table 3 indicates the net value added and production across the mining sector for 2022. This consistent growth indicates the sector's resilience and its significant contribution to overall economic activity as reported by the Zambia Chamber of Mines (ZCM) in 2018. From 2021 to 2023, a cumulative total of close to USD 1 billion of capital expenditure had already been spent on turning existing operations around⁶². With higher prices forecast, mining companies are keen to invest⁶³. These trends indicate that the mining sector is poised for growth, which could lead to increased local employment opportunities.

⁶⁰ Ministry of Finance and National Planning (2022) Eight National Development Plan, 2022 – 2026.

⁶¹ <https://www.mondaq.com/mining/697498/an-overview-of-the-mining-sector-in-zambia-and-in-particular-the-progress-made-in-the-sector>

⁶² Zambia 2023 Mining Report (pwc.com)

⁶³ policy-brief-Zambian mining revenues.indd (unu.edu)

► **Table 3: Net Value Added and Production for Selected Mining Sectors, 2022**

ISIC Division Code	ISIC Rev 4 Description	NVA (ZMW billion)	percent of Total Manufacturing	Total Production Value (ZMW billion)	percent of Total Manufacturing	percent of NVA out of Total Production
07	Mining of metal ores	0.6	50.0	1.2	100.0	50.0
08	Other mining and quarrying	0.1	8.3	0.2	16.7	50.0
09	Mining support service activities	0.1	8.3	0.2	16.7	50.0
Total		0.8	66.7	1.6	133.3	50.0

Source: Zambia 2023 Mining Report – PwC^{64 65 66 67}. Note: The percentages may not add up to 100 due to rounding. The NVA/Production ratio is assumed to be 50 percent for all sectors, as no official data was found.

Direction of trade, patterns and trends

Aspects that affect trade include the already mentioned uptrend in the Zambian mining sector, which can be seen in the increase of investment in 2022 and 2023. These patterns can also be seen in the increase in production¹².

- Investment tripled in 2022, largely due to the introduction of various tax incentives in the new Government's first budget and the commitment to maintaining a stable mining tax policy (PwC 2023). Further investment pledges were made in 2023, doubling that of 2022 commitments.
- The sector is influenced by factors such as rising industrial production, an increase in automotive and aerospace production, and rising iron ore demand from the agricultural sector⁶⁸.

expected to continue for some time due to rising investments in the energy transition and green technologies (PwC 2023; Mwale 2023):

- The International Energy Agency has projected that the total copper demand will increase significantly by 2040⁶⁹. Global copper reserves are estimated at 870 million tonnes and annual global copper demand is currently around 28 million tonnes⁷⁰. Copper demand in 2023 was expected to increase by 2 percent year on year to 25.3 million tonnes and grow by a further 3 percent in 2024 to 26 million tonnes⁷¹.
- The market is going through a period of oversupply that could reach about 450,000 tonnes in 2024, or about 2 percent of total demand⁷².

The following sources indicate that the demand for copper is higher than the supply, and this trend is

⁶⁴ Zambia 2023 Mining Report (pwc.com)

⁶⁵ Mining Sector Set to Lead Economic Recovery in Zambia - IT News Africa | Business Technology, Telecoms and Startup News

⁶⁶ Times of Zambia | '2023 will be turnaround year for mining'

⁶⁷ (zambiainvest.com)

⁶⁸ Zambia Mining Market, Size, Share, Outlook and Growth Opportunities 2020-2026 (researchandmarkets.com)

⁷¹ Global copper demand to rise 20 percent by 2035 to 30 million mt/year: Nornickel | S&P Global Commodity Insights (spglobal.com)

⁷² Copper's Current Weakness Hides Demand – and... | Morningstar

The Direction of Trade Report for the third quarter of 2023 provides an analysis of Zambia's merchandise trade. Based on this the following are key aspects mentioned in Table 4.

► **Table 4: Direction of Trade Summary**

Factor	Description
Major Export Destinations	The major export destinations for Zambia were Switzerland, DR Congo, China, Singapore, and South Africa ⁷³ .
Export Earnings	Total export earnings fell by 3.9 percent to USD 2.8 billion in the first quarter of 2023 relative to a year ago. This was due to the reduction in copper export earnings, which fell by 20.4 percent to USD 2.2 billion, reflecting lower export volumes.
Copper Output	A decline in copper output amid lower ore grades, operational challenges, and routine closures for maintenance at some mines accounted for the reduction in export volumes.
Non-Traditional Exports (NTEs)	NTEs grew by 45.9 percent to about USD 1 billion. The increase was broad-based, largely driven by sustained strong demand in DR Congo and Namibia
Key Contributors to NTEs	Key contributors to the growth in NTEs were plastics, salt sulphur lime and cement, and mineral fuels and oils— mainly electricity.
Mining Production output	The mining production output for Zambia was reported at 2,243,149 tonnes in December 2021 ⁷⁴ . This was a slight decrease from the previous year's output of 2,266,487 tonnes.

Source: Direction of Trade Report, 3rd Qtr. 2023

Exports and Imports

According to World Integrated Trade Solution data, Zambia was ranked 86th in terms of total export value in 2021 with exports amounting to USD 13.4 billion⁷⁵. This rank is a measure of Zambia's position relative to other countries in terms of the total value of its exports. The top export products were raw copper, refined copper, gold, precious stones, and electricity⁷⁶. This means that these commodities were the most significant contributors to Zambia's export earnings. In 2022, Mining accounted for 77 percent of Zambia's total exports. Copper alone contributes over 70 percent of the country's foreign export earnings⁷⁷.

Zambia's exports and imports of minerals and metals have increased significantly in the span of a decade between 2012 and 2022. Exports of minerals and metals

have grown annually at a rate of 7.2 percent, from USD 4.8 billion in 2012 to USD 9.6 billion in 2022. Likewise, imports have increased at 6.8 percent annually, from USD 1.2 billion in 2012 to USD 2.4 billion in 2022. In terms of imports, Zambia's top imports include refined petroleum, nitrogenous fertilizers, delivery trucks, copper ore, and packaged medicaments⁷⁸. Table 5 shows that both the exports and imports of minerals and metals have been steadily increasing from 2012 to 2022, indicating a positive economic trend in the Zambian mining sector, with a consistent increase in the value of both exports and imports over 10 years.

⁷³ Direction_of_Trade_Report_Q1_2023.pdf(boz.zm)

⁷⁴ Zambia Minerals Production, 2009–2024 | CEIC Data

⁷⁵ <https://wits.worldbank.org/CountryProfile/en/Country/ZMB/Year/LTST/Summarytext>

⁷⁶ <https://oec.world/en/profile/country/zmb>

⁷⁷ Zambia - Mining and Minerals (trade.gov)

⁷⁸ Zambia (ZMB) Exports, Imports, and Trade Partners | The Observatory of Economic Complexity (oec.world)

► **Table 5: *Zambian Exports and Imports of Minerals and Metals, 2012-2022***

Year	Exports (US\$ Billions)	Imports (US\$ Billions)
2012	4.8	1.2
2013	5.2	1.3
2014	5.6	1.4
2015	6.0	1.5
2016	6.4	1.6
2017	6.8	1.7
2018	7.2	1.8
2019	7.6	1.9
2020	8.0	2.0
2021	8.4	2.2
2022	9.6	2.4

Source: Trendeconomy 2022⁷⁹

Table 6 reflects a sectoral comparison of Zambia's main exports both in USD value as well as total percentage share per sector. The growth rate indicates that the mining sector remains the mainstay of the country's export revenues and underscores its critical importance to the national economy.

► **Table 6: *Zambia Exports percent of Total Per Sector***

Sector	Exports (US\$ Millions)	Share of Total Exports (percent)	Growth Rate (percent)
Mining	9,600	75	40
Agriculture	1,200	9	10
Manufacturing	800	6	5
Services	600	5	15
Other	800	5	20
Total	13,000	100	30

Sources: PWC 2023; Trading Economics (2022); Zambia Exports By Category - Bank of Zambia (2022); Direction of Trade Report First Quarter 2022 - The World Bank (2022); Exports of goods and services (percent of GDP) - Zambia

The significant minerals and metals exports for Zambia in 2022 are summarised in Table 7, including their contribution to total exports and value in USD. It is interesting to note the growth rate for the Inorganic Chemicals sector from 2021 to 2022, which seems to indicate a new market and revenue stream has developed. This warrants further investigation into the details of the products and what impacts and opportunities there may be for local value addition, employment and skills development.

► **Table 7: *Top Zambian Exports***

Sector Commodity	Contribution to Total Exports (percent)	Value (US\$ Billion)	Growth Rate percent (2021 to 2022)
Copper	69.5	8.1	23,6 percent
Salt, Sulphur, Stone, Cement	4.3	0.5	Cement increased to 5 percent in 2021
Iron, Steel	2.8	0.3	4,4 percent
Mineral Fuels Including Oil	2.7	0.3	-
Inorganic Chemicals	-	-	211.6
Total of Highlighted Sectors	88.2	9.2	-

Sources: Zambia top exports⁸⁰

⁷⁹ Zambia | Imports and Exports | World | ALL COMMODITIES | Value (US\$) and Value Growth, YoY (percent) | 2011 - 2022 (trendconomy.com)

⁸⁰ Zambia's Top Exports 2022 (worldstopexports.com)

The mining industry in Zambia is primarily oriented towards the production of copper and its by-products. In trade statistics, copper products are often classified into four broad categories: copper ores and concentrates (HS 260300), refined copper and copper alloys (HS 740311), copper wire (HS 740811) and other

copper articles (HS 741999). As indicated in Table 8, the Copper categories 7402 and 7403 accounted for 99 percent of Zambian exports in 2024, underscoring the importance of these specific categories of products to Zambia's economy.

► **Table 8: Copper (HS74) and articles thereof, exports from 2013 to 2023**

List of products exported by Zambia.

detailed products in the following category: 74 Copper and articles thereof

Code	Product label	Exported value in 2015	Exported value in 2016	Exported value in 2017	Exported value in 2018	Exported value in 2019	Exported value in 2020	Exported value in 2021	Exported value in 2022	Exported value in 2023	Exported value in 2024
'7402	Copper, unrefined; copper anodes for electrolytic refining	758463	1785625	3635941	4359107	3771226	4329771	6225192	6155831	5081333	5844526
'7403	Copper, refined, and copper alloys, unwrought (excl. copper alloys of heading 7405)	4567992	2663557	2455949	2205400	1132076	1475259	2167302	1893426	1646762	1665054
'7408	Copper wire (excl. surgical sutures, stranded wire, cables, plaited bands and the like and ...	59434	63504	85268	79940	52367	50541	76567	63885	63090	79815
'7413	Stranded wire, cables, plaited bands and the like, of copper (excluding electrically insulated ...	3199	2890	2175	1721	4436	2625	2341	1490	877	1019
'7419	Other articles of copper, n.e.s.	25	0	150	24	0	2193	1262	45	345	206
'7409	Plates, sheets and strip, of copper, of a thickness of > 0,15 mm (excl. expanded sheet and ...	369	166	227	116936	14938	20	22	230	0	102
'7412	Copper tube or pipe fittings "e.g., couplings, elbows, sleeves"	0	0	0	1	17	34	11	11	3	40
'7411	Copper tubes and pipes	0	9	15	20	6	0	0	3	1	37
'7415	Nails, tacks, drawing pins, staples and similar articles, of copper or with shafts of iron ...	14	3	3	98	163	1	34	157	503	27
'7401	Copper mattes; cement copper "precipitated copper"	0	0	7	0	0	0	0	0	0	19
'7407	Bars, rods and profiles, of copper, n.e.s.	1147	597	13	163	276	0	182	1186	590	4
'7418	Table, kitchen or other household articles, sanitary ware, and parts thereof, of copper; pot ...	0	24	15	0	0	5	0	0	1	4
'7414	Cloth "incl. endless bands", grill and netting, of copper wire, and expanded metal, of copper ...	0	0	0	0	0	0	0	0	0	0
'7410	Copper foil "whether or not printed or backed with paper, paperboard, plastics or similar backing ...	0	0	0	0	0	0	0	0	0	0
'7404	Waste and scrap, of copper (excluding ingots or other similar unwrought shapes, of remelted ...	0	0	0	0	1	0	0	2	0	0
'7405	Master alloys of copper (excluding phosphorus-copper compounds "copper phosphide" containing ...	0	0	0	54778	65380	63770	25828	8461	0	0
'7406	Powders and flakes, of copper (excl. grains of copper and spangles of heading 8308)	0	541	0	0	1	0	0	0	0	0

Source: ITC, 2023

Table 9 lists the top ten exporting products by value in USD in 2023 along with the main destination markets for various minerals and metals from Zambia. The data shows that copper ores and concentrates have the highest export value, followed by refined copper and copper alloys, and copper wire. The data differs from the ITC data. The most important difference is that while the ITC show the biggest Zambian export product at HS 6 digit is HS 7401200 Copper unrefined, Zambia records "HS260300 Copper ores" as the biggest export

product. Other significant exports include cobalt ores and concentrates, nickel ores and concentrates, gold in unwrought forms, manganese ores and concentrates, precious stones (excluding diamonds), and diamonds (unsorted).

The main destination markets for these products are Switzerland, China, Japan, South Korea, South Africa, India, United Arab Emirates (UAE), Tanzania, Kenya, and Zimbabwe.

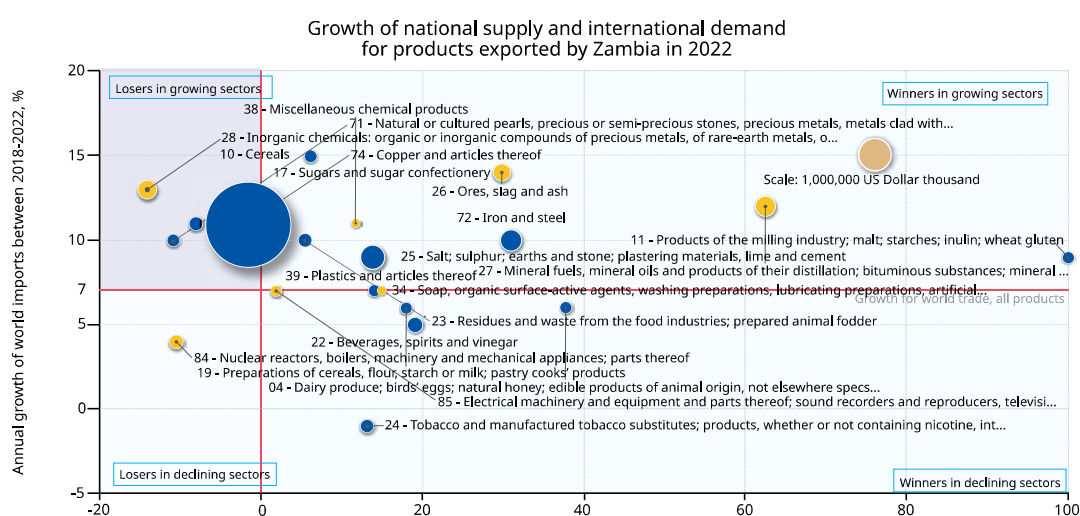
► **Table 9: Export Value and Destinations**

Product	HS Code	Export Value (US\$ million)	Main Destination Markets
Copper ores and concentrates	260300	3,500	China, Japan, South Korea, Switzerland
Refined copper and copper alloys	740311	2,000	South Africa, India, UAE
Copper wire	740811	1,500	Tanzania, Kenya, Zimbabwe
Other copper articles	741999	1,000	USA, UK, Germany
Cobalt ores and concentrates	260500	500	China, Belgium, Finland
Nickel ores and concentrates	260400	300	China, South Africa, Australia
Gold in unwrought forms	710812	200	Switzerland, UAE, India
Manganese ores and concentrates	260200	100	China, India, South Korea
Precious stones (excluding diamonds)	710399	50	Thailand, India, USA
Diamonds (unsorted)	710210	20	Belgium, UAE, India

Source: Zambia's mining industry in 2023⁸¹

Figure 10 indicates the growth in world imports between 2018 and 2022 for Zambia in USD “thousands”. It shows various mining related products, such as copper, between growing and losing sectors. Other copper and/or copper alloy articles include pipes, tubes, fittings, nails, screws, bolts, and springs, and account for over 65 percent of Copper earnings⁸². In

contrast to copper ore, copper cathodes and other refined copper products have been decreasing in total export value. From the data it is clear that being heavily reliant on these mining exports also exposes Zambia to risks such as volatile commodity prices and changes in global demand.



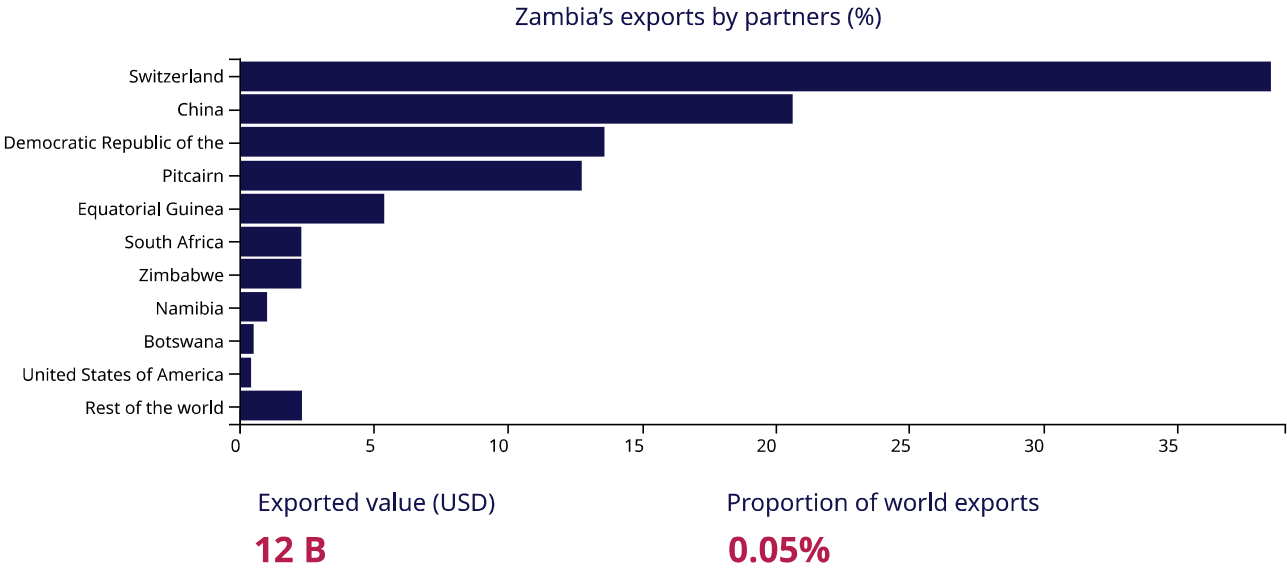
► **Figure 10: ITC 2022 annual growth of world imports between 2018 and 2022**

Source: ITC

⁸¹ Zambia's mining industry in 2023 - (miningforzambia.com)

Besides growing domestic consumption, the Zambian mining industry mainly caters to the mineral and metal markets of the European region⁸³. In 2022, European countries imported USD 3.2 billion of Zambian minerals and metals, while Asian and African countries imported USD 2.4 billion and USD 1.6 billion respectively⁸⁴. In 2022, Zambia's total exports were valued at approximately USD 11.7 billion⁸⁵. Given that European countries imported USD 3.2 billion worth of Zambian minerals and metals, this means that the EU accounted

for approximately 27.4 percent of Zambia's total exports in 2022. This percentage suggests that the EU is a major trading partner for Zambia, particularly for its minerals and metals sector. As indicated in Figure 11, a significant portion of exports going to Switzerland is likely due to copper trading. It is assumed this trend will continue as increasing demand for critical minerals to supply the green economy and energy transition escalates in the coming decades.



► **Figure 11: Export Localities and Value of Exports**
 Source: ITC, 2022

Consistent with the industry's increasing output, imports of mineral inputs have also increased from USD 1.2 billion in 2003 to USD 3.8 billion in 2023. Zambia's main sources of mineral inputs in descending order are South Africa (comprising 35 percent of all Zambian mineral imports in 2023), China (25 percent), India (10 percent), UAE (8 percent), Switzerland (5 percent), Belgium (4 percent), Australia (3 percent), Finland (2 percent), Tanzania (2 percent) and Zimbabwe (2 percent)⁸⁶.

Zambia's top five import partners are South Africa, China, India, the UAE and the DR Congo. Unsurprisingly, due to its proximity and logistics infrastructure, South Africa is the largest source of imports, accounting for 31.3 percent of Zambia's total imports, worth USD 811 million. China follows with 12.6 percent valued at USD 403 million; India accounts for 6.26 percent of imports, worth USD 364 million and the UAE contributes 5.65 percent valued at USD 298 million. Lastly, DR Congo makes up 4.6 percent of imports worth USD 298 million⁸⁷.

⁸² Zambia : Zambia Faced Economic Challenges in 2023, Showed Resilience in Trade Performance (lusakatimes.com)
⁸³ PARLIAMENTARY-SUBMISSION-ECONOMIC-DIVERSIFICATION-4.pdf(ctpd.org.zm)
⁸⁴ The World Bank, World's Top Exports (2022), Zambia's Top Exports
⁸⁵ Zambia Exports, 1960-2023 - knoema.com
⁸⁶ [Up-to-Date] Zambia Total Imports [Data-Chart-Forecast], 2003 – 2024 | CEIC Data
⁸⁷ Zambia (ZMB) Exports, Imports, and Trade Partners | The Observatory of Economic Complexity (oec.world)

Table 10 lists the top imported mineral products, which accounted for almost 90 percent of the total mineral imports in 2023. According to a 2022 report by the ITC, approximately 60 percent of Zambian copper and cobalt imports are utilized by the mining industry, while the remainder is used by other sectors, such as manufacturing and construction. South Africa and

China are the main suppliers of copper and cobalt inputs to Zambia, while India and the UAE are the main suppliers of gold inputs. Australia and Finland are the main suppliers of nickel inputs, South Africa and Tanzania are the main suppliers of manganese inputs, while Switzerland and Belgium supply Zambia with precious stones.

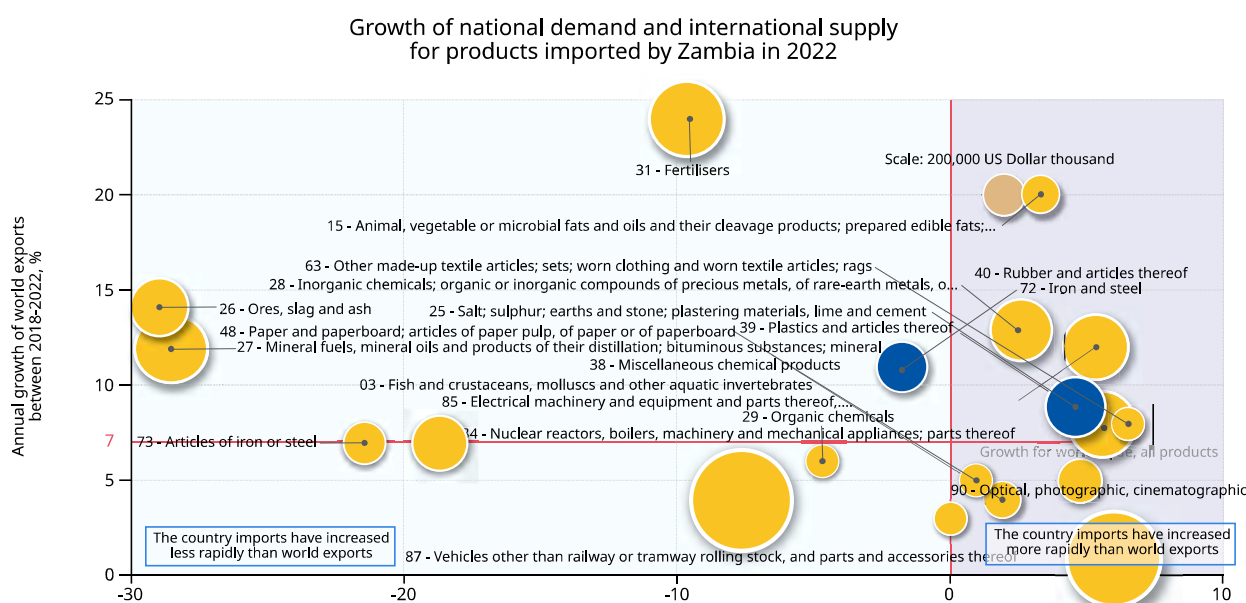
► **Table 10: Import Products**

Product	HS Code	Import Value (US\$ million)	Main Source Markets
Copper ores and concentrates	260300	800	South Africa, China
Cobalt ores and concentrates	260500	600	South Africa, China
Gold in unwrought forms	710812	500	India, UAE
Nickel ores and concentrates	260400	400	Australia, Finland
Manganese ores and concentrates	260200	300	South Africa, Tanzania
Precious stones (excluding diamonds)	710399	200	Switzerland, Belgium
Diamonds (unsorted)	710210	100	UAE, India
Copper waste and scrap	740400	100	China, South Africa
Cobalt waste and scrap	810420	50	China, South Africa
Nickel waste and scrap	750300	50	China, South Africa

Sources: Zambia Mining News⁸⁸ International Trade Administration report⁸⁹

Zambian imports a variety of inputs for its mining sector, including machinery, equipment, chemicals, fertilizers, fuel, and some electricity. Additionally, despite being a significant producer of copper and cobalt, the country also imports some minerals such as gold, nickel, manganese, and precious stones, which

are used for processing and refining copper and cobalt, while others are used for other purposes, such as jewellery making and industrial applications⁹⁰. Figure 12 shows ITC data reflecting the growth of national demand and international supply for products imported by Zambia in 2022.



► **Figure 12: Import Localities and Value of Imports**

Source: ITC, 2022

⁸⁸ raw materials - Zambia Mining News (miningnewszambia.com)

⁸⁹ Zambia - Mining and Minerals (trade.gov)

⁹⁰ Zambia (ZMB) Exports, Imports, and Trade Partners | The Observatory of Economic Complexity (oec.world)

While not all of the above import data is specifically related to the mining sector, recent sources did reveal the following:

- Machinery imports play a crucial role in supporting various industries in Zambia. These imports include electrical machinery, mechanical appliances, and specialized equipment. The primary trading partners for machinery imports are China, South Africa, and India⁹¹.
- Refined petroleum products are among the major imports of Zambia. The country imports petroleum to meet its energy needs and fuel its transportation sector, which are critical for the mining sector⁹².
- In 2021, Zambia imported USD 35.8 thousand worth of manganese⁹³ and USD 4.48 million in precious stones, primarily from Singapore, United States, Ethiopia, and South Africa⁹⁴.
- Specific details about the imports of electricity, chemical fertilizers, gold and nickel imports are not readily available.

One of the major challenges facing the Zambian mining industry is the high cost of importing mineral inputs, especially in the context of fluctuating commodity prices and exchange rates, import duties and taxes, and transportation fees⁹⁵. Various initiatives have been undertaken by different stakeholders to reduce the cost of importing mineral inputs, such as promoting local sourcing, improving infrastructure, and negotiating trade agreements, but the problem persists.

Since mineral inputs account for a large share of the total cost of mining, competitive pressures and low profit margins push local firms to use the cheapest minerals possible. However, many local firms operate on such a small scale that they cannot exercise effective leverage over the suppliers of mineral inputs. In addition, most local firms often do not have expertise in assessing the quality of minerals and although some do attempt to improve the quality of the minerals that they purchase by testing, sorting, and blending them, this process is not always effective.

Future Prospects

The future of Zambia's mining industry looks promising with multi-billion-dollar investment commitments⁹⁶. The growing demand for copper to support the global energy transition presents opportunities for Zambia to capitalize on improving copper prices and build a

sustainable, diversified, and inclusive economy⁹⁷. The projects included in Figures 13 and 14 demonstrate that extensive new mining is anticipated in the future, which will be enhanced by the mapping of all resources as previously mentioned.

⁹¹ Zambia Machinery and Transport Equipment Imports by country 2021 | WITS Data (worldbank.org)

⁹² The Major Imports of Zambia - International Trade Council

⁹³ Manganese Ore in Zambia | The Observatory of Economic Complexity (oec.world)

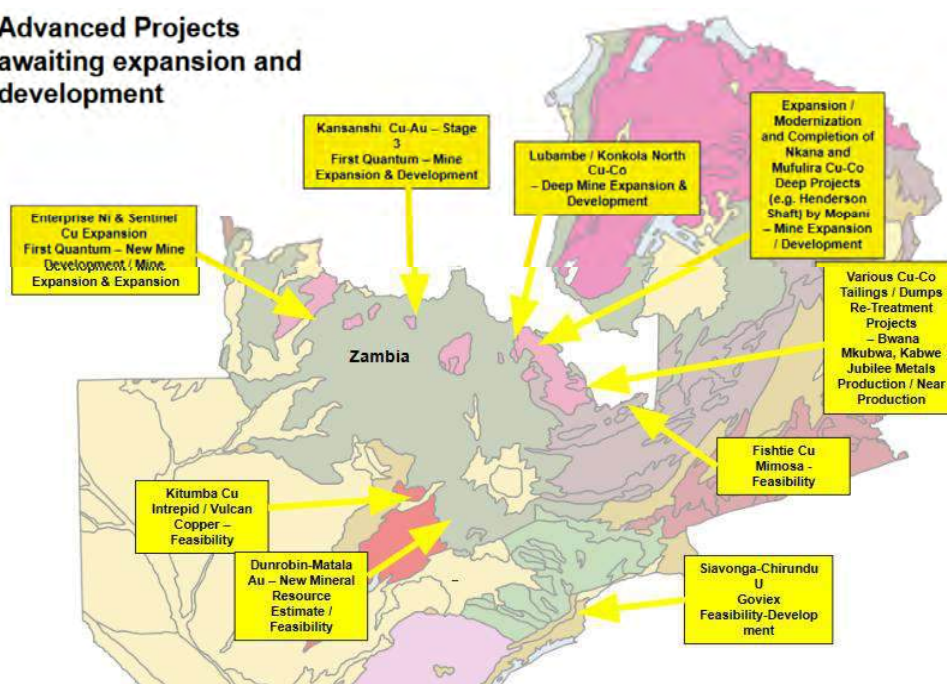
⁹⁴ Precious Stones in Zambia | The Observatory of Economic Complexity (oec.world)

⁹⁵ Needs-and-Challenges-in-the-Zambian-Mining-Supply-Chains-report.pdf (agsprogramme.org)

⁹⁶ Zambia's mining industry in 2023 - (miningforzambia.com)

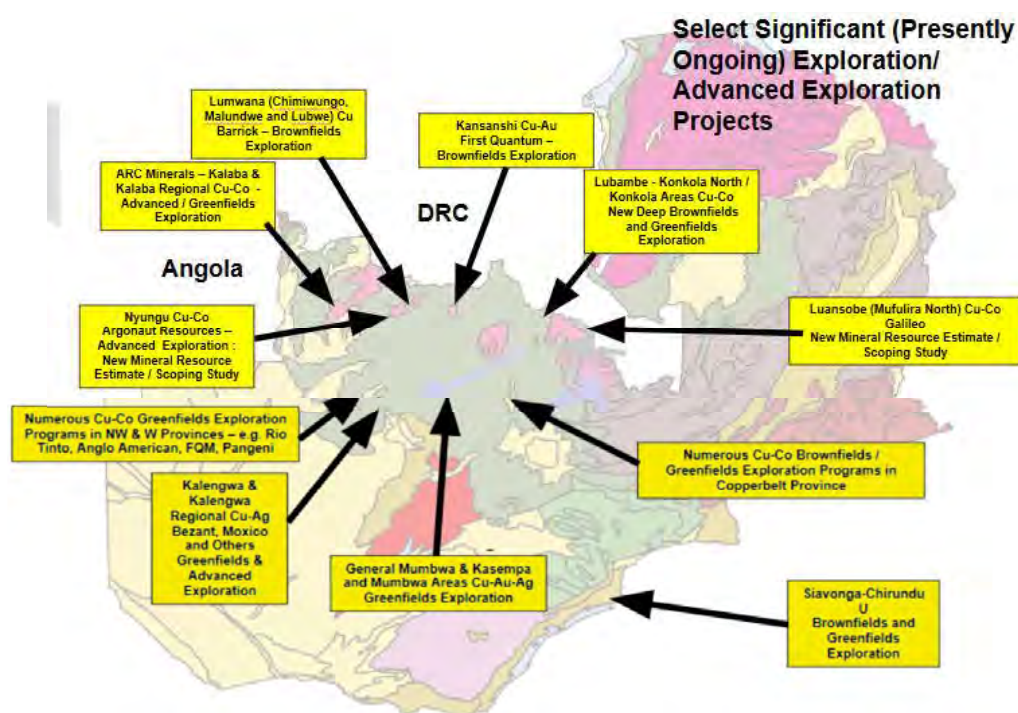
⁹⁷ Strategies to future-proof Zambia's mining industry - The Mail & Guardian (mg.co.za)

Advanced Projects awaiting expansion and development



► **Figure 13: Expansion Projects**

Source: "THE FUTURE OF MINING IN ZAMBIA", Dr Sixtus C Mulenga, Public Lecture, Lusaka, 24 November 2023



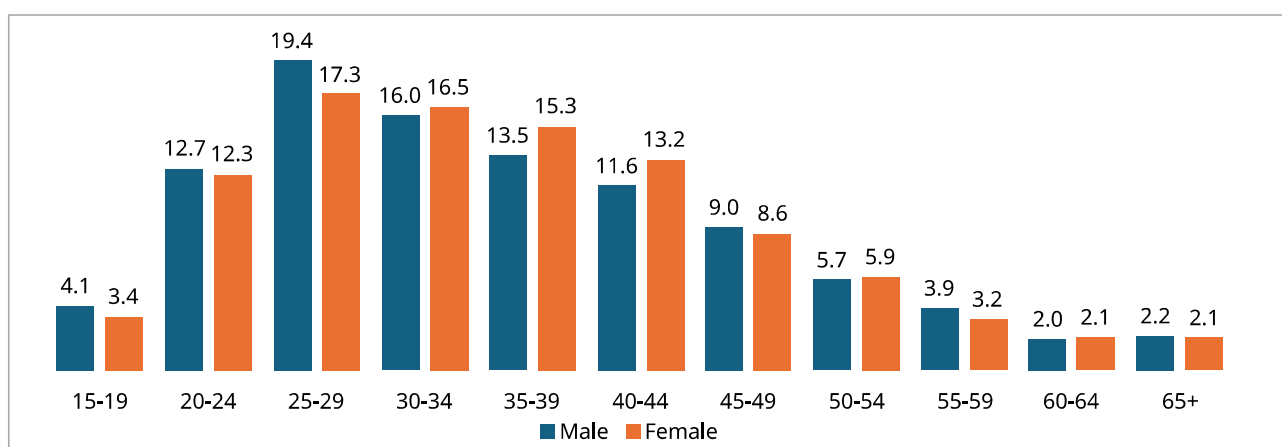
► **Figure 14: Exploration projects**

Source: "THE FUTURE OF MINING IN ZAMBIA", Dr Sixtus C Mulenga, Public Lecture, Lusaka, 24 November 2023

2c. Employment in the sector

The Zambian mining sector continues to be an important source of employment despite fluctuations due to the cyclical nature of the industry. With large reserves of critical minerals that are increasing in global demand, the sector is expected to see an economic upturn driven by new investments⁹⁸. This has prompted the government to secure parliamentary approval to borrow ZMW 33.3 billion under the 2024 national budget, with a focus on economic transformation and job creation. The mining sector is well positioned to increase its share of national employment and stabilise

labour turnover if it can proactively address the anticipated skills needs for direct and indirect industry requirements. This is particularly important in the context of the challenge the country faces with an increasingly educated but unemployed youth population. Figure 15 indicates the age composition and sex distribution of the national labour force. This shows that Zambia's working age population is largely youthful with an almost even distribution between males and females.



► **Figure 15: Labour force distribution by sex and age group 2022**

Source: Labour force survey 2022.

Furthermore, reports such as the IMF Country Report No.23/257⁹⁹ and the ZamStats Labour Force Survey 2022 highlight that the capital-intensive mining sector, the prime export earner, only contributes to

approximately 2 percent of employment. Figure 16 reflects the percentage share of persons employed in the mining sector in 2022 in relation to other sectors.

⁹⁸ Mining Indaba 2024: Zambia's President Hakainde Hichilema to deliver keynote address - African Mining Online



► **Figure 16: percentage Share of Employed Persons by Industry, Zambia 2022**

Source: Zambia Statistics Agency (2023). 2022 annual Labour Force Survey

This suggests a need for a strategic plan that integrates industry skills demand approaches into a human resource development strategy for the sector. However, the Labour Force Survey does not disaggregate occupation data by industry. One could make broad assumptions by combining the rural data for certain

categories that are mining related, such as managers, professionals, technician and associated professionals, plant and machine operators and assemblers, as these are likely to be connected to mining operations in rural locations (as referred to in Table 11).

► **Table 11: Number and percentage Distribution of Employed Persons (15 years of older) by Occupation, Rural/urban and Sex**

Occupation	Total			Rural			Urban		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
	Number	percent	percent	Number	percent	percent	Number	percent	percent
Total	3,273,123	59.7	40.3	1,134,524	62.0	38.0	2,138,599	58.5	41.5
Managers	306,828	53.1	46.9	45,878	52.2	47.8	260,950	53.3	46.7
Professionals	252,621	59.0	41.0	70,329	66.8	33.2	182,292	55.9	44.1
Technician and Associated professionals	162,532	68.2	31.8	29,506	66.6	33.4	133,026	68.5	31.5
Clerical support workers	52,092	54.1	45.9	4,076	69.7	30.3	48,016	52.8	47.2
Service and sales workers	958,177	41.9	58.1	231,261	47.2	52.8	726,916	40.3	59.7
Skilled agriculture and forestry workers	432,483	65.5	34.5	362,309	65.1	34.9	70,174	67.9	32.1
Craft and related trade workers	335,229	80.6	19.4	90,562	68.9	31.1	244,667	85.0	15.0
Plant and machine operators and assemblers	201,151	96.1	39.0	29,502	93.9	6.1	171,649	96.5	3.5
Elementary occupations	523,883	62.3	37.7	253,477	64.0	36.0	270,406	60.7	39.3
Other occupations	48,127	59.1	40.9	17,624	69.5	30.5	30,503	53.2	46.8

Source: Labour Force Survey 2022 ZAMSTATS.

⁹⁹ Zambia: Selected Issues; IMF Country report No23/257; June 2023.

In terms of type of employment, again, as indicated by Table 12 below, there is no data available that specifically lists principle mining occupations by percentage share of employment, nor is there disaggregated data on full time versus part time and permanent versus temporary employment. The most that could be ascertained is by looking at the Type of

Employment split between Formal and Informal Employment numbers in the Mining and Quarrying Industry segment. The relatively large number of 22,862 informally employed is a good indication of the size and importance of the ASM sector (at a minimum of approximately 35 percent).

► **Table 12: Number and percentage Distribution of the Employed Persons by Industry and Type of Employment (Formal/ Informal), Zambia 2022**

Industry	Total	Formal employment		Informal employment	
	Number	Number	percent	Number	percent
Total	3,273,123	776,160	23.7	2,496,963	76.3
Agriculture. Forestry and fishing	721,446	70,728	9.8	650,718	90.2
Mining and quarrying	65,409	42,547	65.0	22,862	35.0
Manufacturing	325,539	93,109	28.6	232,430	71.4
Electricity, gas, steam and air conditioning supply	5,079	4,576	90.1	503	9.9
Water Supply Sewerage, waste management and remediation activities	9,833	5,560	56.5	4,273	43.5
Construction	158,931	18,427	11.6	140,504	88.4
Trade, wholesale and retail distribution	913,967	55,557	6.1	858,410	93.9
Transportation and storage	174,891	48,147	27.5	126,744	72.5
Accommodation and food service activities	96,342	26,883	27.9	69,459	72.1
Information and communication	16,641	11,378	68.4	5,263	31.6
Financial and Insurance Activities	41,022	20,269	49.4	20,753	50.6
Real estate Activities	18,469	0	0	18,469	100.0
Professional, Scientific and technical activities	26,905	16,400	61.0	10,505	39.0
Administrative and support services	144,325	79,324	55.0	65,001	45.0
Public Administration and Defense, Compulsory social security	73,620	62,186	84.5	11,434	15.5
Education	159,952	139,807	87.4	20,145	12.6
Human Health and Social Work	66,744	49,513	74.2	17,231	25.8
Arts, Entertainment and Recreation	18,486	5,349	28.9	13,137	71.1
Other service activities	127,881	7,636	6.0	120,245	94.0
Activities of household as Employers	105,819	16,942	16.0	88,877	84.0
Activities of extraterritorial organization and bodies	1,822	1,822	100.0	0	0.0

Source: Labour Force Survey 2022 ZAMSTATS

The ZCM reported in 2023 that the total direct employment in mining companies is approximately 62,236. Table 13 indicates the distribution of employees among the mining companies for which the ZCM collected data. The table also indicates employment numbers for direct (28 823) and contracted labour (27 896) reported per mine as well as those employed in

expansion projects (5 407)¹⁰⁰. A comparison with the quarterly labour statistics for 2021 shows a higher employment figure of 66,3748 was projected in the statistics. This difference in real and projected employment numbers correlates with the economic lag experienced in the economy in general.

► **Table 13: Direct and Contracted labour per mining entity**

Mine	Direct employees	Contracted Employees	Other
Mopani	10 000	10 000	
Konkola	7 000	9 000	
Lumwana	1 882	2 054	
Kansanshi	4 781	3 731	5 407 (expansion)
Albidon	63 (care and maintenance)		
Lubambe	1 200	1 000	
Chibuluma	602	345	
Chambishi Metals	741	147	
Chambishi Copper smelter	1 600	400	
NFCA	1 064	1 219	
Total reported (62 226)	28 823	27 896	5 407

Source: Employment Figures – Zambia Chamber of Mines

¹⁰⁰ Not all mining companies in Zambia are members of ZCM and a large population could be missing if ZCM has not included data from non-members

Interestingly, in 2012 the ILO reported that the number of miners in formal employment exceeded 90,000¹⁰¹. The information provided states that in 2012, the four largest mining companies operating in Zambia employed a total of 56,300 people. Furthermore, it is noted that 98-99 percent of these employees were Zambian nationals. This statistic highlights the industry's reliance on the local workforce during that specific period.

With regards to gender and female employment, the ZCM reports that 14 percent of the overall mining workforce is comprised of women, which is higher than the Labour Force Survey 2022 figure of 6.9 percent given in Table 14.

► **Table 14: Number and percentage Distribution of Employed Population (15 years or older) by Industry and Sex, Zambia 2022**

Industry	Total			Rural			Urban		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
	Number	percent	percent	Number	percent	percent	Number	percent	percent
Total	3,273,123	59.7	40.3	1,134,524	62.0	38.0	2,138,599	58.5	41.5
Agriculture, forestry, and fishing	721,448	67.3	32.7	577,665	67.8	32.2	143,783	65.2	34.8
Mining and quarrying	65,409	93.1	6.9	12,333	84.3	15.7	53,076	95.1	4.9
Manufacturing	325,539	72.2	27.8	100,817	56.4	43.6	224,722	79.3	20.7
Electricity, gas, steam, and air conditioning supply	5,078	76.8	23.2	607	100.0	0.0	4,471	73.7	26.3
Water Supply Sewerage, waste management and remediation activities	9,833	86.8	13.2	1,165	100.0	0.0	8,668	85.0	15.0
Construction	158,930	98.6	1.4	33,902	100.0	0.0	125,028	98.2	1.8
Trade, wholesale, and retail distribution	913,968	42.9	57.1	227,899	44.9	55.1	686,069	42.2	57.8
Transportation and storage	174,891	95.3	4.7	16,265	95.0	5.0	158,626	95.4	4.6

Source: Zambia Statistics Agency (2023). 2022 annual Labour Force Survey

Table 15 provides a breakdown of employed persons in mining enterprises by sex and occupational categories for the year 2022. The figures reflect the distribution of workers across various roles within both the public and

private sectors, highlighting the diversity of occupations and gender representation in the mining industry.

► **Table 15: Employed Persons in Mining Enterprises by Sex and Occupational Categories, 2022**

Occupational Categories	Public Sector	Private Sector	Female	Male
Managers	100	1,000	50	1,050
Professionals	200	2,000	100	2,100
Technicians and Associate Professionals	300	3,000	150	3,150
Clerical Support Workers	400	4,000	200	4,200
Service and Sales Workers	500	5,000	250	5,250
Skilled Agricultural, Forestry, and Fishery Workers	0	0	0	0
Craft and Related Trades Workers	600	6,000	300	6,300
Plant and Machine Operators and Assemblers	700	7,000	350	7,350
Elementary Occupations	800	8,000	400	8,400
Total	3,600	36,000	1,800	37,800

Source: IGF Zambia Gender Study, 2022

¹⁰¹ ILO supports a partnership approach in the Zambian mining sector to create jobs and stimulate inclusive growth

Despite challenges related to data availability, certain insights can be gleaned about the number of operations and employment in Zambia's mining industry. Notably, large-scale and foreign-owned enterprises dominate the mining sector, and are concentrated in four main provinces: the Copperbelt, Northwestern, Lusaka, and Southern. Some of the largest mining companies operating in Zambia include:

- **First Quantum Minerals Ltd.:** a Canadian-based mining company that operates the Kansanshi and Sentinel mines in Zambia's Copperbelt region, with over 18,000 employees and contractors.
- **Barrick Gold Corporation:** a multinational mining company with operations in several countries, including Zambia. The company operates the Lumwana mine in Zambia's North-western Province and with 4,400 employees is one of the largest employers in the region.
- **Mopani Copper Mines:** in Zambia's Copperbelt region, with over 12,000 employees and contractors.
- **Vedanta Resources plc.:** a London-based mining company that operates the Konkola Copper Mines in Zambia's Copperbelt region, with over 13,000 employees and contractors.

There are also several Chinese mining companies operating in Zambia. Some of the notable ones include:

- China Nonferrous Mining Corporation
- Jinchuan Mining Group
- Delta Mining Limited (a subsidiary of International Resource Holdings)

These companies have significant stakes in various mines across Zambia. For instance, China Nonferrous Mining Corporation owns 85 percent of the Luanshya and Chambishi mines. The Jinchuan Mining Group also has a 51 percent majority share in Zambia's only nickel mine¹⁰².

Drawing from the PwC Zambia 2023 Mining Report, the total number of enterprises operating in the mining sector, encompassing both public and private ownership, has increased from 800 establishments with approximately 70,000 employees in 2012 to over 1,200 establishments employing approximately 85,000 individuals in 2022. However, the Zambia Statistics Agency (ZamStats) annual Labour Force Survey Statistics for 2022 indicates that approximately 65,000 persons were formally employed in the sector. This variance in industry and the official statistics agency reported numbers may be a factor of undercounting in terms of permanent versus contract employees and/or casual labour employed in ASM operations.

The following is a snapshot of mining sector employment information drawn from various sources:

- The mining sector contributes around 2 percent of the country's total employment¹⁰³.
- In 2017, the mining and quarrying sector employed 58,007 people¹⁰⁴.
- In 2019, the mining and quarrying sector accounted for 2.4 percent of occupations in Zambia¹⁰⁵.
- By 2023, the sector employed about 59,371 people, making it fifth on the country's top sector employment index¹⁰⁶.

¹⁰² Chinese Investment in Africa: A Re-examination of the Zambian Debt Crisis (harvard.edu)

¹⁰³ Zambia's mining industry in 2023 - (miningforzambia.com)

¹⁰⁴ Zambia Employed: Mining & Quarrying | Economic Indicators | CEIC (ceicdata.com)

¹⁰⁵ https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_839710.pdf

¹⁰⁶ Times of Zambia | '2023 will be turnaround year for mining'

2d. Business profile in the sector

Unlike the rest of the Zambian manufacturing industry, the mining sector has a small number of Large-Scale Formal Enterprises, which represent 4 percent of the total number of enterprises in the industry (IGF Zambia Gender study 2022). This data confirms that the mining

sector in Zambia is dominated by a few large enterprises, with only 6 percent of enterprises employing more than 50 people, as Indicated in Table 16 below.

► **Table 16: Size Distribution of Enterprises**

Size Category	Number of Enterprises	percentage of Total
Less than 5 employees	600	50
5-9 employees	300	25
10-24 employees	150	12.5
25-49 employees	75	6.25
50+ employees	75	6.25
Total	1,200	100

Source: PWC Zambia 2023 mining report

This is significantly lower compared to, for instance, the manufacturing sector where 40 percent of enterprises employ more than 50 people. This could be due to several factors:

Capital Intensity: Mining is a capital-intensive industry, which means it requires a significant amount of capital investment to start and operate a mine. This could limit the number of SMEs able to operate in the sector.

Regulatory Environment: The regulatory environment favours larger enterprises, which may be better equipped to navigate complex regulatory requirements and have more resources to comply with environmental and safety regulations.

Economies of Scale: Larger enterprises can take advantage of economies of scale, which can make their operations more cost-effective compared to smaller enterprises.

On the other hand, the manufacturing sector might have a higher percentage of enterprises employing more than 50 people due to factors such as lower capital intensity, a more favourable regulatory environment for SMEs, and less reliance on economies of scale. It's important to note that a skewed distribution towards large enterprises in the mining sector could have implications for employment, income distribution, and economic diversification in Zambia.

Large-Scale Mining

There are at least 12 large-scale mines in Zambia¹⁰⁷. There are currently 94 mining projects owned by 7 companies, including international mining companies¹⁰⁸. The "Big Four" mining companies in Zambia are Barrick Lumwana, First Quantum Minerals and Konkola Copper Mines. Other notable mining companies include China Nonferrous Mining Corporation, Chibuluma Mines and Luiri Gold Mines¹⁰⁹.

Mopani Copper Mines, which was initially a part of the state-owned Zambia Consolidated Copper Mines Investments Holdings PLC (ZCCM-IH) until 2000, was until recently the largest mining company in Zambia. First Quantum Minerals is now the leading copper producer in Zambia. At present, ZCCM-IH holds a minority stake in 13 of the country's (mainly copper) mines¹¹⁰. Furthermore, Zambia's Industrial

¹⁰⁷ Zambia | ASM (uneca.org)

¹⁰⁸ Mining Companies in Zambia | Projects IQ

¹⁰⁹ List of mining companies in Zambia - Mines in Zambia (jyminerals.com)

¹¹⁰ Further details of ownership of Mining stake by ZCCM-IH can be found here - Mining Assets - ZCCM Investments Holdings Plc (zccm-ih.com.zm)

Development Corporation plays a significant economic role by investing in the mining sector through a 60.28 percent shareholding of the ZCCM-IH¹¹¹.

The five largest mines in Zambia in 2021 were Sentinel Copper Mine (located at Kalumbila), Kansanshi Mine, Lumwana Copper Mine, Nchanga Copper Mine, and Mopani Mine¹¹². While LSM operations are primarily located in the Copperbelt and Northwestern provinces, future exploration is set to uncover additional deposits in various regions of Zambia. Some mining firms are also operating in both Zambia and DR Congo to take advantage of copper and cobalt, both critical minerals

for the energy transition. For example, Barrick Gold is conducting joint exploration in Zambia and DR Congo for copper to expand its existing presence and identify new opportunities in the region. The discovery of other critical minerals, such as Lithium, may influence the location choice of mining firms in Zambia (OEC, 2023).

Tax revenue records further confirm that the mining sector is primarily dominated by large firms with 85 percent of the gross domestic tax revenue collected from LSMs in 2022. The remaining sector tax paid is 14 percent by small firms, and less than 1 percent by medium firms (Zambia Tax Revenue, 2022).

Artisanal and Small-Scale Mining

There are over 900 small-scale and artisanal licenses in Zambia, with over 90 percent of the licenses inactive¹¹³. The specific number of artisanal miners in Zambia is unknown, but the sector is estimated to employ a significant number of people¹¹⁴, especially in gemstone mining and more recently in gold. The ZamStats Quarterly Labour Force Statistics for 2022 records a total of 65,409 people employed in the Mining and Quarrying category with 42,547 recorded as formally

employed and 22,862 as informally employed. Although actual numbers of persons employed in ASM cannot be accurately confirmed, largely due to the undocumented nature of activities, from these figures inferred estimates suggest that 65 percent of people are employed in LSM and 35 percent in ASM. Recently, Zambia's Mining Licensing Committee sanctioned 118 artisanal mining rights for Cooperatives¹¹⁵ as it looks to formalise this growing subsector.

International firms

Multi-national mining majors and minerals trading conglomerates play a key role in coordinating exploration, production, choosing projects, setting standards, and selling the final products as they also typically have more vertical integration and economies of scale. The primary destination for mineral exports are firms based in or trading from Switzerland. China is the second-largest importer of Zambian copper and there has been a recent increase in copper exports to both Canada and the US, indicating strong growth in these markets as they introduce national policies for electrification and low-emission technologies.

A recent loan of USD 250 million from the United States to Zambia was made to refurbish the Angolan rail line, connecting major mines in the region with the Atlantic port of Lobito, while China has proposed a USD 1 billion

investment for rail refurbishment to the Dar-es-Salaam port in Tanzania. This growing investment in infrastructure demonstrates a sustained interest by large North American and Chinese firms in the region (Bloomberg, 2024).

Beyond commodity producers and traders, firms downstream and upstream in the value chain are responsible for further processing of copper or providing inputs to key firms. Upstream from the mining sector includes any inputs needed to operate a functioning mine, notably electricity. Two regional utilities and the state-owned electricity utility (ZESCO) undertake electricity provision. Other upstream and side stream industries include construction, original equipment manufacturers, transportation, logistics and catering (Mining.com, 2023).

¹¹¹ Top Shareholders - ZCCM-IH Investor Relations Portal (financifi.com)

¹¹² Zambia: Five Largest Mines in 2021 - GlobalData

¹¹³ Kula Resources - Sustainable Small-Scale Copper Mining - Home Page

¹¹⁴ The current state of artisanal and small-scale mining in Zambia | International Growth Centre (theigc.org)

¹¹⁵ Mining Licensing Committee grants 118 artisanal mining rights to Cooperatives in Zambia - Copperbelt Katanga Mining



3. Government policies, strategies and interventions

Zambia's mining sector is governed by several key policies and regulatory frameworks. These instruments aim to ensure that mining activities are conducted in a manner that is safe, healthy, environmentally friendly, and beneficial to the country's economy. They also seek to promote investment in the sector and ensure that the benefits of mining are shared equitably among all stakeholders.

Furthermore, the legal framework can influence the types of skills needed in the

sector. For instance, regulations related to environmental protection may increase the demand for skills in sustainable mining practices. Greening of the economy is key issue for Zambia to the extent that a whole ministry has been created to address this. Currently a Green Growth Strategy is at an advanced stage and will have an impact on all sectors including mining.

The following list summarises key documents and literature related to policy, legal frameworks and initiatives:

Legal Framework/Policy	Description
Eighth National Development Plan 2022-2026 ¹¹⁶	This national plan aims to address the economic and social challenges that Zambia faces, such as high debt levels, low growth, poverty, inequality, unemployment, and climate change. It also aligns with Zambia's Vision 2030 of becoming a prosperous middle-income nation and the Sustainable Development Goals of the United Nations
Mines and Minerals Development Act, No. 11 of 2015 (MMDA) ¹¹⁷ Read with the MMDA Amendment Acts, No.14 of 2016 and No.29 of 2022	The primary law governing Zambia's mining sector. Covers mining rights, licences, large-scale mining, gemstone mining, health and safety, environmental protection, geological services, and issues related to royalties and charges ¹¹⁸ .
Mines Acquisition (Special Provisions) Act, No. 1 and 2, Chapters 218 and 219, Volume 13 The Laws of Zambia	This Act facilitates the transfer of a stakeholdership of the mines to the government.
National Mineral Resources Development Policy (2022-2027) ¹¹⁹	This policy aims to close regulatory gaps in the mining sector. It focuses on stimulating domestic and foreign investment to meet socio-economic demands, outlining strategies for sustainable mineral resource development.
Environmental Management Act, No.12 of 2011 (ZEMA) ¹²⁰	This Act has an impact on the development of the mining sector as it provides for the conduct of strategic environmental assessments of proposed policies, plans and programmes likely to have an impact on environmental management as well as the prevention and control of pollution and environmental degradation.
Occupational Health and Safety Act, No.36 of 2010 ¹²¹ and the Factories Act, No.2 of 1966 (MLSS)	The Act provides for the establishment of health and safety committees at workplaces and for the health, safety and welfare of persons at work.
Lands Act, Chapter 184 and Lands and Deeds Act, Chapter 185, Volume 12, Laws of Zambia	The Act provides for the continuation of Leaseholds and leasehold tenure; the continued vesting or alienation of land in or by the President; for the statutory recognition and continuation of customary tenure; to provide for the conversion of customary tenure into leasehold tenure; to establish a Land Development Fund and a Lands Tribunal.

¹¹⁶ EIGHTH-NATIONAL-DEVELOPMENT-PLAN-2022-2026-1.pdf (acazambia.org)

¹¹⁷ Mining Laws and Regulations Report 2024 Zambia (iclg.com)

¹¹⁸ A detailed list of Zambia's Mining Laws and regulations can be retrieved from <https://iclg.com/practice-areas/mining-laws-and-regulations/zambia>

¹¹⁹ Mining Laws and Regulations Report 2024 Zambia (iclg.com)

¹²⁰ [https://www.parliament.gov.zm/sites/default/files/documents/acts/Environmental percent20Mangement percent20Act percent2012 percent20of percent202011.pdf](https://www.parliament.gov.zm/sites/default/files/documents/acts/Environmental%20Management%20Act%202012%20of%202011.pdf)

¹²¹ <https://zambialii.org/akn/zm/act/2010/36/eng@2010-11-19>

Initiative/Programme	Description
Zambia's Mining Sector Strategic Plan 2022-2026	This strategic plan is a document that outlines the vision, mission, objectives, strategies and actions for the development of the mining sector in Zambia, launched by MMMD in November 2022, for implementation in 2022 to 2026.
Zambia Extractive Industries Transparency Initiative (ZEITI) ¹²² launched 2008 - ongoing ¹²³	The MMDA Act established ZEITI to enhance transparency and accountability in managing revenues from the extractive sector.
Opening Extractives Programme ¹²⁴	The Government of Zambia has signed a Memorandum of Understanding with ZEITI and Open Ownership to participate in the Opening Extractives Programme. This programme aims to improve the availability and use of beneficial ownership data for effective governance in the extractive sector.
Memorandum of Understanding EU-Zambia on sustainable raw materials ¹²⁵ (Oct 2023)	The EU agreed to a partnership with the DR Congo and Zambia to develop a critical raw materials value chain and also improve rail transport connections in Africa.

3a. Policy focus areas for developing and improving the mining value chain

Local content policies

Strengthening local content legislation presents a substantial opportunity to develop the upstream mining supply chain. According to the AfDB, the Zambian import displacement opportunity is estimated at around USD 1 billion annually for goods alone (see footnote 48). While there is a sizeable body of research on how to approach local content legislation in Zambia, implementation has been a hurdle.

Financial instruments and payment terms

Given that access to finance is reported as a major obstacle to firm growth in Zambia, there is a need for further research and policy action to improve the financial capacity of SMEs. The forthcoming section on private sector development explores policy options to improve access to finance for SMEs. However, in the short run, the government could evaluate its role in

ensuring that local suppliers are paid within the agreed timeframes by mining companies.

Understanding competencies of local suppliers and improving competitive environment

While it may be challenging to balance the tensions between friendliness to foreign investors and consideration for local firms, the government needs to better understand the dimensions across which local suppliers can compete with goods imported by mines. Some products and services, such as steel balls, mill liners, steel assembly components, and recycling of tyres are 'low hanging fruit' opportunity areas with potential for local manufacturing and service provision. In these areas, the government could consider reducing incentives to foreign firms to provide a fairer competitive environment that stimulates local suppliers.

¹²² ZEITI - <https://zambiaeiti.org/>

¹²³ About the Zambia Extractive Industries Transparency Initiative – Zambia Extractive Industries Transparency Initiative (zambiaeiti.org)

¹²⁴ Open Ownership - <https://www.openownership.org/en/topics/opening-extractives/#:~:text=The%20programme%20aims%20to%20improve,As%20such%20training%20is%20integral.>

¹²⁵ https://single-market-economy.ec.europa.eu/publications/memorandum-understanding-eu-zambia-sustainable-raw-materials_en?prefLang=de



4. Value chain analysis of the mining sector

The mining industry involves several stages including exploration, extraction, processing, smelting, refining and marketing. All these stages are applicable to the Zambian mining sector as are supporting industries that are

also involved in the process, for example, the production of machinery, equipment, chemicals, and transportation services. Even with core mining activities, elements of the value chain are typically divided between

different business entities, with exploration, extraction, processing, smelting and refining often undertaken by different companies. The mining industry's value chain is both capital and technology intensive, with four primary stages as described in Table 17 below.

► **Table 17: Value Chain for Mining**

Stage	Description	Examples
Exploration	The process of searching and evaluating mineral deposits.	Geological surveys, drilling, sampling, feasibility studies.
Extraction	The process of extracting ore from the ground.	Open-pit mining, underground mining, blasting, hauling, crushing.
Processing	The process of beneficiating and concentrating valuable minerals from the ore.	Flotation, leaching, smelting, refining, electrowinning.
Smelting and Refining	The process of purifying and transforming the minerals into marketable products.	Pyrometallurgy, hydrometallurgy, casting, alloying, electro-refining
Marketing	The process of selling and distributing the products to customers.	Contracts, pricing, hedging, logistics, quality control.

Source: World Bank report¹²⁶ Hampwaye, 2015¹²⁷

Zambia has a good opportunity to redevelop and expand an interconnected supply chain in the mining sector for enduring growth. However, investments in the mineral supply chain should be made cautiously to prevent susceptibility to future commodity price volatility. The growth narratives of other resource rich developing countries have been hindered due to an

excessive dependence on their natural resources, thereby limiting other economic possibilities.

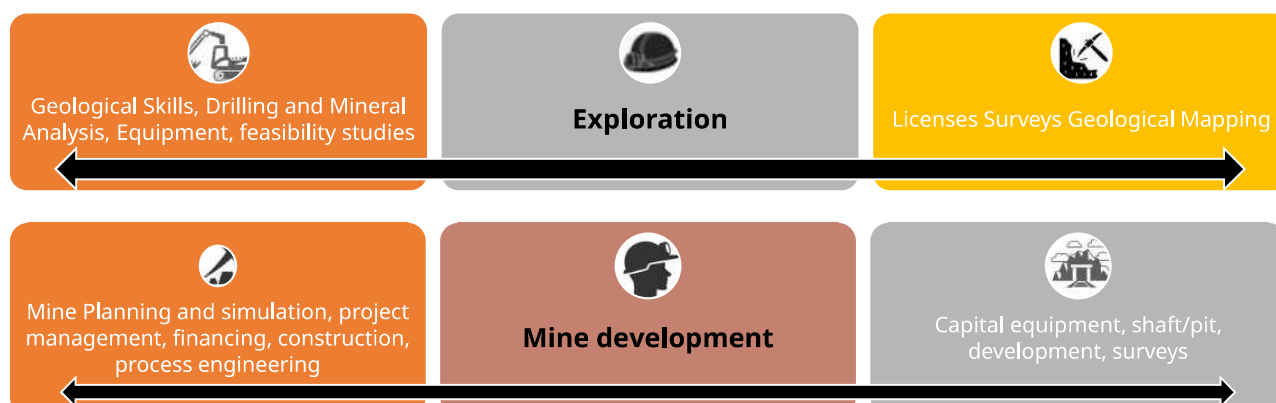
Figure 18 expands on the above primary stages of mining to illustrate in more detail activities involved in the mining industry value chain.

¹²⁶ pubdocs.worldbank.org/en/370251463440936494/MInGov-Zambia-report-160512-FINAL.pdf

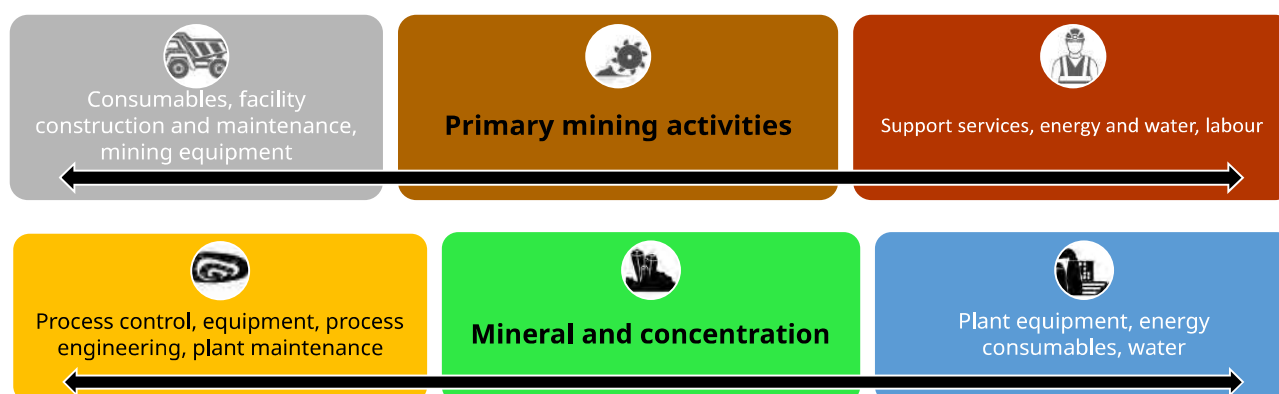
¹²⁷ (PDF) Regional mineral value chains: implications for Zambia's copper sector industrialization-oriented beneficiation | Godfrey Hampwaye - Academia.edu

Mining Value Chain

Mine initiation activities



Mine extraction



Mineral Beneficiation



► **Figure 17: Zambia Mining (Generic) Value Chain for LSM**

Source: Author

Value chain extension

It is critical that the government optimizes resource extraction gains in order to leverage the shift to the green economy to increase job creation and

employment opportunities. Increasing gross national product (GNP) along the mining value chain is crucial to achieving this. Mining GNP can be increased through

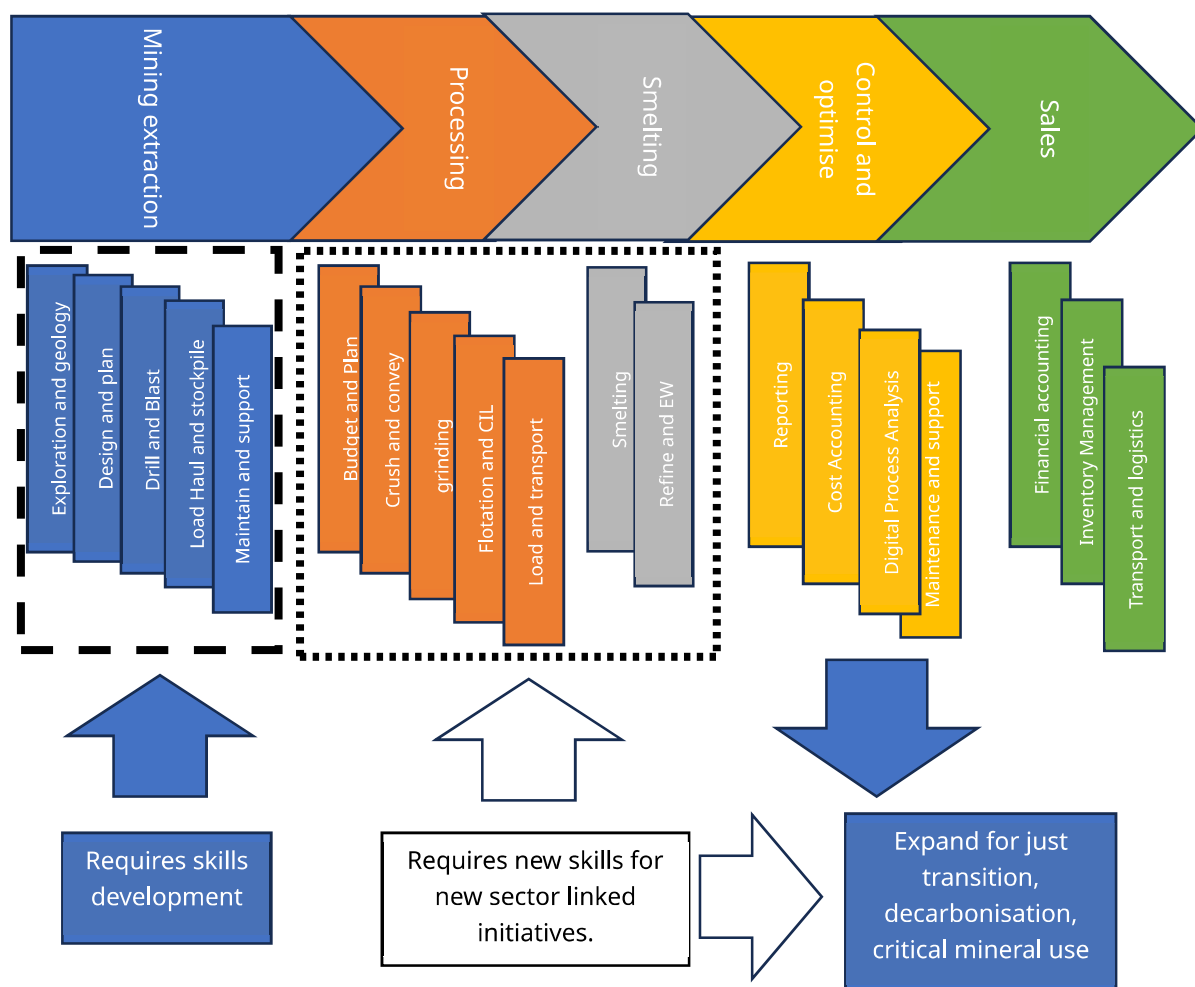
mining production output or, perhaps more importantly, improving returns from the operational mining base by leveraging its value chain.

The Zambian mining value chain is part of a larger value system of the industry that includes companies either upstream (suppliers) or downstream (distribution channels), or both. The value chain is also influenced by various factors such as government policies, regulations, taxes, royalties, infrastructure, labour, technology, and market demand. The value chain is constantly evolving and facing challenges and opportunities in the dynamic global environment. SMEs and mining cooperatives that coordinate with intermediaries such as traders, brokers, and exporters, also have a presence and their value chains tend to be more complex and diverse than those of LSM companies, with correspondingly greater involvement by ASM operators.

The robustness and growth of the copper industry should be utilized to bolster industrial development

both within and outside the sector. Long-term development envisioning a future less reliant on copper will necessitate the capture and reinvestment of mining sector revenues to foster connections within other sectors that have high growth potential.

There exists a distinctive opportunity to leverage the abundance of natural resources, specifically minerals, and the potential for renewable energy to construct affordable infrastructure that encourages business investment. Enhancing the productivity and scale of the copper value chain firstly necessitates a wide base of dependable electricity. The growing electricity demand in the sector will call for new generation capacity, which can be supplied by solar energy. Solar power projects, being less capital-intensive than traditional energy sources and having rapidly falling prices, can be developed in a short time frame. This new solar capacity can serve as a reliable source of electricity. Figure 19 shows the value chain components already showing competitive advantage and those areas that still require further development.



► **Figure 18: Value chain according to existing advantage and future potential development**

Source: Author compiled

Obstacles to extension of the mining value chain

Some of the key obstacles in the Zambia mining sector that may hinder the value chain extension are outlined in Table 18 below.

► **Table 18: Obstacles to value chain extension**

Obstacles	Elaboration
Poor local content legislation and enforcement	The current Mines and Minerals Development Act of 2015 mandates mining license holders to give preference to locally manufactured goods and services provided by Zambian citizens. ¹²⁸ However, in November 2020, the Ministry of Mines and Mineral Development (MMMD) acknowledged that the current legislation has several major gaps. The key weaknesses include: (1) a poor definition of 'local' (2) a lack of targets or parameters for procurement of local goods and services, and (3) loopholes for mines and mining contractors. ¹²⁹
Access to finance and delayed payments	According to the World Bank Enterprise Survey, access to finance is Zambia's most substantial obstacle to firm growth. ¹³⁰ This constraint was reiterated in nearly all stakeholder interviews and consultations. Moreover, the lack of working capital was highlighted as mines typically do not pay up-front, and several suppliers mentioned that payments were frequently delayed. Hence, local SMEs are often restricted to smaller contracts, whereas foreign-owned entities get larger opportunities (see AGS report footnote).
Discriminatory practices	Based on an AfDB investigation, Zambian suppliers cited various discriminatory practices. The suppliers interviewed by AfDB stated that mines provide favourable business terms to foreign 'Tier 1' contractors, including duty-free imports, advance payments, and credit lines. By contrast, Zambian subcontractors pay duty on their imports, frequently receive delayed payments from mines, and pay statutory payments that foreign firms are not subject to. ¹³¹
Transparency gaps	Transparency in the tender process is frequently described as weak and opaque. According to a local Chamber of Commerce, the mines' annual local procurement plans are not made available with enough detail for suppliers to plan their courses of action. In turn, suppliers frequently become general dealers, which is not attractive to mines interested in specialised skills and services (see footnote AfDB, 2019).
Skills Mismatches	Based on insights from local suppliers, industry representatives, and previous reports, it has been repeatedly cited that there is a misalignment between educational curricula and industry needs. Several local stakeholders reiterated that university curricula are too academic, leaving students with few practical skills. Moreover, vocational training has been criticised for focusing too much on business courses rather than developing technical skills. As a result, there are substantial technical skill gaps, including welding, boiler and furnace makers, foundry skills, quality assurers, among others (see footnote Enterprise Survey).

Sources: See footnotes

¹²⁸ Government of Zambia (2015) Mines and Minerals Development Act 2015.

¹²⁹ AGS (2021) Needs and Challenges in the Zambian Mining Supply Chain.

¹³⁰ World Bank (2019) 'World Bank Enterprise Survey 2019'.

¹³¹ African Development Bank Group (2019) Analysis of Input Goods and Services in Zambia's Mining Industry



5. Labour market analysis

The Zambian mining sector faces challenges and opportunities in terms of skills development, labour turnover, wage trends, job vacancies, and employee satisfaction. Similar to many other resource-rich developing countries, it faces a significant skills mismatch. This mismatch has been identified as primarily due to the following factors¹³²:

- **Rapid Growth of the Mining Sector:** The exponential growth in global mining production in the last 20 years has drained the global talent pool. This rapid growth has led to a shortage of skilled workers, making it difficult for mining companies to find the local or international talent they need.
- **Specific Skills Requirement:** Mining is one of the highest-risk industries in the world, requiring very specific skills. Safety demands high standards, and workers often work in dangerous conditions, both above ground and below, in extremes of

temperature, and in close proximity to heavy machinery and equipment.

- **Poor Coordination of Skills Development Efforts:** The experience of the Zambian mining sector has shown that previous efforts in the area of skills development have been poorly coordinated and not designed in a cohesive or sustainable manner. This lack of coordination has exacerbated the skills mismatch since the privatisation of the mines.
- **Challenges in Skills Development and Education:** There are significant challenges in skills development and education in the mining sector¹³³. These challenges include a lack of access to quality education and training, a lack of investment in skills development, and a lack of alignment between the skills taught in educational institutions and the skills needed in the industry.

Wages and Earnings compared with other Sectors

In 2023, a scan of recruitment sites shows that the average salary offered for a Mining Engineer in Zambia was reported to be around ZMW 62,500 per year¹³⁴. However, the gross salary range for people working in Mining and Metallurgy is typically from ZMW 3,662 per month (minimum salary) to ZMW 9,139 per month (highest average, actual maximum salary is higher)¹³⁵.

To calculate average earnings, the minimum and maximum wages are added together and divided by two. Therefore, we can assume that the average wage is approximately ZMK 6,400.50 per month. Note this is an average and actual wages can vary based on factors such as occupation, experience, skills, gender, and

location. This is a much higher monthly average compared with other sectors in the national economy. For example, the average wage in the financial sector is ZMW 5,178.00; the electricity sector is ZMW 4,184.00; the ICT sector is ZMW 2,745.00 and the agricultural sector is ZMW 1,368.00 per month¹³⁶. In theory a higher than average monthly income should make the mining sector an attractive career prospect, however, this does not appear to be the case and Zambia is experiencing similar shortage in attracting skills as other mining jurisdictions all over the world. Across all career fields men earn on average 12 percent more than women in Zambia¹³⁷.

Wage Trends

Although wages in the industry have struggled to keep pace with the cost of living in Zambia, salaries in the mining sector are generally better paid than other

sectors, as indicated above. However, trends in the Zambian mining sector have seen some positive changes recently. An example of this can be seen in a

¹³² TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹³³ Needs-and-Challenges-in-the-Zambian-Mining-Supply-Chains-report.pdf (agsprogramme.org)

¹³⁴ https://www.payscale.com/research/ZM/Job=Mining_Engineer/Salary

¹³⁵ <https://www.paylab.com/zm/salaryinfo/mining-metallurgy>

¹³⁶ <https://alrei.org/education/working-and-living-conditions-of-workers-in-the-mining-sector-in-zambia-by-grayson-koyi>

¹³⁷ Salary comparison by gender, Zambia – <http://www.salaryexplorer.com>

recent negotiated increase agreement between a mining company and unions. In 2024, Kagem Mining Ltd., the Mine Workers Union of Zambia and the National Union of Miners and Allied Workers reached a collective agreement on employee pay increases for 2024 and 2025¹³⁸. Unionised employees will receive a 10 percent increment in pay for 2024 and a further 10 percent in 2025. Additionally, the agreement confirms an increase in the education allowance for employees from the current ZMW 1,500 to ZMW 2,000¹³⁹. This pay increase agreement follows that of 2022, when the mine agreed to enhance the company pension

contribution from 20 percent to 25 percent of basic pay, bringing the effective salary increase at the time to 15 percent for 2022 and 2023.

While it cannot be ascertained if this is an industry-wide trend, it is encouraging to see some actors in the mining sector committed to recognising employees for their contribution towards the mine's success. However, the specific figures for the national workforce in the Zambian mining sector as of 2024 or 2025 are not explicitly stated.

Job vacancies

A scan of recruitment sites and article reveals that as of February 2024, there are a number of mining sector job vacancies. These are mainly for skilled technical and professional positions, which gives substance to anecdotal evidence that staff are being 'poached' from one company to another¹⁴⁰. There is also a lot of demand for critical skills such as those repairing of heavy machinery, occupational safety and health, which are important to drive productivity in the sector. This demonstrates that the country does not have

sufficient human resources to meet the needs of all companies in the mining sector. Alleviating the skills shortage in the short-term means facilitating the smooth entry of international expertise into the industry, and recognising the crucial role it plays both in skills transfer and in allowing mines to function at global levels of competitiveness¹⁴¹. However, the specific figures for international recruitment and the national workforce in the Zambian mining sector are not explicitly stated.

Employee Satisfaction and Retention

Job satisfaction is crucial for retaining employees in the mining sector. Fair treatment, comprehensive training and development programmes, as well as regular consultation with employees, were identified as key factors for retaining talent within the LSM industry¹⁴². Although there is no specific research related to levels

of satisfaction or retention for either LSM or ASM, there was anecdotal evidence of a 'brain drain' mentioned in consultations, implying that skilled workers were seeking and/or being offered better paid positions at overseas operations in Australia, Canada and Saudi Arabia.

¹³⁸ Kagem and mine workers unions reach 2024/2025 collective agreement - Copperbelt Katanga Mining

¹³⁹ Kagem and mine workers unions reach 2024/2025 collective agreement - Copperbelt Katanga Mining

¹⁴⁰ <http://mines.org.zm/skilled-miners-critical-to-meeting-zambias-production-targets/>

¹⁴¹ TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹⁴² North-West University News@NWU article (2023); <https://news.nwu.ac.za/job-satisfaction-key-retaining-employees-mining-sector>



6. Skills demand in the mining sector

Picture courtesy of ZCCM-IH

An analysis of the gaps in business capabilities in the mining sector is necessary to prioritise skills required to drive future production and sustainable export targets. This section considers current skills gaps based on a combination of information from priorities identified by mining entities from the IGF gender survey, an analysis of industry occupation vacancies and those raised in stakeholder consultations. The following factors provide an outline of the skills demand forecast for the Zambian mining sector. However, the estimated potential employment increase and actual numbers could vary significantly depending on factors such as the efficiency of mining operations, the types of mining method used, the ore grades, level of mechanization and automation deployed, imported skills, among others.

- The Zambian mining sector has been attracting significant investment commitments (USD 3.4 billion, doubling pledges made in 2022¹⁴³) and the government is aiming to ramp up copper production from 830 000 tonnes in 2022 to 3 million tonnes in the next 10 years¹⁴⁴. On average 1 person is employed for every 11 tonnes of copper produced, which would mean that there will be an upward trend in the levels of LSM employment in order to meet the target of 3 million tonnes per year.
- This suggests that if the copper production increases as planned, the formal mining sector

has the potential to employ around 264,000 people over the next 10 years, which is a significant increase from the current employment level of approximately 65,000. With the global shortage of mining skills, which has been ranked as the number-one risk facing the industry¹⁴⁵, identifying, nurturing, and training future mining talent has become a priority for the world's mines¹⁴⁶.

- The government has committed to enhancing collaboration to establish skills development centres to sustain the future of mining¹⁴⁷ as challenges with poorly coordinated skills development not designed in a cohesive or sustainable manner persist. The government is also focusing on promoting the growth of small-scale mining through cooperatives, aiming to enhance skills development, especially for youth and women by formalising ASM operations.
- The Zambian mining sector is investing in scholarships, formal skills-transfer programmes, and high-tech training centres to keep up with rapidly evolving mining technology as the future workforce requires different skills from those used in traditional mining methods¹⁴⁸. Upskilling and reskilling existing employees while attracting new talent with specialised expertise in areas such as data analytics, automation and robotics will be crucial for competitiveness.

6a. Key occupations and skills

The life cycle of a mine is measured in decades and requires a wide range of high-level skills. Men and women work in hazardous environments, both above and below ground, facing extreme temperatures and working in close proximity to heavy machinery and equipment. While modern technology enhances mining productivity, efficiency, and safety, it also necessitates higher skill levels.

A typical mine employs geologists, metallurgists, technicians, environmental and social experts, safety officers, doctors, nurses, paramedics, financial managers, accountants, IT experts, data analysts, managers, superintendents, overseers, and all types of engineers – mainly mining, mechanical, electrical and chemical. The global shortage of mining skills also includes critical mine artisans such as welders, riggers,

¹⁴³Zambia's mining industry in 2023 - (miningforzambia.com)

¹⁴⁴Zambia : Zambia's target to increase copper Production to 3 million tonnes in the next ten years is attainable (lusakatimes.com)

¹⁴⁵Zambia affected by global mining-skills crunch – Zambia Chamber of Mines

¹⁴⁶TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹⁴⁷Skills development necessity to prepare youths' mining future - Mutati - Kalembe News

¹⁴⁸Skilled Miners Critical to Meeting Zambia's Production Targets – Zambia Chamber of Mines

boilermakers and mechanics who face rigorous selection criteria.

The range of occupations involved in the mining sector

is extensive and too exhaustive to itemise, however, summaries of the core mining sector skills focus areas for LSM in Table 19 below provides an outline of the workforce skills required.

► **Table 19: LSM skills focus areas, core purpose and key skills required**

LSM Occupations focus areas:	Core Purpose	Key Skills needed
Geology and Exploration	Understanding the earth's rock formation and conducting mineral exploration to identify viable mining sites is crucial	This role requires an extensive knowledge of mineralogy, petrology, economic geology, geological processes, soil science, chemistry, hydrology, field mapping, mineral rights law, and other subjects. Field work, sample collection, mapping, data analysis, report writing, presentation skills, and computer skills are also important.
Mining Engineering	Skills in mining engineering are essential for planning and designing mining operations, including excavation, transportation, and resource optimisation	Mining engineers need to have good technical skills to be able to operate machinery and equipment safely and accurately. They also need to have a solid understanding of occupational health and safety practices. Beneficial skills include strong attention to detail, confident nature and decisive, good oral and written communication skills, and a practical and creative mind.
Mineral Processing	Knowledge of mineral processing techniques is necessary for extracting and refining minerals from ore.	Professionals in this field need to have a high school diploma or equivalent, previous experience in a mill environment, physical fitness, and proficiency in the language of operation. They should enjoy working with math, science, computers and machinery, understand and respect safety procedures, regulations, and legislation and have strong risk management and time management skills.
Health and Safety	Safety is paramount in mining, and skills related to workplace safety, risk assessment, and emergency response are critical.	Health and safety professionals in mining need to provide clear instructions on procedures and on handling equipment, training on necessary safety precautions required while working, identifying the risk factors and ways to avoid them, and mandatory use of machine guards, masks, gloves, and other protective gear while working or handling equipment.
Environmental Management	Mining companies need experts in environmental management to ensure responsible and sustainable mining practices	Environmental management professionals need to identify issues and solve problems, visualize completed projects, enjoy hands-on work, understand and respect safety procedures, regulations and legislation, have strong computer, risk management, communication and interpersonal skills, have a strong interest in natural sciences, and work well in a team.
Mechanical and Electrical Engineering	Maintenance and repair of mining equipment and machinery require skills in mechanical and electrical engineering.	A broad spectrum of engineering skills is required in mining engineering, including civil, electrical, geological, mechanical, and computer engineering knowledge.

LSM Occupations focus areas:	Core Purpose	Key Skills needed
Logistics and Supply Chain	Efficient movement of materials and products within the mining supply chain is vital.	Logistics professionals need to have excellent organizational and problem-solving skills, as well as strong communication and negotiation skills. They also need to have a comprehensive understanding of the end-to-end supply chain process, including knowledge of procurement, production planning, transportation management, warehousing strategies, and distribution networks.
Project Management	Mining projects are complex and require skilled project managers to oversee operations and budgets.	Project managers in mining need to have knowledge of mining operations and mining equipment, strong communication skills (verbal and written), strong management skills, and strong multi-tasking and time management skills.

Source: Zambia Chamber of Mines¹⁴⁹

Apart from the anticipated increase in skills demand in the LSM copper producing sector, a key challenge for the Zambian government lies in the highly fragmented but burgeoning ASM sector. Relatively less is known about this sector as it is largely undocumented and mostly done on a small scale. ASM tends to be very locally driven with low barriers to entry and involves many other types of minerals beyond copper¹⁵⁰ that are more accessible at surface level.

In general, the Zambian ASM sector is characterized by low levels of mechanization, disorganization, and formalization, and often operates in remote and marginal areas, with limited access to finance, technology, markets, and services. It also suffers from

poor working conditions, low productivity, environmental degradation and social conflicts. However, if properly regulated and supported, this sector has the potential to contribute meaningfully to increased employment and livelihoods as well as the socio-economic development plans of the country.

Consultations with government representatives revealed that the MMMD has developed policy to actively promote and regulate formalisation for socio-economic development and local empowerment¹⁵¹ in order to counter illegal mining activities. This is being done through the formation of cooperatives, especially for the youth and women.¹⁵² Although specific data on the annual demand for ASM skills is not readily

¹⁴⁹ TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹⁵⁰ The current state of artisanal and small-scale mining in Zambia | International Growth Centre (theigc.org)

¹⁵¹ Zambia Pioneers Efforts to Empower Women and Youth in the Mining Sector - Copperbelt Katanga Mining

¹⁵² Zambia : Cooperatives and the CDF: Do the Youth and Politicians understand the Business Model? (Lusakatimes.com)

available, there is recognition of key skills focus areas that require support^{153 154} in order to meet future demand, as summarised in Table 20 below.

► **Table 20: ASM skills focus areas and core purpose**

Skills focus area	Purpose
<i>Geology and Exploration</i>	Understanding of basic geology and conducting mineral exploration to identify viable mining sites
<i>Basic Mining</i>	Technical skills for planning and designing mining operations, including excavation, transportation, and resource optimisation. Basic mining in ASM requires physical fitness and capacity, having strong steady hands, manual dexterity, and strong vision and hearing.
<i>Mineral Processing</i>	Knowledge of mineral processing techniques necessary for safely and efficiently extracting and refining minerals from ore. knowledge of safe techniques for extracting and processing ore and gemstones using mainly manual methods.
<i>Health and Safety</i>	Skills related to workplace safety, risk assessment, and emergency response, including health risks such as mercury exposure in gold mining.
<i>Environmental assessment</i>	Knowledge of impact and environmental management to ensure responsible and sustainable mining practices e.g. water sources, land degradation, etc.
<i>Mechanic, Electrician</i>	Equipment maintenance and repair to maintain small-scale diggers, etc.
<i>Transporting</i>	Efficient movement of materials and products within the mining supply chain
<i>Administration and basic business skills</i>	Basic finance and administration

Source: Zambia Chamber of Mines¹⁵⁵

¹⁵³ An Overview Of The Mining Sector In Zambia And, In Particular, The Progress Made In The Sector - Mining - Zambia (mondaq.com)

¹⁵⁴ Needs-and-Challenges-in-the-Zambian-Mining-Supply-Chains-report.pdf (agsprogramme.org)

¹⁵⁵ TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

A photograph of an electrical worker in a blue uniform and white hard hat, smiling while working on a large electrical transformer. The background shows a complex network of power lines and insulators. The image is overlaid with a semi-transparent blue and white geometric pattern.

7. Skills supply in the mining sector

Picture courtesy of ZCCM-IH

The State of Education

An evaluation of existing education and training programmes is important for understanding the foundation that provides professionals, artisans and various levels of skilled labour to the mining sector. The literacy rate is often used as a measure of educational attainment and according to MacroTrends, the adult literacy rate in Zambia was reported at 87.5 percent in 2020¹⁵⁶.

Government education expenditure can also reflect the national commitment towards improving educational outcomes. According to the UNESCO Institute for Statistics, government expenditure on education as a percentage of GDP was around 5 percent in 2017¹⁵⁷. Education in Zambia continues to experience numerous challenges, including limited access to quality education, insufficient infrastructure and resources, a shortage of qualified teachers, and high drop-out rates.

The School Enrolment Rate is another relevant indicator that can be used to assess different levels of education. According to UNICEF's Multiple Indicator Cluster

Surveys, the primary school net enrolment rate in Zambia was approximately 89 percent for boys and 87 percent for girls in 2018¹⁵⁸. World Bank data from 2019 has the gross enrolment rate for primary education at 100 percent. However, the completion rate for primary education was only around 63 percent. At the secondary level, the gross enrolment rate was about 45 percent, with a completion rate of approximately 29 percent. However, there is a general increase in enrolment numbers in primary and secondary education since the introduction of free education.

The data in Table 21 sheds some light on the numbers of male and female education levels in 2022 according to ZamStats data. While it is not possible to directly link these numbers to the potential talent pool available to the mining industry, it is interesting to note the significant difference in male (64.8 percent) and female (35.2 percent) secondary school education attainment, a pattern that continues in tertiary education. This pattern may change in future as more girls attend and complete secondary school now that this level of education is free.

► **Table 21: Number and percentage distribution of youth employment by highest level of education attained, rural/urban and sex, Zambia 2022**

Highest Education Attained	Total	Total		Rural		Urban	
		Male	Female	Male	Female	Male	Female
Total	1,646,617	61.5	38.5	65.0	35.0	59.5	40.5
Primary	401,808	54.2	45.8	60.5	39.5	45.0	55.0
Secondary	1,022,455	64.8	35.2	69.8	30.2	62.7	37.3
Certificate/Diploma	133,358	60.3	39.7	54.9	45.1	61.7	38.3
Bachelors Degree	40,410	58.0	42.0	65.2	34.8	57.3	42.7
Masters Degree or higher	2,777	62.7	37.3	0.0	0.0	62.7	37.3
Never attended school	45,809	59.7	40.3	62.7	37.3	55.0	45.0

Source: Zambia Statistics Agency (2023); 2022 annual Labour Force Survey

Although specific enrolment and graduation rates for mining-related programmes are not readily available, professional and highly skilled occupations in the mining sector tend to require some form of Science, Technology, Mathematics and Engineering (STEM) qualifications. Similar to most countries, STEM

education in Zambia is characterised by a significant gender imbalance, with women underrepresented in these fields. According to data from UNESCO¹⁵⁹, only 18 percent of students enrolled in tertiary education in Zambia pursue STEM-related disciplines, and most of these students are male¹⁶⁰.

¹⁵⁶ Zambia Literacy Rate 1990-2024 | MacroTrends

¹⁵⁷ UIS.Stat Database - Education Expenditure by Country, http://data.uis.unesco.org/Index.aspx?DataSetCode=EAG_2019_COUNTRY

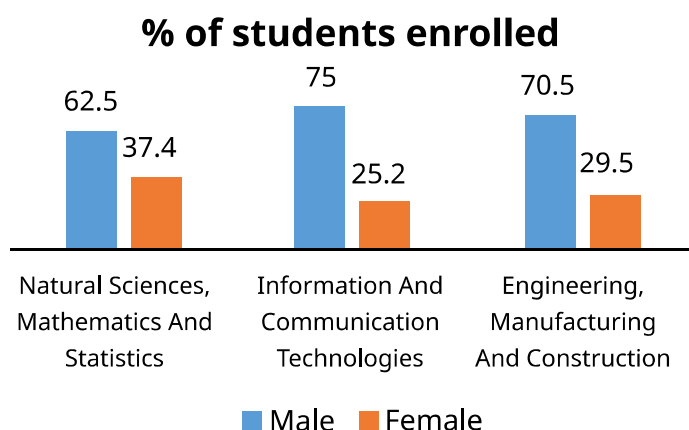
¹⁵⁸ UNICEF MICS6 Survey Results - Zambia, available at <https://mics.unicef.org/surveys>.

¹⁵⁹ UNESCO Institute for Statistics, 2019

¹⁶⁰ UNESCO's Gender Equity Index (GEI) further highlights the disparities in STEM education between genders. The GEI score for Zambia's secondary education system indicates a gender disparity favouring males, with a score of 0.85 for boys compared to 0.76 for girls - UNESCO Institute for Statistics, 2021

Phiri and Mwaanga (2021) evaluated gender in STEM in Zambia and found that in 2018 female students made up 49 percent of the 57,034 enrolled students at the 9 public universities, 54 private universities and 29 vocational education and training institutions. Figure 20 indicates that of the total students enrolled in STEM fields, only 37.3 percent of the female students were

enrolled in Natural Sciences, Mathematics and Statistics, 25.2 percent in Information and Communication Technologies and 29.5 percent in Engineering, Manufacturing and Construction. These numbers were significantly lower compared to those of male students.



► **Figure 19: Figure percentage of Women Enrolled in STEM Fields**

Source: Phiri and Mwaanga 2021, ASTI (2020)

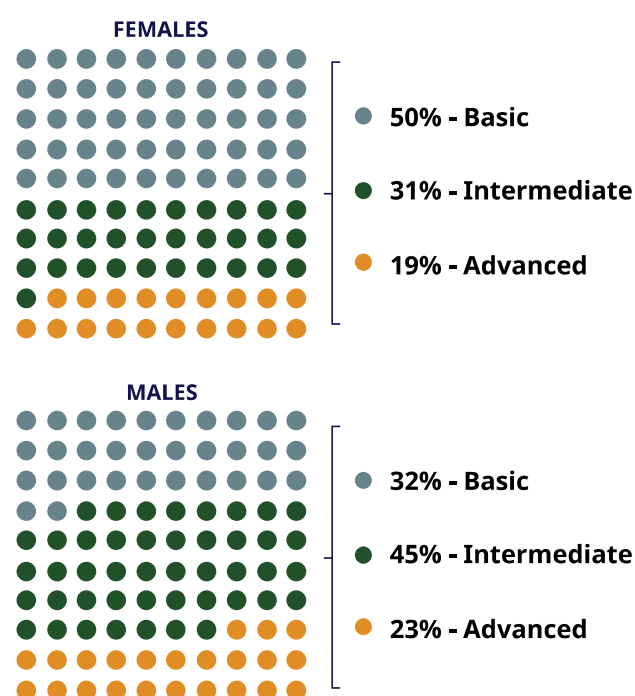
Female students comprised 14 percent of those receiving STEM science related certificates, 25 percent of those receiving diplomas and 29 percent receiving degrees. This was not the case in general fields like education and business-related programmes where female students constituted 48 percent and 49.2 percent respectively. In general terms enrolment between males and females at various levels of education differ significantly whether at secondary school, certificate and diploma, bachelor's degree and postgraduate qualification.

Overall, STEM sciences have very low female participation among those who attained Higher

Education and master's and PhD degrees in these fields are low. These issues have hindered the development of a skilled workforce in various sectors, including mining. As indicated in Figure 21, findings of a 2019 ILO labour survey found that 50 percent of women employed in mining have a basic education, 31 percent have an intermediate education and 19 percent have an advanced education. Women with higher education levels tend to play a larger role in the technical and associate professions category and in Advanced education as professional roles.¹⁶¹

¹⁶¹ Exploring the ILO's Gender-Disaggregated Data on Mining Employment - Intergovernmental Forum (igfmining.org)

EDUCATION LEVELS OF MALES AND FEMALES EMPLOYED IN MINING



Female employees have a higher proportion of basic level education than men and similar levels of advanced degrees.

► **Figure 20: ILO Education Levels of Males and Females Employed in Mining in 2019**

Source: ILO 2019 findings of the labour survey

Science, Technology and Innovation (STI) and vocational training in Zambia is mostly dominated by males, which in turn leads to careers in engineering, agriculture, and medicine, technology and innovations continuing to be male dominated. The government has recognized the importance of gender in promoting STEM education and careers and this is reflected through policy instruments such as the Gender Policy, Higher Education Act, National Policy on Science and Technology, and Education Policy, which are aimed at ensuring gender-based STI participation.

In terms of linkages between education and mining skills development in Zambia, there have been efforts to enhance vocational training and technical skills development programmes specifically targeted towards the mining sector. The government has emphasized the importance of aligning educational curricula with industry needs for better job market

outcomes, and both the government and mining companies have invested in high-tech training centres to keep up with rapidly evolving mining technology.¹⁶²

The Copperbelt, known for its rich mining deposits and long history of mining activity, tends to offer better access to educational and training resources, leading to a concentration of skilled workers in this region.

On the other hand, people living in rural areas often face challenges in accessing such facilities, resulting in a disparity in the skills profile between regions. Some challenges related to skill supply have been identified as:^{163 164}

- A lack of strong in-house training strategies by new mine owners.
- A decrease in industry support to training institutions.

¹⁶²http://mines.org.zm/tackling-the-mining-skills-crisis/?doing_wp_cron=1709481874.8606140613555908203125

¹⁶³http://mines.org.zm/tackling-the-mining-skills-crisis/?doing_wp_cron=1709481874.8606140613555908203125

¹⁶⁴<https://agsprogramme.org/app/uploads/2021/05/Needs-and-Challenges-in-the-Zambian-Mining-Supply-Chains-report.pdf>

- Limitations in terms of teaching staff and (new) equipment in training institutions.
- A lack of coordination, funding, and collaboration between companies and education and training providers.
- Relevant curriculum development and regular updating is a challenge.

The TEVETA institutions admit less than 2 percent of school leavers from basic and secondary education.¹⁶⁵ This is a key area for concern and the government is striving to increase admission rates to above 15 percent. TEVETA has recognized the imperative to concentrate their training efforts on mine operators to enhance mining efficiency, risk management, and fulfil the demand for a skilled workforce. Critical skills such as large machinery repair and occupational safety and health are vital for driving productivity in the sector.¹⁶⁶

Furthermore, it underscored the inherent risks in mining, emphasizing the pivotal role of occupational health and safety in the industry. This endeavour entails a blend of safety protocols and competencies essential for safeguarding mining infrastructure, equipment, and personnel. It has also Identified the need to bolster mining efficiency, reduce downtime stemming from inadequate equipment servicing skills, and conducting similar training programmes to encompass more mining companies and standardize skill levels in the sector.

A good example of action in this regard is the partnership TEVETA has entered into with Bell Equipment Zambia and Mopani Copper Mines on a ZMW 8.2 million contract for mine operator and mine rescue training. The financial support for this training programme is provided the Zambian Skills Development Fund, an initiative designed to enhance efficiency, productivity, and economic transformation by offering tailored and demand-driven skills training across various economic sectors. The Mopani Central Training Centre will conduct the four-year programme, training 240 apprentices annually.

In terms of access to mining-related education facilities, the Copperbelt region is the heart of Zambia's mining industry, hosting a significant number of mining

operations and related infrastructure. The presence of universities, technical colleges, and specialized training facilities in this region contributes to a higher concentration of skilled professionals. Students in the Copperbelt region have more direct access to relevant educational programmes and practical training opportunities tailored to the mining sector's needs. While a more detailed list of mining related education and training facilities is provided in the following section, key education institutions are the University of Zambia, the Copperbelt University, TEVETAs and community colleges, which all offer different levels of mining related education and training programmes. In addition, there are examples of excellence in some private training facilities such as:

- **Mopani Central Training Centre:** a state-of-the-art world class training facility and one of the best mining-orientated training facilities in Zambia and the region. The centre offers long and short courses in engineering, metallurgy and mining, including hands-on and digital simulation training.
- **Zambia Mining School/Short Courses Training Centre:** based in Lusaka, this centre offers short courses in mining.
- **Hill Training Institute of Mining and Constructions:** based in Lusaka, specialises in training operators in earth moving equipment, lifting, mining, construction and other engineering trades.
- **Kagem Mining Limited:** a private company that has signed an Memorandum of Understanding with the government committing to fund construction of the Chapula Vocational Training Centre in Lufwanyama that will enable local people to acquire skills to improve their employability.

In contrast, rural areas where mining operations are also present often lack the infrastructure for comprehensive education and training in mining-related disciplines. Limited access to universities, technical colleges, and specialized training facilities in these more remote areas results in a shortage of skilled workers. The geographic distance and logistical challenges may discourage individuals from pursuing

¹⁶⁵ TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹⁶⁶ TEVETA approves OSH curriculum for increased workers' safety and health (ilo.org)

education and training in mining-related fields. Challenges with accessing education and training in rural regions include:

- **Limited Educational Institutions** - rural areas have fewer educational institutions offering mining-related programmes, limiting the opportunities for local residents to acquire specialized skills.
- **Lack of Specialized Training Facilities** - the absence of laboratories and specialized training facilities in rural areas hinders practical, hands-on learning experiences crucial for mining-related professions.
- **Transportation and Accessibility Issues** - limited transportation infrastructure can make it difficult for individuals in rural areas to access educational institutions located in more urbanized regions.
- **Lack of connectivity** - limited internet and broadband connectivity means there is little opportunity to access online education and distance learning facilities.

The regional disparity in educational and training facilities has implications for the overall mining workforce. The concentration of skilled workers in the Copperbelt may lead to workforce imbalances, affecting the equitable development of the mining sector across the country. To address this, targeted interventions such as the establishment of satellite campuses, online learning platforms, or mobile training units could be explored to bring mining education and training opportunities closer to rural communities.

In summary, the regional variations in mining skills in Zambia are influenced by the distribution of educational and training facilities. The Copperbelt region benefits from a concentration of resources, leading to a higher number of skilled workers, while rural areas face challenges in accessing such facilities, resulting in a skills deficit. Bridging this gap requires strategic investments in education infrastructure and innovative approaches to make mining-related education and training more accessible to individuals in rural areas.

7a. Key institutions, formal programmes and qualifications relevant to the sector

In addition to the MMMD, other government ministries that have differing responsibilities and/or overlapping mandates related to the mining sector are the Ministries of Labour and Social Security; Health; Commerce, Trade and Industry; Finance and National Planning; Technology and Science; General Education; Lands and Natural Resources; Energy; Water Development and Sanitation; Green Economy and Environment; Local Government and Rural Development; Small and Medium Enterprise Development, Justice, Tourism and Foreign Affairs.

The institutional support in Zambia's mining sector also includes several key organizations, which play important roles in advocating for favourable policies, promoting responsible mining practices, and facilitating cooperation among stakeholders. The main, established organisations are:

- **Zambia Chamber of Mines (ZCM)** - a private sector industry organisation that represents the interests of mining companies (mainly LSM enterprises) focusing on policy advocacy, addressing industry challenges, and promoting sustainable and responsible mining practices.
- **Zambia Extractive Industries Transparency Initiative (ZEITI)** - a multi-stakeholder initiative that promotes transparency and accountability in the extractive industries, including mining.
- **Zambia Consolidated Copper Mines Investment Holdings (ZCCM-IH)** - a state-owned investment company that holds a stake in the mining industry and manages the government's interests in mining companies.

- **Zambia Environmental Management Agency (ZEMA)** - the government agency responsible for environmental regulation and management in the mining sector, enforcing environmental regulations and ensuring compliance with environmental standards.
- **Zambia Development Agency (ZDA)** - has a multifaceted mandate of promoting and facilitating trade, investment and enterprise development in the country. It is also responsible for building and enhancing the country's investment profile for increased capital inflows, capital formation, employment creation and growth of the Medium Small and Micro Enterprise Sector.
- **Zambian Qualifications Authority (ZAQA)** - a statutory body under the Ministry of Technology and Science (MTS) to develop and implement a national qualifications framework.
- **Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA)** - under the MTS responsible for regulation and curriculums offered by public and private colleges and training facilities.
- **Artisanal and Small Mining Associations** - are broadly represented by the Zambia Federation of Small-Scale Mining Association (ZAFESSM). Registered in 2008, ZAFESSM is an umbrella body for all the Small Scale Mining Associations operating in Zambia. It has 16 affiliated member associations representing all 10 provinces of Zambia¹⁶⁷.
- **Association of Zambian Women In Mining (AZWIM)** - An umbrella network for Non-Governmental and Community Based Organisations active in championing women's empowerment and gender equity and equality in the mining sector.
- **Mining and Technical Exhibitions (MTE)** - a private sector company that organizes exhibitions and events related to the mining industry providing a platform for mining companies, suppliers, and service providers to showcase their products and services.

7b. Mapping of Existing Actions on Skills

This section describes what actions are being taken by the government, the industry, education and training providers and development partners in terms of skills development.

Government

The Zambian government's commitment to responsible and sustainable mining practices through enhanced oversight and investment in skills development can be seen through past actions such as the creation of the Mining Skills and Training Framework (MSTF) in 2013. To give effect to the MSTF, in 2015 the Australian government supported the establishment of the Zambian Mining Skills, Education and Training Institute (ZAMSET)¹⁶⁸. The organisation planned to be transformational in establishing and managing an integrated framework for extractive sector education and mining skills development from

school to post-university level. The long-term objective of the programme is to provide the Zambian Government and companies with the ability to better satisfy their recruitment requirements through increased access to a more skilled local workforce, demonstrating the inclusive economic growth and job creation benefits of extractives development.

More recent actions include the establishment of the Zambian Skills Development Fund (SDF) and the stakeholder consultations, which aim to create a regulatory framework that ensures accountability.

¹⁶⁷The Federation of small-scale mining Associations of Zambia (FSSMAZ) • ZIMEC International Mining and Energy Conference & Exhibition (zimeczambia.com)

¹⁶⁸<https://adamsmithinternational.com/projects/support-to-fast-track-implementation-of-the-zambian-mining-skills-education-and-training-institute/>

Partnerships with private sector for the establishment of training facilities such as the Solwezi Trades Training Institute also reflects a proactive approach to building a skilled workforce capable of supporting the mining industry's long-term success in the region.

- **The SDF** was established through the Skills Development Levy Act in January 2017 and is funded by levies paid by employers. It is used to enhance the provision of skills development in a more efficient and effective manner, promote private sector participation, and facilitate predictability of resources to the institutions. It is a financing vehicle that enhances efficiency, productivity, and economic transformation through demand-driven and tailor-made skills training for different economic sectors, including mining. Funds collected are overseen by the MTS and disbursed through TEVETA. However, the challenges related to levy collection need to be addressed to ensure the fund's sustainability and effectiveness. There is no database of the companies who should pay the levy, and there is a significant challenge in engaging businesses in the informal sector as the current levy system does not capture them¹⁶⁹. Engaging the informal sector as well as establishing a comprehensive database of levy-paying companies and documenting the informal sector through formalising ASM cooperatives could be potential solutions.
- **The establishment of the SOTTI** is an example of a strategic partnership between the Zambian government and First Quantum Minerals'

Kansanshi Mine to address skills development and education in the mining sector.¹⁷⁰ The vision behind creating a centre of excellence in the Northwestern province aligns with the broader national goal of nurturing a skilled workforce capable of contributing to and sustaining the mining industry's growth. The training facility emphasizes the development of technical skills and expertise relevant to the mining industry. This initiative recognizes the importance of collaboration between the government and private sector entities to bridge skill gaps, promote local employment, and ultimately boost the overall capacity and competitiveness of the mining sector in the region.

- **Consultations on Modalities for Enhanced Monitoring and Accountability** is government initiative under the MMMD¹⁷¹ to consult stakeholders reflects a commitment to improve monitoring and accountability in areas where mining activities are taking place. The presence of officers in these areas aims to strengthen regulatory oversight, ensuring that mineral resources are exploited responsibly and in compliance with environmental and social standards. Stakeholder consultations involve engaging various parties, including local communities, mining companies, environmental agencies, and other relevant entities, to gather input and insights for effective modalities. The goal is to create a collaborative approach that enhances transparency, minimizes environmental impact, and fosters sustainable mining practices in line with national regulations.

Industry

The following industry actions highlight a comprehensive approach to addressing challenges in the Zambian mining sector. Talent development ensures that the workforce is equipped with the necessary skills, while fostering business linkages with local SMEs promotes economic inclusivity and strengthens the sector's overall resilience and contribution to local communities.

- Talent Development to Address Skills Challenges:** As the representative body of the private sector, the ZCM also recognizes the importance of talent development¹⁷² to counter the global skills crisis in the mining sector caused by the evolving nature of work, shifts in workers preferences, changes in ways of working, global energy uncertainty, demand exceeding supply

¹⁶⁹UNESCO_Funding-of-Training_Zambia.pdf

¹⁷⁰TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹⁷¹ Ministerial Statement - Mines and Minerals Development.pdf (parliament.gov.zm)

¹⁷²TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

and a decrease in mining engineering enrolment. This initiative involves the implementation of targeted programmes, training, and educational efforts to enhance the skills and capabilities of the local workforce (as summarised in Table 19 below), which emphasizes the diverse range of skills and knowledge required for a well-rounded and skilled workforce. The goal is to create a pool of skilled professionals who can contribute effectively to the mining industry, ensuring its competitiveness and sustainability.

b) Establishing Business Linkages Between Mining Companies and Local SMEs: PwC reports that LSM companies are exploring innovative approaches to establish robust business linkages between the industry and local SMEs¹⁷³. Some examples of the innovative approaches that LSM companies are exploring to establish business linkages with local SMEs include:

- **Owning More of the Supply Chain:** some LSM companies are considering opportunities to own more of the supply chain, which could involve creating partnerships with original equipment manufacturers and local suppliers.
- **Incorporating Low-Emission Technologies:** companies are incorporating renewable energy, low-emission and automated technologies into their operations, which opens new possibilities for SME suppliers of technical services and goods.

This private sector strategy aims to strengthen the mining sector's capacity by fostering collaboration and mutually beneficial relationships between major players and smaller local businesses. By creating these linkages, the mining industry can contribute to the development of local economies, promote job creation, and enhance community engagement. The focus on SMEs suggests a commitment to inclusive growth, allowing smaller enterprises to participate in and benefit from the mining supply chain.

► **Table 22: Aspects of Talent Development Initiatives**

Aspects of Talent Development	Description
Technical Skills Development	Enhancing expertise in geology, engineering, mineral processing and equipment operation.
Safety Protocols Training	Rigorous training on safety protocols, emergency response and compliance with safety standards.
Environmental Stewardship	Education on environmentally friendly mining techniques, waste management and compliance.
Leadership Training	Cultivating effective communication, decision -making and management skills for leadership roles.
Scholarships and Skills Transfer	Offering educational opportunities and formal programs to transfer skills, especially to the underprivileged.
Investment in High-Tech Training Centres	Substantial investments in advanced training facilities for hands - on experience with the latest mining technologies.

Source: Zambia Chamber of Mines, 2018

Education and Training Providers

Zambia has several well-established universities and training institutions that offer degrees in a range of mining disciplines and related diploma courses. Curriculums include essential topics such as engineering, metallurgy, mathematics, mine development, fluid mechanics, probability, investment analysis, mineral economics, geo-statistics, and operations research. The main universities with Mining Schools are:

a) University of Zambia: Bachelor of Sciences in Mineral Sciences

The University of Zambia has been a home for pioneering excellent teaching and research for well over thirty-five years, with their graduates becoming leaders in both academia and industry¹⁷⁴. However, specific enrolment and graduate numbers are not readily available.

¹⁷³Zambia 2023 Mining Report (pwc.com)

¹⁷⁴<https://www.unza.zm/academics/undergraduate/bachelor-of-mineral-sciences-metallurgy-and-mineral-processing>

b) Copperbelt University: Bachelor of Science in Mining Engineering

Copperbelt University has about 15,900 students and produces an annual average of 1,500 graduates who form a nucleus of experts in critical areas of national development¹⁷⁵. However, specific enrolment and graduate numbers for the Bachelor of Science in Mining Engineering are not readily available.

c) Copperstone University: Diploma in Mining Engineering

Copper stone University is one of the leading private institutions of higher learning and its programmes today attract well over 1,000 applicants each year. The university has a total population of well over 1,500 students and staff establishment of 75 of whom 60 are academic staff¹⁷⁶. However, specific enrolment and graduate numbers for the Diploma in Mining Engineering are not readily available.

In addition to the university courses and diplomas mentioned above, the local skills supply for the Zambian mining sector is also provided for by various ministries, government agencies and industry bodies, which offer different levels and types of technical education, vocational and entrepreneurship training (TEVET) programmes. These educational programmes are designed to furnish students and workers with theoretical and practical knowledge that aims to enhance their employability and entrepreneurial skills. Formal TEVET providers include the MTS, TEVETA, the ZCM, and ZAMSET.¹⁷⁷ These entities deliver a range of courses and qualifications, encompassing certificates, diplomas, degrees, and apprenticeships across diverse mining-related disciplines, including exploration, extraction, processing, smelting, refining, and marketing of minerals and metals.¹⁷⁸ While there are numerous TEVET institutions (approximately 300) across the country, several located in the mining provinces offer specific courses in fields related to mining and engineering.

The main institutions are:

- a) Kitwe Vocational Training Centre: a MTS public institution, offers courses in mining engineering,

electrical engineering, mechanical engineering, and welding and fabrication.

- b) Northern Technical College: a MTS public institution, provides technical and vocational education in engineering, business, and applied sciences. Offers courses in mining engineering, metallurgy, geology, and surveying.
- c) Pascal Advanced Machinery Training Institute: a private institution specializing in training operators of heavy machinery in mining, construction, and agriculture. Equipped with modern simulators and trainers with industry experience.
- d) Solwezi Trades Training Institute: a MTS public institution in partnership with private sector, offers trades and crafts courses, including carpentry, bricklaying, plumbing, electrical installation, and mining operations and safety.
- e) Livingstone Institute of Business and Engineering Studies: a MTS public institution, offers diploma and certificate courses in business and engineering fields, including mining engineering, civil engineering, electrical engineering, and accounting.
- f) Mopani Central Training College: established by Mopani Copper Mines Plc, a state-of-the-art facility offering long- and short-term courses in engineering, metallurgy, and mining. Features full-scale underground and surface simulations, modern equipment, and laboratories.
- g) Kite Trades Training Institute (owned by Konkola Copper Mines): a TEVET institution in provides training in electrical, instrumentation, mechanical fitting, metal fabrication and rigging.
- h) Konkola Copper Mines: also has Mining Training Schools in Chingola and Chililabombwe to train miners in skills in drilling blasting and eventually issuing blasting licences to successful graduates.
- i) Kafue Gorge Regional Training Centre: established by SADC Ministers of Energy to provide specialised training in energy for the SADC region. The Centre provides skills training to the mining sector in engineering courses like High Voltages Switching Operations, Substation Operations and Maintenance, Switchgear Operations and Maintenance.

¹⁷⁵https://en.wikipedia.org/wiki/Copperbelt_University

¹⁷⁶<https://educationinzambia.com/index.php/universities/copperstone-university>

¹⁷⁷An Overview Of The Mining Sector In Zambia And, In Particular, The Progress Made In The Sector - Mining - Zambia (mondaq.com)

¹⁷⁸Zambia : Harnessing Zambia's Mining Sector and Agriculture for Economic Growth (lusakatimes.com)

- j) **Gemstone Processing and Lapidary Training Centre:** located at Ndola, this is the only institution in the country that is providing hands-on training for gemmologists, lapidaries and manufacturers of jewellery.
- k) **SinoZam College:** offers courses in Mining and Mineral Survey, Mining Engineering and B-Tech in Mineral Resource Management.

In addition, there are examples of other collaborative actions between the public and private sector such as the previously mentioned Bell Equipment/MCTM

apprenticeship programme¹⁷⁹ as well as the tripartite TEVET, Kagem Mining Limited and Industrial Training Centre Contract. This contract is a site-based skills training for earthmoving equipment operators conducted by trainers from the centre. The project is valued at about ZMW 1.1 million, benefiting 300 employees of Kagem Mining.

Development Partners

The following are initiatives between government, development partners and the private sector.

- a) **UNIDO Partnership for Industrial Skills Development:** UNIDO is partnering with the Volvo Group, the Embassy of Sweden in Zambia, and Northern Technical College¹⁸⁰ in the Zambian Industrial Training Academy (ZAMITA) to develop industrial skills specifically for the mining sector through tailored training programmes, capacity building, and initiatives focused on address specific skills needs.
- b) **UNIDO Partnership for Industrial Skills Development:** UNIDO is also partnering with the Ministry of Foreign Affairs in Finland and Mopani Central Training College to develop skills training in Water Resources Management with specific focus on water in mining.
- c) **ILO Facilitation for Job Creation and Enterprise Development:** the ILO facilitates consultations involving the Zambian government, mining companies, and employers' and workers' organizations. By Identifying effective strategies to promote job creation and enterprise development in mining communities, the organisation encourages collaboration between stakeholders to address socio-economic challenges in mining areas.¹⁸¹

- d) **Skills Development for Increased Employability Programme (SDEP):** initiated in 2023, this programme aims to strengthen the relevance, quality, and governance of the TEVET system by encouraging greater participation of the private sector in skills development initiatives aligned with industry needs, particularly with a green economy focus.¹⁸²
- e) **Mining Sector Technical Assistance Project:** the World Bank has implemented the Mining Sector Technical Assistance Project to help the government of Zambia implement an effective development strategy for the mining sector¹⁸³. These actions aim to enhance skills development, improve working conditions, promote business linkages, and foster the creation of more and better jobs in the Zambian mining sector.
- f) **Zambia Mining and Environmental and Remediation Improvement Project (ZMERIP):** the World Bank has provided USD 65.6 million to reduce environmental health risks in critically polluted mining areas, specifically targeting communities living in Chingola, Kabwe, Kitwe and Mufulira municipalities. This commitment influences the workforce, necessitating skills in sustainable resources management and environmental stewardship.

¹⁷⁹ Bell AF Mining and Construction (bellequipment.com)

¹⁸⁰ Supporting industrial skills development in Zambia (lkdfacility.org)

¹⁸¹ ILO supports a partnership approach in the Zambian mining sector to create jobs and stimulate inclusive growth

¹⁸² Skills Development for Increased Employability Programme (ilo.org)

¹⁸³ content (worldbank.org)

Informal sector training

Worldwide ASM operators have difficulty in accessing finance, technology, markets, and services, as well as complying with quality, health, safety and environmental standards. However, ASM operators, cooperatives, and associations play a vital role in informal skills transfer by providing on-the-job training and mentoring to their members and workers, often grounded in traditional and local knowledge and practices. As a means of providing initial training for miners, informal apprenticeships can be successful in teaching traditional skills to new generations, although the quality of the skills learned can be quite variable. However, ASM operators are not effective in adopting and adapting to new ideas, techniques and technologies, or providing new workers with a solid grounding in the skills they need for their own success and that of the mining sector (Eniowo, Meyer, Kilambo, & Gerber, 2022); (Ledwaba, 2017); (Madi Africa, 2020); (Ambler, 2020); (Forbes Human Resources Council, 2021); (Apt, 2020); (Goliath, 2023).

A closely related skills challenge is that entrepreneurs who operate ASM enterprises are often from the same background and lack the training to effectively run their businesses. Other countries have tackled this issue by offering continuing training or mentoring, including master miners training.¹⁸⁴ Support from the government, mining companies, and civil society organizations such as the Association of Zambian Women In Mining (AZWIM), the Zambia Federation of Small-Scale Miners (ZAFESSM) and the Zambia Artisanal and Small-scale Mining Association (ZASMA) could further enhance the effectiveness of these initiatives and those identified in Figure 20 below.

TEVET institutions, particularly those operating in collaboration with the mining companies and the government, have demonstrated the value of more formal basic training and it is important that these opportunities be extended to a much wider population of ASM operators and workers¹⁸⁵.



► **Figure 21: ASM Training Initiatives**

Source: UNDP

¹⁸⁴ Achieving Sustainable Mining in Zambia: The Role of Technology, Innovation, and Government Regulation – Zambia: News Diggers!

¹⁸⁵ Appraisal of Zambia's Artisanal and Small-Scale Gold Mining Sector - Centre for Trade Policy & Development-CTPD

7c. Key gaps and constraints in skills supply

In terms of the supply of skills in the Zambian mining sector, LSM companies are able to recruit and train workers from TEVET institutions, as well as provide in-house training and skills development programmes. However, small-scale mining entities tend to rely on workers who acquire their skills through informal apprenticeships, resulting in a skill base that is of uneven quality and relevance. This, combined with differences in technology and innovation between large-scale and small-scale mining entities, creates a skills gap and mismatch between the supply and demand of skills, as well as contributing to lowering the productivity and competitiveness of the sector.

Although efforts are being made in developing skills standards, reviewing curricula, and developing training packages, there is a need for a more comprehensive strategic plan that integrates these efforts with trade-related development approaches. While current skills development actions by various stakeholders are outlined in the previous section, Table 23 broadly highlights a few examples.

► **Table 23: Skills Activities**

Skills activities	Description
Developing Skills Standards	The ZCM has been tackling the mining skills crisis by targeting both new and existing employees with ongoing education, coaching, mentoring, and first-hand exposure to different mines and mining techniques. ¹⁸⁶ The Zambia Qualifications Authority (ZAQA) has developed five National Occupations Standards for certifications in mining occupations and is seeking support to develop more certification standards.
Reviewing Curricula	The TEVETA has signed a contract with Bell Equipment Zambia and Mopani Copper Mines for mine operator and mine rescue training. This training is meant to meet national mining sector productivity targets (see footnotes Page 18)
Developing Training Packages	The Mopani Central Training Centre offers long and short-term training courses that are open to the fee-paying general public. Also, Zambia's young engineers from the Copperbelt University and the University of Zambia are set to receive capacity building in mining engineering in Russia ¹⁸⁷ .

Sources: Contained in footnotes

Overall, while there are clearly a number of well-established educational institutions and training facilities, the skills supply for the Zambian mining sector does face several challenges. The main issues raised in consultations were:

1. Low quality and relevance of the formal TEVET programmes to keep pace with a rapidly evolving mining environment.
2. Lack of and/or access to current training equipment, laboratories, technology, connectivity, etc. hinder learning at institutions.
3. Difficulties with securing apprenticeships/workplace learnerships for practical skills transfer and real-world work experience.
4. Experienced workforce with no formal recognition of prior learning qualifications limiting opportunities for promotion or applying for positions at other firms.
5. Highly skilled retirement age workforce but insufficiently experienced workforce pipeline for replacement.
6. Skills migration (brain drain) of qualified workers

¹⁸⁶TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

¹⁸⁷Russia to train Zambian mining engineers ~ (znbcc.co.zm)

offered better prospects and foreign currency earnings at overseas companies and operations.

7. Lack of coordination and collaboration among the various stakeholders e.g. between government bodies such as the MMMD and MTS in providing ASM skills training.
8. Lack of focus on building capacity for increasing local value addition.
9. Insufficient funding and incentives to scale up skills development.
10. Weak linkages between education and training providers and the industry i.e. demand driven curricula must be assessed in consultation with industry.

In addition to the main occupations indicated previously in Section 6a, skills gaps for the following occupations were identified through stakeholder consultations as well as through a scan of articles¹⁸⁸ that refer to specific skills gaps relevant to the Zambian mining sector¹⁸⁹:

Skills Gaps - List of occupations:

1. Geologists; Geological Mapping; Geological Research and Analytica
2. Metallurgists; Mineral Evaluation; Assaying
3. Gemmologists and Lapidaries
4. Mining Engineer; Resource Estimation; Mineral Processing Engineer

5. Chemical Engineer
6. Ventilation Engineer; Rock Mechanic; Driller; Blasting Engineer
7. Surveyors
8. Code Welder; Plastic Welder; Boilermaker
9. Electrical Engineers; Electricians
10. Mechanics; Operating and Maintenance Technicians
11. Managers; Superintendents
12. Health and Safety Officer; Doctors; Nurses; Paramedics (emergency response)
13. Environmental experts; Environmental Officer
14. IT Expertise; Basic Computer and Data Processing; Data Management
15. Contract Negotiation; Legal Drafting Skills
16. Financial Management; Accountants
17. Business Development; Marketing
18. Human Resources

¹⁸⁸<http://mines.org.zm/tackling-the-mining-skills-crisis/>

¹⁸⁹Zambia affected by global mining-skills crunch – Zambia Chamber of Mines



8. Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the mining sector in Zambia

Picture courtesy of ZCCM-IH

8a. Competitive Assets

The Zambian mining industry's performance, especially in copper production over the last decade, is based on a number of advantages that Zambian mining enterprises have enjoyed. These strengths, as summarized below, also present potential for further future development.

- 1. Zambia's rich mineral endowment:** the country possesses some of the world's largest and highest-grade copper deposits contributing over 70 percent of the country's foreign export earnings. It is the second largest copper producer in Africa (after DR Congo) and ranked ninth largest copper producer in the world. In addition, Zambia is home to small, exploitable deposits of cobalt, nickel, and manganese, and produces about 20 percent of the world's emeralds. There are also prospects in uranium, gold, coal mining, and diamond and gas exploration. Zambia's mineral wealth and diversity give it a potential advantage in meeting the growing demand for critical minerals, driven by the increasing investments in green technologies and low-carbon energy. Zambia is in a position to benefit from the global energy transition and demand-driven high copper prices.
- 2. Strong mining skills and expertise:** the country has a long history of mining (since the 1920's) and has developed a strong mining culture, know-how and pool of skilled and experienced workers. The industry is strong in exploration, extraction, processing, smelting and refining. It also has a potential advantage in technology intensive products if it can adopt and adapt to the latest innovations and best practices. Although mining skills and expertise are scarce and costly in the region, Zambia has more capacity and capability than most of its neighbours, with good mining regulatory and institutional frameworks.
- 3. Competitive labour and energy costs:** from an investment and operating perspective, the Zambian mining industry benefits from relatively low labour and energy costs compared to some of its competitors. It has a large and young population, with a median age of 17.6 years, which provides a potential source of labour for the mining sector. Zambia also has abundant hydropower resources, which account for about 85 percent of its electricity generation. Hydropower is a clean and renewable source of energy, which can help reduce the environmental impact and carbon footprint of mining and also offers lower and more stable electricity tariffs than other sources, such as thermal or solar power.
- 4. Mining value chain and industrial development:** Opportunities to unlock the mining value chain to drive and sustain industrial development that would create jobs clearly exist. The potential for mining sector linkages and industrial development is strong as most goods are not manufactured in-country, but rather imported from abroad by Zambian companies. The women and youth dominated space of the ASM sector presents many opportunities for innovation, development and stimulation of the local fabrication and manufacturing industry. It has become an increasingly important source of employment for many who cannot get jobs in the formal sector and is perceived by the government as a potential source of tax revenue.
- 5. Increasing regional integration and trade:** Zambia's geographical and economic closeness to its main regional markets, including SADC and COMESA, facilitates business operations and regional trade as it is a member of both regional blocs, which together comprise 26 countries and a market of over 600 million people. Zambia also benefits from preferential trade agreements with other countries and regions, such as the African Growth and Opportunity Act with the United States, the Economic Partnership Agreement with the European Union, and the African Continental Free Trade Area with the rest of Africa. Zambia is in a strategic geographic location at the heart of Southern Africa, giving it advantages in transportation and logistics with access to eight neighbouring countries and several ports, which can help reduce the cost and time of exporting and importing minerals and mining inputs. The development of the Lobito Corridor will also be a significant advantage in the future.

8b. Challenges

Despite the industry's strengths and its recent strong performance, it continues to face significant challenges. The following main issues were highlighted in literature review sources and/or raised in consultation with various prominent industry actors:

- 1. Mono-dependency on copper mining:** while copper prices were stable for five years, a recent fall in the commodity price has reduced the profitability and viability of mining operations, impacting government revenue and fiscal balance. Although unlikely given the global demand for critical minerals to enable the energy transition, volatility or a decline in copper prices could result in deterring new investments and project expansions as well as increasing the risk of mine closures and job losses.
- 2. Inconsistent Mineral Fiscal Policy:** with over five reforms in the last six years, frequent and unpredictable changes in mineral fiscal policy has negatively affected the stability and certainty of the mining taxation regime. Changes in royalty rates, corporate income tax rates, mineral export duties, and withholding taxes create confusion and uncertainty among mining investors, eroding trust and confidence between the government and the mining sector. Frequent alterations distort long-term mine plans, which discourages future investments.
- 3. Lack of geological information:** the lack of comprehensive and up-to-date geological information hampers exploration and development of new mineral deposits. Zambia has not conducted a nationwide geological survey since the 1950s resulting in outdated, incomplete, and inaccessible data. This limits potential for discovering new mineral resources, reduces Zambia's attractiveness as a mining destination, and affects valuation, taxation, and overall development planning for the mining sector.
- 4. Skills mismatch:** with regards to skills provision, LSM companies are able to recruit and train workers from TEVET institutions, as well as provide in-house training and skills development programmes. However, small-scale mining entities still rely on workers who acquire their skills through informal apprenticeships, resulting in a skill base that is of uneven quality and relevance. This, combined with differences in technology and innovation between large-scale and small-scale mining entities, creates a skills gap and mismatch between the supply and demand of skills.
- 5. Underdeveloped ASM Sector:** constituting a sizable part of the informal workforce and production, miners face challenges including lack of access to finance, technology, markets, and formalization services. The sector also experiences poor working conditions, low productivity, environmental degradation, and social conflicts. Despite its potential contribution to socio-economic development, the sector lacks adequate support, recognition, and integration into the formal mining value chain, hindering its empowerment and regulation.
- 6. Fragmented institutional capacity:** while there are numerous government ministries, agencies and bodies as well as established private sector and educational institutions that play important roles in the mining sector, a lack of coherence and coordination has resulted in siloed approaches to skills development. This in turn duplicates effort, dilutes capacity and reduces the funding pool for addressing key sector skills and workforce challenges.

SWOT Summary

Figure 23 provides a summary of the SWOT analysis of the Zambian mining sector that have an impact on skills anticipation.

Strengths • Strong mining culture with long standing experience, skills and expertise, both technical and economic • Competitive labour and energy costs, especially hydropower • Increasing regional integration and trade, especially SADC and COMESA • Developmental Political and Policy environment • Provision of opportunities to rural community • Significant contribution to the fiscus • Job creation potential in LSM and ASM • Contributions to infrastructure development • Existing education and training facilities	Weaknesses • Inconsistent mineral fiscal policy and taxation regime • Lack of geological information and exploration activities • Underdeveloped and informal ASM sector • Lack of transport infrastructure (roads) and electricity • Lack of policy enforcement • Pollution from LSM activities • Lack of clear CSR and ESG policy, compliance and enforcement • Corruption and political interference • Skilled workforce nearing retirement and youth unskilled / lack work experience • Displacement of local communities due to mining activities • Land degradation due to illegal and legal mining activity • Lack of investment in skills development
Opportunities • Growing demand for minerals and metals for the energy transition and green technologies • Technological innovation and digitalization for improving productivity and sustainability • New markets and segments, especially in Asia and Africa • Diversification and industrialization of the mining sector and value chain • Potential to increase jobs through production increases in copper • Developing the mid-tier or medium-scale mining sector • Ancillary services to exploration and prospecting firms • Value addition and services	Threats • Declining mineral reserves and resource depletion • Increased competition and substitution from other mineral producers • Environmental and social regulations and standards • Political and economic instability and insecurity • Lack of control on mineral prices • Climate change – increased CO2 emissions • Environmental activists added contestation to reduce carbon emissions • Competition from neighbouring countries • Job losses due to technology • Outflow of skilled workers, skills drain • Trade wars • Violent conflicts • Reliance on skilled labour from other countries

► **Figure 22: SWOT Analysis Sources: Inputs from stakeholders and sources in footnotes^{190 191 192}**

¹⁹⁰Building trust, securing the future - A review of the Zambian mining sector (pwc.com)

¹⁹¹Zambia mining investment and governance review (worldbank.org)

¹⁹²Zambia Mining Market, Size, Share, Outlook and Growth Opportunities 2020-2026 (researchandmarkets.com)



9. Summary and policy implications

Picture courtesy of ZCCM-IH

The desktop study conducted on the current state of play of the Zambian mining sector, although limited by the availability of information and data, nonetheless illuminated several areas on which to focus recommendations for improving local skills development. While these will be elaborated on in the Sector Skills Strategy document that follows this report, a key overarching recommendation that cannot be emphasised strongly enough is that there should be significant focus on investing in improving and aligning both public and private sector data collection.

From a national government perspective, although the Zambian government has done much to transform its mining policy and strategy, this is lagging through a lack of coordination to be translated into implementable action. A major stumbling block to enacting good policies and strategies is the lack of standardised and consistent data collection and availability. Establishing gender-disaggregated data collection and monitoring systems to track the progress of employees in the mining sector will be enormously transformative to better understanding barriers and informing targeted interventions and strategies for relevant skills development in a rapidly evolving work environment. National government and the private sector should focus on improving methods to collect, track and monitor disaggregated data per sector (including by gender) to support the national policy and strategy for the mining sector as well as measure impact and industry related Sustainable Development Goals. Data gathering, processing and analytics are themselves important occupations for future portable skills and increasing employment. Furthermore, technology driven careers are attractive to younger generations, and the mining sector should promote its evolution into these fields more aggressively to bolster its talent pipeline.

From a private sector perspective, the absence of reliable national data and information has resulted in mining companies adopting internal means and methods of addressing employment and skills impacts in a variety of desperate ways. While much

disaggregated data is collected by mines, this is not standardised or captured or aligned or reported effectively to measure impact on useful indicators, for example such as local transformation and gender equality. Hampered by lack of empirical data to support focused policy and praxis interventions, where policies exist, they are poorly implemented, monitored and reviewed. For example, Gender Pay gap policy implementation is critical in levelling the playing field and creating a fair and equitable workplace. This is an internal process that could be actioned relatively quickly by regulating the reporting of salary and pay grades for all employment and occupations. Furthermore, a mine company's internal ESG labour force related elements need to be addressed first in terms of current recruitment, and retention strategies before focussing on external communities. Workplace adaptation is also required to meet gender-specific needs in the workplace as well as balance work/life responsibilities of care.

The mining sector's substantial contribution to GDP and export earnings, coupled with consistent production growth, underscores its importance in Zambia's economic development and overall stability. Considering industry projections and future demand for mining skills is essential for national strategic planning. Anticipating changes in technology, regulations, and market conditions is vital for ensuring a workforce that aligns with the evolving needs of the mining sector. To achieve increased local employment as well as more equitable gender inclusivity, the mining sector should focus on the large youthful population, increasing geographic exploration and prospecting activities, growing the mid-tier or 'junior' mining sector and substantially supporting the growth and formalisation of the ASM sector. In conclusion, this report emphasizes the significance of addressing the mining skills deficit in Zambia. By leveraging labour force statistics and strategic planning, the industry can cultivate a skilled workforce that propels sustainable growth and innovation in alignment with Zambia's Eighth National Development Plan.

References

[Artisanal and Small-scale Mining in Zambia: Opportunities and Challenges]

TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

An Overview Of The Mining Sector In Zambia And, In Particular, The Progress Made In The Sector

Blog: 2022 Budget Analysis – Mining Sector. – PMRC'

Zambia : Harnessing Zambia's Mining Sector and Agriculture for Economic Growth : [Artisanal and Small-scale Mining in Zambia: Opportunities and Challenges] : [Zambia Mining Vision]

Zambia Mining Investment and Governance Review:

Banda, W. (2019). Zambia's Domestication of the Africa Mining Vision: A Gap Analysis. Lusaka, Zambia : Centre for Trade Policy and Development (CTPD). OXFAM. (2021). Copper for Development Report .

Lusaka, Zambia: OXFAM international Zambia. Siwale, A., & Siwale, A. (2017). Has the Promise of Formalising Artisanal and Small scale Mining (ASM) failed? The Case of Zambia. The Extractives Industry and Society, 4(1), 191-201..

Banda, W. 2021. The current challenges of the Zambian Mining Sector: What is the way forward? - Zambia: News Diggers!. Diggers. News. 29 March 2021. <https://diggers.news/guest-diggers/2021/03/29>

Bank of Zambia. (2022). Direction of Trade Report First Quarter 2022. Retrieved from Bank of Zambia

Blog: 2022 Budget Analysis – Mining Sector. – PMRC (pmrczambia.com)

embapro.com

ICLG. (2023). Mining Laws and Regulations Report 2024 Zambia. ICLG. Retrieved from the ICLG website1.

ICLG. (2023). Mining Laws and Regulations Report 2024 Zambia. ICLG. Retrieved from the ICLG websiteHYPERLINK "<https://iclg.com/practice-areas/mining-laws-and-regulations/zambia>"1.

IMF. (2023). Country Report No. 23/257. International Monetary Fund.

International Labour Organization. (2014). ILO

supports a partnership approach in the Zambian mining sector to create jobs and stimulate inclusive growth.

International Monetary Fund. (2023). Zambia: Selected issues and statistical appendix. IMF Country Report No. 23/257.

International Trade Administration. (n.d.). Zambia - Import Tariffs. International Trade Administration. Retrieved from the International Trade Administration websiteHYPERLINK "<https://www.trade.gov/country-commercial-guides/zambia-import-tariffs>"

International Trade Administration. (n.d.). Zambia - Import Tariffs. International Trade Administration. Retrieved from the International Trade Administration websiteHYPERLINK "<https://www.trade.gov/country-commercial-guides/zambia-import-tariffs>"4.

International Trade Centre. (n.d.). Trade Map. 3(Accessed on December 30, 2023)

Interventions in mining and other key sectors to prop Zambia's GDP - Zambian Mining News (miningnewszambia.com)

Knoema. (n.d.). Zambia GDP, 1980-2021. 5 (Accessed on December 30, 2023)

MacroTrends. (n.d.). Zambia GDP 1960-2023. 4 (Accessed on December 30, 2023)

PARLIAMENTARY-SUBMISSION-ECONOMIC-DIVERSIFICATION-4.pdf(ctpd.org.zm)

PMRC-OPED-Agriculture-Mining-Manufacturing-and-Tourism-Four-Key-Economic-Sectors-to-Drive-Zambia's-Economic-Stabilisation-Agenda.pdf (pmrczambia.com)

pubdocs.worldbank.org

PwC Zambia. (2023). Mining report 2023. 1

PwC. (2023). Zambia 2023 Mining Report. PricewaterhouseCoopers.

Reviving Zambia's Mining Industry: Challenges and Opportunities

Strategies to future-proof Zambia's mining industry - The Mail & Guardian (mg.co.za)

TACKLING THE MINING SKILLS CRISIS – Zambia Chamber of Mines

The current challenges of the Zambian Mining Sector: What is the way forward?

The World Bank. (2015). Fifth Zambia Economic Brief: Making Mining Work for Zambia.

The World Bank. (2022). Exports of goods and services (percent of GDP) - Zambia. Retrieved from The World Bank

Trading Economics. (2022). Zambia Exports By Category. Retrieved from Trading Economics

Trading Economics. (n.d.). Zambia Mining Production | 2002-2018 Data. Retrieved from the Trading Economics website.

World Customs Organization. (2017). HS Nomenclature 2017 Edition. World Customs Organization. Retrieved from the World Customs Organization website.

World's Top Exports. (2022). Zambia's Top Exports. Retrieved from World's Top Exports

Zambia - Mining and Minerals

Zambia Chamber of Mines. (2018). TACKLING THE MINING SKILLS CRISIS.

Zambia Mining and Environmental Remediation and Improvement Project(worldbank.org)

Zambia Mining Investment and Governance Review

Zambia Revenue Authority. (n.d.). Classification of Goods in Zambia. Zambia Revenue Authority. Retrieved from the Zambia Revenue Authority website.

Zambia Revenue Authority. (n.d.). Classification of Goods in Zambia. Zambia Revenue Authority. Retrieved from the Zambia Revenue Authority website.

Zambia Revenue Authority. (n.d.). UPDATED CUSTOMS TARIFF BOOK AS OF 04- 01- 2019_1. Zambia Revenue Authority. Retrieved from the Zambia Revenue Authority website ["https://www.zra.org.zm/tax-information/tax-information-details/updated-customs-tariff-book-as-of-04-01-2019_1/"](https://www.zra.org.zm/tax-information/tax-information-details/updated-customs-tariff-book-as-of-04-01-2019_1/)3.

Zambia Revenue Authority. (n.d.). UPDATED CUSTOMS TARIFF BOOK AS OF 04- 01- 2019_1. Zambia Revenue Authority. Retrieved from the Zambia Revenue Authority website [HYPERLINK "https://www.zra.org.zm/tax-information/tax-information-details/updated-customs-tariff-book-as-of-04-01-2019_1/"](https://www.zra.org.zm/tax-information/tax-information-details/updated-customs-tariff-book-as-of-04-01-2019_1/)3.

Zambia Statistics Agency. (2023). 2022 annual Labour Force Survey. 4

Zambian Chamber of Mines. (2018.). Mining in Zambia.

Eniowo, O.D., Meyer, L.D., Kilambo, S.R., & Gerber, L.J. (2022). Implications of credit constraint on the formalization of artisanal and small-scale mining (ASM) in sub-Saharan Africa. Journal of the Southern African Institute of Mining and Metallurgy, 122(3). Retrieved from Implications of credit constraint on the formalization of artisanal and small-scale mining (ASM) in sub-Saharan Africa ([scielo.org.za](https://doi.org/10.1016/j.safim.2022.105003))

Ledwaba, P.F. (2017). The status of artisanal and small-scale mining sector in South Africa: tracking progress. Journal of the Southern African Institute of Mining and Metallurgy, 117(1). Retrieved from The status of artisanal and small-scale mining sector in South Africa: tracking progress ([scielo.org.za](https://doi.org/10.1016/j.safim.2017.01.001))

Madi Africa. (n.d.). Artisanal and Small Scale Mining (ASM) and Conflict Minerals. Retrieved from Artisanal and Small Scale Mining (ASM) and Conflict Minerals - MADI

Ambler, S.W. (n.d.). The Agile Scaling Model (ASM): Adapting Agile Methods for Complex Environments. Agile Alliance. Retrieved from Agile-Scaling-Model-RAW14204USEN.pdf ([agilealliance.org](https://www.agilealliance.org/glossary/agile-scaling-model-raw14204usen/))

Forbes Human Resources Council. (2021). 13 Practical Ways To Help Employees Adapt To New Technology. Forbes. Retrieved from 13 Practical Ways To Help Employees Adapt To New Technology ([forbes.com](https://www.forbes.com/sites/hr/2021/05/13/practical-ways-to-help-employees-adapt-to-new-technology/))

Apty. (2020). Technology Adoption Explained. Retrieved from Technology Adoption Explained | Apty

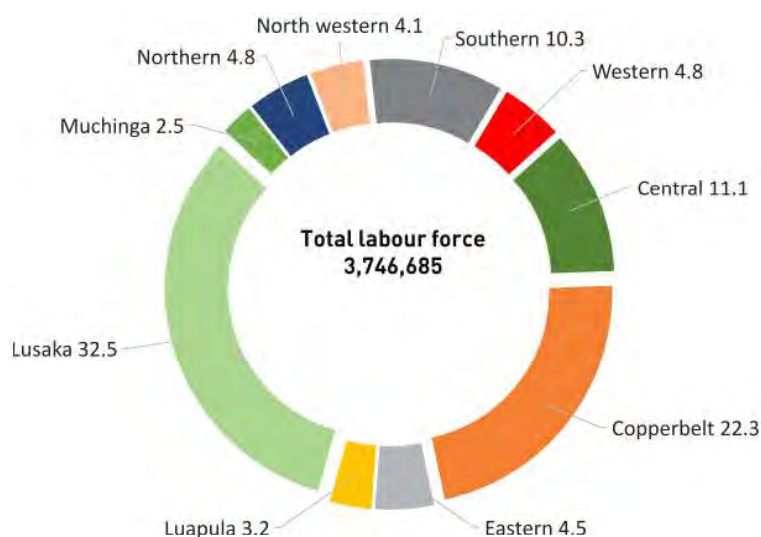
Goliath, M.L.M (2023). Urban pacification strategies and solutions towards a contested space theory of artisanal mining. Unpublished thesis. UFS, Bloemfontein. South Africa



11. Appendix

Appendix a - Additional Statistical, Quantitative and Qualitative data

The highest concentration of labour is situated in Lusaka and the Copperbelt provinces.



► **Figure 23: Regional Distribution of the Labour Force in 2022**

Source: Zambia Statistics Agency. (2023). 2022 annual Labour Force Survey

► **Table 24: Number and percentage Distribution of Employed Persons 15 Years and Older, By Rural/ Urban, Age Group and Sex Zambia 2022**

Age Group	Total			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	Number	percent	percent	Number	percent	percent	Number	percent	percent
Total	3,273,123	59.7	40.3	1,134,524	62.0	38.4	2,138,599	58.5	41.5
15-19	97,226	64.9	35.1	61,764	67.2	32.8	35,462	61.0	39.0
20-24	329,168	61.8	38.2	145,331	66.5	33.5	183,837	58.2	41.8
25-29	584,241	63.8	36.2	204,654	67.7	32.3	379,587	61.7	38.3
30-34	532,135	59.3	40.7	151,931	60.9	39.1	380,204	58.6	41.4
35-39	494,163	56.2	43.8	143,430	56.9	43.1	350,733	55.9	44.1
40-44	431,788	55.8	44.2	141,075	53.4	46.6	290,713	56.9	43.1
45-49	311,862	60.2	39.8	96,060	59.7	40.3	215,802	60.4	39.6
50-54	207,483	58.7	41.3	71,607	57.5	42.5	135,876	59.4	40.6
55-59	132,960	63.3	36.7	58,904	65.2	34.8	74,056	61.7	38.3
60-64	73,736	56.9	43.1	27,113	69.7	30.3	46,623	49.5	50.5
65+	78,361	59.0	41.0	32,655	64.3	35.7	45,706	55.2	44.8

Source: Zambia Statistics Agency (2023). 2022 annual Labour Force Survey

► **Table 25: Number and percentage Distribution of Employed Population (15 years or older) by Industry and Sex, Zambia 2022**

Industry	Both Sexes	Total		Rural			Urban		
		Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Number		percent	percent	Number	percent	percent	Number	percent	percent
Accommodation and food service activities	96,342	37.5	62.5	18,385	31.1	68.9	77,957	39.0	61.0
Information and communication	16,641	65.0	35.0	1,919	80.8	19.2	14,722	62.9	37.1
Financial and Insurance Activities	41,021	53.3	46.7	2,907	26.3	73.7	38,114	55.4	44.6
Real estate Activities	18,469	49.2	50.8	1,485	100.0	0.0	16,984	4.8	55.2
Professional. Scientific and technical activities	26,906	70.7	29.3	2,389	36.1	63.9	24,517	74.0	26.0
Administrative and support services	144,325	67.6	32.4	19,814	70.7	29.3	124,511	67.1	32.9
Public Administration and Defence, Compulsory social security	73,620	59.1	40.9	15,894	44.1	55.9	57,726	63.2	36.8
Education	159,953	46.5	53.5	57,635	61.5	38.5	102,318	38.0	60.0
Human Health and Social Work	66,744	53.3	46.7	14,107	58.8	41.2	52,637	51.8	48.2
Arts, Entertainment and Recreation	18,485	73.6	26.4	2,576	91.7	8.3	15,909	70.7	29.3
Other service activities	127,880	45.0	55.0	16,808	54.7	45.3	111,072	43.6	56.4
Activities of household as Employers	105,819	23.9	76.1	9,510	36.7	63.3	96,309	22.6	77.4
Activities of extraterritorial organization and bodies	1,822	76.9	23.1	44.2	100.0	0.0	1,380	69.5	30.5

Source: Zambia Statistics Agency (2023). 2022 annual Labour Force Survey



► **Figure 24: percentage distribution of youth employment by industry Zambia 2022**

Source: Zambia Statistics Agency (2023). 2022 annual Labour Force Survey

► **Table 26: Occupational Distribution of Employed Persons by Educational Attainment - (Skills Mismatch), Zambia 2022**

Occupation	Nursery or No education	Grade 1-7	Grade 08-12	Certificate/ Diploma	Bachelors' degree	Masters' degree or higher	Total
Total	130,889	940,374	1,828,202	257,365	102,238	14,056	3,273,123
Other occupation	1,133	11,159	29,037	4,116	2,320	362	48,127
Managers	8,055	54,353	186,812	29,502	22,963	5,143	306,827
Professionals	1,842	6,184	76,364	115,036	47,968	5,197	252,622
Technician and associated professionals	5,455	20,258	95,997	25,555	12,640	2,626	162,532
Clerical support workers	522	2,293	33,696	10,806	4,776	-	52,093
Service and sales workers	39,971	296,076	583,420	34,416	3,985	309	958,177
Skilled agriculture and forestry workers	31,454	209,321	185,459	4,512	1,318	419	432,484
Craft and related trade workers	8,009	92,215	212,721	17,729	4,555	-	335,229
Plant and machine operators and assemblers	4,627	19,799	164,538	10,473	1,713	-	201,150
Elementary occupations	29,820	228,715	260,127	5,220	-	-	523,883
						Number	percent
						Under skilled	1,404,997 42.90%
						Over skilled	266,075 8.10%
						Matched Skills	1,602,051 49.0%

Source: Zambia Statistics Agency (2023). 2022 annual Labour Force Survey

IGF “Women and the Mine of the Future” Zambia Gender Research Report – summary list of qualitative skills required related gender issues raised by respondents in the mining sector to the online survey.

percent	Skills Type	ISCO 8	Description of skills development required
10 percent	Conflict resolution	1219	Developing strong conflict resolution skills can help women address workplace disputes and maintain harmonious relationships within mining teams.
2 percent	Cultural Sensitivity	2639	Understanding and navigating the cultural dynamics within mining communities is essential for building positive relationships and community engagement.
5 percent	Digital and Technological Skills	2511	Mining is becoming more reliant on technology, so proficiency in using mining-related software and digital tools
3 percent	Entrepreneurship Skills	1219	Women interested in starting their own mining-related businesses may require entrepreneurial skills, including business planning, marketing, and financial management.
5 percent	Financial Literacy	2411	Women looking to start their mining-related businesses or manage budgets for mining projects indicated that they require an understanding of financial management and budgeting
13 percent	Health and Safety Training	1219	Women indicated that continuous training in health and safety practices, including risk assessment and emergency response is required.
4 percent	Leadership and Management Development	1219	To advance in their careers, women indicate they may benefit from leadership and management training programs that help them take on more senior roles.
50 percent	Mechanical and Technical Skills	2141,2149	In roles that require maintenance and repair of mining equipment, women indicated they need mechanical and technical skills to perform tasks efficiently.

Source: IGF “Women and the Mine of the Future” Gender Research Report – Mining Dialogues 360

11. Appendix b – Full list of Stakeholders

The development of the Energy Background Study required the effort of several stakeholders.

In particular, the ILO acknowledges the following:

The Copperbelt University; Copperbelt Energy Corporation; European Union Delegation; First Quantum Trident (Kansanshi Mine); Gemstone Processing and Lapidary Training Centre; GIZ; Grizzly Mining Limited; the ILO and ILO Zambia Country Office; Kafue Gorge Regional Training Centre; Kagem Mining; Kalumbila Mine; Kitwe Trades School; Kitwe Vocational Training Centre; Konkola Copper Mines; Lubambe Copper Mine; Mine Workers Union of Zambia; Ministry of Commerce; Ministry of Labour and Social Security; Ministry of Mines and Mineral Development; Ministry of Technology and Science; Mopani Copper Mines; Mopani Central Training Centre; NNKW; Northern

Technical College; Pridegems Mines Ltd; Solwezi Trade Training Institute; Southern Africa Institute of Mining Metallurgy (Zambia Branch), Small-Scale Mining Association of Zambia; Technical Education, Vocational and Entrepreneurship Training Authority; United Nations Development Programme; United Nations Industrial Development Organisation; University of Zambia; WEEMIA; Women in Emerald Extractive Mining Industry Association, ZACCI; Zambia Association of Manufacturers; Zambia Congress of Trade Unions; Zambia Development Agency; Zambia Federation of Employers; Zambia Federation of Small-Scale Mining; Zambia Qualification Authority; Zambia Revenue Authority; Zambia Women in Mining; Zambia Chamber of Mines; Zambia Federation of Employers; and the Zambia Statistics Agency.



Skills Development
for Increased Employability
Programme in Zambia

Mining Sector Review Report

ilo.org

International Labour Organization