MINISTRY OF SCIENCE AND HIGHER EDUCATION

NATIONAL MINING SECTOR RESEARCH AND DEVELOPMENT PRIORITY THEMATIC AREAS

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NATIONAL RESEARCH THEMATIC AREAS FOR MINING

1. Background

Ethiopia is embarked on developmental path that is anchored on home grown economic reform underpinning knowledgeable and sustainable development of its rich natural resources through enhanced participation of public and private partnerships. Owing to Ethiopia's reach, but unutilized mineral resources, mining sector is identified as one of the potential pillars for socioeconomic development under the reform program. According to the 10 years development plan, the mining sector is expected to propel the home grown economic growth through foreign currency earning, import substitution, provision of raw materials as an input to the manufacturing industries there by supporting the economic structural transformation from agriculture-led to industrialization. The sector is also identified as one of the potential means of job creation and improving the socio-economic wellbeing of the nation. Despite the abundance of indications of the minerals resources (both minerals and hydrocarbon resources) in the country, the true potential, investment –worth economic ore deposits is yet to be studied and full scale natural resources utilization through linkages with value addition industries and various economic sector has never been fully achieved. Any utilization of the resource is so far based on export of a few varieties of raw materials to the world market without any significant value addition. Hence the country is net minerals and hydrocarbon importer.

In order to fully utilize the mineral resources of the country, knowledge based and sustainable resources exploration, evaluation, extraction, regulation and management is crucial. Therefore, to attain the desired goal, nationally thematized research direction is found imperative to achieve the following:

- Prioritised resource allocation to the research topics and agenda in the mining sector
- Enhanced collaboration (in knowledge generation, technology adoption and innovation) between the public and private sectors and academia in order to have an enhanced and sustainable socio-economic development contribution of the sector

- Introduction of enhanced Technologies and development of Human resources capacity at all levels (regulatory, technical and operational levels) to effective and sustainable development and utilization of the sector
- Quality Earth resources (metallic, non-metallic, industrial, gemstone minerals and oil and gas) exploration data generation through integrated geological, geochemical geophysical and modern exploration techniques, storage and dissemination of the data in order to make the sector development sustainable, environmentally and socially responsible, attractive to the investment and competitive with respect to competing regional and continental courtiers
- To ensure the "Transparent, equitable and optimal exploitation of mineral resources to underpin broad-based sustainable growth and socio-economic development" - (Africa mining vision) and ultimately:-
- To ensure that the mining sector contributes its fair share towards the national vision of becoming middle income country by 2030.

2. Major Research thematic areas of Mining

The following major research thematic areas are identified to support the national Transparent, equitable and optimal exploitation of mineral resources to ensure broad-based sustainable economic growth and socio-economic development.

1. Applied and Innovative Geoscience Research

2. Earth Resources Exploration and evaluation

3. Earth resources extraction and processing

4. Artisanal and Small-Scale Mining

5. Sustainable Mining and impact management

6. Mining governance

The Thematic areas are aligned with the nationally identified mining sector policy, strategy and priorities as stipulated in policy and strategy documents.

2.1. Applied and innovative geosciences research

Applied and innovative geoscience research is interdisciplinary research integrating all aspects of earth sciences and other relevant fields of studies. The research focuses on the understanding of geological and tectonic settings of the earth and its relevance and application to the discovery of mineral deposits. The theme also studies earth's internal and external processes through the analysis of physical and chemical properties of the earth's surface and its interior and postulates new models that may lead to the understanding and modelling of the dynamics of the earths' crust. This thematic area is expected to provide improved and innovative ideas for natural resource explorations. The theme can be further sub-divided into the following sub-themes: -

• Geophysics and geodynamics processes

• Earth system geochemistry and climate

2.2. Earth resource exploration and evaluation

Research on earth resource exploration incorporates a range of activities to determine and understand the type, amount and economic significance of earth resources on the surface and subsurface of the earth's crust. It involves geological, geochemical and geophysical techniques to survey the earth's crust for various resources. The Earth resource exploration research is expected to lead towards the discoveries of valuable earth resources that can be extracted and used as industrial input to accelerate the industrialization and manufacturing development in the country, exported for earning foreign exchange. The theme is further sub-divided into the following sub-themes: -

- Exploration for Precious, base metal and associated minerals
- Industrial minerals exploration
- Exploration for Construction and dimension stones
- Exploration for Gemstones and semi-precious stones
- Coal, petroleum and natural gas Exploration
- Exploration for Geothermal and other energy resources

2.3. Earth resources extraction and processing

Earth resources extraction research deals with research in rock mechanics, mine design-simulation, mine machinery, safety and ventilation systems, and environmentally degrading activities associated with extraction practice. The research in this thematic area mainly focuses on the improvement of mining performances to achieve better outcomes. The research also includes the effectiveness of the mining methods which depends on the type of mineral resource that is mined, its location at or beneath the surface, and whether the resource is worth enough to justify extracting it. Earth resources processing research focuses on a process used to produce granular material which meets a specific set of requirements in terms of material composition and physical characteristics. It also includes cutting-edge research on the development of new techniques in processing and renovation of the existing techniques in order to add value and quality of the mineral, develop cost effective and environmentally friendly extraction methods and etc. The earth resources extraction and processing theme is further sub-divided into the following sub-themes: -

- Gemstone extraction and processing
- Hydrocarbon processing and beneficiation
- Adaptation of extraction and optimization of mineral processing technology
- Mining Engineering (Mine design and simulation)
- Metallic minerals separations and quality upgrading
- Mineral process monitoring and ore beneficiation
- Material characterization and handling

2.4. Artisanal and Small-Scale Mining

Artisanal and Small-Scale Mining (ASM), is playing pivotal role in the extraction of placer gold, tantalum, gemstones and other various industrial and construction minerals. To date, it is one of the major extraction method that contributes to foreign currency earning and job creation and significant contributor to the national economy. However, the ASM activities are largely operated informally with limited available information on production, revenues generation, operations technologies. Therefore, to alleviate the negative impacts often

associated with ASM and enhance its impact in socially responsible, environmentally friendly and economically viable socio-economic development, research that advance the understanding and analysis of ASM is vital for sustainable development of the sector. The theme is further sub-divided into the following sub-themes: -

- Technology transfer and capacity building
- Supply chain and market linkages
- Environmental and occupational health hazards
- Mineral value-addition and livelihoods diversification
- Socio-economic impacts and rural transformation
- Recoveries and disposal of tailings

2.5. Mining impact and sustainability management

Mining, be it small scale (ASM) or large scale and mechanised, is known for its impact in the environment and, if not managed knowledgably, is known for driving conflict. Moreover, its known that extractive industries are not sustainable and hence, the cycle and eventual closure of the mining negatively affects the society both economically and environmentally. Therefore, research on the management and sustainability of the environment and societal wellbeing vital for proper usage of mineral resources, rehabilitation and ensure the sustainable benefit of the society. The theme is further sub-divided into the following sub-themes: -

- Environmental, social and economic impact assessment and mitigation
- Mining life cycle assessment and management
- Mining pollution, waste and hazard management
- Mining safety and health issues

2.6. Mining governance

Governance is a framework of laws (proclamation, regulations and directives), voluntary initiatives, standards, norms, practices and institutions that are applied by the stakeholders concerned by this industry and any of its specific projects. It requires effective, verifiable implementation and the commitment to this framework of all stakeholders with an interest in a specific project or activity. This theme is reorganized into the following sub-themes: -

- Mineral value-chain management
- Mining management systems and organization
- Policy and strategy assessment of the mining sector
- Efficiency and transparency of mining sector
- Mineral quality and standardization
- Mining data managements

3. References

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