

	Global Journal of Arts Humanity and Social Sciences			
	ISSN: 2583-2034			
	Abbreviated key title: Glob.J.Arts.Humanit.Soc.Sci			
	Frequency: Monthly			
	Published By GSAR Publishers			
Journal Homepage Link: https://gsarpublishers.com/journal-gjahss-home/				
Volume - 6	Issue - 10	October 2026	Total pages 1026-1031	DOI: 10.5281/zenodo.23296647

ASSESSMENT OF REGULATORY CONSTRAINTS ON TECHNOLOGY DISSEMINATION IN TANZANIA'S MINING INDUSTRY: A CRITICAL ANALYSIS

By

Sekamandwa Happyness John

2nd Year LLM Student, St Augustine University of Tanzania



Article History

Received: 01- 10- 2026

Accepted: 08- 10- 2026

Published: 10- 10- 2026

Corresponding author

**Sekamandwa
Happyness John**

Abstract

Tanzania's mining industry attracts substantial investment and provides an important platform for technological development. This paper examines the legal and regulatory challenges affecting technology dissemination in Tanzania's mining industry, with particular emphasis on the adequacy, clarity, implementation and enforcement of existing legal obligations. The analysis focuses principally on the Mining Act, the Mining (Local Content) Regulations, and related investment and natural-resource legislation. The paper argues that the principal challenge is therefore not the complete absence of legal provisions, but the adequacy, specificity and enforceability of the mechanisms through which those provisions are translated into measurable technological capabilities. It recommends strengthening statutory standards for technology transfer, establishing measurable performance indicators and reporting requirements, improving institutional coordination and enforcement, and developing stronger linkages among mining companies, local enterprises, universities and technical institutions.

Keywords: *Mining Investment; Technology Dissemination; Technology Transfer; Local Content; Mining Law; Regulatory Framework; Tanzania.*

Introduction

Tanzania has established specific legal mechanisms to link mining activities with local technological development. Section 102 of the Mining Act provides the statutory basis for local-content requirements in the mining sector,ⁱ while the Mining (Local Content) Regulations, establish specific requirements concerning employment and training, research and development, and technology transfer.ⁱⁱ In particular,ⁱⁱⁱ Regulations 25–29 address the national plan on technology transfer, technology-transfer programmes, technology-transfer sub-plans, support for technology transfer and technology-transfer reporting. Regulation 27 requires a technology-transfer sub-plan containing planned initiatives for transferring technology to Tanzanian indigenous companies or citizens.

Despite these provisions, significant implementation challenges remain. The Controller and Auditor General (2026) found that sampled mining companies did not consistently report the implementation of technology transfer to local beneficiaries

between 2021 and 2024. The audit further observed that technology-transfer activities often focused on training Tanzanians to operate existing equipment rather than enabling them to acquire capabilities to produce or develop similar technologies. This distinction is legally and developmentally significant because operational training does not necessarily constitute comprehensive technology dissemination. The regulatory challenge is therefore not merely the existence of technology-transfer provisions, but whether those provisions are sufficiently clear, measurable and enforceable to produce meaningful technological capabilities among Tanzanian citizens and enterprises.

The need of the legal and regulatory framework governing mining investment promotion and technology dissemination in Tanzania.

A comprehensive legal and regulatory framework is essential for ensuring that mining investment in Tanzania contributes not only to mineral extraction and economic growth but also to technology dissemination, skills development and local industrial capacity. Mining is a capital and technology-intensive sector, and foreign



investors often possess advanced technologies, technical expertise and managerial capabilities that can contribute to domestic technological development. Accordingly, the law must establish clear obligations and institutional mechanisms through which such investment can generate wider technological benefits for Tanzanian citizens and enterprises.

In Tanzania, the Mining Act, provides the principal statutory framework for the regulation of mining activities. Importantly, the Act recognises local content principles, including training and employment of Tanzanians and technology transfer, as matters to be regulated within the mining sector. This establishes a legal basis for linking mining operations with development of domestic human and technological capacity. The Mining (Local Content) Regulations 2018,^{iv} as amended, give further effect to this objective by requiring mining contractors, subcontractors, licensees and allied entities to prepare and implement programmes for technology transfer. Regulation 27 requires a Technology Transfer Sub-Plan, while Regulation 29 requires annual reporting on technology-transfer initiatives and their results.

The framework is also necessary to promote investment certainty and investor confidence. The Tanzania Investment Act, 2022, Act No. 10 of 2022,^v establishes an institutional framework for the coordination, protection, attraction, promotion and facilitation of investment in Tanzania. However, from a legal analytical perspective, it is important to note that section 2(1)(a) expressly excludes enterprises authorised to conduct reconnaissance, prospecting or mining operations under the Mining Act from the general application of the Investment Act. Consequently, mining investment promotion and protection must be analysed principally within the specialised mining-law framework rather than assuming that the general investment legislation automatically governs mining operations.

The need for an effective framework is further demonstrated by the relationship between local participation and technology transfer. The Local Content Regulations seek to develop local capacity through education, skills transfer, expertise development, technology and know-how transfer, and research and development. Thus, the legal framework should ensure that local content is not limited to employment or procurement but also produces measurable technological capabilities among Tanzanian employees, companies and institutions.

Nevertheless, the effectiveness of the framework depends upon clear standards, institutional coordination, monitoring and enforcement. A 2025 performance audit by the National Audit Office of Tanzania reported weaknesses concerning the implementation of technology-transfer requirements, including uncertainty regarding the scope and content of technology transfer and the adequacy of implementation reporting. This indicates that the existence of statutory provisions alone may not be sufficient; effective implementation requires measurable obligations, appropriate institutional oversight, reporting mechanisms and enforcement.

Accordingly, the legal and regulatory framework governing mining investment promotion and technology dissemination is necessary to establish a predictable investment environment while ensuring that mining investment generates sustainable technological and human-capital benefits for Tanzania. The principal legal instruments relevant to this analysis include the following:

Analysis of the Legal Framework governing mining investment promotion and technology dissemination in Tanzania.

The Tanzania Commission for Science and Technology Act

The Tanzania Commission for Science and Technology Act, establishes the Tanzania Commission for Science and Technology (COSTECH) as the principal advisory institution of the Government on matters relating to scientific research and technology development. The Act mandates the Commission to monitor and coordinate scientific research and technology-development activities and to acquire, store and disseminate scientific and technological information.^{vi} The Act further provides for Research and Development Advisory Committees, including a Natural Resources Research and Development Advisory Committee, whose functions include advising on research priorities, research funding, coordination of research and extension services, manpower development and national and international cooperation. These functions are potentially significant to the mining sector, particularly in relation to technological research, skills development and innovation.

However, although the COSTECH framework provides a broad institutional basis for science, research and technology development, it does not expressly establish a comprehensive mechanism linking the Natural Resources Research and Development Advisory Committee with the mining-sector technology-transfer obligations imposed on mineral right holders under the Mining Act. This creates an institutional coordination question concerning how technological knowledge introduced through mining investment is connected with national research institutions, training programmes, domestic enterprises and wider technology dissemination.

The Mining Act, separately imposes obligations relating to training and technology transfer. Section 104 requires mineral right holders to establish training programmes, maximise knowledge transfer to Tanzanians,^{vii} develop management and technical capabilities, and provide practical training opportunities to students from local training institutions. It further recognises technology transfer as a shared responsibility between the Government and the mineral right holder.

The legal issue, therefore, is not whether Tanzania has legislation recognising technology development and transfer, but whether the COSTECH framework and mining regulatory framework are sufficiently integrated to convert these legal obligations into measurable technological outcomes. The effectiveness of the framework consequently depends on institutional coordination, implementation, monitoring and the capacity of Tanzanian employees, enterprises and research institutions to absorb and adapt transferred technologies.^{viii}

Mining has undergone significant technological transformation since the nineteenth century, with continuous developments in exploration, extraction, processing and mineral recovery technologies. Research and technological development (RTD) have increasingly become critical determinants of competitiveness in the emerging modern mining industry. Countries seeking to maximise technological spillovers from foreign investment have consequently adopted policies aimed at promoting trade and foreign direct investment (FDI), while simultaneously creating favourable conditions for domestic firms to absorb and utilise technologies introduced through such investment. Technology can subsequently diffuse throughout the domestic economy through various channels, including FDI, labour mobility, supplier linkages, training, joint ventures and interactions between foreign investors and domestic enterprises.

Tanzania has similarly been exposed to considerable opportunities for acquiring mining-related technologies, particularly through FDI and the participation of foreign-owned mining enterprises. Nevertheless, the existence of such opportunities does not necessarily translate into effective or sustainable technology transfer. This chapter therefore critically examines the extent to which Tanzania has utilised these opportunities and whether the existing investment and mining legal frameworks contain adequate mechanisms to ensure that technological knowledge and capabilities introduced through mining investment are transferred, absorbed and retained within the domestic economy.

The Mining Act

The Mining Act, constitutes the principal legislation governing prospecting, mining, processing and dealing in minerals in Mainland Tanzania. It represents the principal sector-specific legal framework through which the State regulates mineral development and the participation of investors in the mining industry.^{ix} From the perspective of technology dissemination, the significance of the Mining Act extends beyond the regulation of mineral rights and exploitation. The Act contains specific provisions concerning training and technology transfer, thereby recognising that the development of the mining sector should contribute to the acquisition of knowledge and technical capabilities by Tanzanians.

The Mining (Local Content) Regulations

The Mining (Local Content) Regulations, as amended, constitute one of the most significant regulatory instruments for promoting technology transfer within Tanzania's mining industry. The Regulations seek, among other objectives, to develop local capacity through education, skills and expertise development, transfer of technology and know-how, and research and development. The Regulations are particularly important because they convert the general concept of local participation into specific obligations concerning employment, training, research, procurement and technology transfer.

Legal and regulatory constraints on technology dissemination in Tanzania's mining industry

The legal and regulatory challenges affecting technology dissemination in Tanzania's mining industry.

Fragmentation of Technology-Related Legal Provisions

Technology dissemination may involve investment regulation, mining regulation, local content, employment, education, training and industrial development. The absence of a single coordinated framework may create difficulties in determining the precise legal responsibilities of different stakeholders.

Limited Specificity of Technology-Transfer Obligations

The existing legal and regulatory framework does not always define technology dissemination and transfer with sufficient specificity to facilitate effective implementation and enforcement. Although the legal framework imposes obligations relating to training, employment, local participation, knowledge transfer and capacity building, these broad requirements do not always establish sufficiently precise and measurable obligations regarding the nature and scope of technology to be transferred. In particular, the framework does not clearly and consistently prescribe what categories or levels of technology should be transferred, the specific categories of Tanzanian employees, local enterprises or institutions that should receive such technology, the level of technical and professional competence expected to be attained, or the specific timeframe within which technology-transfer obligations should be fulfilled. Similarly, the absence of clearly defined indicators for measuring the extent and quality of technology dissemination makes it difficult for regulatory authorities to objectively determine whether a mining company has merely provided training or enabled Tanzanian personnel to operate existing equipment, or has actually facilitated the acquisition of substantive technical knowledge, skills and capabilities that can be independently applied, adapted and further developed.

The lack of clearly prescribed monitoring benchmarks and measurable outcomes may consequently create uncertainty in assessing compliance and weaken the consistency of regulatory supervision. Furthermore, where the legal framework does not expressly establish sufficiently specific consequences for failure to achieve identified technology-transfer obligations, enforcement may become dependent on general compliance requirements rather than measurable technology-transfer outcomes. This situation may limit the effectiveness of the legal framework in converting mining investment into sustainable technological capabilities among Tanzanian employees, local enterprises and institutions. Therefore, the statutory and regulatory provisions addressing training and technology transfer, greater legal specificity is necessary to define the content, beneficiaries, timelines, measurable outcomes, monitoring mechanisms and consequences associated with technology-transfer obligations.

Weak Monitoring and Evaluation Mechanisms

It is relatively easy to measure the number of employees trained or the number of Tanzanian employees employed. It is more difficult to determine whether those employees have acquired sufficient technological knowledge to independently operate, maintain and improve sophisticated mining technologies.

Institutional Coordination

Technology dissemination involves various institutions responsible for mining, investment, local content, labour, education, vocational training and industrial development. Where these institutions operate independently, there may be duplication of responsibilities or gaps in monitoring. Effective technology dissemination therefore requires stronger coordination among the relevant regulatory and educational institutions.

Limited Domestic Technical Capacity

Advanced mining technologies require specialised knowledge in areas such as engineering, automation, information technology, geology, mineral processing, equipment diagnostics and mine planning. Where domestic institutions cannot provide sufficient numbers of highly specialised personnel, mining companies may continue to rely on foreign expertise. This can affect the pace at which advanced technologies are transferred and localised.

Technology Dissemination versus Technology Utilisation

The technology dissemination requires the transfer of the knowledge and skills necessary for Tanzanian employees and local institutions to understand, operate, maintain, adapt and develop such technologies. This distinction is important because a legal framework may successfully attract technologically advanced investors while still failing to achieve the broader objective of developing domestic technological capabilities.

Conclusion

This paper concludes that Tanzania has established a substantial legal and regulatory foundation for promoting technology dissemination in the mining industry, particularly through the Mining Act, and the Mining (Local Content) Regulations. Section 102 of the Mining Act establishes the statutory basis for local content requirements,^x while section 104 specifically requires mineral right holders to develop local capacity through training programmes, maximise knowledge transfer to Tanzanians, establish technical capabilities and facilitate technology transfer in collaboration with the Government. The Mining (Local Content) Regulations further provide specific mechanisms through Regulations 25–29, including technology-transfer planning, technology-transfer programmes, technology-transfer sub-plans, support for technology-transfer arrangements and reporting requirements. Therefore, the principal legal challenge is not necessarily the complete absence of a regulatory framework, but the extent to which existing provisions translate into measurable and sustainable technological capabilities among Tanzanian citizens, enterprises and institutions.^{xi}

The study further concludes that regulatory ambiguity and limited measurability of technology-transfer obligations constitute significant challenges. Although the law requires technology transfer, the framework does not sufficiently define the minimum technological outcomes that mining companies are expected to achieve. In particular, there is a need for clearer indicators concerning the nature of technology to be transferred, the competencies to be developed, the beneficiaries, implementation periods, performance targets and methods of verifying successful

transfer. This creates a risk that compliance may be demonstrated through conventional employee training or equipment operation without necessarily developing the capacity of Tanzanians to independently understand, maintain, adapt, innovate or develop mining technologies.

The findings also demonstrate an implementation and monitoring gap. The National Audit Office of Tanzania reported that sampled mining companies focused more on training local employees to operate and maintain mining equipment than on transferring technology capable of generating new knowledge or technology. The audit also identified weaknesses in the development of local capacities and implementation of section 104 of the Mining Act. These findings are important because they demonstrate that the distinction between *skills transfer* and *technology transfer* requires greater legal and regulatory clarification.

Furthermore, the effectiveness of technology dissemination is constrained by institutional coordination and local absorptive capacity. Technology transfer requires cooperation between the Ministry of Minerals, Mining Commission, mining companies, universities, vocational and technical institutions, research organisations and Tanzanian enterprises. It also requires local beneficiaries to possess adequate financial, technical, managerial and research capabilities to absorb and utilise transferred technologies. Consequently, technology dissemination should not be treated as an isolated obligation of mining companies but as part of a broader national system of skills development, research, innovation and industrial development.

The study therefore concludes that the effectiveness of Tanzania's technology-dissemination framework depends upon moving from formal regulatory compliance towards outcome-based technology transfer. The legal framework should increasingly focus on demonstrable technological capability, measurable local participation, succession of technical positions, research and development, local enterprise upgrading and the sustainable acquisition of technological knowledge. Recent CAG/NAOT reporting reinforces the importance of this transition, particularly given the identified weaknesses in technology-transfer implementation and local capacity development.

Recommendations

Clarification of the Legal Definition and Scope of Technology Transfer

The Government should strengthen the Mining Act and the Mining (Local Content) Regulations by providing a clearer legal definition of technology transfer and technology dissemination. The regulatory framework should distinguish between basic operational training, skills transfer, knowledge transfer, technological adaptation, technological innovation and actual transfer of technical capability.^{xii} This would reduce uncertainty among regulators and mining companies concerning what constitutes substantive compliance.

Introduction of Measurable Technology-Transfer Indicators

The Mining Commission should develop mandatory and measurable indicators for assessing technology-transfer programmes. Such indicators may include the number and level of Tanzanian personnel trained in specialised technologies, transfer of technical documentation and know-how, localisation of specialised technical positions, development of local maintenance and engineering capabilities, joint research projects, technology adaptation, patents or innovations, and the number of Tanzanian enterprises acquiring advanced technical capabilities. Technology-transfer plans should therefore be assessed according to outputs and outcomes rather than merely the existence of a submitted plan or training programme.

Strengthening Monitoring and Verification

The Mining Commission should strengthen monitoring and verification of technology-transfer obligations through periodic inspections and independent assessment of annual local-content reports.^{xiii} Mining companies should be required to provide documentary evidence demonstrating the actual technological capabilities acquired by Tanzanian employees and enterprises. This recommendation is consistent with broader audit findings concerning weaknesses in monitoring and performance assessment within the mining-sector regulatory system.

Development of a National Mining Technology Transfer Strategy

The Government should establish a clearly coordinated National Mining Technology Transfer Strategy or Plan identifying priority technologies, strategic minerals, critical technical skills, beneficiary institutions and expected technological outcomes. Such a strategy should be developed jointly by the Ministry of Minerals, Mining Commission, universities, technical and vocational institutions, research institutions, mining companies and representatives of Tanzanian enterprises.

Linking Technology Transfer with Training, Research and Development

Mining companies should be encouraged, and where appropriate required, to establish structured partnerships with Tanzanian universities, vocational institutions and research organisations. Local-content obligations should therefore be linked with research and development programmes, industrial attachments, apprenticeships, scholarships, innovation projects and joint technical research. This would enable technology transfer to extend beyond the immediate workplace and contribute to long-term national technological capacity.

Strengthening Local Enterprise Absorptive Capacity

The Government should support Tanzanian indigenous companies to acquire the financial, technical and managerial capacity necessary to absorb advanced mining technologies. Technology transfer should therefore be integrated with supplier-development programmes, access to finance, technical certification, joint ventures, licensing arrangements and specialised training. Without adequate absorptive capacity, the existence of technology-transfer

opportunities may not result in meaningful technological upgrading.^{xiv}

Strengthening Succession and Localisation of Technical Positions

Mining companies should be required to develop structured succession plans for specialised technical and managerial positions occupied by expatriate personnel. The plans should identify Tanzanian successors, required competencies, training programmes, mentorship arrangements and target periods for localisation. This would transform technology transfer from short-term operational training into a systematic process of developing Tanzanian technical leadership.

Strengthening Enforcement and Accountability

The Government should strengthen enforcement mechanisms for non-compliance with technology-transfer obligations. Compliance should be assessed against approved technology-transfer plans and measurable indicators, and appropriate regulatory measures should apply where companies fail to implement approved commitments without lawful justification. Enforcement should, however, be accompanied by clear guidance so that mining companies understand precisely what constitutes compliance.

Establishment of a Technology-Transfer Reporting and Evaluation System

A centralised technology-transfer reporting system should be established within the Mining Commission. Mining companies should submit standardised annual reports indicating the technologies introduced, technologies transferred, beneficiaries, training provided, technical competencies achieved, local enterprises involved,^{xv} research activities undertaken and measurable outcomes. The information should be capable of independent verification and comparative assessment across the mining sector.

Periodic Review of the Regulatory Framework

Finally, the Government should periodically review the legal and regulatory framework governing technology dissemination to ensure that it responds to technological developments in the mining industry. Emerging technologies such as automation, artificial intelligence, remote operations, advanced geological modelling, digital mine management, autonomous equipment and modern mineral-processing technologies require a regulatory framework capable of promoting continuous technological upgrading rather than static compliance.^{xvi}

ENDNOTES

ⁱ The Mining Act 2010, Act No. 14 of 2010 (Cap 123 R.E. 2019).

ⁱⁱ National Audit Office of Tanzania (2026), Performance Audit Report on the Management of Local Content Provisions in the Mining Sector. Dar es Salaam: Controller and Auditor General

ⁱⁱⁱ National Audit Office of Tanzania (2026), Performance Audit Report on the Management of Local Content Provisions

in the Mining Sector. Dar es Salaam: Controller and Auditor General

^{iv} The Mining (Local Content) Regulations, 2018, Government Notice No. 3 of 2018, as amended by Government Notices No. 139 of 2019, No. 656 of 2019 and No. 479 of 2022

^v The Tanzania Investment Act, 2022, Act No. 10 of 2022

^{vi} Ibid

^{vii} The Natural Wealth and Resources (Permanent Sovereignty) Act, 2017, Act No. 5 of 2017.

^{viii} The Mining (Local Content) Regulations, 2018,

^{ix} The Mining Act 2010, Act No. 14 of 2010 (Cap 123 R.E. 2019).

^x The Mining Act 2010, Act No. 14 of 2010 (Cap 123 R.E. 2023).

^{xi} Cohen, W.M. et al. (2020) 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly*, 35(1), pp. 128–152.

^{xii} Tanzania Chamber of Minerals and Energy (TCME) (2026) Tanzania Chamber of Minerals and Energy: About Us. Dar es Salaam: TCME.

^{xiii} The Mining (Local Content) Regulations, 2018, Government Notice No. 3 of 2018, as amended by Government Notices No. 139 of 2019, No. 656 of 2019 and No. 479 of 2022

^{xiv} Ibid

^{xv} Cohen, W.M. et al. (2020) 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly*, 35(1), pp. 128–152.

^{xvi} Ibid