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TECHNOLOGY TRANSFER AND COMMERCIALISATION FRAMEWORK

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Participants of the SGC with the Minister of Science and Technology, Felix Mutati, senior government officials, representatives of SGCs, private sector and academia at the Consultative Workshop on the Framework, August 2024, Lusaka, Zambia

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Summary

This work presents a coherent, evidence-based, and inclusive framework to systematically strengthen the ecosystem for effective technology transfer and commercialization. Designed to align with national development goals and stakeholder needs, the **Framework for Technology Transfer and Commercialization** is structured around five core components: agenda setting, initiatives, instruments, governance, and implementation. These are further divided into 14 sub-components that collectively inform the design, execution, and monitoring and evaluation of technology transfer and commercialization strategies.

The framework highlights the central role of technology transfer and commercialization within national innovation systems. The effectiveness of technology transfer depends on alignment with development priorities, active stakeholder engagement, and strong mechanisms for continuous learning and accountability.

This framework has been developed as part of the Science Granting Councils Initiative (SGCI) project on *Supporting African Science Granting Councils (SGCs) to Develop Policy Frameworks and Enabling Structures for Public-Private Partnerships in Research and Innovation*.

1. Setting the Scene

Technology transfer and commercialization is not a single event but a complex process involving a variety of activities, stakeholders, systems, and interactions, each with their distinct roles, responsibilities, and functions. These may include the systems that conceive, develop, own, diffuse, use, and further enhance knowledge and technology, as well as those that inspire and create demand for new innovations. The term "system" here highlights the intricate network of arrangements, institutions, policies, mechanisms, and contextual factors engaged across the entire journey from the initial conception of knowledge or technology to its eventual market launch.

Provisions on technology transfer and commercialization are often embedded in research and innovation policies, education (e.g., university-level courses), trade[1], taxation (e.g., R&D or technology acquisition exemptions), investment, legal, health, and environmental policies, among others. Each of these policies may treat technology transfer and commercialization from their distinct perspectives[2]. Their interests and concerns should be considered in the design of technology transfer and commercialization strategies and policies

2. Objectives of the Framework

This framework is intended to guide national governments and institutions in formulating and implementing technology transfer and commercialization policies that are responsive to their unique socioeconomic contexts and development priorities. It serves as a strategic reference tool to inform evidence-based decision-making, facilitate stakeholder dialogue, and support the planning, execution, and monitoring of context-specific interventions. The framework builds on a model developed for the review and design of national nature strategies[3].

3. Elements of the Framework

The framework comprises five (5) main components: Agenda Setting, Initiatives, Instruments, Governance, and Implementation. They are supported by fourteen (14) sub-components. These sub-components specify key activities and outputs, beginning with establishing a commercialization and technology transfer baseline, assessing the case for transfer, and progressing through implementation and review. Designed as a linear model, outputs from earlier stages feed into subsequent ones, cumulatively shaping policies and strategies for technology transfer and commercialization (see table 1).

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[1] Athreye, S., Piscitello, L., & Shadlen, K.C. (2020). Twenty-five years since TRIPS: Patent Policy and International Business. *Journal of International Business Policy*, 3, 315-328. https://doi.org/10.1057/s42214-020-00079-1

[2] Strengthening Africa's Intellectual Property Capacity To Enhance Innovation And Commercialisation **in** Africa (blog of APET Secretariat accessing here https://www.nepad.org/blog/strengthening-africas-intellectual-property-capacity-enhance-innovation-and-commercialisation)

[3] United Nations Economic Commission for Africa (2023). *Framework for a national nature strategy: facilitating the development of national nature strategies that are aligned with the Convention on Biological Diversity*. https://hdl.handle.net/10855/49997

Table 1. Main Components and Sub-components of the Framework

Main Component	Sub-Component	Purpose / Focus	Key Activities & Questions
I. Agenda Setting	1. Establish a baseline	Assess current state of Tech Transfer	SWOT analysis (internal & external)
	2. Make the public & private sector case	Identify stakeholders' needs, urgency, value	Who benefits? Why now? What value?
	3. Define vision, mission, goals	Set SMART goals aligned with national priorities	What future? What outcomes? Stakeholder engagement
II. Initiatives	4. High-impact initiatives	Identify transformative initiatives	Strategic themes, prioritization, impact analysis
	5. Cross-cutting initiatives	Support core enablers across all themes	Capacity building, data, IP, finance, systems
III. Instruments	6. Policy, regulatory, and administrative systems	Strengthen enabling environment	Policy gap analysis, new instrument proposals
	7. Economic & financial instruments	Mobilize and align funding tools	Assessment of current and new financial mechanisms
IV. Governance	8. Institutional mechanisms	Build supportive structures, values, systems	Operational frameworks, cultural alignment
	9. Engagement platforms	Foster inclusive stakeholder engagement	Who, how, when to engage; EDI principles
	10. Political support	Ensure alignment and sustained backing	Identify key actors, engagement strategies
	11. Resource mobilization	Secure necessary resources	Needs assessment, mobilization plan
V. Implementation	12. Define action plans	Translate strategy into actions	Clear steps linked to initiatives
	13. Monitoring & evaluation	Track progress and effectiveness	Set indicators, frequency, responsible parties
	14. Reporting systems	Ensure accountability and follow-up	Reporting lines, review cycles

Source: AEH 2025

I. AGENDA SETTING

1. Establish the Baseline

Assess the current state of technology transfer and commercialization, identifying challenges, barriers, and missed opportunities. Apply tools such as surveys, focus groups, and expert consultations. Use SWOT analysis to specify strengths, weaknesses, opportunities, and threats. Engage directly with researchers and entrepreneurs to secure accurate insights and minimize biases, particularly those arising from engaging only intermediaries. Focus on and prioritize realistic, market-driven solutions, systematically questioning the market viability of proposed innovations. This thorough groundwork ensures identification of the right problems and critical challenges, and steer efforts toward actionable and effective solutions.

2. Establish the Case for Technology Commercialization

Understand the diverse interests of public and private sector stakeholders, which may vary widely, for example, academia may focus on commercialization without market demand, while private firms may prefer imported technologies. Identify areas of alignment and build stakeholder support to increases the likelihood of successful technology transfer initiatives, even if benefits are initially uneven. This stage identifies differing stakeholder priorities, recognizes whose support and trust are critical to enable subsequent work, and lays the groundwork for effective resource mobilization and collaboration.

3. Set Clear Vision, Mission, and Goals

Building on a clear understanding of the current landscape and stakeholder interests, define a focused vision and mission with measurable, attainable goals. Prioritize initiatives that drive systemic change and are achievable with available resources. Technology transfer should be framed as an integral part of the broader innovation system, with goals aligned to address key challenges such as R&D funding, infrastructure, and political support to strengthen the overall ecosystem.

II. INITIATIVES

Initiatives to promote technology transfer and commercialization can be designed at regional, national, sub-national, or institutional levels. Defining and activating these initiatives requires careful consideration of several questions: Which initiatives are most likely to generate lasting impact? Who are the potential winners and losers, and how can negative effects be mitigated without compromising outcomes? Which initiatives are feasible in the short term, and which are more complexity and hence require more time and resources? What are the associated costs, who bears them, and how are the benefits distributed in both the short and long run? Addressing these questions helps guide the development, selection, and prioritization of initiatives.

4. Develop High Impact Initiatives

Prioritize initiatives that create broad, sustainable, and inclusive impacts for R&D performers, inventors, and innovators across sectors. For example, South Africa's Intellectual Property Rights Act (2008) and Technology Innovation Agency Act (2008) established strong structures

for technology development and commercialization[4][5], while the U.S. Bayh-Dole Act (1980) allowed contractors to retain ownership of federally funded inventions[6]. These examples highlight how R&D funding structures influence policy choices. South Africa's government-driven approach contrasts with the U.S. business-driven model, as seen in programs like SBIR and STTR[7], which support innovation and commercialization in small businesses. Initiatives can be legal, operational, or both, but must align with national goals for impact and sustainability.

5. Feature Cross-Cutting Initiatives

Complement individual initiatives with cross-cutting efforts that strengthen the overall ecosystem. Examples include technology transfer offices, incubators, and innovation hubs, as seen in the U.S. SBIR and STTR programs. Cross-cutting initiatives such as training and skills development, awareness-building, and advocacy should align with the unique needs and conditions of each country. South Africa's NIPMO safeguards IP from public research, while Zambia's National Technology Business Centre (NTBC) focuses on transforming innovations into viable businesses. The initiatives selected must align with national or institutional goals and local realities. The key point is that initiatives can be legal, operational, or a combination of both.

III. INSTRUMENTS

6. Strengthen Policy, Regulatory, and Administrative Systems

Strengthen policies and regulations that support technology transfer and commercialization, addressing critical areas such as trade, finance, and intellectual property protection. Simplify administrative processes to reduce complexity and prevent delays. Develop and implement standardized technology disclosure, ownership, benefit sharing and material transfer agreements can help lower transaction costs and clarify priorities, promoting trust and efficiency among stakeholders[8].

7. Enhance Economic and Financial Instruments

Beyond funding, a broad range of economic instruments, such as tax incentives and dedicated funds, are essential for successful commercialization. While funding is crucial, it must be structured to encourage sustainable innovation rather than stifle it. For example, the story of Zamnet Technologies highlights how taking a loan instead of grant funding enabled the team

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[4] *https://www.dst.gov.za/images/pdfs/IPR%20Act%20of%202008.pdf*

[5] *https://www.tia.org.za/wp-content/uploads/2024/04/Technology_Innovation_Agency_Act_No._26_of_2008_1-April-2021-003.pdf*

[6] Subcommittee on Domestic and International Scientific Planning and Analysis of the Committee on Science and Technology U.S. House of Representatives (1976). *Background Materials on Government Patent Policies: The Ownership of Inventions Resulting From Federally Funded Research and Development*. Washington DC: U.S. Government Printing Office. pp. 29–49.

[7] https://www.sbir.gov/about

[8] WIPO (n.d.) Technology transfer agreements. https://www.wipo.int/web/technology-transfer/agreements#:~:text=Collaboration%20agreements%20or%20collaborative%20research,intellectual%20property%20rights)%20and%20skills.

to innovate and grow faster. Balancing the adequacy and effectiveness of financial incentives is key to ensuring they stimulate long-term innovation and commercialization[9].

IV. GOVERNANCE

8 Enhance Institutional Mechanisms

Build systems to monitor and track technology transfer and commercialization, including understanding the Technology Readiness Levels of firms and R&D institutions. Strengthen mechanisms for monitoring global practices, such as data protection, to avoid hindrances in technology commercialization (e.g., generic drug production affected by data protection rights).

9 Create Platforms for Stakeholder Engagement

Establish platforms to manage expectations, build visibility, and engage stakeholders throughout the technology commercialization process. Platforms can be digital (e.g., social media, collaborative tools) or physical (e.g., innovation hubs, workshops). These platforms facilitate knowledge sharing, monitor regulatory changes, and serve as consultation points for stakeholders.

10 Ensure Political Support and Alignment

Secure political support by identifying key policymakers whose portfolios align with technology transfer goals. Aligning commercialization efforts with government priorities, such as public health and job creation, helps foster broader political buy-in and mobilizes resources. Framing outcomes in terms of public good and socio-economic impact can increase political support.

11 Mobilize Resources

Mobilize financial, human, physical, and intangible resources to enable successful commercialization. This includes recruiting skilled talent, allocating sufficient time and funding, leveraging networks, and collecting relevant data. Programs like SBIR and STTR in the U.S. exemplify how existing resources can be leveraged to facilitate technology transfer by involving SMEs in federal R&D efforts.

V. IMPLEMENTATION

12 Define Action to Meet the Targets

Develop a clear action plan that specifies who is responsible, when tasks will occur, and how they will be supported. Actions must align with objectives (e.g., training patent examiners when patent applications increase). Identify and minimize conflicting actions or institutional

[9] Guerrero, M., Urbano, D. Effectiveness of technology transfer policies and legislation in fostering entrepreneurial innovations across continents: an overview. *Journal of Technology Transfer,* 44, 1347–1366 (2019). https://doi.org/10.1007/s10961-019-09736-x

arrangements, such as those experienced by Zambia's National Technology Business Centre (NTBC), which faces challenges due to existing restrictions. Recognizing and addressing these obstacles early is vital. Engaging and securing commitment from all stakeholders remain crucial for effective implementation and sustained success.

13 Define Monitoring and Evaluation (M&E) Measures

Implement tools to monitor and evaluate progress that incorporate the following key elements:

- **Frequency:** Determine how often to evaluate progress (e.g., bi-monthly for teams, annual for senior management).
- **Accountabilities:** Designate entities responsible for monitoring each action area.
- **KPIs and Data:** Set clear KPIs (e.g., technology licenses issued, R&D contracts, patents filed) and define data collection and reporting methods.
- **Management of M&E:** Establish teams to oversee implementation and adjust strategies or tasks, ensuring proper oversight from senior bodies.

14 Establish Reporting Systems

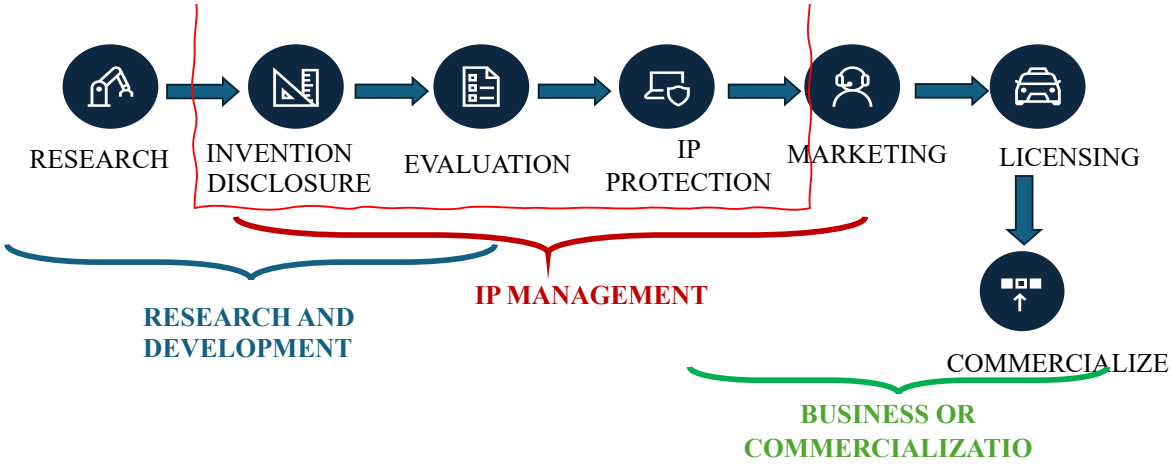
Reporting should clearly show progress, challenges, and outcomes. Key elements include:

- **Target and Purpose:** Define the audience (e.g., advisory bodies, government, public) and tailor the report accordingly.
- **Chain of Reporting:** Clarify reporting hierarchy and the purpose of each report.
- **Frequency:** Decide on the reporting schedule (e.g., monthly, quarterly).
- **Form of Reporting:** Determine if reports will be publicly accessible or internally reviewed before release.

4. Application of the Framework at National Level

As noted earlier, the different SGCs participating in this component vary widely in terms of mandate and their influence at the national level. However, most have the capacity to drive and support changes in technology commercialization practices of their R&D institutions. This section examines the existences of support mechanisms for technology commercialization at both national and institutional levels, focusing specifically on the phase between invention disclosure and intellectual property protection (see figure 1).

Figure 1. Applying the framework to invention disclosure, evaluation and protection



Source: AEH illustration based on several sources

A. Invention disclosure

There are significant gaps in invention disclosure processes (table 2). In three of the six countries, there are no clear guidelines on what constitutes an invention, nor are there standardized procedures for researchers to declare or register their inventions. Likewise, generic disclosure forms are absent in half of the countries surveyed. Despite this, most countries (five out of six) have institutions or agencies in place to assist inventors with the disclosure process.

Table 2. Availability of invention disclosure processes, procedures and support

	Tanzania	Uganda	Zambia	Cote d' Ivoire	Burkina Faso	Mozambique
Clear guidelines on what may constitute an invention to researchers?	**No**	**No**	**Yes***	**No**	**Yes**	**Yes**
Clear processes and procedures for disclosing inventions?	**No**	**Yes**	**Yes***	**No**	**No**	**Yes**
Is there a generic form that inventors can complete?	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**
National office that supports and helps inventors to disclose their inventions?	**Yes**	**No**	**Yes***	**Yes**	**Yes**	**Yes**

Source: AEH survey

Agreed Actions by Responding SGCs

Burkina Faso to clarify the procedure for how, where, and to whom inventions are declared.

Cote d'Ivoire to develop processes, procedures and documentation for invention disclosure, including simple definitions that clarify what constitute inventions. Guidance should specify when and where disclosures are made, and outline who should witness and safeguard the disclosed information.

Mozambique to review existing processes and procedures against the Framework's samples to ensure completeness.

Tanzania to develop guidelines that define invention, and detail clear processes and procedures for declaring inventions. Creating documents and forms that inventors can access for standardized invention disclosure.

Uganda has all the documents but considers adding clear definitions to help inventors avoid plagiarism.

Zambia to develop generic documentation and forms that inventors can use for invention disclosure.

b. Invention evaluation

The survey showed that three countries lack advisory teams to assist in assessing inventions, either at institutional or national levels. Consequently, these countries do not have non-disclosure agreements (NDAs) in place for teams involved in invention evaluation and evaluation teams lack individuals with business startup experience or sufficient technological awareness (see Table 3). This evaluation stage is critical as institutions decide which inventions to support or discard, identify potential partners, and determine the most suitable technology commercialization strategies.

Table 3. Invention evaluations teams and compositions

	Tanzania	Uganda	Zambia	Cote d' Ivoire	Burkina Faso	Mozambique
Who evaluates the invention? Existence of advisory teams that assess inventions?	**Yes**	**No**	**Yes***	**No**	**Yes**	**Yes/No**
Do you have NDAs all members of the evaluation teams must sign?	**Yes**	**No**	**Yes***	**No**	**Yes**	**Yes**
Evaluation teams include startup serial entrepreneurs and tech savvy individuals?	**Yes**	**No**	**No**	**No**	**No**	**No**
Clear guidelines on technology readiness and commercial viability or value?	**Yes**	**Yes**	**No***	**No**	**No**	**Yes**

Source: AEH survey

Agreed Actions by Responding SGCs

Burkina Faso plans to develop generic documentation and forms to guide technology evaluation and to expand its advisory teams with private sector players who bring startup experience or technological expertise, while also taking into account that FONRID functions as a funding agency.

Côte d'Ivoire will focus on designing and developing processes, procedures, documentation, and in-house teams to support technology commercialization.

Mozambique has established the essential processes and procedures. It is enhancing its advisory teams by engaging private sector actors with startup experience or technological knowledge.

Tanzania already has the necessary materials, processes, and institutional teams in place to support and undertake technology valuation. Building on this comprehensive groundwork, the country is taking steps to ensure that all universities establish similar arrangements.

Uganda has already issued guidelines for assessing technology readiness but intends to further design the processes, guidelines, and institutional teams required for comprehensive invention evaluation.

Zambia aims to prepare generic documentation and forms for technology evaluation while strengthening its advisory teams by including greater private sector players with startup experience or technical expertise.

c. Technology protection

It is the responsibility of inventing or supporting institutions to determine the extent and types of IP claims and register them with the relevant national and/or international IP organizations. Findings revealed that half of the surveyed teams lacked adequate or appropriate human and financial resources, as well as mechanisms to guide decisions on IP claims (see Table 4).

Table 4. Support for technology protection

	Tanzania	Uganda	Zambia	Cote d' Ivoire	Burkina Faso	Mozambique
Do you have the right human, financial and administrative resources?	Yes	No	No	Yes	Yes	No
Do you have adequate processes, procedures and guidelines on when IP may be claimed?	Yes	No	Yes*	No	No	Yes
Who meet the costs of IP protection?						
Inventors		✓	✓			
Inventing Institutions	✓		✓			
Public entities	✓			✓	✓	✓

Do you provide guidance and support for commercializing inventions?	Yes	Yes	No	No	No	No

Source: AEH survey

Agreed Actions by Responding SGCs

Burkina Faso will design generic documentation, guidelines, and support measures to assist inventors in protecting and commercializing their inventions.

Côte d'Ivoire will develop guidelines to determine when commercialization-related IP claims may be pursued, along with measures to support inventors in bringing their innovations to market.

Mozambique and Zambia plan to enhance both human and financial resources for invention protection and commercialization. In **Zambia**, the SGC will collaborate with the NTBC on human resource development and with the parent ministry and NTBC to operationalize the innovation fund.

Tanzania has already established the measures necessary for effective protection and commercialization of inventions. Nevertheless, it will continue to support research institutions in strengthening these measures.

Uganda will develop guidelines and documentation to ensure that institutions have the appropriate procedures, as well as the necessary human and administrative support, for effective IP protection and commercialization.

5. CONCLUSION

This framework provides countries and institutions with a strategic approach to improve technology transfer and commercialization systems. By focusing on the entire innovation cycle, the framework helps stakeholders identify gaps, understand current systems, and implement measures tailored to their specific contexts, enabling a more systemic approach to innovation.

Key recommendations include:

1. **Institutionalizing Governance**: Establish specialized committees and teams with expertise in technology development and transfer, ensuring alignment between research themes and national development priorities.
2. **Strengthening R&D Ecosystems**: Ensure a steady flow of inventions through continuous reviews and support from technology transfer offices (TTOs), incubators, accelerators, and responsive funding systems.
3. **Advancing Inclusivity**: Engage diverse actors from academia, industry, government, and civil society, with a focus on equitable participation across gender, age, ethnicity, and professional expertise. This inclusivity will foster a dynamic innovation ecosystem, involving individuals, institutions, and firms at all stages of development.
4. **Standardizing Processes**: Harmonize contracts, disclosure protocols, licensing frameworks, and startup procedures to reduce transaction costs and ensure alignment with national policies and regulations.

5. **Building Networks**: Support sustained networks across the public and private sectors, providing platforms for showcasing inventions, sharing breakthroughs, and attracting investment, particularly for startups.

In summary, the framework aims to improve commercialization outcomes while strategically contributing to Africa's innovation-driven growth. By fostering a robust, inclusive, and standardized system, it supports long-term economic competitiveness and societal transformation.