

AGENCY DEEP DIVE

COSTECH Tanzania

Strengthening Research-Industry Linkages: Spotlight on Tanzania's Innovation Ecosystem Initiatives

The Tanzania Commission for Science and Technology (COSTECH) presents a compelling model for IAA Network members seeking to bridge the persistent gap between research outputs and commercial application. Established in 1986 as a traditional research coordination body, COSTECH has evolved into a comprehensive innovation ecosystem orchestrator, pioneering Tanzania's first tech hub, developing shared digital infrastructure connecting 23 research institutions, operating diverse funding mechanisms from grants to credit guarantees, and catalyzing the growth of 20+ innovation spaces nationwide. This deep dive examines COSTECH's specific mechanisms for strengthening research-industry linkages and the practical lessons other African innovation agencies can adapt.

45
PATENTS FACILITATED

15
IPs COMMERCIALIZED

23
INSTITUTIONS
CONNECTED

20+
INNOVATION SPACES

1. The Institutional Architecture for Research-Industry Linkage

COSTECH's effectiveness in bridging research and industry stems from its unique three-in-one institutional structure established by Act of Parliament No. 7 of 1986. Understanding this architecture helps explain why COSTECH can operate across the full research-to-commercialization spectrum.

Three Integrated Entities

The Commission (**Governing Body**) provides strategic oversight and brings together leadership from scientific institutions, universities, and policymakers. This composition ensures that research priorities align with both scientific opportunity and market demand from the outset.

The Centre for Development and Transfer of Technology (CDTT) **handles technology transfer, adaptation, and assessment**, including evaluating imported technologies. CDTT operates Technology and Innovation Support Centres (TISCs) and coordinates Technology Transfer Offices (TTOs) at universities, creating structured pathways for moving research toward application.

The National Fund for Advancement of Science and Technology (NFAST) **provides financing across the innovation pipeline**, from basic research grants to commercialization support to credit guarantees for market-ready innovations.

LESSON FOR IAA NETWORK MEMBERS: Integrated Mandates Enable End-to-End Support

Many African innovation agencies struggle because their mandate covers only part of the research-to-market journey. COSTECH's integration of coordination (Commission), technology transfer (CDTT), and funding

(NFAST) under one roof enables seamless support from early research through commercialization. Consider whether your agency's structure creates gaps that force innovators to navigate multiple institutions.

The TTO and TISC Network

A critical mechanism for research-industry linkage is COSTECH's network of Technology Transfer Offices and Technology and Innovation Support Centres. Through the HEET project, COSTECH has trained 35 TTO supervisors in innovation management across Tanzanian universities. These offices facilitate early engagement with industry stakeholders, aligning research with market needs through consultations, workshops, and collaborative research programs.

The results are measurable: COSTECH has facilitated 45 patent applications and achieved successful commercialization of 15 intellectual properties. This represents a systematic approach to IP management that many African research systems lack.

2. Funding Instruments: From Grants to Credit Guarantees

COSTECH's funding evolution illustrates how innovation agencies can develop diverse instruments to address different stages of the commercialization journey. The progression from traditional grants to credit guarantees represents a sophisticated understanding that different barriers require different financial tools.

The NFAST Grant Architecture

The National Fund for Advancement of Science and Technology provides grants across four categories, each designed for specific purposes:

Grant Categories

Category 1 – Small Grants: Preliminary studies, proof of concept, early-stage validation

Category 2 – Standard Grants: Full research and innovation project funding

Category 3 – Long-term Grants: Multi-year research initiatives requiring sustained support

Category 4 – Partial Support: Conference participation, registration fees, dissemination activities

The scale of investment is significant: over the past three years, more than TZS 30 billion has been allocated to fund 20+ sector-specific research initiatives. In December 2024 alone, TZS 6.3 billion in grants were awarded to 19 scientists conducting climate change research, demonstrating thematic focus aligned with national priorities.

The Credit Guarantee Scheme: Beyond Grants

Perhaps COSTECH's most innovative recent financing mechanism is the TZS 2.5 billion Credit Guarantee Scheme launched in 2024. This represents a fundamental shift in thinking about how innovation agencies can support commercialization.

The scheme targets innovation startups that have moved beyond the grant-appropriate stage, those with minimum viable products demonstrating market traction. By providing credit guarantees rather than grants, COSTECH:

- Leverages commercial banking infrastructure rather than building parallel systems
- Requires innovators to demonstrate commercial viability through credit assessment
- Creates pathways to follow-on commercial funding once innovations are de-risked

- Extends limited public funds further by guaranteeing rather than directly providing capital

LESSON FOR IAA NETWORK MEMBERS: Diversify Beyond Grants

Grant funding alone cannot bridge the commercialization gap. COSTECH's credit guarantee scheme shows how agencies can support later-stage innovators without becoming venture capitalists. Consider what financing mechanisms beyond grants could address barriers your innovators face, guarantees, patient capital, revenue-based financing, or procurement commitments.

3. HERIN: The Shared Infrastructure Model

The Higher Education Research Infrastructure Network (HERIN) demonstrates how innovation agencies can address systemic infrastructure gaps that no single institution can solve alone. This shared digital backbone has become essential to Tanzania's research-industry linkage efforts.

The Problem HERIN Solves

Tanzanian universities and research institutions individually lacked the resources to build and maintain high-quality digital infrastructure. This created barriers to research collaboration, access to global knowledge resources, and participation in international networks, all prerequisites for research that can engage industry.

The Infrastructure

Established through the Tanzania Science, Technology and Higher Education Project (STHEP) with IDA financing, HERIN now provides:

- National ICT Backbone (NICTBB) connectivity as the carrier between regions
- Points of Presence (POPs) connecting the backbone to last-mile institutions
- Last-mile connectivity to individual universities and research centers
- Shared services including video conferencing, GOVNET access, and MPLS VPN connectivity

The network currently serves 23 active users across seven regions: Dar es Salaam, Arusha, Dodoma, Iringa, Mbeya, Kilimanjaro, and Morogoro. Through the HEET project, connectivity has been enhanced in 17 Higher Learning Institutions and 15 Teacher Training Colleges, with HERIN uptime improved to 99%.

Services and Expansion

Current services include internet bandwidth, video conferencing, GOVNET for public institutions, and MPLS VPN connectivity between campuses. Planned additions include Turnitin plagiarism detection and centralized data storage for research data management, services that individual institutions could not afford independently.

LESSON FOR IAA NETWORK MEMBERS: Shared Infrastructure Multiplies Impact

Individual institutions cannot afford world-class research infrastructure. By aggregating demand and operating shared services, COSTECH enables capabilities that would otherwise be impossible. Consider what infrastructure barriers your research community faces that could be addressed through shared investment, connectivity, computing resources, testing facilities, or equipment libraries.

4. The Buni Hub Model: From Tech Hub to Ecosystem Orchestrator

Buni Innovation Hub represents COSTECH's most visible innovation ecosystem initiative and offers rich lessons for other agencies considering hub investments. What makes Buni distinctive is not the hub itself, but how it evolved from a single space into a mechanism for catalyzing ecosystem-wide growth.

Origins and Evolution

Buni was established in October 2011 through the TANZICT bilateral project with Finland, Tanzania's first tech hub. The founding team deliberately adopted a startup mentality within a government institution. They adapted Finnish models like Demola (for the internship program) and Startup Sauna (for the mentorship program) to the Tanzanian context through trial and error.

Starting with just 100 square meters, tables, chairs, and broadband, Buni has since served over 10,000 Tanzanian youth, with 60% being university students and recent graduates. The hub has received over 5,000 registration requests and maintains 350+ active members. But raw numbers don't capture Buni's real impact, its transformation into a 'Hub of Hubs.'

The Hub of Hubs Strategy

Rather than scaling by building more COSTECH-operated hubs, Buni repositioned as an ecosystem enabler. Its current role focuses on:

- Building capacity in hub managers, both new and existing spaces
- Mentoring innovation spaces on operations, programming, and sustainability
- Supporting establishment of hubs in universities, R&D institutions, and local government
- Acting as intermediary connecting spaces to government and funding
- Developing innovation space toolkits, online and offline resources for establishing hubs

This approach catalyzed growth from 3 hubs in Dar es Salaam (2011) to 20+ innovation spaces nationwide. Notable spaces supported include UDOM Innovation Hub at University of Dodoma, spaces at Tumaini University (Iringa), and hubs in Zanzibar, Mbeya, Kigoma, and Moshi.

The Five Programme Model

Buni Programmes

Buni Internship Programme (BIP): Practical experience for university students working on real projects, adapted from Finland's Demola model

Buni Mentorship Programme (BMP): Pre-incubation support transforming ideas into early-stage businesses—adapted from Startup Sauna

Buni Mini Fabrication Laboratory: Tanzania's first makerspace for hardware prototyping, launched with just TZS 15 million

Buni Community Programme (BCP): Outreach activities and 'Buni Champions' volunteer network extending reach beyond the physical hub

Buni Divaz: Dedicated programme increasing women's participation in technology and entrepreneurship

LESSON FOR IAA NETWORK MEMBERS: Scale Through Others

Direct hub operations are resource-intensive and difficult to scale. COSTECH's hub-of-hubs model multiplies impact by building capacity in others. If your agency operates or plans innovation spaces, consider: could you achieve greater ecosystem impact by enabling 10 local hubs rather than running 2 excellent ones yourself?

5. Hardware Innovation: The Makerspace Story

Software dominates most African tech hub programming, but COSTECH's investment in hardware capabilities offers lessons for agencies seeking to support innovation in manufacturing, agriculture, and other physical-product sectors.

The E-Waste 3D Printer

In 2014, with just TZS 15 million (approximately USD 6,500), COSTECH's Director General approved a pilot for Tanzania's first makerspace within Buni. In partnership with Tech4Trade, this modest investment yielded East Africa's first electronic waste 3D printer, a machine assembled entirely from e-waste components.

The ripple effects far exceeded the initial investment:

- World Bank attention led to the RefabDar project for expanded maker infrastructure
- STICLab community makerspace emerged in Kitunda, manufacturing e-waste 3D printers commercially
- Three 3D printers were deployed to create teaching aids for local schools including Kijitonyama Primary
- A maker community developed, spawning Robotech Lab, Projekt Inspire, Bongo Tech Lab, and other spaces

Drone Technology Transfer

COSTECH also facilitated practical technology transfer in drone applications. With World Bank support, commercial drones were acquired and deployed for real development applications: mapping Songwe region, Morogoro municipality, Zanzibar, and Kilimanjaro International Airport. This demonstrated how innovation agencies can bridge emerging technologies and practical development challenges, creating demonstration effects that attract further investment.

LESSON FOR IAA NETWORK MEMBERS: Small Hardware Investments Can Catalyze Ecosystems

Makerspaces and hardware capabilities don't require massive investment to start. COSTECH's TZS 15 million pilot generated ecosystem-wide effects including commercial spinoffs. Consider modest investments in prototyping infrastructure that can serve as proof points for larger initiatives.

6. The Incubation Partnership Model: DTBi

COSTECH's relationship with Dar Teknohama Business Incubator (DTBi) illustrates how government agencies can support market-oriented incubation while maintaining appropriate boundaries.

The Structure

DTBi is a Not-For-Profit company with its own Board comprising private sector, public sector, and civil society members. COSTECH is a shareholder and founding member alongside infoDev (World Bank). This structure gives DTBi:

- Operational independence and private-sector agility
- Governance accountability through diverse board composition
- Legitimacy through government (COSTECH) and international (World Bank) founding support

- Sustainable business model as a registered company rather than government programme

The Pipeline Connection

Critically, DTBi and Buni operate as connected pipeline stages. Buni serves as 'breeding ground' for pre-incubatees, entrepreneurs still in ideation stage. Those who develop prototypes, register companies, and create business plans within Buni's three-month pre-incubation window can graduate to DTBi for full incubation.

DTBi currently supports 25+ startup companies, 8 resident at COSTECH premises and others virtually across Dar es Salaam, Mwanza, Mbeya, Kigoma, Zanzibar, and Moshi. Success stories include MaxCom Africa, now one of Tanzania's largest mobile consumer services companies.

LESSON FOR IAA NETWORK MEMBERS: Shareholder Not Operator

Government agencies often struggle to run market-oriented incubation programmes with the agility startups need. COSTECH's shareholder relationship with DTBi provides influence without operational burden. Consider whether partnership structures could achieve better outcomes than direct operation for private-sector-facing initiatives.

7. The HEET Project: Leveraging External Investment for Systems Change

The Higher Education for Economic Transformation (HEET) project demonstrates how innovation agencies can leverage large external investments to achieve transformational change across the research-industry linkage ecosystem.

Scale of Investment

Funded by the World Bank, HEET represents a TZS 1.1 trillion investment in Tanzania's higher education and innovation system. COSTECH's strategic positioning within HEET has enabled it to address systemic barriers that incremental funding could never tackle.

What COSTECH Has Achieved Through HEET

Digital Infrastructure

- Enhanced internet connectivity in 17 Higher Learning Institutions and 15 Teacher Training Colleges
- HERIN uptime improved to 99%
- Free video conferencing and open data platforms deployed
- Development of the National Information System for STI (NISSTI)

Institutional Capacity

- 35 TTO supervisors trained in innovation management
- 27 participants from six HLIs trained in intellectual property protection
- 10 patents successfully registered at BRELA

Physical Infrastructure

- New Science, Technology, and Innovation Complex under construction in Dodoma
- Facility will include technology workshops, innovation hub, and incubation facilities

The Four National Frameworks

In October 2024, COSTECH launched four frameworks developed through HEET that provide structured guidance for strengthening research-industry linkages across the entire ecosystem:

National Frameworks

- 1. National Innovation Framework:** Guiding innovation policy and practice nationwide
- 2. Framework for Linkage between HLIs, R&D and Industries:** Structured approaches to academia-industry collaboration
- 3. Data Sharing Framework for STI:** Enabling research data accessibility and reuse
- 4. Framework for Scientific Research Competence:** Building research capacity systematically

LESSON FOR IAA NETWORK MEMBERS: Position for Transformational Investment

Incremental improvements rarely transform research-industry linkages. COSTECH's strategic positioning within HEET enabled systemic change across infrastructure, capacity, and frameworks simultaneously. Consider how your agency could position itself to leverage large-scale investments, whether from World Bank, AfDB, bilateral partners, or domestic sources.

8. Dissemination and Visibility: The STICE Conference

Research-industry linkage requires visibility, connecting researchers with potential industry partners, showcasing innovations to policymakers, and building public understanding of STI's role in development. COSTECH's annual Science, Technology and Innovation Conference and Exhibition (STICE) has become a cornerstone of this effort.

The 9th STICE (December 2024)

The most recent STICE, held at Julius Nyerere International Convention Centre in Dar es Salaam, brought together 1,240+ participants from 47 institutions. The conference theme, 'Harnessing Science, Technology and Innovation to Achieve Climate Resilience and a Competitive Economy', aligned research dissemination with national priorities.

Key outcomes included:

- 76 research papers presented and discussed, with refined versions published in East African Journal of Science, Technology and Innovation
- TZS 6.3 billion in grants announced for 19 climate change researchers
- TZS 2.5 billion credit guarantee scheme launched for innovation commercialization
- Five exemplary researchers honored for contributions to national transformation
- Estimated 13.7 million people reached through media coverage and digital outreach

STICE serves multiple functions simultaneously: disseminating research findings to policymakers and practitioners, creating networking opportunities between researchers and industry, providing a platform for major funding announcements, and building public visibility for STI contributions to development.

LESSON FOR IAA NETWORK MEMBERS: Annual Convenings Build Momentum

Regular high-profile events create predictable moments for announcements, recognition, networking, and visibility. COSTECH's STICE has become an institution in itself, a forcing function for progress and a platform for ecosystem building. Consider establishing or strengthening annual convenings that serve similar functions for your national innovation ecosystem.

9. Summary: Key Takeaways for IAA Network Members

COSTECH's journey from traditional research council to comprehensive innovation ecosystem orchestrator offers actionable lessons for agencies across Africa seeking to strengthen research-industry linkages.

1. Integrate Coordination, Transfer, and Funding

COSTECH's three-in-one structure (Commission + CDTT + NFAST) enables end-to-end support. Fragmented mandates create gaps where innovations fall through.

2. Diversify Financing Instruments

The credit guarantee scheme addresses barriers grants cannot solve. Different innovation stages require different financial tools.

3. Invest in Shared Infrastructure

HERIN demonstrates how aggregating demand enables capabilities individual institutions cannot afford. Consider connectivity, computing, testing facilities, or equipment libraries.

4. Be an Ecosystem Orchestrator, Not Just an Operator

Buni's hub-of-hubs model multiplies impact by building capacity in others rather than scaling direct operations.

5. Start Small with Hardware

The TZS 15 million makerspace pilot catalyzed ecosystem-wide effects. Modest investments can create demonstration effects that attract larger resources.

6. Partner Rather Than Operate Market-Facing Programmes

COSTECH's shareholder relationship with DTBi provides influence without operational burden for market-oriented incubation.

7. Position for Transformational Investment

Strategic positioning within HEET enabled systemic change that incremental funding could never achieve.

8. Build TTO and TISC Networks

Systematic IP management through trained TTOs yields measurable results: 45 patents facilitated, 15 IPs commercialized.

9. Create Annual Forcing Functions

STICE provides predictable moments for announcements, recognition, and ecosystem building that compound over time.

Conclusion

COSTECH's evolution demonstrates that traditional research councils can transform into comprehensive innovation ecosystem orchestrators. The key is strategic expansion of mandate and capabilities over time, from research coordination to technology transfer to innovation funding to ecosystem building, while maintaining focus on the ultimate goal: translating research into economic and social impact.

For IAA Network members, COSTECH offers not a blueprint to copy, but a set of proven mechanisms to adapt. The hub-of-hubs model, credit guarantee scheme, shared infrastructure approach, and partnership structures represent practical innovations that can strengthen research-industry linkages in diverse African contexts. As Dr. Amos Nungu, COSTECH's Director General, noted: the frameworks and mechanisms are tools for inspiring 'innovative ideas, collaborative efforts, and a sustainable and prosperous future for Tanzania and beyond.'

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