

Achieving Uganda's NDP 4 Growth Agenda:

How Science, Technology, Innovation
and Carbon Markets can Facilitate
Productivity, Industrialisation and
Export Growth

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SYNOPSIS

Technological change has always altered the fortunes of nations. The first industrial revolution reorganized production around steam and mechanization. The second placed electricity, steel and railways at the center of industrial power. The third built the modern world around electronics, computing and telecommunications. The fourth, now deepening through artificial intelligence, biotechnology, robotics, data systems, climate technologies and digital trade, is reorganizing economic value around knowledge, standards, intellectual property and the ability of nations to commercialize innovation.

Uganda's development challenge must therefore be read in this context. The country is naturally endowed, agriculturally fertile, youthful, increasingly connected and strategically located within the East African Community. It produces coffee, tea, fish, dairy, fruits, minerals, cultural works, indigenous knowledge and digital services. Yet the country continues to capture limited value from many of these assets because the higher-value activities in most value chains occur elsewhere.

Coffee is grown locally, but much of the value is captured through roasting, branding, certification, packaging and retailing elsewhere. Agricultural knowledge exists locally, but improved genetics, precision tools, climate-smart systems and digital advisory platforms are often

externally developed. Health needs are local, but medicines, diagnostics, laboratory consumables and medical technologies are largely imported. Climate assets exist in Uganda's forests, wetlands, farms, e-mobility systems and clean cooking projects, yet carbon market value depends on scientific measurement, verification, legal structuring and access to buyers.

Science, Technology and Innovation ("STI") provides Uganda with a route out of this pattern. Its value lies in increasing productivity, improving value addition, strengthening local manufacturing, supporting digital transformation, enabling carbon markets, protecting intellectual property and creating firms that can compete regionally and globally.

Artificial Intelligence ("AI") intensifies this opportunity. It can improve farm productivity, support medical diagnostics, reduce manufacturing waste, strengthen public finance, improve climate monitoring, support carbon market verification and turn data into an economic asset. However, AI will benefit Uganda only where it is anchored in local data, local problems, local firms and a clear governance framework.

This paper argues that Uganda should treat STI as a national economic instrument. The measure of success should be visible in patents commercialized, firms created, products certified, exports generated, imports substituted, jobs created, carbon finance mobilized, private capital attracted and productivity improved.

UGANDA'S GROWTH CONTEXT AND PROBLEM STATEMENT

Uganda's economy has grown significantly, but structural transformation remains incomplete. World Bank data places Uganda's GDP at approximately USD 53.91 billion in 2024, compared to Kenya at approximately USD 120.34 billion and Tanzania at approximately USD 78.84 billion. Uganda's GDP per capita stood at approximately USD 1,077.9 in 2024, compared to Kenya's USD 2,132.4 and Tanzania's USD 1,186.7.¹

These figures show that Uganda is growing, but also that regional peers have moved further in total output and productivity. The central question is how Uganda can raise the value generated by each acre, each worker, each firm, each university, each innovator and each public investment.

That argument remains relevant, but the policy environment has expanded. STI now sits at the intersection of agriculture, health, manufacturing, AI, data governance, carbon markets, climate finance and trade competitiveness. Uganda must move from innovation support to innovation absorption.

Uganda's earlier development plans already recognized the importance of industrialization, value addition and technology. The NDP III was anchored on sustainable industrialization for inclusive growth, employment and wealth creation.

In 2021 I wrote a paper on Intellectual Property, Digital Trade and the Fourth Industrial Revolution² and argued that IP, digital trade and 4IR technologies could facilitate an inclusive and robust digital economy and specifically made the case that IP should be placed at the center of Uganda's industrialization agenda.

That argument remains relevant, but the policy environment has expanded. STI now sits at the intersection of agriculture, health, manufacturing, AI, data governance, carbon markets, climate finance and trade competitiveness. Uganda must move from innovation support to innovation absorption.

A prototype only begins to carry economic meaning when it is tested, certified, financed, procured or taken to market. A research paper can become more than academic output when it informs policy, creates a product, improves a process, gives rise to a firm or is translated into intellectual property that can be licensed, assigned or commercialized. Similarly, a carbon project only becomes a financial asset when its emissions reductions or removals are credibly measured, reported, verified and supported by community legitimacy and market access. A digital platform also requires more than code; it requires trust, data governance, scale, users, interoperability and a viable commercial model. Uganda's STI agenda must therefore be organised around the full journey from idea to market, and not merely around the existence of ideas themselves.

Uganda's STI agenda must therefore be deliberately organized around productivity and value capture.

¹ World Bank, World Development Indicators, GDP (current US\$) and GDP per capita (current US\$), 2024. [Worldbank](https://data.worldbank.org/)

² Kenneth Muhangi, Achieving Uganda's NDP III Goals: How Intellectual Property, Digital Trade and the 4IR Can Facilitate an Inclusive and Robust Digital Economy, KTA Advocates, 18 December 2021. www.ktaadvocates.com/NDPIII

STI AS A PRODUCTIVITY AND VALUE CAPTURE INSTRUMENT

Productivity is the hidden discipline behind national prosperity. It explains why one farmer produces more from the same land, why one factory generates more output from the same workforce, why one country exports branded products while another exports raw materials, and why knowledge economies generate income without always depending on physical resources.

STI improves productivity in several ways. Science improves inputs, Technology improves processes, Innovation improves business models, IP protects value, AI improves prediction, automation and decision-making. Standards create trust, data improves planning, commercialization converts ideas into products and firms.

Globally, AI has been projected to add significant value to the world economy. PwC estimated that AI could contribute up to USD 15.7 trillion to global GDP by 2030³, while McKinsey estimates that generative AI deployed at scale could unlock USD 61 billion to USD 103 billion in additional economic value across Africa⁴.

For Uganda, the relevance of these global estimates lies in practical application across the productive life of the country. AI can help a coffee farmer detect disease earlier, guide a rural health worker interpreting diagnostic images, support a factory owner to anticipate machinery failure, help government identify ghost beneficiaries in public programmes, strengthen tax compliance, monitor forests and wetlands, improve the credibility of carbon credit

verification and assist regulators to detect market abuse before it distorts the economy. Applied in this manner, AI becomes a productivity tool embedded in agriculture, health, manufacturing, climate governance, public finance and market regulation.

The countries that benefit most from AI will be those that connect it to productive sectors. Uganda should therefore approach AI through agriculture, health, manufacturing, climate, public service delivery and digital trade.

CASE STUDY: STI, IP AND AGRICULTURE

Agriculture remains Uganda's most important social and economic sector. World Bank data places agriculture, forestry and fishing at approximately 24.67 percent of Uganda's GDP in 2024.⁵ Earlier sector analysis also showed that agriculture accounted for about 31 percent of export earnings and employed approximately 70 percent of Uganda's working population.

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Uganda's agricultural potential is rarely disputed; she has fertile soils, two rainy seasons in many regions, diverse agro-

³ PwC, *Sizing the Prize: What's the Real Value of AI for Your Business and How Can You Capitalise?* 2017. The report estimates that artificial intelligence could contribute up to USD 15.7 trillion to the global economy by 2030, equivalent to a 14 percent increase in global GDP.

⁴ McKinsey & Company, *Africa's gen AI potential*, 29 May 2025. McKinsey estimates that at-scale deployment of generative AI could create between USD 61 billion and USD 103 billion of additional economic value across Africa

⁵ World Bank, World Development Indicators, Agriculture, forestry, and fishing, value added (% of GDP), Uganda, indicator code NV.AGR.TOTL.ZS, 2024. The World Bank reports Uganda's agriculture, forestry and fishing value added at 24.67% of GDP in 2024

ecological zones and strong performance in coffee, tea, fish, dairy, fruits, bananas and other crops. The challenge has always been the limited conversion of agricultural production into industrial value.

Coffee illustrates the opportunity. UCDA reported that coffee exports for the twelve months between May 2024 and April 2025 totaled 7.17 million bags worth USD 1.97 billion, compared to 5.90 million bags worth USD 1.01 billion in the previous year⁶. This demonstrates the strength of Uganda's coffee sector, but also the urgency of moving further into roasting, packaging, branding, certification, specialty coffee, climate-smart production and premium retail markets.

STI can support agriculture at each stage of the value chain. At production level, it can support improved seed genetics, disease-resistant varieties, plant breeding, soil science, irrigation technologies, pest surveillance and climate-resilient farming. At farm management level, satellite monitoring, drones, AI advisory systems and digital extension can assist farmers to make better decisions. At market level, traceability systems, certification marks, digital marketplaces, warehouse receipt systems and farmer data infrastructure can improve access to buyers and finance.

IP also remains central, the Geographical Indications Act, Trademarks Act, Plant Variety framework and Industrial Property Act can be used to protect agricultural value. Rwenzori coffee, Ugandan vanilla, shea butter, Ankole cattle products, barkcloth and Malewa can benefit from

trademarks, certification marks, collective marks, geographical indications and product standards.

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The Netherlands provides a useful comparison. It became one of the world's leading agricultural exporters by treating agriculture as science, logistics, seed technology, controlled environments, data and standards⁷. Israel similarly turned water scarcity into irrigation innovation. Uganda has better natural agricultural conditions than many countries that outperform it. Its next agricultural leap will depend on how deliberately it combines science, IP, data, finance, carbon markets and industrial policy around farmers.

CASE STUDY: STI, HEALTH AND THE BIOECONOMY

Health is both a public service and an industrial opportunity. Uganda imports a significant portion of medicines, diagnostics, medical devices and laboratory consumables. This creates supply vulnerability and limits the country's ability to capture economic value from health expenditure.

⁶ Uganda Coffee Development Authority, Monthly Coffee Report, April 2025, Coffee Year 2024/25 – Issue 7. The report states that coffee exports for the twelve months from May 2024 to April 2025 totalled 7.17 million 60kg bags worth US\$1.97 billion, compared to 5.90 million bags worth US\$1.01 billion in May 2023 to April 2024, representing increases of 21.70% in quantity and 94.64% in value.

⁷ Government of the Netherlands, Agriculture and Horticulture, noting that the Netherlands is one of the world's largest agricultural producers and, after the United States, the biggest exporter of agricultural produce in the world; Wageningen University & Research, Agrologistics Sector Study Netherlands, 2022, noting that the Netherlands is the second-largest exporter of agricultural and agriculture-related products worldwide.

STI can support a health economy built around vaccine manufacturing, diagnostics, medical devices, pharmaceutical production, clinical trials, biotechnology, digital health and indigenous knowledge commercialization. The proposed Biosciences Park and investments in diagnostics and vaccine manufacturing should therefore be treated as industrial infrastructure.

Uganda's herbal and traditional medicine sector should also be brought into this discussion with greater seriousness. The existence of bodies such as the National Council of Traditional Healers and Herbalists Associations of Uganda (NACOTHA)⁸ demonstrates that the sector is not merely informal practice, but an organised body of knowledge, practitioners and community-based health systems that already serve a large section of the population. The policy challenge is how to move this knowledge into a regulated bioeconomy supported by documentation, scientific validation, quality control, benefit sharing, certification, collective marks, trademarks and, where appropriate, patent or utility model protection. URSB, WIPO and the National Drug Authority have already held training on certification and collective trademarks for traditional medical practitioners, which is the correct direction because much of the immediate value may lie in product identity, quality assurance and collective branding before one even reaches patents.

The intellectual property question in medicine is more complicated because Uganda, as a least developed country, benefits from WTO TRIPS flexibilities that allow LDCs to maintain maximum flexibility on pharmaceutical patents until at least 2033⁹. Uganda can still therefore support generic medicine capacity,

build regulatory capability and examine whether further extensions or renegotiated flexibilities are necessary for countries still building pharmaceutical industries.

Uganda may not begin at India's scale, but it can draw the correct lesson: a country does not have to own every finished pharmaceutical product to participate meaningfully in the health economy.

At the same time, where patenting finished medicines is difficult, expensive or strategically constrained, the country can focus on the "ingredients" of the pharmaceutical value chain: active pharmaceutical ingredients, botanical extracts, standardized herbal compounds, excipients, validated natural products, clinical data, manufacturing processes, packaging, quality systems and supply contracts with larger pharmaceutical companies.

India offers a useful comparison. Its pharmaceutical rise was built on finished medicines and also on process engineering, generic manufacturing, regulatory competence and active pharmaceutical ingredients. India's API industry is now a major part of its pharmaceutical value chain, supplying ingredients used in medicines for domestic and export markets. Uganda may not begin at India's scale, but it can draw the correct lesson: a country does not have to own every finished pharmaceutical product to participate meaningfully in the health economy. It can build capability around validated ingredients, manufacturing inputs, quality

⁸ NACOTHA as the "National Council of Traditional Healers and Herbalists Associations (NACOTHA) – Uganda. www.unesco.org/NACOTHA

⁹ World Trade Organization, WTO members agree to extend drug patent exemption for poorest members, 6 November 2015. The WTO states that least-developed country members are allowed to maintain maximum flexibility in their approach to patenting pharmaceutical products until at least 2033. www.wto.org

systems, bio-prospecting, traditional knowledge documentation, clinical research and regional supply chains.

The COVID-19 pandemic demonstrated that countries with stronger scientific and manufacturing capacity had greater resilience. Drone-supported medical delivery in Uganda's West Nile region also demonstrates how technology can improve service delivery while creating new logistics and data industries¹⁰.

IP should again be treated as industrial infrastructure. Patents, utility models, industrial designs, trade secrets, trademarks and copyright in software all determine whether Ugandan firms merely assemble products or own value within the product.

CASE STUDY: STI, MANUFACTURING AND TECHNOLOGY TRANSFER

Manufacturing growth requires deliberate mastery of technology. Many successful industrial economies first acquired and adapted existing technologies before developing frontier technologies of their own. Japan, South Korea, Taiwan and China all built capability through learning, adaptation, component manufacturing, standards and export discipline.

Taiwan provides one of the clearest lessons. It became indispensable by focusing on semiconductors, a critical component in the global technology value chain. The United States International Trade Administration reports that Taiwan accounts for over 60 percent of global foundry revenue and

more than 90 percent of leading-edge chip manufacturing, with its semiconductor industry generating over USD 165 billion in revenue in 2024.

Uganda should draw the principle rather than copy the product. A country can gain leverage by controlling strategic ingredients within selected value chains. In agriculture, the strategic ingredient may be seed genetics, certification, traceability or specialty branding. In health, it may be diagnostics, clinical data, validated herbal products or medical devices. In e-mobility, it may be battery systems, charging infrastructure, electric motorcycle components or software. In carbon markets, it may be MRV platforms, verification services and climate data.

Uganda's manufacturing policy should therefore place technology transfer at the center. This requires engineering centers, shared manufacturing facilities, product testing laboratories, industrial design support, standards fast-tracking, university-industry partnerships and finance for firms moving from prototype to production.

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CASE STUDY: STI, CARBON MARKETS AND CLIMATE FINANCE

Climate change has moved from the margins of environmental policy to the center of trade, finance, industrial policy and development planning. The modern economy is increasingly shaped by the carbon content embedded in goods, the

¹⁰ United Nations Capital Development Fund (UNCDF), Leveraging Drone Technology in the COVID-19 Rapid Response in Rural Areas of Uganda, 2 November 2021. www.uncdf.org

credibility of emissions data, the integrity of verification systems, and the regulatory capacity of nations to participate in climate-linked markets.

For Uganda, this shift presents both risk and opportunity. Uganda's forests, wetlands, agricultural landscapes, renewable energy potential, e-mobility initiatives, clean cooking technologies and biodiversity assets represent substantial climate and economic assets. Yet these assets only become financially meaningful where they can be measured, verified, protected, financed and traded.

For Uganda, this shift presents both risk and opportunity. Uganda's forests, wetlands, agricultural landscapes, renewable energy potential, e-mobility initiatives, clean cooking technologies and biodiversity assets represent substantial climate and economic assets.

A carbon credit is created through measurement, reporting, verification, certification, legal ownership, registry infrastructure, market confidence and finance. Each of these steps depends on science, technology, data, AI, standards, intellectual property and regulation.

Uganda ratified the UNFCCC, the Kyoto Protocol and the Paris Agreement. Article 6 of the Paris Agreement creates mechanisms for cooperative approaches, internationally transferred mitigation

outcomes, a centralized carbon crediting mechanism and non-market approaches such as technology transfer and capacity building. Uganda's National Climate Change Act, 2021 gives domestic force to climate change mechanisms, including voluntary emissions trading, compliance mechanisms, cooperative approaches and non-market approaches¹¹.

The practical reality is that carbon markets reward credible systems rather than natural endowment alone. Satellite monitoring, remote sensing, AI verification, digital registries, carbon accounting, soil testing, forestry science and geospatial data all determine whether a project can generate credible credits.

Uganda already has examples of climate-linked investment, including solar solutions, degraded land restoration and bamboo planting, ceramic water filters, clean cooking and e-mobility. These examples show how carbon finance can support clean energy, household technologies, manufacturing, reforestation and local employment.

Carbon markets also connect back to agriculture. Regenerative agriculture, shade-grown coffee, agroforestry, soil carbon improvement and sustainable land management can improve farmer resilience and create climate finance opportunities. They also connect to manufacturing through clean cooking appliances, ceramic water filters, solar equipment and e-mobility components.

GrowGrounds¹² provides a practical example of how carbon markets can strengthen Uganda's coffee supply base where projects are designed around farmer productivity rather than credit

¹¹ Kenneth Muhangi, Article 6 of the Paris Agreement and the Carbon Market in Uganda, KTA Advocates, May 2024. www.ktaadvocates.com

¹² GrowGrounds, *Nature-Growing Carbon Capture Program*. GrowGrounds states that it connects coffee brands and farmers to renovate and build coffee forest farms, financed by verified carbon credits that lead to resilient supply chains. It also states that it helps coffee farmers convert to carbon-positive agroforestry by planting trees, training farmers and promoting organic farming, with captured carbon converted into Carbon Reduction Units for insetting or trading. <https://growgrounds.org>

generation alone. In its partnership with Ankole Coffee Producers Cooperative Union, GrowGrounds announced a programme to support up to 5,000 coffee farmers and 5,000 acres of land to transition from degraded monocultures into syntropic agroforestry systems, with ACPCU leading farmer selection, training and implementation, while GrowGrounds manages the carbon methodology, Gold Standard certification and digital tools for geo-mapping and monitoring.

If responsibly governed, this data can support planning, credit access, service delivery and enterprise growth. If poorly governed, it can deepen exclusion, enable surveillance, distort markets and transfer economic value away from Ugandan firms

The process of setting up such projects requires farmers to adopt more sustainable agronomic practices, including shade trees, improved soil management, appropriate fertiliser use, agroforestry and better farm-level monitoring. This is important because the carbon value is then tied to a real productivity pathway: farmers improve the health and resilience of their coffee farms, the supply base becomes stronger, yields can improve over time, and the verified climate benefit can be converted into carbon credits for sale. In that sense, companies such as GrowGrounds demonstrate how STI, carbon finance and farmer support can work together, with science and data improving the farm, certification creating the credit, and the carbon market creating an additional

revenue stream around better coffee production.

Carbon markets should therefore be treated as a serious growth sector within Uganda's STI agenda. They can support farmers, manufacturers, households, project developers, communities, exporters and public institutions where the underlying science, technology, law, finance and community structures are properly organized.

CASE STUDY: AI, DIGITAL TRADE, FINTECH AND BIG DATA

Uganda's digital economy has already shown how technology can move quickly where there is consumer need, regulatory openness and private sector energy. My 2021 paper noted that Uganda had over 28 million mobile connections by January 2021, representing approximately 60.3 percent of the population. It also noted that Uganda's fintech sector had transaction volumes estimated at USD 4.7 billion as early as 2016¹³.

Mobile money, payment systems, ride-hailing, e-commerce, digital entertainment and online services have shown that Ugandan consumers can adopt technology rapidly. The National Payment Systems Act, Electronic Transactions Act, Electronic Signatures Act and Data Protection and Privacy Act have provided parts of the legal foundation for this shift.

Digital trade platforms reveal consumer preferences, logistics patterns, demand gaps, pricing behaviour and the movement of goods across urban and peri-urban markets. Jumia Uganda provides a useful example; by June 2020 Jumia Uganda had an average of 5,000 unique sellers and approximately 2.6 million customers in Kampala, generating valuable data on

¹³ Ibid 2

what Ugandans buy, where demand is concentrated, and which goods could be prioritized for local production¹⁴.

Fintech platforms similarly generate data on payments, enterprise activity and credit behavior, while agriculture platforms generate data on yields, inputs and market access. Health systems generate data on disease patterns, medicines and facility demand, and public systems generate data on licensing, tax, procurement and service delivery¹⁵. When responsibly governed, these datasets can help Uganda move from intuition-based planning to evidence-based production, regulation and service delivery.

If responsibly governed, this data can support planning, credit access, service delivery and enterprise growth. If poorly governed, it can deepen exclusion, enable surveillance, distort markets and transfer economic value away from Ugandan firms.

Uganda should therefore develop a practical AI economy strategy. It should support local language models, sector datasets, AI sandboxes, public-sector AI pilots, responsible data-sharing frameworks, ethical AI standards, cyber security and skills development. The emphasis should be on Ugandan use cases: coffee disease detection, tax analytics, hospital triage, carbon monitoring, public procurement oversight, logistics optimization and agricultural market intelligence.

UGANDA'S STI, IP AND DIGITAL LEGAL FRAMEWORK

Uganda already has several laws that can support an STI-led growth agenda. These include the Industrial Property Act,

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Trademarks Act, Copyright and Neighboring Rights Act, Geographical Indications Act, Trade Secrets Protection Act, Plant Variety framework, Security Interest in Movable Property Act, Data Protection and Privacy Act, National Payment Systems Act, Electronic Transactions Act, Electronic Signatures Act and National Climate Change Act.

The issue is implementation and coordination. The Security Interest in Movable Property Act is particularly important because it recognizes intangible assets, including intellectual property, as capable of supporting secured financing. This creates a pathway for IP-backed lending, but only if Uganda develops IP valuation capacity, predictable enforcement, bank training and credit guarantee support.

¹⁴ Kenneth Muhangi, *Achieving Uganda's NDP III Goals: How Intellectual Property, Digital Trade and the 4IR Can Facilitate an Inclusive and Robust Digital Economy*, KTA Advocates, 2021, noting that by June 2020 Jumia Uganda had an average of 5,000 unique sellers and approximately 2.6 million customers in Kampala. See also Jumia Uganda, www.jumia.ug.

¹⁵ Financial Technologies Service Providers Association of Uganda (FITSPA) is Uganda's umbrella body for fintechs and industry stakeholders. FITSPA has over 210 members, with more recent social profiles referring to over 215 members, demonstrating the scale of fintech aggregation in Uganda's digital economy. See FITSPA Uganda, About, <https://fitspa.ug/about>; FITSPA Uganda LinkedIn profile; FITSPA Uganda X profile.

In the FY2026/27 Budget Speech¹⁶, Government has allocated Shs 1.140 trillion to Science, Technology and Innovation, ICT and the creative industries, with priorities including the commercialization of innovations such as Kiira Motors vehicles, coffee, Dei BioPharma drugs and vaccines, and banana products, additional investment in research and development, expansion of digital infrastructure, BPO growth and the strengthening of intellectual property protection.

Uganda should create a national commercialization pipeline for publicly supported innovation. Every supported project should have a pathway covering IP protection, standards, certification, regulatory approval, first buyer, scale finance and export readiness.

The portion directed towards intellectual property should deliberately support IP sensitization, skilling on IP commercialization, IP structuring, IP valuation, brand advisory, technology transfer support and sector-specific IP strategies for agriculture, health, software, climate technologies, manufacturing and the creative industries. The Budget Speech already recognizes that STI is central to productivity, industrialization and competitiveness, and that Uganda's tenfold growth strategy requires STI to sit at the center of development. The next step is to ensure that the allocation to IP helps innovators, firms, universities and creatives move from registration of rights to commercial use of rights.

Technology Transfer Offices in universities and research institutions should also be strengthened. Research institutions should not end at publication. They should support invention disclosure, IP audits, patent filings, licensing, spin-outs, industry partnerships and commercialization.

STI-S should coordinate these tools into a visible commercialization pipeline: research identification, IP audit, prototype, standards testing, certification, regulatory approval, pilot deployment, first buyer, scale finance and export readiness.

SECTOR-SPECIFIC RECOMMENDATIONS

Uganda should establish mission-led STI programmes aligned to agriculture, health, manufacturing, carbon markets, AI, digital trade, indigenous knowledge and geospatial services. Each mission should have a delivery board, budget, private sector anchors, regulators, standards bodies, universities and quarterly reporting.

Uganda should create a national commercialization pipeline for publicly supported innovation. Every supported project should have a pathway covering IP protection, standards, certification, regulatory approval, first buyer, scale finance and export readiness.

Uganda should introduce an STI Founder Fellowship modelled on programmes such as Germany's EXIST Start-up Grant. Selected innovators should receive a one-year stipend to work full-time on commercialization through accredited hubs, universities, technology transfer offices and science parks.

Government should use procurement as an STI tool. Ministries, Departments and

¹³ Ibid 2

Agencies should define public problems in agriculture, health, education, transport, climate, energy and security, then use challenge procurement and pre-commercial contracts to validate Ugandan solutions.

Uganda should build a national AI and data infrastructure program. This should include sector datasets, local language tools, public-sector AI pilots, ethical AI standards, cyber security safeguards and AI skills development.

Uganda should operationalize IP-backed finance through valuation guidelines, credit guarantee support, bank training, licensing templates and collaboration between URSB, UDB, commercial banks and sector regulators.

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Uganda should establish a carbon MRV and climate data platform to support carbon accounting, satellite monitoring, project transparency, benefit-sharing, verification and Article 6 participation.

Uganda should develop sector IP strategies for agriculture, indigenous knowledge, health products, software, climate technologies and manufactured goods. Geographical indications, certification marks, trademarks, industrial designs, patents and trade secrets should be used as export tools.

Uganda should strengthen standards and certification pathways for innovators. UNBS-linked testing routes, compliance vouchers, regulatory helpdesks and sector sandboxes should be created for health tech, climate tech, AI, e-mobility, drones, fintech and space services.

Uganda should publish STI economic dashboards. These should track patents filed, IP commercialized, products certified, firms created, jobs generated, private capital mobilized, public pilots converted to contracts, exports generated, imports substituted and carbon finance mobilized.

CONCLUSION

Uganda's development challenge is ultimately a question of value capture. The country has land, water, biodiversity, minerals, culture, youth, universities, innovators, entrepreneurs and regional market access. These assets must now be organized into productive capability.

STI provides the organizing framework for that transition by ensuring that science, technology and innovation are deliberately linked to production, enterprise and national development. IP protects the value created from ideas, brands, designs, inventions, software and indigenous knowledge, while AI increases productivity and the data it generates can improve public and private sector decision-making. Carbon markets can convert climate action into finance where measurement, reporting, verification and standards have built sufficient trust, while procurement creates early markets for local innovation and finance enables firms to move from prototype to scale. Commercialization then becomes the bridge through which knowledge is converted into enterprise.

Uganda must connect science to industry, universities to markets, farmers to data, innovators to finance, carbon



assets to verification systems, and public procurement to local enterprise.

The measure of success should be economic and visible in the productive life of the country. Farms should become more productive because farmers have better seed, better data, better weather intelligence, better market access and better financing. Ugandan products should move through testing, certification, branding and standards so that they can compete in domestic, regional and export markets.

Health innovation should reduce dependence on imported diagnostics

and medical technologies, while climate innovation should mobilise finance for farmers, manufacturers, households and communities. Software should become a Ugandan export, industrial components should be locally designed and manufactured, protected brands should command a premium, and new firms should emerge from universities, hubs and research institutions. The final test is whether STI creates more exports, more firms, more jobs and more value retained in Uganda. Uganda's growth agenda will be strengthened when ideas are protected, tested, certified, financed, procured, scaled and exported.

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