INNOVATION, TECHNOLOGY DEVELOPMENT AND TRANSFER PROGRAMME

Semi-Annual Budget Monitoring Report

Financial Year 2024/25

May 2025

Budget Monitoring and Accountability Unit
Ministry of Finance, Planning and Economic Development
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ABBREVIATIONS AND ACRONYMS

BIRDC	Banana Industrial Research and Development Centre
BMAU	Budget Monitoring and Accountability Unit
Bn	Billion
COVAB	College of Veterinary Medicine, Animal Resources and Biosecurity
COVID-19	Coronavirus Disease
EDIC	Engineering Development and Innovation Centre
ELISA	Enzyme-linked Immunosorbent Assay
GMP	Good Manufacturing Practice
GoU	Government of Uganda
HPLC	High-Performance Liquid Chromatography
IFMS	Integrated Financial Management System
ISO	International Organization for Standardization
ITDT	Innovation Technology Development and Transfer
KMC	Kiira Motors Corporation
MAK-BRC	Makerere University Biomedical Research Centre
MDAs	Ministries, Departments and Agencies
MoFPED	Ministry of Finance, Planning and Economic Development
MUST	Mbarara University of Science and Technology
NCRI	Natural Chemotherapeutics Research Institute
NDA	National Drug Authority
NDP	National Development Plan
NPA	National Planning Authority
NRIP	National Research and Innovation Program
NSTEIC	National Science, Technology, Engineering and Innovation Centre
NSTEI-SEP	National Science, Technology, Engineering, Innovation and Skills Enhancement Project
OP	Office of the President
PIAP	Programme Implementation Action Plan
PRC	Polymerase Chain Reaction
PRESIDE	Presidential Scientific Initiative on Epidemics
R&D	Research and Development
RNA	Ribonucleic acid
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
TIBIC	Technology, Innovation and Business Incubation Centre
TSC	Technical Service Company
UIRI	Uganda Industrial Research Institute
UNBS	Uganda National Bureau of Standards
UNCST	Uganda National Council for Science and Technology
UPIK	Uganda Petroleum Institute, Kigumba
USD	United States Dollar

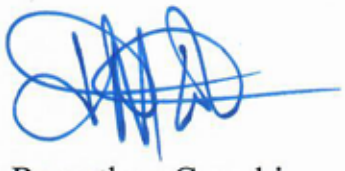
FOREWORD

At the start of the Financial Year 2024/25, the Government of Uganda outlined strategies to restore the economy back to the medium-term growth path with the ultimate vision of a self-sustaining, integrated economy. The strategy emphasized accelerating commercial agriculture, fostering industrialization, and expanding both service sectors and digital transformation. Key areas of focus included enhancing market access and leveraging technological advancements to drive economic growth.

The strategic interventions that were prioritized under various programmes included: roads under Integrated Transport and Infrastructure Services; electricity under the Sustainable Energy Development; irrigation under Agro-Industrialization; Industrial parks under Manufacturing; support to medical schools and science-based research and development under Human Capital Development; as well as oil and gas among others.

Semi-Annual programme assessments were made, and it was established that performance was fairly good. This implies that programmes are on track, but with a lot of improvements required. These monitoring findings form a very important building block upon which programmes can commence the reflective exercises.

The government has embarked on the 10-fold growth strategy that demands for enhanced efficiency and effectiveness within programmes. We cannot afford to have fair performance scores hence forth, as this will jeopardize the prospects of doubling the economic growth rates in the medium term.



Ramathan Ggoobi
Permanent Secretary/ Secretary to the Treasury

EXECUTIVE SUMMARY

The Innovation, Technology Development, and Transfer (ITDT) Programme seeks to increase the application of appropriate technology in the production and service delivery processes. The programme activities were executed through the Science, Technology and Innovations (STI) Secretariat and the Uganda Industrial Research Institute (UIRI). There are three subventions under the programme, namely: the Banana Industrial Research and Development Centre (BIRDC), Kiira Motors Corporation (KMC), and Uganda National Council for Science and Technology (UNCST).

The programme has three sub-programmes, namely: Research and Development; Science, Technology and Innovation (STI) Ecosystem Development; and Industrial Value Chain Development. This summary presents monitoring findings for the period 1st July 2024 to 31st December 2024 for two sub-programmes of Industrial Value Chain Development and STI Ecosystem Development. The Research and Development Sub-programme was not reported on during the period under review.

Overall Programme Performance

The approved ITDT programme budget for FY 2024/25 is USh 346.95 billion, of which USh 211.1 billion (60%) was released and USh 151.98 billion (72%) spent by 31st December 2024. The release was fair while the absorption was good. The fair absorption was attributed to the delayed completion of selection and award of grants to the successful applicants. The STI had the biggest share of the programme budget, at 92.8%, and the Ministry of Foreign Affairs (MoFA) had the least, at 0.1%.

The overall ITDT Programme performance was fair, at 61.7%, with both the monitored sub-programmes posting fair performance. The highlights of the achievements under the sub-programmes are as follows:

Industrial Value Chain Development Sub-programme

The performance of the sub-programme was fair, at 59.9%, with all the three interventions posting fair performance. Under aeronautics and space science, installation of the satellite communication system progressed to 50%, with works for equipping of the Aerospace Electronic Laboratory (phase 1) at 20% and the network infrastructure at 15%. The rehabilitation of Mpoma Satellite Station also commenced and was in the early stages, with advance payment made to the contractor.

The pilot and efficacy studies for the vaccines were undertaken. The review of vaccine clinical trial protocols for the 3 COVID-19 vaccine candidates was at 60%, while the expansion of the humanised mice colonies continued with the multiplication to support the challenge studies for the Subunit, Inactivated, and Adenovector vaccines, among others. The final assessment for the clinical trials were pending due to lack of a Good Manufacturing Practice (GMP) facility.

The establishment of some of the GMP facilities was underway. Clearance was obtained from the National Drug Authority (NDA) to construct a pilot GMP plant for human herbal medicines by the Natural Chemotherapeutics Research Institute (NCRI) at Wandegeya. Documentation for remodelling the BSL3 laboratory for the recombinant vaccine pilot production platform into the GMP facility at the College of Veterinary and Biosecurity (COVAB), Makerere University was also finalised but civil works had not commenced due to procurement delays. Remodelling of the biomarker GMP facility at COVAB was also at 85%, whereas the development of the Good Laboratory Practice (GLP) platform and office spaces at Busitema University, College of Health Sciences, Mbale Campus was at 95%.

The final designs of the Biosciences Park (Pathogen Economy Industrial Park) progressed to 80% and the structural and architectural plans for one of the vaccines and therapeutics components of the park were at 50% completion. The review of the PCR Diagnostics Plant designs by international collaborators was finalised and awaiting ground-breaking.

The selection of grantees for FY 2024/25 to support research and innovation was behind schedule at the award stage; therefore implementation had not commenced. However, the 67 grantees funded in the FY 2023/24 were still undertaking research. These were at varying levels of progress but also behind schedule since some started implementation in the third quarter of FY 2023/24. This was attributed to the late disbursement of funds, delayed granting of permission to spend funds by the STI, and procurement delays arising from the absence of Procurement and Disposal Units (PDUs) and contractor capacity for science research-related procurements. The 22 grantees assessed expressed the lack of harmonisation of the policies on intellectual property (IP) sharing rights between the innovators, host institutions, and the STI Secretariat, which was said to be unfair and demoralising the innovators.

There was also deliberate action to increase investment to boost capacity in research and development under the sub-programme. In line with this, the Banana Industrial Research Development Centre (BIRDC) received the Q-mark for all "Tooke" brands and the institution was recommended for ISO 22000:2018 certification by June 2025. The procurement of equipment to upscale and automate the plant to speed up processing, however, registered slow progress. The phase 2 lab equipment was procured and installed and consumables were procured, while the contract for procurement of phase 3 lab equipment was at the initiation stage. The construction of five collection centres had not commenced.

As a result, BIRDC procured only 564 metric tonnes (MT) of the targeted 3,600 MT of fresh green bananas from farmers, translating into sales revenue of USh 1.86 billion, which was 30% of the semi-annual target. The procurement delays, therefore, slowed the full commercialisation of the plant for sustainability. The establishment of a tertiary coffee roasting and instant coffee processing facility in Ntungamo was also at 75%, with both civil works and installation of machinery ongoing.

STI Ecosystem Development Sub-programme

The sub-programme performance was fair, at 63.4%. The phase 1 and 2 construction of the Kiira Motor Vehicle Plant with a capacity of 2,500 vehicles annually was completed. The plant was under the defects liability period (DLP) and it was yet to be commissioned. The National E-mobility Strategy was developed and published, and an e-public transport system was piloted in Jinja City with seven buses using a cashless payment system. The renovation of Lira and Nakawa agricultural incubation centres was also ongoing.

The National Science, Technology, Engineering, Innovation and Skills Enhancement Project (NSTEI-SEP) was transformed from a project phase to the Engineering Development and Innovation Centre (EDIC) subvention under STI. However, EDIC was not operational due to the lack of funding to recruit the requisite staff.

The civil works and machine installation for the NSTEI-SEP was completed for both centres in Rwebitete and Namanve. However, precision tools, components, and industrial systems designing, production, and assembling had not yet started because EDIC was not operational. This was attributed to the shortage of funds to recruit the requisite staff.

The final draft of the National STI Strategy was completed and the development of the National STI Information Management System database was ongoing. The draft STI Policy, however, was yet to be approved and the strategy for National STI outreach and advancement had not yet been completed.

The Uganda Industrial Research Institute (UIRI) continued optimising research and skilling. One concept on development of medical textiles from locally available materials was developed, namely sanitary towels from locally available fibres. Virtue and in-house incubation was also supported in dairy, textiles, bakery, and cosmetics. Through the skilling centre, UIRI registered 84 PhD studies to enrich innovative ideas and provided industrial training to 86 students from Kyambogo, Uganda Petroleum Institute, Kigumba (UPIK), and other institutions of learning. In addition, UIRI continued to conduct repairs on the bakery and fruit sections at the Nakawa Incubation Centre and the renovation of the peanut butter processing plant in Lira.

Conclusion

The preclinical studies for the three human vaccines progressed but the take-off and completion of clinical studies were hindered by the absence of a GMP facility. Slow progress was registered in the area of registering IP rights. This was attributed to a lack of policy harmonisation on IP sharing between the innovators, host institutions, and STI Secretariat.

There was an increase in the human resource capacity for the STI through the various protégés recruited and PhD and master's students enrolled in the various research and innovation projects. The legal and regulatory framework was behind schedule as most of the policies, regulations, and strategies did not reach their final stages.

The civil works and installation of equipment and machinery at NSTEIC and the Technology, Innovation and Business Incubation Centre (TIBIC) in Rwebitete-Kiruhura and Namanve were completed. The construction and tooling of the Kiira Vehicle Plant was completed and awaiting commissioning. The e-public transport system was being piloted in Jinja City. The laboratory equipment for BIRDC was procured and installed at Bushenyi, while procurement of additional equipment for the "Tooke" factory and bakery was behind schedule. BIRDC was also in the process of acquiring ISO certification for the plant. Revenue generated by BIRDC through the sale of products was below target.

Implementation of the research and development (R&D) grants was behind schedule, and this was partly occasioned by the continued delay by the STI to authorise the use of funds by the grantees and difficulties in acquiring some critical equipment. Besides, STI was taking on many grantees in spite of inadequate resources, leading to tokenism for some grantees, and was, therefore, unable to achieve the intended targets within the project period.

The continued delay in recruiting staff for EDIC hindered the achievement of the project objectives and the delayed finalisation of operational documents for the Technical Service Company (TSC) affects revenue generation for the company and renders some equipment idle, and the few units leased out to some companies through service MoUs are being abused or misused.

Recommendations

1. The STI Secretariat should timeously authorise grantees to spend the funds disbursed to facilitate the achievement of the set objectives.

2. STI and host institutions should review the IP policies, especially on clauses to do with the sharing of proceeds from the intellectual property to recognise the individual innovator as opposed to only STI and host institutions.

3. The STI Secretariat should accelerate the establishment of a central GMP facility at one of the collaborating institutions to ensure the achievement of research objectives, especially clinical trials for vaccine development and therapeutics.

4. The STI Secretariat, together with the Public Service Commission, should expedite the recruitment of staff for EDIC to achieve the project's objectives.

CHAPTER 1: INTRODUCTION

1.1 Background

The mission of the Ministry of Finance, Planning and Economic Development (MoFPED) is: "*To formulate sound economic policies, maximise revenue mobilisation, and ensure efficient allocation and accountability for public resources so as to achieve the most rapid and sustainable economic growth and development*."

MoFPED, through the Budget Monitoring and Accountability Unit (BMAU), tracks the implementation of programmes/projects by observing how values of different financial and physical indicators change over time against stated goals and indicators. BMAU work is aligned with budget execution, accountability, and service delivery.

Commencing FY 2021/22, BMAU began undertaking Programme-Based Monitoring to assess performance against targets and outcomes in the Programme Implementation Action Plans (PIAPs)/Ministerial Policy Statements (MPSs). The semi-annual and annual field monitoring of Government programmes and projects was undertaken to verify the receipt and expenditure of funds by the user entities and beneficiaries, the outputs and intermediate outcomes achieved, and the level of gender and equity compliance in the budget execution processes. The monitoring also reviewed the level of cohesion between sub-programmes and noted implementation challenges.

The monitoring covered the following Programmes: Agro-Industrialisation; Community Mobilisation and Mindset Change; Digital Transformation; Human Capital Development; Innovation, Technology Development and Transfer; Integrated Transport Infrastructure and Services; Manufacturing; Mineral Development; Natural Resources, Environment, Climate Change, Land and Water Management; Public Sector Transformation; Private Sector Development; Sustainable Development of Petroleum Resources; and Sustainable Energy Development.

This report presents findings from monitoring the Innovation, Technology Development and Transfer (ITDT) Programme for the period 1st July 2024 to 31st December 2024.

1.2 Programme Goal and Objectives

The ITDT Programme contributes to objective four of the NDP III, i.e. to enhance the productivity and social well-being of the population. The goal of the ITDT Programme is to increase the application of appropriate technology in the production and service delivery processes through the development of a well-coordinated STI ecosystem.

The objectives of the programme are:

i. To develop requisite STI infrastructure.
ii. To build human resource capacity in STI.
iii. To strengthen research and development (R&D) capacities and applications.
iv. To increase the development, transfer and adoption of appropriate technologies and innovations.
v. To improve the legal and regulatory framework.

1.3 Sub-programmes

The ITDT Programme is implemented through the following sub-programmes:

i. Research and Development (R&D).
ii. Industrial Value Chains Development.
iii. STI Ecosystem Development.

1.4 Programme Outcomes

The Third National Development Plan (NDP III) ITDT Programme outcomes are:

i. Increased innovation in all sectors of the economy.
ii. Enhanced development of appropriate technologies.
iii. Increased R&D activities in the economy.
iv. Increased utilisation of appropriate technologies.
v. An enabling environment for Science, Technology, Engineering and Innovation created.

The key targets to be achieved by this programme over the NDP III period include:

i. Increase the Global Innovation Index from 25.3 to 35.0.
ii. Increase gross expenditure on R&D as a percentage of Gross Domestic Product (GDP) (GERD) from 0.4 percent to 1 percent.
iii. Increase business enterprise sector spending on R&D (percent of GDP) from 0.01 percent to 0.21 percent.
iv. Increase the number of intellectual property rights registered per year from 2 to 50.

CHAPTER 2: METHODOLOGY

2.1 Scope

This monitoring report is based on selected interventions in the ITDT Programme during FY 2024/25. Implementation of the programme is spearheaded by Vote 167: Science, Technology and Innovations (STI), and Vote 110: Uganda Industrial Research Institute (UIRI). The funded subventions under STI include: The Uganda National Council for Science and Technology (UNCST), Kiira Motors Corporation (KMC), and the Banana Industrial Research and Development Centre (BIRDC).

The annual monitoring for FY 2024/25 focused on two votes, i.e. STI and UIRI, as well as three subventions, i.e. KMC, UNCST, and BIRDC.

The monitoring involved analysis and tracking of inputs, activities, processes, outputs and, in some instances, intermediate outcomes as identified in the Programme Implementation Action Plan (PIAP), MPSs, and Quarterly Work Plans, progress and performance reports of Ministries, Departments, and Agencies (MDAs).

A total of seven (7) interventions out of 23 under the PIAP were monitored, as indicated in Annex 1. The selection of the interventions to monitor was based on the following criteria:

i. A significant contribution to the programme objectives and national priorities.
ii. Level of investment and interventions that had a large volume of funds allocated were prioritised.
iii. Planned outputs whose implementation commenced in the year of review, whether directly financed or not. In some instances, multiyear investments or rolled-over projects were prioritised.
iv. Interventions that had clearly articulated gender and equity commitments in the policy documents.

2.2 Approach and Methods

Both qualitative and quantitative methods were used in the monitoring exercise. The physical performance of interventions, planned outputs, and intermediate outcomes were assessed by monitoring a range of indicators. The progress reported was linked to the reported expenditure and physical performance.

A combination of random and purposive sampling was used in selecting interventions and outputs from the PIAPs, MPSs, and progress reports of the respective agencies for monitoring. To aid in mapping PIAP interventions against annual planned targets stated in the programme MPSs and Quarterly Work Plans, multi-stage sampling was undertaken at three levels: i) Sub-programmes; ii) Sub-sub-programmes; and iii) Project beneficiaries. Regional representation was considered in the selection of beneficiaries and outputs.

2.3 Data Collection and Analysis

2.3.1 Data collection

The monitoring team employed both primary and secondary data collection methods. Secondary data collection methods include:

i) Literature review of key policy documents, including MPSs for FY 2024/25; National and Programme Budget Framework Papers; A Handbook for Implementation of NDP III

Gender and Equity Commitments; PIAPs; NDP III; quarterly progress reports and work plans for the respective implementing agencies; Quarterly Performance Reports; the Budget Speech; Public Investment Plans; and Approved Estimates of Revenue and Expenditure.

ii) Review and analysis of data from the Integrated Financial Management System (IFMS) and Programme Budgeting System (PBS) Quarterly Performance Reports.

Primary data collection methods, on the other hand, include:

iii) Consultations and key informant interviews with institutional heads and project/intervention managers.

iv) Field visits to various institutions for primary data collection, observation, and photography.

v) Callbacks in some cases were made to triangulate information.

2.3.2 Data Analysis

The data was analysed using both qualitative and quantitative approaches. Qualitative data was examined and classified in terms of constructs, themes, or patterns to explain events among the beneficiaries (interpretation analysis) and reflective analysis, where the monitoring teams provided an objective interpretation of the field events. Quantitative data, on the other hand, was analysed using advanced Excel tools that aided interpretation.

Comparative analyses were done using percentages, averages, and cross-tabulations of the outputs/interventions. The performance of outputs/interventions and intermediate outcome indicators was rated in percentages according to the level of achievement against the annual targets. The assessment of grants under the STI funding windows was based on the achievement of annual output targets (numbers) and the level of annual budget disbursements. The sub-programme score was determined as the weighted aggregate of the average percentage ratings for the output/intermediate outcomes in the ratio of 65% : 35%, respectively.

The overall programme performance is an average of individual sub-programme scores assessed based on outputs monitored. The performance of the programme and sub-programme was rated based on the criteria set out in Table 2.1. Based on the rating assigned, a BMAU colour-coded system was used to alert policymakers and implementers to whether the interventions were achieved or had very good performance (green), good performance (yellow), fair performance (light gold), or poor performance (red).

Table 2.1: Assessment Guide to Measure Performance in FY 2024/25

Score	Performance Rating	Comment
90% and above		Very Good (Achieved at least 90% of outputs and outcomes)
70% – 89%		Good (Achieved at least 70% of outputs and outcomes)
50% – 69%		Fair (Achieved at least 50% of outputs and outcomes)
49% and below		Poor (Achieved below 50% of outputs and outcomes)

Source: Author's Compilation

Ethical considerations

Introduction letters from the Permanent Secretary/Secretary to the Treasury were issued to the respective MDAs, and beneficiaries were monitored. Entry meetings were held with the Accounting Officers or delegated officers upon commencement of the monitoring exercise. Consent was sought from respondents, including programme or project beneficiaries. All

information obtained during the budget monitoring exercise was treated with a high degree of confidentiality.

2.4 Limitation

- Lack of reliable and real-time financial data on subventions on the IFMS.
- Misaligned PIAP interventions that do not relate to outputs and sub-programmes in the work plan, which affects performance assessment.

2.5 Structure of the Report

The report is structured into four chapters. These are: Introduction; Methodology; Programme Performance; and Conclusion and Recommendations.

CHAPTER 3: PROGRAMME PERFORMANCE

3.1 Overall Performance

3.2.1 Financial performance

The approved budget for the ITDT Programme is USh 346.95 billion, of which USh 211.1 billion (60%) was released and USh 151.98 billion (72%) spent by 31st December 2024 (Table 3.1). The release was very good, while the expenditure was good. The fair absorption was attributed to the delayed selection and issuance of grants to the successful innovators.

STI had the biggest share of the annual budget, at 92.8%, followed by UIRI at 6.4%, while the support to the Uganda Embassy in Moscow and the Ministry of Foreign Affairs (MoFA) had the least budget share, at 0.03% and 0.1%, respectively. The detailed performance of the votes under the programme is presented in Table 3.1.

Table 3.1: Financial performance for the ITDT Programme as at 31st December 2024 (Bn USh)

Vote	Approved Budget	Releases	Expenditure	% Budget Released	% Budget Spent
Science, Technology and Innovation	322.00	200.38	142.16	62.2	70.9
Uganda Industrial Research Institute	22.37	9.17	8.60	41.0	93.7
Uganda Registration Services Bureau	2.10	1.31	1.00	62.5	76.6
Ministry of Foreign Affairs	0.37	0.18	0.15	50.0	83.5
Uganda Embassy in Moscow, Russia	0.12	0.06	0.06	49.7	99.1
Total for the Programme	**346.95**	**211.1**	**151.98**	**60.8**	**72.0**

Source: Quarter Two PBS Report FY 2024/25

3.2.2 Physical performance

The overall performance of the ITDT Programme was fair, at 61.7% (Table 3.2), with both the Industrial Value Chain Development and STI Ecosystems Development Sub-programmes posting fair performance. This was attributed to the delayed award of contracts to the successful grantees for the FY under review, which negatively impacted on expenditure.

The key infrastructure development outputs, namely the National Science, Technology Engineering, Innovation and Skills Enhancement Centre (NSTEIC), the Technology and Industrial Business Incubation Centre (TIBIC), the National Products Research and Innovation Center (NAPRIC) in Mbale, and Kiira Vehicle Plant were completed and under defects liability. The construction of the Good Manufacturing Practice (GMP) facility at the Natural Therapeutics Centre in Wandegeya commenced, while the construction of the pathogen park in Nakasongola was yet to start.

The progress of the vaccine studies had slowed down due to the absence of GMP facilities to facilitate undertaking of the final preclinical trials. The commercialising of the "Tooke" plant registered slow progress, attributed to lengthy procurement of required equipment, especially the drum drier. However, the research laboratories received additional equipment and were ready for use. Table 3.2 presents the programme performance.

Table 3.2: ITDT Programme output performance by 31st December 2024

Sub-programme	Physical Performance (%)	Remarks
Industrial Value Chains Development	59.9	Fair performance
STI Ecosystems Development	63.4	Fair performance
Overall Programme Performance	**61.7**	**Fair performance**

Source: Field Findings

Detailed performance of the monitored sub-programmes and interventions is given hereafter:

3.2 Industrial Value Chain Development Sub-programme

The sub-programme aims to increase development, transfer and adoption of appropriate technologies and innovations; and development of requisite STI infrastructure. The sub-programme has three interventions and all were monitored. The sub-programme performance was fair at 59.9%. Table 3.3 provides the summary performance of the sub-programme interventions as at 31st December 2024.

Table 3.3: Performance of interventions under the Industrial Value Chain Development Sub-programme by 31st December 2024

No	Intervention	Colour code	Remark
1	Design and implement special programmes for nanotechnology, space exploration, nuclear technology, biosciences, ICT and engineering	38	Poor performance
2	Strengthen the function of technology acquisition, promotion as well as transfer and adoption	55.7	Fair performance
3	Increase investment in research and development (R&D) in key priority sectors like agriculture, oil and gas, minerals, energy, health, transport	75	Good performance

Source: Field Findings

3.2.1 Design and implement special programmes for nanotechnology, space exploration, nuclear technology, biosciences, ICT and engineering

The intervention aims at building institutional and human resource capacity in STI. The planned output during the FY 2024/25 is technology and innovation. The plan is to train five engineers in aeronautics and space science, operationalise the earth station for satellite communication, set up an aerospace electronic laboratory (phase 1) at Mpoma, install network infrastructure at Mpoma and create the Space Policy and Strategy.

The overall intervention performance was poor, at 38%. By 31st December 2024, the training of the engineers was ongoing in Egypt and an additional 106 university students were trained locally in aeronautics and space science. The installation of the satellite communication system progressed to 50%. The phase 1 setting up and equipping of the aerospace electronic laboratory was at 20%. The development and installation of the network infrastructure was at 15%, while the drafted space policy, space strategy and the bill for the corporation were ongoing, at stakeholder consultation stage.

In addition, Uganda is participating in the Africa Development Satellite (AFDEV) initiatives led by the Egyptian Space Agency to develop a space system for climate change monitoring

and capacity building. On the other hand, the Northern Corridor Initiative satellite is being developed by East African nations to help in climate monitoring and disaster prediction.

Phase 2 rehabilitation of Mpoma Satellite Earth Station in Mukono, including research and development of a laboratory and the Geospatial Centre, commenced during the period under review. The equipment-upgraded capability for the ground station was procured to be able to receive data from many partners' satellites in addition to Uganda's own satellite.

3.2.2 Strengthen the function of technology acquisition, promotion as well as transfer and adoption

The intervention aims at increasing the development, transfer and adoption of appropriate technologies and innovations. The planned output during the FY 2024/25 is research and development, and technology and innovation undertaken.

The plan was to support researchers to undertake innovations in various fields. The targets were: complete clinical trials for three (3) selected vaccines and prepare plans for the construction of the pathogen economy industrial park among others.

The intervention performance was fair, at 55.7%. The clinical trials were not completed as planned due to the absence of a GMP facility in the country. The development of the National Pathogen Economy Strategy draft was at 80% completion. The land for the establishment of a Science and Technology Park (Pathogen Economy Park) was acquired in Katuugo, Nakasongola and the plan for the park was being finalised.

It was noted that these were innovators whose funding was in the budget of FY 2022/23. However, the funds were disbursed in FY 2023/24 and execution spilt into FY 2024/25. The selection of grantees for FY 2024/25 was at the award stage.

A total of 67 grantees were supported to undertake research and innovation in various fields. The project objective for the various projects for the grantees is given in Annex 2. Whereas funds were released to the grantees, the permission to spend was granted very late, with some taking up to six months from the time of receiving funds. During the period under review, 22 grants were reviewed to ascertain progress and the findings are discussed below:

1. ***Adeno-vector vaccine: Preclinical immunogenicity assessment and GMP process transfer***

The project aims at developing a SARS-CoV-2 vaccine using an adenovirus vector and viral spike (S-glycoprotein) from Ugandan viral strains. The key objectives are to: 1) Complete immunogenicity studies in humanised mice; and 2) Produce bulk stock for clinical trials under cGMP (current Good Manufacturing Practice) conditions. The project planned outputs included: A Ugandan Non-Human Primate (NHP) adenovirus vector developed; an adeno-vector COVID-19 vaccine developed; and technical capacity for vaccine production built.

The project budget during FY 2023/24 was USh 1 billion, which was all disbursed to the implementer by 30th October 2023; however, permission to spend was granted in March 2024.

The following progress had been registered by December 2024: Completed genotypic characterisation of 73 faecal samples collected from chimpanzees; an adeno-vector backbone was generated; three vaccine candidates (A23.1, Delta and Omicron) were generated from deleted adeno-vectors; bulk laboratory stock of both the vaccine and vector were generated;

and capacity building of project staff in areas of bioinformatics, next generation sequencing and cytometry flow panels was done. Additionally, a PhD student was recruited with a focus on developing the capacity for multivalent vaccines. Three PhD students were also enrolled in various capacity-building programmes and were at different stages of completion.

By the end of December 2024, the pilot study on the vaccines to evaluate the safety and immunogenicity of the vaccines was completed successfully. Most of the products tested did not have any negative effects on the function of the organs (liver, kidney, heart, brain, spleen, and skeletal muscle) of the mice. The efficacy studies (to assess whether the antibodies neutralise the virus) were also completed. The final assessment of the vaccine had not been undertaken due to the absence of a GMP facility in the country.

The request for patent rights for the indigenous vaccine backbone was submitted to the African Regional Intellectual Property Organization (ARIPO) and was in the final stages of clearance. The project was affected by delayed approval to spend the funds, inadequate resources to pay the project staff, and the absence of a GMP facility.

2. *Development and evaluation of recombinant subunit SARS-CoV-2 Spike Protein-based subunit vaccines*

This project developed a candidate COVID-19 vaccine using recombinant vaccine technology. The objectives were to: 1) Establish a cGMP for pilot production of subunit vaccine; and 2) Produce a vaccine for clinical trials.

The budget for FY 2023/24 was USh 1.5 billion, all of which all was disbursed and USh 0.637 billion spent by December 2024. During the first phase of funding, the Delta and Omicron spike antigen was successfully cloned and expressed, and the safety and immunogenicity studies were completed.

The conversion to BSL3 laboratory progressed to 30%, with the facility plans and bills of quantities (BOQs) generated following the support of GMP experts from Cuba. Additionally, the manufacturing methods were optimised and a patent was applied for.

Sample vaccines were produced for clinical trials, and the preliminary processes were being undertaken to have the vaccine approved by all the required agencies. The phase 1 clinical trial protocols were developed, and the procurement of equipment such as the HVAC-HEPA filters, biosafety cabinets, and bioreactor for protein expression to carry out the clinical trial was initiated. The manufacturing methods were also optimised, the vaccine was characterised to 80%, and the application for the patent was submitted. Additionally, efficiency studies in humanised mice were undertaken.

The project was delayed by the delayed approval to spend the funds by the STI Secretariat and change of facility from a cGMP to a BSL 3 lab for the production of the vaccine following the production partner's (M/s Alfasan) lack of some equipment to manufacture human vaccines.

3. *Preclinical studies and GMP production for inactivated vaccine*

This is one of the pioneer human vaccine projects utilising inactivated vaccine technology. The project has two objectives: 1) Completing the animal trials-preclinical immunogenicity assessment; and 2) Production of bulk stock for clinical trials in a cGMP facility.

The project budget was USh 1 billion, all of which was released and over 80% expended by 31st of December 2024. The study had completed inactivation and purification, and also completed the pilot animal trials in Swiss mice. The results from the initial trials indicated no significant safety concerns and adverse effects.

Analysis of the data and pilot optimisation of the collection of the cellular specimen before conducting the full preclinical trials on humanised mice for safety and immunogenicity were completed. The absence of a GMP facility for pilot bulk production of seed stock and GMP stock was a hindrance to the progress of the project.

Under the capacity-building output, three members completed their master's degrees in different areas related to the project, three were in their final year, while two had enrolled for master's degrees. The capacity building was intended to bridge the gap in the insufficient immunology skilled workforce.

The project was delayed by the lack of GMP facilities in Uganda for the production of GMP-certified products for use in human clinical trials, a discontinuous funding structure, limited access to high-containment laboratories (BSL-3) in Uganda, and an insufficient immunology skilled workforce.

4. Preclinical evaluation and standardization of antidiabetic herbal prototypes – GLUCOKAT Project

This project builds on earlier preliminary research that aimed at developing a natural anti-diabetic therapeutic through reformulation of an existing product. The key project objectives were to: 1) Evaluate the anti-hyperglycaemic and antidiabetic potential of the formulated prototypes using animal models; 2) Assess the toxicity profiles of the most efficacious formulated antidiabetic prototype in cell lines and animal models; 3) Analyse the phytochemical composition and contaminants of the most efficacious formulated prototype; 4) Assess and optimise the pharmaceutical properties of the of the most efficacious formulated antidiabetic prototype; and 5) Establish a Good Laboratory Practice (GLP) facility to support preclinical evaluation of natural therapeutics in Uganda.

Samples of the anti-diabetic herbal remedy ready for clinical trials.

The budget for the project was USh 1.3 billion, all of which was disbursed to the grantee and a total of USh 1.29 billion (99.9%) was spent by 31st December 2024. The project has two components, which are research, and infrastructure development.

The research component progressed to 99%, with the sample product submitted to National Drug Authority (NDA) for notification. Samples were collected and permutation of the five plants (*Tamarindus indica, Aloe vera, Erythrina abbyssinica, Kigelia Africana,* and *Entada abyssinica*) that were identified at prototype stage was undertaken. This was to enable optimisation of a few without losing the purpose and content. Four prototypes were formulated and one was prioritised because of its good physicochemical and organoleptic properties.

By 31st December 2024, a benchmarking visit to China was undertaken and the formulation of 100 doses of the chosen prototype-GTK04 and the preclinical safety and efficacy studies were

completed. The validation of efficacy, toxicity and analysis of the phytochemical composition and contaminants of prototypes was completed. The pending activity was pharmaceutical analysis and branding, which had progressed to 99% by half-year.

The infrastructure component (construction of a GLP) also progressed to 99%, with additional two floors completed and rectification of snags ongoing. The facility was not operational because it was not fully equipped. The funding scope did not include equipping of the centre.

The lack of clarity in IP sharing between STI, the host institution and the innovators was also still of concern to parties and derailed the submission of an IP application.

The delayed approval to spend affected timely implementation. There is need for the STI Secretariat to harmonise IP rights sharing between the researcher/grantee, host institution and the funder.

The substantially complete GLP facility at Busitema University, Mbale campus.

5. Fabrication of lithium-ion batteries for electric vehicle and rechargeable batteries for energy storage using locally available materials in Uganda

The aim of the project is to demonstrate the potential for developing electric vehicle batteries from Ugandan lithium and graphite. The objectives of the project are to: 1) Characterise the composition of local lithium and graphite ores; 2) Establish a small-scale process for purification of lithium and graphite from the ores on a laboratory scale; 3) Purify the raw lithium and graphite to battery grade materials and test for physical and chemical properties; and 4) Evaluate the purified lithium and graphite materials for energy storage ability.

The project has three phases, namely: Phase one of ideation and materials processing; phase two for materials analysis and testing, equipment assembly, and establishment of a battery testing laboratory; and phase three of setting up a lithium processing line, fabrication of different cylindrical battery types, assembly and testing battery packs for different applications.

The project budget is USh 1.75 billion, and a total of USh 0.458 billion was released and spent by 31st December 2024. The project progress was estimated at 60%. The renovation of the project laboratory was completed in September 2024 and handed over to Busitema University for use. The laboratory was partially equipped with furniture and other equipment for preliminary use.

A comprehensive survey of several potential lithium and graphite mines in some districts in Uganda was undertaken and samples collected. The active mines included Mbale, Mubende, Nampewo in Kasanda, Buhweju, Kigarama-Murambi, Kikagati-Nyanga and Kahama Cell, Kinono, although these were privately owned. Extensive sample collection was affected by difficulty in accessing mining sites as most of them were leased to private companies.

The researcher was conducting the physical and chemical characterisation of the ores, and the semi-purified materials using the acquired electrochemical testing machine. This was meant to verify whether the purified materials meet the required specifications for battery applications. The development of a preliminary laboratory-scale process for lithium and graphite purification based on the ore composition, and conducting initial experiments to assess the efficiency of the process were ongoing. This was intended to identify optimisation areas to improve yield and purity. Some of the remaining samples were to be sent to external laboratories for detailed chemical analysis to identify the ores' lithium and graphite content and their potential impurities.

The acquisition of more equipment for further sample analysis did not progress. A contract was awarded to M/s Wagtech International in February 2024 worth USh 1.2 billion for the big muffle furnace as well as other equipment[1] and materials. However, in November 2024, the contract was terminated following the contractor's failure to deliver. This arose from demands that were outside the contract, including demanding that the client pay the taxes and also changing the equipment warranty from three years to two years. By 31st December 2024, Busitema University was in the process of procuring another supplier.

The project implementation was hampered by difficulty in gaining access to the different lithium and graphite mines since most of them were leased to private companies, and change of the project's main objective from battery fabrication to material processing by STI. Others were delayed granting of permission to spend by STI and the inadequate capacity of the equipment contractor, resulting in delays.

[1] Planetary ball mill, slitting machine, rolling pressing machine, coating machine, vacuum oven, grooving machine, glove box and sealing machine among others.


L-R: Some of the collected and processed samples of graphite. The electrochemical testing machine used in lithium and graphite analysis.


The defective packaging materials that were supplied but could not be used for the purpose.

6. Formulation and preclinical evaluation of herbal toothpaste/ mouthwash for management of oral diseases

This project was a joint venture between Busitema University and CDH Herbal Solution Limited. The focus was on the development of herbal toothpaste for complete dental healing. The project objectives were to: 1) Formulate herbal toothpaste/mouthwash from extracts of selected plants for the management of oral disease; 2) Evaluate the organoleptic and physical properties of the formulated herbal toothpaste/mouthwash as per specified standards; 3) Evaluate the antimicrobial activity of the formulated herbal remedy against selected oral pathogens, *Streptococcus mutans* and *Staphylococcus aureus*; and 4) Produce and undertake field testing of one batch of the fully tested herbal remedy.

The project budget was USh 500 million, all of which was released and USh 419 million spent by end of December 2024. The product formulation was at 99%, with one prototype and 20 doses developed. Preclinical studies were conducted on the extracts where phytochemical and microbial analysis was at 99%. Studies on organoleptic and physical properties were also undertaken.

Antimicrobial and susceptibility tests progressed to 99%, while one IP asset was identified and filed. The data analysis and the drafting of one manuscript progressed to 30%. The capacity building was ongoing, with one intern recruited and eight (8) team members undergoing continuous professional development.

On the other hand, field testing had not commenced, pending registration with the Uganda National Bureau of Standards (UNBS) and NDA and the production of batch 1 (150 doses of herbal toothpaste and mouthwash). This was attributed to the inadequate capacity of the contractor to supply the right specifications of the packaging materials and filling machine.

The timely completion of the project was affected by the delayed approval to start spending, and shortage of equipment such as the Liquid Chromatography-Mass Spectrometry (LC-MS) to undertake certain tests and bulk production equipment.

7. Space Weather Science and Education Project for Disaster Management and Preparedness

This project intends to develop earth observation products using satellite and geospatial data towards disaster prediction (drought, weather and landslides, among others). It is intended to yield the premier product from the Aeronautics and Space Bureau. The objectives of the project are to: 1) Develop a space weather based early warning tool; 2) Design and prototype requisite instrumentation and equipment; and 3) Develop human resource capacity in space science and technology.

The project budget is USh 2 billion, of which USh 0.592 billion was spent by end of December 2024. The activity with the highest expenditure by December 2024 was housing costs and the least was raw materials. A total of USh 0.402 billion was committed to items under procurement while USh 0.549 billion was committed to tuition for the research students that were enrolled on the project.

By 31st December 2024, the overall project progress was 75%. All critical staff were identified and recruited, the renovation of the test bed room was completed, and six PhDs and two master's students were recruited. The prediction model was developed and refined to 85%. The launching of the tool (with four models namely: a foundational weather model, a rainfall prediction model, a landslide prediction model and a rainfall-induced landslide model) was behind schedule, at 50%, and validation of the prototype progressed to 30%.

The installation of weather equipment was at 20%, while data collection and cleaning progressed to 25%. The development of a reliable mobile application had not commenced because a developer was not yet contracted.

The project was affected by the delayed approval to spend by the STI Secretariat, inadequate capacity of some contractors and price variation from the original budget, which necessitated scaling down the required equipment.

8. Laboratory-scale production of beta propiolactone from cassava for application in the pharmaceutical industrial value chains

This project aimed to study the chemical conversion of ethanol from cassava to produce a more valuable product, beta-propiolactone (BPL), which is an essential ingredient in vaccine development. The key objectives of the projects were: 1) Optimising the production process for beta propiolactone; 2) Synthesising the intermediate chemicals (ethanol, ethylene and ethylene oxide) required for BPL production; 3) Producing beta-propiolactone at laboratory scale for inactivation of viruses during vaccine development; and 4) Determining the quality profile of the synthesised BPL.

The project budget was USh 0.450 billion and all was released to the researcher and USh 0.251 billion (52%) expended by end of December 2024. The project overall physical progress was

42%. The renovation and set-up of the laboratory involving benchmarking on the production line was complete and the production of the intermediate chemicals and catalysts (yeast) progressed to 30%. However, the procurement of equipment and material sourcing/material supply system was at 80%, pending delivery.

Other achievements were: a solar drying shade for cassava was established; a catalytic reactor was fabricated locally; and four (4) Master of Science students were partially supported to undertake further studies (three in Busitema University and one in Makerere University).

The project was behind schedule due to delayed disbursement, procurement delays, and price variations for some equipment beyond the budget.

9. Animal research services for enhancing shared efficiency and effectiveness

The project is to act as a common user laboratory animal facility to support animal studies for vaccine and therapeutics research. The project objectives are: 1) Continuous breeding and maintenance of humanised ACE2 mice; 2) Designing humanised mice for diseases of interest (cancer and malaria, among others); 3) Complete refurbishment of the laboratory animal house facility into a Bio-Security Level 3 (BSL-3) facility; and 4) Conducting animal studies for COVID vaccines. The project is housed at the College of Veterinary Medicine, Animal Resources and Bio-security (COVAB).

The budget was USh 1 billion, all of which was released and USh 0.864 billion (86.4%) spent by 31st December 2024. The facility continued the breeding of over 500 mice. A draft curriculum for the preclinical trials at the facility was designed and approved by the university.

The refurbishment and transformation of the laboratory animal house into a Bio-Security Level 3 (BSL-3) laboratory was ongoing, with the air conditioning and incinerator completed, tested and pending handover. Five staff were trained on approaches to preclinical trials, including animal management, animal feeding and animal feed-making, animal experimental testing procedures, and animal ethics. The Standard Operating Procedures (SOPs) for the BSL-3 and BSL-2 lab facilities were also developed.

The pending activities included the installation of five airtight doors (50%); five aluminium doors with glazed glass (50%); a heating, ventilation, and air conditioning (HVAC) system; and 50 individual cages for the mice that had been procured.

The procurement of a class three biosafety cabinet, a key equipment for efficacy studies on vaccines, had stalled. The contractor wanted 100% payment before delivery and that funds be paid to a Germany-based company. The university was establishing the legal implication and carrying out the necessary consultations to avoid a potential financial loss.

The project was affected by the delayed approval to spend, delayed procurement, especially by the University Estates Department, and delayed acquisition of inputs and lab consumables due to price changes.

10. Establishment of a biomarker research facility

The aim was to put in place a common user facility to support the identification and isolation of biological molecules found in body fluids or tissues that are signs of a normal or abnormal process, or of a condition or disease. These molecules are used in the development of drugs, diagnostics and other biotechnology products.

The project is a continuation from the first phase of funding under the Presidential Scientific Initiative on Epidemics (PRESIDE), where the project acquired equipment for the Bio-Security Level 2 (BSL-2) laboratory for biomarker discovery, developed a biomarker panel for Rapid Diagnostic Tests (RDT), generated a lateral flow prototype and expressed antigens and monoclonal antibodies.

The project budget is USh 1.5 billion, all of which was released and USh 1.31 billion (88.2%) spent by end of December 2024. The overall physical progress of the project was 70%.

During the second year of the project, some pieces of equipment, such as the High-Performance Liquid Chromatography (HPLCP), were procured but not installed owing to unavailability of the required facility. Space for the biomarker facility at the Centre for Global Health and Biosecurity had been allocated, the architectural plan and a BOQ were acquired and solicitation of bids for the remodelling of the facility was ongoing. A manuscript had been developed and was awaiting the guidance of the STI Secretariat to enable the registration of intellectual property. An evaluation of the biomarker was ongoing to test its validity, stability and usability.

The key objectives for the third year (FY 2024/25) of funding are to: 1) Finalise the establishment of the biomarker research facility at Makerere University; 2) Evaluate the stability and usability of the newly assembled lateral flow immunochromatographic assay prognostic/diagnostic kit under different conditions (Temperature, humidity and life span stability); 3) Scale up the production of the SARS-COV-2 lateral flow assay kit prototype for detecting/predicting severe SARS- COV-2 patients; and 4) Clinically validate the performance (sensitivity and specificity) of the newly assembled lateral flow immunochromatographic assay prognostic/diagnostic test for monitoring SARS-COV-2 cases from Mulago, Jinja and Mbarara Hospitals in Uganda.

By the end of December 2024, various pieces of equipment[2] were procured and installed, although the facility was not yet remodelled for its intended purpose. The procurement of a contractor for the remodelling of the facility was at the Office of the Solicitor General for approval. To build capacity, eight laboratory staff at the Centre for Biosecurity and Global Health (CeBiGH), Makerere, were trained on the use of lateral flow equipment.

The validation of the newly assembled lateral flow assay kit for predicting/detecting severe SARS- COV-2 patients progressed to 80% with positive results. The evaluation of the assembled lateral flow kit for stability and usability was undertaken with stability optimised at 25 degrees. The scale-up for the production of the SARS-COV-2 lateral flow assay kit prototype had not commenced due to delayed delivery of some equipment and kit materials. The clinical validation of the performance (sensitivity and specificity) of the assay was behind schedule, awaiting the mass production of the kits.

[2] Lateral flow dispenser, strip cutter, lateral flow printer and Liquid Chromatography-Mass Spectroscopy (LC-MS/MS).

Due to a reduction in the reported cases of COVID-19, the researcher was exploring the repurposing of the assay kit targeting four tests. These were: Rapid bovine pregnancy test, which was at prototype level; human African trypanosomiasis, which was awaiting clinical trials; malaria urine strip, which was at prototype validation level; and a prostate cancer screening Prostate Specific Antigen (PSA) rapid kit, which was at biomarker validation.

The High-Performance Liquid Chromatography (HPLC) that was procured under the STI funding.

The project was behind schedule, arising from the delayed finalisation of procurement of a contractor to remodel the biomarker facility and delayed mass production of the lateral flow assay kit, which, in turn, affected progress of the clinical tests. The absence of a budget for sustainability of the activities through equipment maintenance and personnel after the project posed a risk of equipment breakdown after the project period.

11. Developing Sustainable Mushroom Agribusiness Support Services (MASS) for improving livelihoods and sparking competitive Agro-Industrialisation in Bukedi sub-region

The project aims at developing a least-cost substrate combination for the growing of mushrooms to improve access to optimal substrate/medium for mushroom growing. This will reduce the importation of cotton seed cake for mushroom growing. The project objectives are to: 1) Develop a product of the mushroom agribusiness support-based substrate for mushroom growing; 2) Develop a distribution model for the mushroom agribusiness support-based substrate for mushroom growing; and 3) Establish a cooperation that will drive the commercialisation of the mushroom agribusiness support-based substrate for mushroom growing.

The project budget is USh 0.900 billion, which was all released. By 31st December 2024, a total of USh 0.734 billion (82%) was expended. The biggest expenditure was on personnel costs, followed by other project activities. The physical progress was estimated at 60%, all registered under objectives 1 and 2, but with no progress under objective 3.

By 31st December 2024, three substrates, namely coffee husks, rice straw and sawdust, had been tested as alternatives to cotton seed cake in mushroom production. After the trials, rice straw was identified as the substitute with higher potential to substitute cotton seed cake. The research on *Azolla weed* as another alternative was ongoing. However, the weed was scarce, especially during the dry season since it grows in wetlands, ditches and rice fields. Though the grantee opted to dig ponds to cultivate the weed, the returns were still very low.

A total of 700 out of the planned 2,000 farmers were reportedly trained in modern mushroom production and two outlets in Butaleja and Budaka were established to act as points of supply, product collection centres, and information points to the farmers.

The establishment of a cooperative was not done, the project did not demonstrate value for money, and there was hardly any substantial innovative idea demonstrated.

L-R: One of the mushroom gardens established in Butaleja; Equipment for cutting the rice straws as an alternative substrate to cotton seed cake

12. Developing a national network of STI excellence as a foundry for transformative human capital development

This project aimed at developing national human capital for STI by identifying, nurturing, skilling and deploying industrial scientists. The project is being implemented in phases and phase one was completed. The project objectives under phase 2 are to: i) Establish an efficient aggregator mechanism for transforming traditional research and science into internationally acclaimed industrial science and technology; ii) Provide a sustainable mechanism for nurturing internationally acclaimed industrial scientists and associated workforce for developing Uganda's niche industrial value chains; and iii) Promote science development and support network for STI establishments in the provision of transformative STI services for sustainable socio-economic transformation.

The project budget for phases 1 and 2 is USh 2 billion. By 31st December 2024, a total of 1.5 billion (75.1%) was spent. The highest expenditure is on stipends for protégé scientists followed by training (nurturing industrial scientists). As part of the preparation processes, the entity was registered with Uganda Registration Services Bureau (URSB), a board of directors was established and a situation analysis was undertaken.

Under objective 1, a draft framework agreement was developed, waiting legal and regulatory processes to make it operational. In addition, training modules in the areas of good laboratory practices, bio-risk management, mass spectrophotometry, and research laboratory animal handling were developed and piloted. A vaccinology curriculum and other working documents were being developed.

For objective 2, a sustainable mechanism for training internationally accredited scientists was being developed. Tools for training, including manuals and assessment tools, were developed and a website was set up. Consequently, a total of 22 protégés were enrolled for training to increase the STI critical mass, and eight facilitators, several onsite/industry-based trainers were recruited.

Under the third objective, the Fonds pour la Science, la Technologie et l'Innovation (FONSTI) mediated collaborative capacity building between Makerere University and St. Andrew's University (UK). This collaboration will start with one PhD student upon the finalisation of the collaboration agreement. In addition, a Project Implementation and Action Plan (PIAP) was established and training materials for product evaluation and clinical trials were obtained from the United States of America.

13. Productivity acceleration support service

The project aimed at developing a sustainable solution to household productivity through capacity gap diagnosis and empowerment of households to produce efficiently. This would lead to the transitioning of subsistence households into the cash economy with or without PDM funding. The project objectives were to: 1) Develop the productivity acceleration support service; 2) Develop a distribution model for the productivity acceleration support service; and 3) Establish a cooperation that will drive the commercialisation of the productivity acceleration support service.

The project annual budget was USh 2.4 billion, all of which was disbursed, and USh 2.09 billion (87.2%) was spent by 31st December 2024. The bigger percentage of the budget was on training and nurturing (56.5%), followed by allowances (20%). Five districts were selected as a pilot to the project, and these were: Kamuli, Butebo, Budaka, Kakumiro, and Nakapiripirit. However, due to security challenges in accessing Nakapiripirt, it was replaced with Kapelebyong.

By the end of December 2024, the following progress was registered: Data analysis and storage for service product market research (90%); strengthening of corporate formation and relations with community, public and private sectors (90%); recruitment of staff members, orientation, tooling and retooling (100%); and data collection and analysis to aid the development of business models and strategy was at 90%.

Other ongoing activities were: assessment of fish feeds used by farmers in Bukedi; standardisation of fish ponds; fish farmer training; design of a nutritious pond feed system formula; and stocking of fish ponds.

The project progress was affected by delayed approval to spend, political interference, and socio-cultural barriers. The project also lacked regional representation in the selection of the pilot beneficiary districts.

14. ICT Platform for the Pathogen Economy Project

The focus of the project is to develop Artificial Intelligence (AI)-enabled diagnostic tools for cancer, and support for AI-in-health incubation for the ecosystem. The key project objectives are to: i) Develop and support the commercialisation of three (3) AI-driven platforms for screening diseases of national priority, i.e. cervical cancer, tuberculosis (TB) and one project selected through open calls; and ii) Establish AI in the Healthcare Research and Innovation Hub.

The one-year project budget was USh 1.150 billion, of which USh 0.178 billion was released and expended by 31st December 2024. Implementation started late in September 2024 owing to the delayed approval to spend by the STI Secretariat. Despite the delayed commencement, implementation was halted/paused by STI in December 2024 to review and harmonise the objectives of this project with another project under the Industry 4.0+ Bureau within STI. At the time of halting operations (end of December 2024), the development of the cervical cancer and TB screening platforms were being developed.

The gathering of system requirements and documentation, business development training and co-creation sessions, as well as a market development strategy for both the cancer and TB screening platforms were completed. Customer engagement for the TB screening platform progressed to 50%. However, the market field visit and the customer engagement for cancer screening was not done.

Under the selection and on-boarding of the third AI-for-Health Project, a total of 38 applications were received, and three applicants had been selected before the project was halted by Science, Technology and Innovation-Office of the President (STI-OP).

The project was affected by financial loss arising from currency conversion. Whereas the project is funded in Ugandan shillings, the account at the College of Engineering, Design, Art and Technology (CEDAT) on which funds are deposited is a US dollar account. CEDAT should either provide a Ugandan shilling account for the funds or the funds should be deposited on a Ugandan shilling account at the College of Computing and Information Science, where the project is housed. In addition, STI-OP should expedite the harmonisation of project objectives and communicate the next steps to the grantees.

15. Improved UBV-01N product for management of viral respiratory infections

The aim was to establish a GMP pilot plant for natural therapeutics at the Natural Chemotherapeutics Research Institute (NCRI) and support the reformulation of Uganda Bee Venom (UBV-01) for viability as an anti-breast cancer natural therapeutic. The project objectives were: 1) cGMP establishment; and 2) Reformulation of UBV-01 as an anti-carcinogen.

The one-year project budget was USh 1 billion, all of which was released and USh 0.300 billion expended by the end of December 2024. This project builds on the initial funding under PRESIDE that started in 2021.

The reformulation of the UBV-01 to treat breast cancer was undertaken and was awaiting the conclusion of in-vitro studies to inform the next steps. The registration of the IP was delayed by URSB's lack of a process to deal with IP registration for natural therapeutic products. However, the STI Secretariat was engaging URSB for a solution.

The survey for ground space for the GMP facility was undertaken and the structural drawings were completed and approved by NDA. The construction works had not commenced owing to the earlier communication by STI to use the funds to support the production of a remedy for hangover (*Pombe Guard*). However, this was later reversed and the project was granted a no-cost extension for eighteen months up to June 2026 to conclude the pending works.

16. Production and commercialisation of mosquito repellent lotions from ethnomedicinal plant oils and shea butter

This project aims to utilise shea butter as a base for the plant extract mosquito repellent to contribute to the reduction of imported petroleum-based mosquito repellents into the country. The key project objectives are to: 1) Establish a pilot plant to make products for market testing and to understand the process for scaling up to a commercial production; 2) Obtain all the necessary licensing and certification for the production of mosquito repellents before the viable products are introduced to the market; and 3) Cary out trial sales of the viable mosquito repellent products.

The project budget was USh 0.500 billion, all of which was released and all spent. The following was achieved: A detailed design of the pilot plant system with a visual representation of the entire process was developed; and the structure was constructed. A 200-litre lotion production unit was obtained and installed in the warehouse structure.

A market survey was conducted and a report produced, while the report for the supply chain analysis had not been produced. The application for licensing and certification for the

production of mosquito repellents was submitted to NDA, pending a site visit by NDA. Objective 3 of trial sales is not done pending final certification of the pilot production unit by NDA.

Although two products (a jelly and a lotion) were funded in the first stage, only one (lotion) was selected for commercialisation due to limited funds allocation.

17. Sweet potato value chain development through technology transfer and promotion

This project aims to develop the sweet potato value chain by developing high-value products out of the sweet potato plant parts. This will lead to the substitution of wheat for bakeries (bread) and confectionaries. The objectives of the project are to: 1) Support the development of a supply chain and the support activities of producing the bread, sanitiser and spirit, breakfast cereal, beef and chicken-flavoured puffed snacks, and baby foods; 2) Establish a central processing plant and satellite hubs for piloting the primary activities of the bread, sanitiser and spirit, breakfast cereal, beef and chicken-flavoured puffed snack, and baby food value chains; and 3) Develop a distribution model for the sweet potato high-end value-added products.

The project budget was USh 1.5 billion, which was all released and spent by end of December 2024. The biggest percentage of the expenditure was on equipment.

A central processing plant was set up at Namanve with the capacity to process 500 kg of potatoes per day. To support the development of the supply chain and the support activities of producing the potato products, vine multiplication and tuber production was scaled back to fewer sweet potato (SP) varieties (NASPOT 13 variety) and smaller volumes of tubers to align with the available processing capacity. The trial processing of some products was done in July 2024.

However, the satellite processing hubs to boost production were not set up owing to limited funding and the ethanol line in Namanve was not set up owing to the inadequate space for the equipment. The limited access to relevant sweet potato vines and the short window to the beginning of the planting season hampered production quantities.

Some of the installed potato processing equipment at CURAD in Namanve.

To develop a distribution model for the sweet potato high-end value-added products, a strategic venture business plan and a corporate business venture (Kyoga Consultants Limited) were formed. Trial sales were done with the nearby shops using the two procured tricycles. However, this was hampered by the lack of UNBS certification.

The registration of intellectual property was postponed until there was harmonisation of IP registration policies. At the time of monitoring, there were no finished products for market trials, and potato puree had been processed and stored in freezers awaiting the next funding phase to make the final products.

18. Incubating Mbarara ZARDI prototype starter cultures for enhancing productivity and safety of fermented milk products in cottage industries in Uganda

The aim of the project is to yield locally developed starter cultures for the milk industry, with potential for import substitution and export. The project objectives are to: 1) Determine the properties of the four (4) starter cultures developed by NARO-Mbarara ZARDI; 2) Assess the potential of the developed starter cultures in improving the quality and quantity of fermented dairy products in the cottage industries; 3) Evaluate the effects of the Mbarara ZARDI developed probiotic starter culture on the ulcer causing *Helicobacter pylori* and diarrhoea causing *Escherichia coli*; and 4) Incubate the production of the prototype into commercialisable local starter cultures. However, the third objective was later dropped on the advice of STI-OP.

The total project cost is USh 0.250 billion, all of which was released to the grantee and USh 0.189 billion was spent by 31st December 2024. The biggest expenditure was on equipment (USh 131 billion).

By 31st December 2024, one lyophilizer and one ultra-low temperature freezer was procured for commercial production of powdered starter cultures. The properties of the four[3] Mbarara ZARDI starter cultures were documented, although this was achieved later than planned owing to the prolonged optimisation due to equipment challenges, insufficient and intermittent power at the laboratory.

A prototype starter culture

In addition, four commercialisable powered starter culture products were developed and the necessary information about the products was provided at Page laboratory level. The lack of potential user feedback on the properties of the industry product (starter cultures) delayed the applications for IP protection with the URSB, but the PI was preparing to register a utility model.

As part of capacity building, two master's students were recruited in the microbiology field. At the time of monitoring, the grantee was generating the required quantities to be able to test with the milk cottage industries. As a spin-off from the study, the researcher developed probiotic microbes which increase milk production in the cows and cause weight gain in the calves.

The project encountered challenges of insufficient and intermittent electricity at the laboratory to run some machines, which sometimes resulted in wastage of samples that require 24-hour power supply.

19. Silkworm Eggs Production Unit in Uganda

The aim of the project is to make available affordable silkworm eggs which are locally produced and viable. It was intended to increase access to viable silkworm eggs in the country and save cocoon producers enormous losses, especially in the importation and transportation of cocoons. The key project objectives are to: 1) Establish a silkworm egg producing facility; and 2) Distribute viable silkworm eggs to cocoon producers in the country.

[3] NARO-STAT-GP01, NARO-STAT-CP02, NARO-STAT-PV01, and another for normal yoghurt.

The project budget is USh 1.671 billion, of which USh 1.133 billion was released and all spent by 31st December 2024. A total of USh 0.750 billion of the released funds were for construction of six units.

By February 2025, the construction of all the structures was substantially compete. They include a rearing house and tools store (600 sq. metres) furnished with shelves, a hatching house (100 sq. metres) furnished with shelves and incubators, a laboratory unit (100 sq. metres) and the equipment were delivered but not installed, cold rooms (100 sq. metres), an office building (150 sq. metres), staff quarters (200 sq. metres), a solar water system installed and a water connection.

Ongoing activities included final finishing on the buildings, final assembly of some shelves, and equipment installation. The parent egg worms were to be imported after the completion and final installation of the required equipment. The implementation of the project is hampered by the lack of grid power at the site yet the installed solar system could not sufficiently run all the equipment at the site.

20. Silicon wafer manufacturing in Uganda

The project's aim is to conduct a feasibility and viability assessment of converting Uganda's silica sand into wafers, potentially tapping into the global USD 20 billion wafer industry. The project objectives are: 1) Lab characterisation of Uganda's silica sand; 2) Techno-feasibility

L-R: The equipped cocoon rearing house; A silk egg worm production house nearing completion at the silk farm in Kisozi, Gomba District.

study on the sand-to-wafers value chain in Uganda; and 3) An industrial process design for the pilot plant. The project budget is USh 0.500 billion, all of which was released to the grantee.

By 31st December 2024, sand samples had been collected from 16 sites in different regions in Uganda. The samples were characterised in a lab in Germany and analysed. The results revealed that the silica sand mined from Uganda is of a high grade and quality, with a silica content above 99%, ideal for wafer manufacturing. As a result, market analysis, technical analysis, financial analysis and regulatory and legal analysis were finalised. The industrial process design for the pilot plant had not commenced.

21. Development of a Uganda single-source-origin high-altitude-grown and -roasted coffee product for the international market through a coffee processing hub system (Coffee Investment Consortium Uganda [CICU])

The project focus was on amplifying efforts towards coffee value addition from earning USD 2.5 to USD 15 dollars per kilogram with an intention of improving incomes from coffee beans. The project has received grants since FY 2022/23, with one of the objectives being construction and equipping of the tertiary hub at Inspire Africa Coffee in Ntungamo-Rwashamire. The grant provision for the project during FY 2024/25 is USh 75 billion (approximately USD 20.3 million). This was intended to fund the completion of the coffee processing hub. All the funds were released to the grantee. However, the expenditure details were not readily available.

The completion of the tertiary coffee processing hub in Ntungamo-Rwashamire progressed to 75%. This facility has a roastery, freeze dry and spray dry technology to produce instant, roast and ground coffee products. The roastery line was completed and tested for production. The average progress on other processing lines was approximately 50%. The finalisation of market agreements to boost coffee trade in Russia, Saudi Arabia, Serbia and USA also progressed to 50%.

22. Construction of the Bioscience Park

STI embarked on establishing a Biosciences Park, as the nation's one-stop centre for research and development (R&D), pilot industrial manufacturing for vaccines, diagnostics, therapeutics and other inputs targeting human, animal, and plant health. Subsequently, 50 acres of land were provided by the National Enterprise Corporation (NEC) in Nakasongola and STI commenced the development of the land.

During the period under review, the project was allocated USh 2.0 billion to commence the development of the land. By 31st December 2024, the review of Terms of Reference (TOR) for international and local consultants for the final designs of the Bioscience Park (Pathogen Economy Industrial Park) had progressed to 80%. The initial facility to be established in the park is the Polymeric Chain Reaction (PCR) diagnostics plant which was under final design review by international collaborators. The park was awaiting ground-breaking by February 2025.

Support to Dei BioPharma

Dei BioPharma is a private pharmaceutical company whose mission is to be a globally recognised pharmaceutical company, producing a diverse range of vaccines and affordable medicines to combat widespread diseases. It specialises in messenger ribonucleic acid (mRNA) vaccines, oncology treatments, insulin, monoclonal antibodies, and generics, ensuring affordable and high-quality healthcare solutions. The project aims to address critical medical challenges and will contribute to the advancement of healthcare through innovative pharmaceutical solutions.

In FY 2023/24, the Government of Uganda (GoU), through STI, extended funding worth USh 720 billion to Dei Bio Pharma, which was all disbursed. However, the detailed expenditure was not made available. The funds were to support the construction of approximately 15 state-of-the-art structures for the production of the various categories of human drugs and vaccines. The facilities are generic oral solid manufacturing, GLP laboratory, nutraceutical, syrup and ointment, mRNA vaccine, penicillin, cephalosporin, hormone, non-beta-lactam antibiotics,

medical diagnostic, biotech, oncology, injectables, double deep warehouse, psychotropic, and cosmetology.

By February 2025, some of the facilities were completed and operational, marking the beginning of large-scale pharmaceutical production. The company had also secured certification for compliance with global quality and safety standards in January 2025.

The civil works for the different structures were ongoing at varying stages. The construction of the Generic OSM was substantially complete and in operation, with six products (Protobact, Bactigyl, Metscuro, Paincumol, Chlamydine, Relieftram) being produced. In addition, the YTKM Biotech Laboratories were complete with quality control, quality assurance, micro-laboratory and pilot laboratory operational. The Nutraceutical, the syrup and ointment facility was nearly complete and pharmaceutical installation was ongoing.

L-R: Some of the equipment in the quality assurance laboratory, and a tablet production unit installed at DEI Bio Pharma in Kigoogwa, Nansana Municipality, Wakiso district

One of the production facilities under construction at the Dei BioPharma in Kigoogwa, Nansana Municipality, Wakiso district

The civil works for medical diagnostic, biotechnology, oncology, injectables and the double deep warehouse, non-beta-lactam antibiotics, hormone, cephalosporin, and penicillin facilities were at 60%. The instantiation of equipment was awaiting completion of the facilities, although

some of the equipment had been procured and delivered, while others were in transit, such as the mRNA vaccine production equipment.

3.2.3 Increase investment in research and development in key priority sectors like agriculture, oil and gas, minerals, energy, health and transport

The intervention contributes to the objective of strengthening research and development capacities and applications. The planned outputs for FY 2024/25 included infrastructure development and management, and technology and innovation.

The plan was to support the banana pilot plant in Bushenyi, BIRDC, to upscale and automate the primary processing for commercialisation to increase daily output from 1.4 metric tons to 14 metric tons. It also planned to operationalise the banana value chain through franchising, establishing a business and enterprise development framework, and processing bananas into "Tooke" products. Others were: to equip the laboratory to undertake research; market access to generate revenue; and to support the establishment of community processing hubs.

The performance of the intervention was good, at 75%. The approved budget for BIRDC in FY 2024/25 is USh 71.646 billion (inclusive of USh 9.883 billion carried forward from the previous FY and USh 12 billion from product sales). By 31st December 2024, USh 37.33 billion (52.1%) was released and USh 15.22 billion (40.7%) spent. The poor absorption was attributed to the prolonged procurement of some equipment, with some contracts taking more than six months at the Solicitor General's Office.

BIRDC received the Q-mark for all "Tooke" biscuit brands, bread, queen cakes and crisps. The second ISO audit indicated that all the corrective actions from the first audit were rectified and the institution was recommended for granting of ISO 22000:2018 by June 2025.

BIRDC procured 564 MT of fresh green bananas against an annual target of 3,600 MT. This translated into 58,102 kg of dry banana chips and "Tooke" products. In turn, the generated sales revenue was USh 1.86 billion against an annual target of USh 12 billion. This poor performance was attributed to the delayed delivery of some equipment that was required to upscale and automate the plant to speed up processing. For example, the supply of the drum drier was in the final stages following the completion of its testing in the Netherlands and the contract for bakery equipment had been signed. The construction of the Community Processing Unit (CPU) was also incomplete and progress was at 60% with the superstructure set up and roofed. At this rate, it will be unlikely that the annual target of USh 12 billion sales revenue will be realised.

A pilot Community Processing Facility under construction at BIRDC in Bushenyi.

Renovated water system at Nyaruzinga -Bushenyi

To support research and development for commercial value, phase II laboratory equipment was procured and installed. These include a protein analyser, an automatic fat extraction system, an oven and incubator, a muffle furnace, a waring commercial blender, and an ultra-sonic bath. Others were data loggers, a dry block heater, a cabinet descanter and a magnetic heating block. The water systems at Katonya and Nyaruzinga were renovated. The procurement of phase III equipment was initiated. In spite of these acquisitions, the human resource to operate the equipment was still inadequate.

One hub at Jinja out of the planned three was constructed to 60%. The designs were completed for the Jinja bakery, while procurement of a contractor for the Bumbaire irrigation waterworks was at tendering stage. The contract for the five collection centres was due for submission to the Solicitor General, while the BOQ and design consultancy for the warehouse expansion were completed.

A total of 42 registered "Tooke" Farmer Cooperatives were maintained, with a total membership of 6,500 members and 10[4] cooperatives supplied raw material to the pilot plant.

The delayed approval by Cabinet of the institutional framework that was developed by the defunct Ministry of Science, Technology and Innovation (MoSTI) was affecting the effective operationalisation of the BIRDC model.

Table 3.4 shows the performance of the Industrial Value Chain Sub-programme monitored outputs.

[4] Bumbeire, Shuuku, Kyabugimbi, Rubindi, Kyamuhunga, Kazo, Kitagata, Bunyaruguru and Mitooma cooperative societies.

Table 3.4: Performance of the Industrial Value Chain Development Sub-programme as at 31st December 2024

Outputs Performance								Remark
Intervention	Output	Financial Performance			Physical Performance			
		Annual Budget (USh Bn)	% of Budget Received	% of Budget Spent	Annual Target	Cum. Achieved Quantity	Physical Performance Score (%)	
Design and implement special programmes for nanotechnology, space exploration, nuclear technology, biosciences, ICT and engineering	Technology and Innovation	8.25	100.	2	100	38	38	The training of the engineers was ongoing in Egypt
Strengthen the function of technology acquisition, promotion as well as transfer and adoption	Research and Developme nt (Sub 01 Dep 008)	78.653	42.4	8	100	24	56.63	The clinical trials were not completed as planned due to the absence of a GMP facility in the country
	Technology and innovation	92.776	92.6	100	100	50.8	54.85	The tertiary coffee processing hub in Ntungamo-Rwashamire progressed to 75%.
Increase investment in R&D in key priority sectors like agriculture, oil and gas, minerals, energy, health, transport	Infrastructu re Developme nt and Manageme nt	2.998	100.	31	100	50	50	BIRDC generated a total of USh 1.86 billion against an annual target of USh 12 billion.
	Technology and Innovation (KMC)	49.624	52	100	100	67.1	100	The Kiira vehicle start-up facilities were completed to 98% and was under defects liability.
	Total	**232.302**	**67.3**	**74**			**59.9**	
Overall Sub-programme Performance							**60**	***Fair performance***

Source: Field Findings

Sub-programme challenges

1. Poor planning and coordination at the STI Secretariat as demonstrated by disbursement of funds and permission to utilise them being issued after several months and changes in grant objectives.
2. Discontinuous funding structure: The mode of funding, often disbursed once to grantees, disrupts project continuity; on the other hand, quarterly release for subventions interrupts critical processes, delays milestones, ignores staffing considerations and increases the risk of project overruns.
3. Lack of facilities to aid research development such as Good Manufacturing Practices (GMP) for producing certified production for human clinical trials and High-Containment Laboratories (BSL-3) for vaccine development.
4. Insufficient immunology-skilled workforce: The limited skilled workforce hampers the speed and quality of vaccine development efforts, necessitating additional training and capacity building.
5. Procurement difficulties, especially for some sensitive equipment and reagents that required certain international clearances and institutional bureaucracies in procurement also delayed research.
6. Delayed agreement on sharing intellectual property proceeds by the funders, host institutions and innovators.

Conclusion

The overall sub-programme performance was fair, at 59.9%. The supported grantees made steps towards finalisation of their projects. However, the low capacity of procurement units, especially in universities, delayed the completion of projects hosted in those institutions. The equipping of the laboratory at BIRDC to scale up production was behind schedule and hence the levels of the finished products were still low. The staffing levels were also inadequate. The National Science Technology Engineering Innovation Centre (NSTEIC) was completed and metamorphosed into EDIC. However, the absence of funds to recruit staff delayed its operationalisation. The clinical trials registered slow progress due to the absence of a GMP facility in the country.

3.3 STI Ecosystems Development Sub-programme

The sub-programme contributes to the five ITDT Programme objectives and aims at transforming the innovation landscape by ensuring a coordinated, inclusive and a sustainable STI ecosystem. The sub-programme has 19 interventions, of which four were funded and monitored. The sub-programme performance was fair, at 63.4%. The interventions of developing a framework for the promotion of multi-sectoral and multilateral collaborations posted very good performance, while the intervention of design and conduct practical skills development programmes, performed poorly. The summary performance of the monitored interventions is given in Table 3.5.

Table 3.5: Performance of interventions under the STI Ecosystem Development Sub-programme by 31st December 2024

No	Intervention	Colour Code	Remark
1	Support the establishment and operations of technology and business incubators and technology transfer centres.	61.5	Fair performance
2	Increase investment in research and development in key priority sectors like agriculture, oil and gas, minerals, energy, health, transport.	62.6	Fair performance
3	Develop a framework for the promotion of multi-sectoral and multilateral collaborations.	90	Very good performance
4	Design and conduct practical skills development programmes.	46	Poor performance
5	Support academia and research institutions to acquire research and development infrastructure.	95.4	Very good performance

Source: Authors' Compilation

The detailed performance of the sub-programme interventions and outputs is presented here under:

3.3.1 Support the establishment and operations of technology and business incubators and technology transfer centres

The intervention contributes to the ITDT Programme's objective: develop the requisite STI infrastructure. The planned and monitored budgeted outputs for FY 2024/25 under the interventions were: a) Infrastructure development and management; and b) Industrial skills development. The intervention performance was fair, at 61.5%.

a) Infrastructure Development and Management: The planned outputs were to upgrade both physical and technological bi-model incubation centres in Lira and Nakawa that help in adding value to agricultural produce, and a fully operational vehicle manufacturing plant.

i) Incubation Centres: By 31st December 2024, the upgrade and renovation of Lira and Nakawa incubation centres was ongoing at 45%. The renovation included replacing of the pipes, supply of additional new equipment, replacement of doors, partitioning and repair of the perimeter wall and recasting building walls.

ii) Kiira Vehicle Manufacturing Plant*:* The facilities at the plant include the body shop, machine shop, paint shop, chassis line, trim and assembly shop, quality inspection and testing shop, washing bay, production planning, warehouse and logistics, watchtower, fencing and gates and utilities (solar plant, waste water treatment plant, power station and roads, among others).

Since FY 2018/19, a total of USh 379.9 billion has been invested in the Kiira Motor Corporation (KMC), against a funding requirement of USh 745.5 billion. To this effect, the full operationalisation of the KMC suffers a funding gap of USh 347 billion. This, however, has not deterred progress to have a fully constructed vehicle manufacturing plant.

The progress is presented below:

The construction, equipping, and furnishing of the Kiira Vehicle Plant for phase one and two was substantially complete. The majority (98%) of the starter facilities were handed over to KMC by the contractor and the remaining 2% were still under defects liability. However, the facility was yet to be commissioned. The initial installed capacity is 11 buses off the line per

day, translating into 2,500 buses per annum, which is upgradable to 22 buses per day, translating into 5,000 buses per annum.

Under vehicle production, KMC planned to produce 30 buses, both electric and diesel. Among the buses to be produced is a 13.5-metre electric bus on order. The design, engineering, and development of the 2025 bus models were finalised, and parts and materials for 10 electric buses had been shipped into Uganda by December 2024, but the production and assembly were yet to commence. The parts and materials from the remaining 20 buses were expected in April 2025.

The electric bus operator skilling programme continued with a total of 197 learners, of whom five (5) were female, against the annual target of 215 drivers. They were equipped with critical skills to ensure the safe, efficient, and sustainable operation of electric buses. Under the bus production skilling programme, a total of 26 engineers completed a 45-day strategic industrial placement on bus production skilling and training at the supplier's premises in China.

Under the e-mobility mass transit system, a total of seven[5] electric buses were deployed on the Iganga–Mbiiko through Jinja town route. They started operation in November 2024 and were running scheduled services and cashless payment using e-bus express prepaid cards. The buses covered a combined 77,798 km, ferrying a total of 40,397 passengers in three months. The programme raised a total revenue of USh 111,581,687 between November 2024 and January 2025 (three months).

To generate more revenue, KMC signed contracts worth USh 12.9 billion for sale of vehicles and long-term hire of the Kayoola EVS buses, with USh 4.5 billion and USh 8.4 billion to be collected from sales and long-term hire, respectively. Out of the signed contracts, KMC generated USh 1.9 billion by the first half of FY 2024/25.

A bus chassis being assembled at the Kiira Vehicle Plant in Jinja

The performance of the Kiira Vehicle Plant activities was affected by manpower shortages[6] for the initial production stage, coupled with high turnover as the trained workers left for greener pastures. In addition, delays in fund disbursement have derailed the implementation of planned activities, leading to cost overruns and disruption of the supply chains.

[5] 8.5 m Kayoola EVS, 200 km range, and 55 passengers.
[6] There are 202 workers (37 are female), against the required 900 for the initial production phase of 2,500 buses per year.

b) Industrial Skills Development: The National Science, Technology, Engineering and Innovation-Skills Enhancement Project (NSTEI-SEP) was completed and transited into the Engineering Development and Innovation Centres (EDIC) subvention. EDIC (Namanve and Rwebitete centres) is supposed to develop the engineering capacity of Uganda in seven (7) critical areas: Industrial Technology; Metallurgy; Electrical and Electronics; Civil Engineering; Automotive Technology; Agricultural Mechanisation; and Construction Machinery.

The planned activities for the FY 2024/25 as part of the EDIC operationalisation are: a) design, production, and assembly of precision tools, components, and industrial systems; b) develop locally produced raw materials for precision tooling and machining; and c) construction of prefabricated low-cost houses.

By 31st December 2024, the planned activities had not yet started because EDIC was not operational, even though the civil works and machine installation were completed. This delay was attributed to lack of funding to recruit the requisite staff. The absence of a budget for operations and maintenance creates a risk of equipment breakdown and expiry of warrants before machines are effectively used to test their capability thus a white elephant.

3.3.2 Increase investment in research and development in key priority sectors like agriculture, oil and gas, minerals, energy, health and transport

The intervention contributes to the objective of strengthening research and development (R&D) capacities, and applications. The planned outputs for FY 2024/25 include research and development, and model value addition. The performance of the intervention was fair, at 62.6%.

Research and development: A total of 251 edible and non-edible samples were analysed in the chemistry and microbiology laboratories. This was against the annual target of 1,200 products. Establishment of four (4) research collaborations at local, regional and international levels was not undertaken.

To revitalise the textile unit by operationalising two (2) concepts and research and development, one concept on the development of medical textiles from locally available materials was developed. One robot prototype was developed as part of the demand-driven research in food processing, engineering and value addition on at least five (5) products.

Model value addition services: UIRI planned to refurbish one pilot production plant and two (2) analytical laboratories physical infrastructure. By 31st December 2024, the bakery and fruit section were undergoing repairs including replacement of water pipes, floor repairs and painting.

3.3.3 Develop a framework for the promotion of multi-sectoral and multilateral collaborations

The planned output for FY 2024/25 is industrial skills development. The plan by STI was to establish two well-furnished laboratories in research and academic institutions. The laboratories were envisaged to support the pathogen economy, Industry 4.0, and STI infrastructure.

The overall intervention performance was good (90%). By 31st December 2024, a total of nine laboratories were furnished as follows: Four laboratories at Makerere University – COVAB; one at UVRI; one at Makerere University Biomedical Research Centre (MAK-BRC); one at Mbarara University of Science and Technology (MUST); and two laboratories at Busitema University. The facilities enhanced the available testing capacity in the country.

3.3.4 Design and conduct practical skills development programmes

The planned output under the intervention was policies, regulations and standards. The intervention performance was poor at 46%. The STI Policy was drafted but not approved. The development of the National STI Information Management System database was ongoing. The stakeholder engagements were ongoing to finalise the STI outreach and advancement strategy.

3.3.5 Support academia and research institutions to acquire research and development infrastructure

The intervention aim is to support academia and research institution to acquire research and development infrastructure, including laboratory renovations and laboratory equipment. It also targets supporting researchers to acquire the necessary approval to undertake scientific research and empowerment of Research and Ethics Committees in institutions.

The FY 2024/25 planned outputs are industrial skills development; and industrial and technological incubation.

The intervention performance was very good, at 95.4%. The achievements by 31st December 2024 are presented hereunder:

Industrial skills development: During the period under review, a total of 73 members of Institutional Ethics Committees (IECs) and scientists received short-term training of up to five (5) days designed to boost their capacity to review and approve research proposals so that they can meet ethical standards.

In addition, an analysis was made for PhD research that generates new knowledge and deepens understanding in specialised fields, and a total of 84 PhD studies where registered. All these studies were anticipated to lead to innovative ideas, products, and technologies that can address pressing societal challenges, improve industries, and enhance quality of life.

Industrial and technological incubation: UIRI supported 120 virtue and in-house incubatees in dairy, textiles, bakery and cosmetics against a target of 70. The upscaling of the Nakawa incubation centre to accommodate the rising high demand for incubation services was deferred to the next quarter due to funding.

Table 3.6 shows the overall sub-programme performance.

Table 3.6: Performance of the Industrial Value Chains Development Sub-programme as at 31st December 2024

Outputs Performance								Remarks
Intervention	Output	Financial Performance			Physical Performance			
		Annual Budget (USh Bn)	% of Budget Received	% of Budget Spent	Annual Target	Cum. Achieved Quantity	Physical Performance Score (%)	
Support the establishment and operations of technology & business incubators and technology transfer centres	Industrial Skills Development	0.5	10.1	96	100	9	88.99	The Engineering Development and Innovation Centre (EDIC) was established but not yet started.
	Infrastructure Development and Management	2.915	0	100	100	0	0	The upgrade and renovation of Lira and Nakawa incubation centres was ongoing and estimated at 45%.
Increase investment in R&D in key priority sectors like agriculture, oil and gas, minerals, energy, health, transport.	Model value addition services	0.5	6	-	100	3	50	One concept on the development of medical textiles from locally available materials was developed by UIRI.
	Administrative and support services	15.673	49.7	97	100	50	100	Good performance as administrative activities were executed.
	Research and development	0.638	48.3	91	100	22	45.58	251 edible and non-edible samples were analysed in the chemistry and microbiology laboratories.
	Technology and innovation	0.444	60	44	100	33	54.96	Fair performance
Develop a framework for the promotion of multi-sectoral and	Industrial skills development	40.5	33.3	63	100	30	90	Nine laboratories were furnished in academic and research institutions.

Outputs Performance								Remarks
Intervention	Output	Financial Performance			Physical Performance			
		Annual Budget (USh Bn)	% of Budget Received	% of Budget Spent	Annual Target	Cum. Achieved Quantity	Physical Performance Score (%)	
multilateral collaborations								
Design and conduct practical skills development programmes	Policies, regulations and standards	0.4	100	40	100	46	46	The STI draft policy was developed but not approved.
Support academia and research institutions to acquire R&D infrastructure	Industrial and technological Incubation	0.65	43	99	100	41	95.4	UIRI supported 120 virtue and in-house incubatees in dairy, textiles, bakery and cosmetics.
	Total	**62.220**	**36.4**	**75**			**63.44**	
Overall Sub-programme Performance							**63.44**	***Fair performance***

Source: Field Findings

Sub-programme challenge

Absence of a budget under NSTEI-SEP for operations and maintenance of the equipment under TSU and to operationalise EDIC.

Conclusion

The overall performance of the sub-programme was fair, at 63.4%. The construction and equipment installation for phases one and two at the Kiira Vehicle Plant were completed and handed over, and designs for the 2025 buses were finalised, with materials for 10 buses shipped. A total of I97 drivers were skilled under the electric bus operator skilling programme. The e-mobility mass transit system was also piloted, with seven buses plying the Iganga–Mbikko via Jinja City route. The upgrade and renovation of Lira and Nakawa incubation centres for agricultural produce were ongoing at varying levels. The NSTEI-SEP Project transitioned into EDIC, housed at UNCST. However, its operationalisation had not been realised due to delays in the recruitment of staff as a result of inadequate funding. Additionally, industrial training was provided to intern students by UIRI and the development of the National STI Information Management System database was ongoing. The STI draft policy was developed, but it had not been approved.

CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The overall performance of the ITDT Programme stood at 61.7%, indicating a fair result, with both the STI Ecosystems Development and Industrial Value Chain Development Sub-programmes registering fair results. The performance was hampered by delays in awarding contracts and permission to grantees to utilise disbursed resources from the STI Secretariat, which, in turn, affected expenditure patterns for the financial year.

Significant progress was made in STI infrastructure projects, notably the completion of civil works and equipment installations at NSTEIC and TIBIC, construction and equipping Dei BioPharma in Matugga, Wakiso District, as well as the Kiira Vehicle Plant, which is now ready for commissioning. The pilot testing of the e-public transport system commenced in Jinja City. Meanwhile, laboratory equipment was installed at BIRDC in Bushenyi, and additional equipment for the "Tooke" factory and bakery is still being procured, albeit behind schedule. Despite acquiring ISO certification, BIRDC's revenue generation from product sales fell below target.

Good progress was noted in preclinical studies for three human vaccines, though the lack of a GMP facility impeded advancement to clinical stages. Intellectual property rights registration remained slow due to unresolved policy issues around IP ownership among innovators, host institutions, and the STI Secretariat.

Implementation of research and development (R&D) grants lagged behind due to continued delays in fund authorisation and challenges in procuring essential equipment, resulting in project and funding spill-over into subsequent financial years. Over-subscription of grantees in the face of limited resources led to inadequate funding for some projects, resulting in token support and unmet targets.

Arrangements to improve STI human resource capacity advanced with the recruitment of protégés and enrolment of postgraduate students across various research projects. However, delays in finalising policies, regulations, and strategies affected the development of the legal and regulatory framework.

The delays in providing an operations and maintenance budget as well as staffing EDIC and the Technical Service Company (TSC) under UNCST constrained revenue generation and led to underutilisation of equipment and facilities immediately after the completion of the externally financed project, therefore affecting the value for money in this investment.

A misalignment between the Programme Implementation Action Plan (PIAP) and the Annual Work Plan further impeded performance. By addressing these key areas, the ITDT Programme can significantly increase its impact and contribute to Uganda's goal of becoming a leader in technological innovation and industrial development in the region.

4.2 Recommendations

1. The STI Secretariat should timeously authorise grantees to spend the funds disbursed to facilitate the timely achievement of the set objectives.

2. STI and host institutions should review the policies on the sharing of proceeds from intellectual property to adequately consider the individual innovator as opposed to only STI and host institutions.

3. The STI Secretariat should accelerate the establishment of a central GMP facility at one of the collaborating institutions to ensure the achievement of research objectives, especially clinical trials for vaccine development and therapeutics.

4. The STI Secretariat together with the Public Service Commission should expedite the recruitment of staff for EDIC to achieve the project's objectives and value for the investment.

5. The STI Secretariat together with MoFPED and National Planning Authority (NPA) should align the outputs in the work plan to the respective Programme Implementation Action Plan (PIAP).

6. The STI Secretariat should review the portfolio of grantees and identify those for funding as projects through the Public Investment Management (PIM) modality and those for continuous financing through normal programming. These include grants that act as platforms and play a supportive role for other innovations such as the Clinical Trials of Natural Therapeutics (CONAT), in-vitro studies, establishment of science parks, and animal research facilities.

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Annex 1: List of interventions monitored during the first half of FY 2024/25

Sub programme	Intervention
Industrial Value Chain Development Sub-programme	Design and implement special programmes for nanotechnology, space exploration, nuclear technology, biosciences, ICT and engineering
	Strengthen the function of technology acquisition, promotion as well as transfer and adoption
	Increase investment in R & D in key priority sectors like agriculture, oil and gas, minerals, energy, health, transport
STI Ecosystems Development Sub-programme	Support the establishment and operations of technology & business incubators and technology transfer centres
	Increase investment in R & D in key priority sectors like; agriculture, oil & gas, minerals, energy, health, transport
	Develop a framework for promotion of multi-sectoral and multilateral collaborations
	Design and conduct practical skills development programmes
	Support academia and research institutions to acquire research and development infrastructure

Source: Author's Compilation

Annex 2: List of Grantees funded by STI during the FY 2023/24 (implementation was in FY 2024/25)

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Establishment of a common user packaging facility	2,700,000,000	This project will establish a Government owned common user facility for packaging at NSTEI-SEP, Namanve targeting value-added food products. This will address lack of affordable and quality packaging materials for our food manufacturing ecosystem. Objectives: 1) To conduct value chain mapping and analysis of the flexible packaging value chains 2) To develop prototypes and manufacturing processes for flexible packages; 3) To set up and commercialise a packaging manufacturing facility for affordable and quality flexible packages.
Direct Reduction Technology for Metallisation of Ugandan Iron Ore	800,000,000	This project aims to establish capacity for value addition to our iron ore using eco-friendly gas reduction technology. The first level is a prototype with capacity of 1 tonne per cycle. Objectives: 1) Process design 2) Protype fabrication, 3) Prototype testing and validation
Fabrication of lithium and sodium ion batteries for electric vehicle and rechargeable batteries for energy storage using locally available materials in Uganda	1,750,000,000	This project will demonstrate the potential for developing electric vehicle batteries from our lithium and graphite. Objectives: 1) To characterise the composition of local lithium and graphite ores, 2) To establish a small-scale process for purification of lithium and graphite from the ores on laboratory-scale 3) To purify the raw lithium and graphite to battery grade materials and test for physical and chemical properties, 4) To evaluate the purified lithium and graphite materials for energy storage ability.
Development of a solar water pump	600,000,000	This project will result in local manufacture a Solar-powered Water Pump through reverse engineering. Objectives: 1) To design pump components and systems, 2) To assemble the pump component into working prototypes, 3) To undertake field validation studies to assess pump performance.
Development of Technology for Application of Iron Oxide Nanoparticles in Wastewater and Drinking Water Treatment	350,000,000	This project aims to develop novel technology for treatment of industrial effluent and domestic water using nanoparticles. It is being funded for a second year. Objectives: 1) To optimise the performance of the water treatment system based on IONPS, 2) To design a water treatment system that uses iron oxide nanoparticles (IONPs) as treatment medium, 3) To develop scaling plan for mass production of IONPs based water treatment systems.
Solar-powered egg incubator	250,503,600	This project will fabricate high quality, high capacity solar-powered egg incubators for commercial poultry farming. Objectives: 1) To fabricate an engineering Prototype, 2) To establish a production line for the egg incubators, 3) To produce three (3) 120 egg incubators and three (3) 240 egg incubators, 4) Field validation
Transforming Uganda into a global electronics powerhouse	899,000,000	This project will establish a state-of-the-art SMT manufacturing line for electronics, which will provide subsidized services to the local electronics development ecosystem. Objectives: 1) To establish infrastructure for a world standard local Surface Mount Technology (SMT) facility in Uganda with a capacity of 2,000 units a month, 2) To undertake contract manufacturing for

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
		other players in the electronics development industry in Uganda and across the region, 3) To undertake research and development targeting niche products such as Electronic Control Units (ECUs).
Local Electronics Design and Hardware Enterprise Incubation	1,153,470,000	This project will support local electronics innovators to develop electronics products such as those used in consumer, industrial, medical, avionic, and automotive applications, by designing, prototyping, testing, and assisting in certification. Objectives: 1) Establish electronics design facility, 2) Provide seed funding for prototyping 3) Human Capital Development for local electronics design and prototyping ecosystem.
Silicon Wafer Manufacturing in Uganda	500,000,000	Project will conduct a feasibility and viability assessment of converting Uganda's silica sand into wafers, potentially tapping into the global USD 20 billion wafer industry. Objectives: 1) Lab characterisation of Uganda's silica sand, 2) Techno-feasibility study for the sand to wafers value chain in Uganda, 3) Industrial process design for pilot plant.
The MDA Technology Support Project	600,000,000	The project will establish human capital and enterprise competitiveness for local technology companies to develop software solutions for Government MDAs. Objectives: 1) Needs Assessment for 2 MDAs, 2) Identify competent tech companies to undertake development, 3) Develop and pilot the software.
Commercialisation of Academic Research Initiative	300,040,000	The project will create a pathway for prototypes in universities to enter the market by providing technical and business support to budding innovators thus addressing the limited translation of research into commercial products. Objectives: a) Characterise Uganda's Science, Technology and Innovation ecosystem for incubating academic research products/services into viable businesses; b) Sensitize universities on policies, processes and commercial benefits of commercialising research and innovation outputs; c) Support commercialisation of at least five (5) research-based products or services deploying fourth industrial revolution technologies in agriculture and education, and d) Document the experiences and lessons learnt from the support of the five enterprises to guide larger scale national programmes in the translation of academia to business research.
Enhancing the Efficiency and Accessibility of Public Transportation through the Deployment of Contactless Card Payment Technology	433,000,000	The project aims to develop and deploy Uganda's first cashless ticketing system for mass transit. This will lead to formalization of the Public Transport Sector with streamlined ticketing and revenue collection mechanisms; Enhanced efficiency and accessibility of Public Transportation and Improved revenues from Public Transport Objectives: 1) Develop a secure contactless ticketing and payment system for public transportation in Uganda, to facilitate revenue sharing among key stakeholders and minimize cash transactions. 2) Pilot the contactless ticketing and payment system on the Kayoola EVS Buses.
Productivity Acceleration Support Service	2,400,000,000	The project aims at developing a sustainable solution to household productivity through capacity gap diagnosis and empowerment of households to produce efficiently. This will lead to the transitioning of subsistence households into the cash economy with or without PDM funding. Objectives: 1) Develop the Productivity Acceleration Support Service; 2) Develop a

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
		distribution model for the Productivity Acceleration Support Service; 3) Establish a cooperation that will drive the commercialisation of the Productivity Acceleration Support Service.
Developing Sustainable Mushroom Agribusiness Support Services (MASS) for improving livelihoods and sparking competitive agro-industrialisation in Bukedi sub-region	900,000,000	The project aims at developing a least-cost substrate combination for the growing of mushrooms. This will improve access to optimal substrate/medium for mushroom growing. This will reduce the importation of cotton seed cake for mushroom growing. Objectives: 1) Develop a product of the mushroom agribusiness support-based substrate for mushroom growing; 2) Develop a distribution model for the mushroom agribusiness support-based substrate for mushroom growing; 3) Establish a cooperation that will drive the commercialisation of the mushroom agribusiness support-based substrate for mushroom growing.
Production and commercialisation of mosquito repellent lotions from ethnomedicinal plant oils and shea butter	500,000,000	This project aims at utilising the shea butter as a base for the plant extract mosquito repellent. This will contribute to the reduction of imported petroleum-based mosquito repellents into the country. It will also contribute to the increased access of mosquito repellents hence preventing malaria in the country. Objective: 1) To obtain all the necessary licensing and certification for production of mosquito repellents before the viable products are introduced to the market; 2) Trial sales of the viable mosquito repellent products; 3) To carry out supply chain analysis and optimization.
Improved indigenous chicken line	200,000,000	This project aims at identifying and preserving the best performing local chicken breed lines in the country. This will lead to the development of a commercial duo purpose chicken breed line from our locally indigenous chicken. The objectives: 1) To evaluate on-farm performance of the improved indigenous chicken line; 2) Stabilising and mass production of the improved chicken line; 3) Market-oriented supply chain platform for the improved indigenous chicken line set-up.
Sweet potato value chain development through technology transfer and promotion	1,500,000,000	This project is focused on developing the sweet potato value chain by developing high-value products out of the sweet potato plant parts. This will lead to a replacement for wheat for breads. Objectives: 1) To support the development of supply chain and the support activities of producing the bread, sanitiser and spirit, breakfast cereal, beef and chicken-flavoured puffed snacks, and baby foods; 2) To establish a central processing plant and satellite hubs for piloting the primary activities of the bread, sanitiser and spirit, breakfast cereal, beef and chicken-flavoured puffed snack, and baby food value chains; 3) Develop a distribution model for the sweet potato high-end value-added products.
Piloting an activity-based learning and teaching approach for Advanced level Science students	199,509,910	This project targets to develop a synergistic capacity development for Science, Technology and Innovation among A-Level students. This will simplify how science education is delivered with minimal materials. Objective: 1) Develop tools for capacity development and practical skilling among A-level science students; 2) Pilot the tools for capacity development and practical skilling among A-level science students.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Establishment of BU Agro-Science Park	300,000,000	This project aims at establishing a facility that can create an interface between communities and the university. This will increase offtake of locally produced agro-products as raw materials for high-end processing. The facility will develop research-based solutions that support the efficient productivity by communities. Objectives: 1) Establish the suitability of Arapai campus for the Agro-science Park. 2) To profile basic information to guide on the products development for all the crops. 3) Develop the Agro-science Park project proposal (feasibility study, business plan (10 years), financial model (10 years), pitch deck). 4) Profile technology for local development and transfer. 5) Develop the prerequisite human capital for the Agro-science Park.
Science Laboratory Reagents Project (SLaRP)	450,000,000	This project will develop science laboratory re-agents from our local minerals and other inputs. It has high potential for import substitution. Objectives: 1) To map/profile local sources of raw materials for production of school chemicals and reagents; 2) To test, select and optimise appropriate methods-protocols and procedures for productions of products; 3) To produce prototypes of chemical and reagents (NaOH, H2SO4 and HNO3).
Incubating Mbarara ZARDI prototype starter cultures for enhancing productivity and safety of fermented milk products in cottage industries in Uganda	250,000,000	This project will yield locally developed starter cultures for the milk industry, with potential for import substitution and export. Objectives: 1) To determine the properties of the four (4) starter cultures developed by NARO - Mbarara ZARD; 2) To assess the potential of the developed starter cultures in improving the quality and quantity of fermented dairy products in the cottage industries; 3) To evaluate the effects of the Mbarara ZARDI developed probiotic starter culture on the ulcer causing *Helicobacter pylori* and diarrhoea causing *Escherichia coli*; 4) Incubate the production of the prototype into commercialisable local starter cultures.
Pearl Breakfast Cereal	150,000,000	This project will develop and validate a breakfast cereal from Ugandan crops. Objectives: 1) To produce recipes for nutritious instant breakfast cereal from composites of maize, cassava and Amaranthus; 2) To evaluate the consumer preference of the formulated recipes of breakfast cereals from composites of maize, cassava and Amaranthus; 3) To produce pearl cereals from maize, cassava and Amaranthus for test marketing; 4) To develop a marketing strategy for market entry of Pearl Breakfast Cereal brand as an alternative Ugandan made breakfast cereal; 5) To conduct a baseline study for the mass production facility of Pearl Breakfast Cereal brand as an alternative Ugandan-made breakfast cereal.
Development of canned matooke and gonja in retort pouches: A Proof of concept for sustainable and convenient agricultural innovation	600,000,000	This project focuses on value addition to matoke and gonja, our heritage crops. Novel products for that are ready to eat and packed in retort pouches/cans as well as vacuum sealed matooke shall be explored. Objectives: 1) Characterisation of matooke/ gonja products; 2) To optimise ingredient and processing conditions for canned matooke/gonja; 3)To evaluate product quality and safety; 4) To assess market potential and consumer acceptance

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Space Weather Science and Education Project for Disaster Management and Preparedness	2,000,000,000	This project will develop earth observation products using satellite and geospatial data towards disaster prediction (drought, weather, landslides etc). It will yield the premier product from our Aeronautics and Space Bureau. Objectives: 1) Requirements analysis for 2 earth observation products; 2) Product design; 3) Product development; 4) Validation in support of PDM.
Laboratory-scale production of beta propiolactone (BPL) from cassava for application in the pharmaceutical industrial value chains	450,000,000	This project will study the chemical conversion of ethanol from cassava to produce a more valuable product, beta propiolactone (BPL) which is an essential ingredient in vaccine development. Objectives: 1) Optimising production process for beta propiolactone; 2) Synthesise the intermediate chemicals (ethanol, ethylene and ethylene oxide) required for BPL production; 3) Produce beta propiolactone at laboratory-scale for inactivation of viruses during vaccine development; 4) Determine the quality profile of the synthesised BPL.
Preclinical evaluation and standardisation of herbal antidiabetic prototypes – GLUCOKAT PROJECT	1,300,000,000	This project aims to develop a natural anti-diabetic therapeutic through reformulation of an existing product. Objectives: 1) To evaluate the antihyperglycemic and antidiabetic potential of the formulated prototypes using animal models; 2) To assess the toxicity profiles of the most efficacious formulated antidiabetic prototype in cell lines and animal models; 3) To analyse the phytochemical composition and contaminants of the most efficacious formulated prototype; 4) To assess and optimise the pharmaceutical properties of the of the most efficacious formulated antidiabetic prototype; 5) To establish a GLP facility to support preclinical evaluation of natural therapeutics in Uganda.
Multiple function Neonatal Intensive Care Units (Baby Incubator)	250,000,000	This project will build a reproducible 10-unit neonatal incubator, building on the success of an existing prototype. Objectives: 1) Develop a fully functional neonatal intensive care unit; 2) Design and document the manufacturing process; 3) Undertake clinical validation.
Improved UBV-01N product for management of viral respiratory infections	1,000,000,000	This project will establish a Good Manufacturing Practices Pilot Plant for Natural Therapeutics at NCRI and support reformulation of UBV-01 for viability as an anti-breast cancer natural therapeutic. Objectives: 1) cGMP establishment; 2) Reformulation of UBV-01 as an anti-carcinogen.
Innovative re-usable unisex sanitary pads and protective gear for salt miners: Addressing community health-related challenges in Katwe-Kabatooro Town Council, Kasese District, Uganda	300,000,000	The project will yield a unisex pad that reduces occupational health hazards among salt miners. Objectives: 1) Needs assessment 2) Product design and prototyping; 3) Lab validation; 4) Field validation.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Medicinal plants for sickle cell disease and respiratory tract disorders	350,000,000	This project will yield a prototype for sickle cell disease from ethnomedicinal plants in Northern Uganda. Objectives: 1) Conduct an ethnobotanical survey; 2) Formulate a prototype against sickle cell; 3) Phytochemical analysis; 4) Undertake toxicity analysis of promising prototype.
Animal research services for enhancing shared efficiency and effectiveness	1,000,000,000	This project is in the context of a common user laboratory animal facility to support animal studies for vaccine and therapeutics research. Objectives: 1) Continuous breeding and maintenance of humanized ACE2 mice; 2) Design humanized mice for diseases of interest (cancer, malaria etc); 3) Complete refurbishment of lab animal house facility into a BSL-3 facility; 4) Conduct animal studies for Covid vaccines.
Establishment of a biomarker research facility	1,500,000,000	This is a common user facility that supports identification and isolation of biological molecules found in body fluids or tissues that are signs of a normal or abnormal process, or of a condition or disease. These molecules are used in development of drugs, diagnostics and other biotechnology products. Objectives: 1) Finalise the establishment of the biomarker research facility at Makerere University; 2) To make in-house monoclonal antibodies against the biomarker antigens to be used in lateral flow assay testing; 3) To clinically evaluate the performance of the newly assembled rapid diagnostic test prototype for monitoring SARS-COV-2 patients; 4) To evaluate the stability and usability of newly assembled diagnostic test for monitoring SARS-COV-2 patients.
Evaluation of nanoscale materials as adjuvants and delivery systems for vaccines	200,000,000	This project is developing a nano-adjuvant for vaccine delivery, but with potential for drug delivery, e.g. targeted cancer therapy. Objectives: 1) To formulate a lipid nano-adjuvant delivery system-SARS-CoV-2-complex; 2) To determine the loading and release efficiencies of the delivery system; 3) To determine the immunogenicity (cytokine profiles) induced after vaccination with the lipid nano-adjuvant delivery system-SARS-CoV-2 complex.
Smart Post-Partum Haemorrhage Volumetric Drape	200,000,000	Focus is on development of a minimum viable product and clinical validation of a Smart Postpartum Haemorrhage Volumetric Drape (SMART-PVD) for early detection of postpartum haemorrhage during childbirth. Objectives: 1) To evaluate the usability and acceptability of the SMART- PVD; 2) Develop the Minimum Viable Product of the SMART PVD; 3) To undertake clinical validation for the device.
Baby saver device for affordable neonatal resuscitation with intact umbilical cord at birth in Uganda	350,000,000	Focus is on developing a baby saver device: a mobile resuscitation unit that can help every new-born breathe at birth, within the golden minute before clamping the umbilical cord. In Uganda, 1 new-born in every 5 births does not cry immediately at birth (Ditai et al., 2023, in press) and is at risk of hypoxic-ischaemic encephalopathy, intrapartum-related death, morbidity, and neurological sequelae (cerebral palsy) in life. Objectives: 1) Develop a minimum viable device; 2) Clinically validate device; 3) Take device through regulatory pathway.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Vitamin D as a therapy for chronic conditions	300,000,000	Project has previously shown that the majority of persons in Uganda are Vitamin D deficient. Next step is to build capacity for Vitamin D research, and manufacturing. Objectives: 1) To build and enhance human capacity for vitamin D research and its applications; 2) To build capacity for clinical work on vitamin D; 3) To build capacity for pharmaceutical manufacturing and dosage formulation of vitamin D as preventative and treatment therapy.
Local research and production of a dual vaccine for lumpy skin disease and foot and mouth disease in Uganda	175,000,000	Focus is on development of a dual vaccine for Lumpy skin disease and foot-and mouth disease in Uganda. Objectives: 1) Collection of new outbreak viruses for both foot-and-mouth disease (FMD) and lumpy skin disease (LSD) in Uganda for virus bank establishment; 2) Sequencing and molecular genotyping of the collected outbreak LSD and FMD viruses to determine alterations in genome sequences; 3)Creation of LSD virus vectors to shuttle and deliver protective proteins of foot-and-mouth disease viruses; 4) To conduct in-vitro laboratory testing of the LSD-FMD vaccine candidates for protective vaccine properties; 5) To conduct in-vivo testing of the LSD-FMD vaccine candidates for vaccine candidate efficacy properties.
Preclinical studies and GMP production for inactivated vaccine	1,000,000,000	This is one of the pioneer human vaccine projects utilising Inactivated vaccine technology. Objectives: 1) Complete animal trials – preclinical immunogenicity assessment; 2) Produce bulk stock for clinical trials in a cGMP facility.
Investigating the anti-cancer properties of wild *Ganoderma lucidium* mushroom species	200,000,000	The project aims to develop an anti-cancer therapy from wild Ganoderma mushrooms. Objectives: 1) Develop prototype; 2) Undertake phytochemical analysis; 3) Undertake preliminary efficacy and safety studies.
Formulation and preclinical evaluation of herbal toothpaste for management of oral diseases	500,000,000	Focus is on development of a herbal toothpaste for complete dental healing. Objectives: 1) To formulate herbal toothpaste/ mouthwash from extracts of selected plants for management of oral disease; 2) To evaluate the organoleptic and physical properties of the formulated herbal toothpaste/mouthwash as per specified standards; 3) To evaluate the antimicrobial activity of the formulated herbal remedy against selected oral pathogens, *Streptococcus mutans* and *Staphylococcus aureus*; 4) To produce and undertake field testing of one batch of the fully tested herbal remedy.
Ethnobotanical survey of medicinal plants used in the treatment of diseases in the Greater Bushenyi Region	200,000,000	This project aims to conserve common medicinal plants in the Greater Ankole area, and formulate prototypes for clinical trials. Objectives: 1) To propagate seedlings for commonly used and extinct medicinal plant species; 2) To formulate two prototypes for preclinical and clinical trials.
ICT platform for the pathogen economy	1,150,000,000	Focus is on development of AI-enabled diagnostic tools for cancer, and support for AI-in-health incubation for the ecosystem. Objectives: 1) Clinical validation of cervical cancer screening platform; 2) Establish common user facilities and resources (data, compute resources etc); 3) Develop framework to support incubation.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Development and evaluation of nanobody based point-of-care diagnostic kit for detection of covid-19 in saliva	400,000,000	Focus is on development of a rapid diagnostic test for covid-19 utilizing saliva. Objectives: 1) Generation of virus-specific nanobodies; 2) Develop and evaluate saliva antigen lateral flow assay; 3) Develop and evaluate antibody capture lateral flow assay strip for the detection of antibodies in COVID-19; 4) Develop and evaluate re-purposed lateral flow assay strip for the detection of pneumonia causing pathogens (Strep pneumoniae/H. influenza).
In-vitro studies of natural therapeutics of Uganda of Uganda (INVONAT Programme)	900,000,000	This is a common user facility for in vivo studies for natural therapeutics as well as vaccines. Objective: Take at least 15 experimental drugs through in vivo studies (safety, efficacy)
Herbal extract larvicide	300,000,000	Focus is on development of a herbal extract larvicide for malaria control. Objectives: 1) To analyse the phytochemical and pharmaceutical properties of the formulated mosquito larvicide products; 2) To assess the larvicidal activities of the formulated Larvicide to kills the mosquito larvae (Anopheles, Culex, Aegypti, Mansonia and Ades); 3) To assess the toxicity profiles and purity of the formulated herbal extract larvicide; 4) To conduct the larviciding trails using the formulated herbal extract larvicide in Arocha Division, Apac District.
Clinical Trials for Natural Therapeutics (CONAT)	5,000,000,000	A platform to support clinical trials for natural therapeutics at no cost to the innovator. The platform can run multiple experimental drugs at the same time through the protocol. To qualify, the drugs must be notified by NDA and go through in vitro studies.
Commercialisation of *Phytolacca dodecandra* powder – Snailtox	200,000,000	This project aims to standardise Phytolacca dodecandra (Snailtox). Objectives: 1) Conduct phytochemical analysis; 2) Undertake in vitro studies (bacterial/fungal sterility, in vitro cytotoxicity); 3) Animal studies (in vivo toxicity testing); 4) Aqua ecological safety studies.
Formulation of herbal products for treatment of brucellosis and osteomyelitis from profiled plants in Kigezi Region	250,000,000	This project will formulate a natural therapeutic against Brucellosis. Objectives: 1) Cross-sectional ethnobotanical survey and document traditional medicinal plants used in the management of brucellosis within the cattle corridor of Uganda; 2) Determine the phytochemical constituents of selected medicinal plants used in the management of brucellosis within the cattle corridor of Uganda; 3) Evaluate the in vitro efficacy of extracts and phytocompounds from traditional medicinal plants used in the management of brucellosis in the cattle corridor of Uganda; 4) Formulate and develop a pharmaceutical grade herbal product for treatment of brucellosis; 5) Assess and establish the acute and repeated dose toxicities of the formulated product in the treatment of brucellosis.
Adenovector vaccine: Preclinical immunogenicity assessment and GMP process transfer	1,000,000,000	This project developed a candidate Covid vaccine using the Adeno-virus technology. We developed our own indigenous vaccine backbone which we have patented and shall use for other vaccines. Objectives: 1) Complete immunogenicity studies in humanised mice; 2) Produce bulk stock for clinical trials under cGMP conditions.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Development and evaluation of recombinant sub-unit SARS-COV-2 spike protein-based sub-unit vaccines	1,500,000,000	This project developed a candidate Covid vaccine using recombinant vaccine technology. Objectives: 1) Establish cGMP for pilot production of subunit vaccine; 2) Produce vaccine for clinical trials.
Development of a telemetric shunt system for hydrocephalus treatment	200,000,000	Focus is on development of a telemetric shunt for treatment of hydrocephalus. Objectives: 1) Design and prototype; 2) Take device through regulatory approvals; 3) Undertake clinical validation.
COVID-19 Biobank	300,000,000	Aims to establish and maintain a biobank for covid-19 bio-samples to support drug, vaccine and diagnostics development. Objectives: 1) To support the continued running of the COV-BANK, including replenishment of COVID-19 biospecimen stocks as well as continued specimen distribution to qualifying researchers and research groups in Uganda's pathogen economy; 2) Position the biobank's human resources and infrastructure to test and evaluate new biotechnology innovations, prototypes and products in support of accelerated regulatory approvals and commercialisation in Uganda and the regional market; 3) Position the Biorepository's preparedness to efficiently respond to re-emerging epidemics and pandemics including communicable and non-communicable diseases.
Establishing a two-in-one pharmaceutical and vaccine factory in Uganda	2,000,000,000	This is a partnership with the private sector (Alfasan, Government, Makerere) to establish the first cGMP facility for vaccine production in Uganda, to manufacture anti-tick vaccine and other locally developed vaccines. Objectives: 1) Infrastructural upgrade (civil, electrical) for full certification by NDA as cGMP; 2) Complete anti-tick vaccine production line.
PCR and Antibody Diagnostic Kits factory	7,000,000,000	The focus is on R&D, pilot production and commercialisation of PCR and Antibody Diagnostic Kits. Objective: Construct and equip pilot plant for production.
Development of a Uganda-single-source-origin high altitude grown and roasted coffee product for International Market through coffee processing hub system	3,700,000,000	The project focuses on amplifying efforts towards coffee value addition from earning just USD 2.5 to up to USD 15 dollars per kilo. This will improve incomes from coffee beans. Objectives: 1) To strengthen the management of coffee eco-hub-system under the Coffee Investment Consortium Uganda by 2024. 2) To empower CICU members to process and aggregate at least 1,147,236 kg of medium to high quality green coffee beans annually by the end of 2024. 3) To establish a tertiary hub for making Standardised Quality Uganda Single Source Origin High-altitude roasted coffee products at the Ntungamo hub under Inspire Africa Coffee Limited by the end of 2024. 4) To promote the Uganda Single Source Origin High-altitude roasted coffee products on the international market by the end of 2024. 5) To support the innovation process for the chocolate coffee, ready-to-drink coffee and coffee dispensing machine.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Growing and value addition of mange tout, sugar snaps, baby leaks, baby corn, asparagus	330,600,000	This project aimed at developing an export system for flowers into the Eastern Europe region. This would create a reproducible system to be used by other exporters of flowers and other produce outside Uganda. Objectives: 1) Develop protocols for the multiplication and packaging of the mange tout, sugar snaps, baby leaks, baby corn, asparagus flowers. 2) Develop an export system for the transportation and distribution of fresh flowers to Eastern Europe.
Infolistic Ankole long-horn beef branding for export of high-value beef products and tourism	798,000,000	This project focuses on developing an export grade beef product from the Ankole long-horn cattle. This will elevate Ankole long-horn cattle from just being local cattle but a tourist attraction. Objective: 1) To develop an infolistic Ankole long-horn beef value-added products brand. 2) To develop an Ankole long-horn beef value-added product. 3) To test an Ankole long-horn beef value-added products on Serbia market.
Establishment of brand-based traceability system for export using a case of fresh vegetable and fruit exports	771,401,500	This project aims at developing a protocol for a traceability system for fresh produce to meet the export demands. This will provide knowledge on how to export fresh produce into sophisticated markets. Objectives: 1) To develop an appropriate traceability system using vegetables and fruits as a case study in international market. 2) To validate the effectiveness of the develop traceability system using vegetables and fruits as a case study in international market.
Biodegradable banana fibre hair extensions for hair dressing	450,000,000	This project is undertaking R&D in development of biodegradable hair from banana fibre. Prototype products are promising. Objectives: 1) To undertake product optimization, 2) To perform manufacturing process optimisation; 3) Establish a pilot plant for manufacturing; 4) Market validation of products.
Local manufacturing of high-quality shoe brushes from cow tail hair	300,000,000	Undertaking R&D in development of high-quality shoe brushes from cow tail hair. Objectives: 1) Construction of the production area and storage room; 2) Establish production infrastructure; 3) Undertake business development towards scaling on the market.
Operationalising the Cassava Processing Plant Business in Gulu University	588,000,000	This project focuses on amplifying the efforts to develop the high-end value addition products from cassava value chain. This will reduce imports for wheat into the country. Objectives: (1) Streamline the commercialisation process to articulate the roles of the different operational staff independent of academic duties and responsibilities. This will strengthen the capacity of the University in operationalising the business incubation centre to complement research and training. (2) Fix and operationalise the existing infrastructure utilising the existing capacity of about 4000 kg per day to commercialise starch and High-Quality Cassava Flour (HQCF). (3) To develop a realistic business plan for cassava processing based on prevailing economic conditions and parameters. (4) Extend the value chain to make laboratory grade ethanol, animal feeds, cassava/millet and cassava/sorghum composite flours, briquettes and blended foods using the existing equipment, packaging and funding generated from proceeds of scaled production to generate income and create jobs without additional funding.

Venture Title/Project	Grant Amount (USh)	Brief description of Grant and Key Objectives
Silkworm Egg Production Unit in Uganda	1,671,846,667	This project intends to avail affordable silkworm eggs which are locally produced and viable. This will increase access to viable silkworm eggs in the country and save cocoon producers a lot of losses. Objectives: 1) Establish silkworm egg producing facility; 2) Distribute viable silkworm eggs to cocoon producers in the country.
Developing a medicinal product for relief of hangover, alcohol poisoning and pain.	881,800,000	The team has developed a natural remedy for hangover, with potential for analgesia. Objectives: 1) Undertake In vivo studies 2) Establish cGMP pilot production line; 3) Undertake market validation studies (as food supplement); 4) Undertake clinical trials to prove analgesic properties.
Apokor Cassava Value Addition Project (ACAVAP)	300,000,000	This project focuses on amplifying the efforts to develop the high-end value addition products from cassava value chain. This will reduce imports for wheat into the country. Objectives: 1) Develop cassava products brands such as HQCF, starch, among others; 2) Develop a distribution model for the cassava products brands.
Developing a National Network of STI Excellence as a Foundry for Transformative Human Capital Development	2,000,000,000	This project aims to develop national human capital for STI, by identifying, nurturing, skilling and deploying industrial scientists. Objectives: 1) Establish institutional framework for a national network; 2) Develop training curricula; 3) Train 18 protege scientists.

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