



INNOVATION, TECHNOLOGY DEVELOPMENT AND TRANSFER PROGRAMME

Annual Budget Monitoring Report

Financial Year 2022/23

October 2023

Budget Monitoring and Accountability Unit
Ministry of Finance, Planning and Economic Development
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Semi-Annual Budget Monitoring Report

Financial Year 2023/24

March 2024

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ABBREVIATIONS AND ACRONYMS

BIRDC	Banana Industrial Research and Development Centre
BMAU	Budget Monitoring and Accountability Unit
Bn	Billion
cDNA	Complementary DNA
CHTC	China High-Tech Corporation
CLARF	Central Laboratory Animal Research Facility
CNC	Computer Numeric Control
COVAB	College of Veterinary Medicine, Animal Resources and Biosecurity
COVID-19	Corona Virus Disease
DLG	District Local Government
DNA	Deoxyribonucleic acid
EAC	East African Community
ELISA	Enzyme-linked Immunosorbent Assay
GMP	Good Manufacturing Practice
GoU	Government of Uganda
HIG	Human Immunoglobulin
HPLC	High-Performance Liquid Chromatography
IFMS	Integrated Financial Management System
ISO	International Organization for Standardization
ITDT	Innovation Technology Development and Transfer
JCRC	Joint Clinical Research Centre
KMC	Kiira Motors Corporation
LGs	Local Governments
MAK-BRC	Makerere University Biomedical Research Centre
MDAs	Ministries, Departments and Agencies
MFPED	Ministry of Finance, Planning and Economic Development
MUST	Mbarara University of Science and Technology
NDA	National Drug Authority
NDP	National Development Plan
NMR	Nuclear Magnetic Resonance
NMS	National Medical Stores
NRIP	National Research and Innovation Program
NSTEIC	National Science, Technology Engineering, 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
RT-PCR	Reverse Transcription PCR
SARS-CoV-2	Severe Acute Respiratory Syndrome Corona Virus 2
TIBIC	Technology, Innovation and Business Incubation Centre
TSC	Technical Service Company
UCI	Uganda Cancer Institute
UIRI	Uganda Industrial Research Institute
UNBS	Uganda National Bureau of Standards
UNCST	Uganda National Council for Science and Technology
USD	United States Dollar



FOREWORD

At the start of this Financial Year 2023/24, the Government of Uganda outlined strategies to accelerate the country's economic growth agenda. Some of these strategies centered on enhanced domestic revenue mobilization and collection, and effective implementation of various initiatives to improve the efficiency and effectiveness of government programs and projects.

Within your programmes, I urge you to undertake a comprehensive reflective exercise to find out if indeed the interventions being implemented are achieving the true essence of efficiency and effectiveness. If not, why? How can this situation be remedied? Without efficiency and effectiveness, the impact and the ensuing sustainability from the interventions will not be achieved, thus reducing the opportunities for investment in new and more productive ventures.

The government is concerned that some programmes have stagnated at fair performance over the years, although they receive a considerable amount of their budgets annually. These monitoring findings form a very important building block upon which the programmes can begin the reflective exercise. I will be happy to hear your ideas on how the last-mile service delivery can be improved.

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 through the development of a well-coordinated Science, Technology, Engineering and Innovation (STEI) ecosystem. The programme has three sub-programmes, namely: Research and Development; STI Ecosystem Development, and Industrial Value Chain Development. The programme is contributed to by Vote 167: Science Technology and Innovations (STI) Secretariat, and Vote 110: Uganda Industrial Research Institute (UIRI).

The programme activities were executed through Vote 167: Science Technology and Innovations (STI) and Vote 110: Uganda Industrial Research Institute (UIRI). The programme has three subventions: Banana Industrial Research and Development Centre (BIRDC), Kiira Motors Corporation (KMC) and Uganda National Council for Science and Technology (UNCST).

This report presents monitoring findings for the period 1st July 2023 to 31st December 2023 for three sub-programmes of Research and Development, Industrial Value Chain Development and STI Ecosystem Development.

Overall Programme Performance

The overall ITDT Programme performance was fair at 61.3% with all sub-programmes performing fairly. The approved budget for the Programme for Financial Year (FY) 2023/24 is Ug shs 256.656 billion (bn) which was revised upwards to Ug shs 456.616bn. A total of Ug shs 229.121bn (89.3%) was released and Ug shs 126.892bn (55.4%) spent by 31st December 2023. The release was very good, while expenditure was fair. The fair absorption was attributed to the delay by the STI to approve the expenditure of released funds to the STI grantees, and the late initiation of procurement under the BIRDC. Vote 167 had the biggest share of the annual budget (94%) though with the least absorption.

Most of the activities being implemented were under the Industrial Value Chain Development Sub-programme. Infrastructure development outputs registered fair performance though all were behind schedule. The research-related outputs posted poor performance since most were in the initial stages of implementation. The programme registered progress in achieving some of the objectives and targets of the NDP III such as an increase in expenditure on research and development and building human resource capacity for the STI while others such as increasing IPs registered were behind schedule.

Research and Development Sub-programme

The sub-programme contributes to the objectives of building institutional and human resource capacity in STI, and strengthening research and development capacities and applications. Its overall performance was fair at 66.5%. Three new Intellectual Properties (IPs) were registered with the Uganda Registration Services Bureau (URSB) albeit with funds carried forward from the previous financial year.



Industrial Value Chain Development Sub-programme

The sub-programme aims at increasing development, transfer and adoption of appropriate technologies and innovations; and development of requisite STI infrastructure. The sub-programme performance was fair at 57%.

A pilot study on the safety and immunogenicity of the Novel Adeno-vector vaccines was ongoing, with most results on safety obtained and meeting the minimum safety standards. Optimisation and validation of the immuno-assays to determine the immune responses to the vaccine was ongoing with preliminary results indicating no evidence to support serious adverse effects of the vaccine.

Under the In-Vitro Studies of Natural Therapeutics of Uganda Program (INVONAT), sterility tests were done on 16 samples received in 2023 and 10 passed. Cytotoxicity was done for 10 products and six were identified as toxic and did not qualify for efficacy studies while four products passed and progressed to the efficacy test stage. The preclinical evaluation and standardization of the antidiabetic herbal prototypes code-named GLUCOKAT at Busitema University was at the stage of permutating the five plants that were identified at the prototype stage to be able to optimise a few without losing purpose and content.

The Good Manufacturing Practice (GMP) process for the Adeno-vector vaccines was yet to be realised due to the lack of an appropriate GMP facility in Uganda however, plans were underway by the STI to establish a GMP facility within the UVRI. On the other hand, the construction of the Good Laboratory Practices (GLP) facility at the Natural Products Research and Innovation Centre (NAPRIC)-Busitema University was ongoing. Sixty-five grantees were selected for support and most beneficiaries received the funds in October 2023 however, the STI secretariat delayed to issue authorisation to spend during the period under review leading to poor absorption and delayed implementation.

Five (5) engineers received training in Egypt to support the development and operationalisation of a space science programme, and a concept to inform the study on the status of the aerospace industry in Uganda was completed. Under the capacity building for the Fourth Industrial Revolution (4IR), the STI was working with the Regional Universities Forum (RUFORUM) to identify and incubate research projects at academic institutions across Uganda.

The coffee value chain analysis was ongoing and reported at 90% progress while the coffee roasting and instant coffee processing facility in Ntungamo was at 30% physical progress. The development of coffee secondary hubs for green coffee aggregation was reported at 20%.

The BIRDC generated sales revenue amounting to Ug shs 1.209bn (25.2% of the target) against an annual target of Ug shs 5bn. Some transport equipment was delivered, while others were under procurement. Three new products were developed against a target of 12 for both the local and international markets. Recertification for raw and instant flour for halal was attained and preparation for the International Standards Organisation (ISO) continued with the first audit undertaken.



STI Ecosystem Development Sub-programme

The sub-programme performance was fair at 60.4%. The intervention of; Strengthen the function of technology acquisition, promotion as well as transfer and adoption had good performance while the interventions of; Increase investment in research and Development (R&D) in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, and Transport registered poor performance.

The national E-Mobility Strategy was developed and was awaiting approval by the Inter-Ministerial Committee while an online and physical support facility for technology development and innovations advancement was developed and in operation. A master plan for the automotive park was completed and approved, while the preparation of the detailed design for the diagnostics pilot plant was ongoing.

Construction of the Kiira Vehicle Plant was at 80% with equipment installation in the production facility, trim shop, Quality Inspection and Testing (QIT) and body shop ongoing. The construction of the principal access road and watchtower was ongoing. The assembly and production of the 28 buses (23 electric and 5 diesel buses) was ongoing at Luweero Industries Limited with three buses completed and the rest at different stages. Uganda was allocated the very first World Manufacturing Identifier (WMI) and subsequently the first Vehicle Identification Number (VIN). Ten e-bus operators were trained and the third cohort of 20 was undergoing training.

The construction works at the National Science, Technology, Engineering, and Innovation Centre (NSTEIC) in Rwebitete, Kiruhura District was at 95% pending furniture supply, and landscaping. All equipment for the workshops was delivered and was under installation at different levels. Some were under testing. Procurement of start-up raw materials (steel and aluminium), light ICT hardware plus other machinery and equipment was ongoing. Construction works for the Technology Innovation and Business Incubation Centre (TIBIC) at Namanve were 100% complete and over 97% of the equipment was installed and tested. Procurement of assorted equipment for the smart conference hall was ongoing though behind schedule.

All engineering machinery, equipment and spare parts for the Technical Service Company (TSC) were delivered and tested. A functional equipment leasing and machinery rental program was implemented. Some equipment had been leased to M/s National Enterprise Corporation (NEC) at King-Fisher oil wells while other equipment remains parked at Court Yard Hotel-Lyantonde, unused. Rental fees amounting to Ug shs 890,000,000 were yet to be remitted to the UNCST bank account by the NEC. A general curriculum was developed for the NSTEIC and the operational plan and guidelines for the National Science, Technology, Engineering, and Innovation Centre (NSTEIC) was developed while the one for TIBIC is being reviewed. The project was due for the operations and maintenance phase but no resources had been earmarked for the purpose.

A Think Tank on Aeronautics and Space science was instituted and a concept to inform the study of the ecosystem in Uganda was generated. To operationalise the skilling centre, 25 Trainers of Trainers (ToTs) personnel were recruited by the Uganda National Council of Science and Technology (UNCST) and on-boarded for a three-month training programme in China. The procurement of NSTEIC and TIBIC hardware infrastructure progressed at varying levels.



Conclusion

The overall Innovation, Technology Development and Transfer (ITDT) Programme performance was fair at 61.3%. The human resource capacity for the STI is being built through the various protégés recruited and PhD students enrolled on the various research and innovation projects. The legal and regulatory framework has been improved with the development of regulations and strategies such as the National E-mobility Strategy.

Increasing the number of IP rights registered per year from 2 to 50 progressed rather slow with one IP registered and two under review against a target of five by the third year of the NDP III. If this doesn't change, the target of 50 is likely not to be achieved. The clinical studies for safety and immunogenicity of the Novel Adeno-vector vaccine were ongoing with preliminary results on safety obtained and meeting the minimum safety standards though behind schedule partly due to intermittent releases and lack of critical facilities in the country.

Civil works at the NSTEIC and TIBIC were complete, with some external works ongoing for NSTEIC. Equipment for the NSTEIC and KMC was delivered and installation ongoing however, all were behind schedule. There is an increase in STI innovations, R&D and an enabling environment.

The delayed conclusion of procurements under the BIRDC such as the 2 10-ton truck that has been at Solicitor General's Office for clearance since FY2022/23 affected the commercialisation of the pilot plant. The delay by the STI to authorise the use of funds by the grantees demoralises the researchers and causes delays in the implementation of planned outputs. Additionally, the absence of a GMP facility was affecting the completion of some studies. Moreover, the STI was taking on many grantees despite inadequate resources and therefore some projects were not receiving sufficient funding to actualize the objectives for which they were conceived. It was observed that there was misalignment of the Programme Implementation Action Plan (PIAP) interventions that were not related to the planned outputs and subprograms under which they were placed.

Recommendations

1. 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.
2. The STI Secretariat should timely authorise grantees to spend the funds disbursed to facilitate the timely achievement of set objectives.
3. The UNCST should expedite the installation of requisite equipment and hardware to operationalise the NSTEI Project and prioritise the operation and maintenance of the outputs delivered by the project.
4. The STI Secretariat should review the portfolio supported with a view of phasing, postponing and terminating some of the studies given the fiscal limitations.
5. The STI should also review the policy on sharing of proceeds from the IP rights to include the innovator as opposed to only the STI and host institutions.



6. The BIRDC and the Solicitor General should streamline the issues that are delaying the finalisation of procurement for some equipment to expedite the full commercialisation of the pilot banana plant.
7. The STI should streamline communication of the next steps to innovators whose research has successfully progressed beyond prototyping and is ready for commercialisation to act as a catalyst for innovation.
8. The STI Secretariat together with the Ministry of Finance, and the National Planning Authority should align the outputs in the work plan to the respective sub-programmes and implementation plan.



CHAPTER 1: INTRODUCTION

1.1 Background

The mission of the Ministry of Finance, Planning and Economic Development (MFPED) is, “*To formulate sound economic policies, maximize revenue mobilization, and ensure efficient allocation and accountability for public resources so as to achieve the most rapid and sustainable economic growth and development.*”

The MFPED 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. The BMAU work is aligned with budget execution, accountability, and service delivery.

Commencing FY 2021/22, the BMAU began undertaking Programme-Based Monitoring to assess performance against targets and outcomes in the Programme Implementation Action Plans (PIAPs)/Ministerial Policy Statements. 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-Industrialization; Community Mobilisation and Mindset Change; Digital Transformation; Human Capital Development; Innovation, Technology Development and Transfer; Integrated Transport Infrastructure and Services; 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 2023 to 31st December 2023.

1.2 Programme Goal and Objectives

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:

1. To develop requisite STI infrastructure.
2. To build human resource capacity in STI.
3. To strengthen Research and Development (R&D) capacities and applications.
4. To increase development, transfer and adoption of appropriate technologies and innovations.
5. To improve the legal and regulatory framework.

1.3 Sub-programmes

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

1. STI Ecosystem Development



2. Research and Development (R&D)
3. Industrial Value Chains Development

1.4 Programme Outcomes

The third National Development Plan (NDPIII) ITDT Programme outcomes are:

1. Increased innovation in all sectors of the economy.
2. Enhanced development of appropriate technologies.
3. Increased R&D activities in the economy.
4. Increased utilization of appropriate technologies.
5. An enabling environment for Science, Technology, Engineering & Innovation created.

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

1. Increase the Global Innovation Index from 25.3 to 35.0.
2. Increase Gross Expenditure on R&D as a percentage of Gross Domestic Product (GDP (GERD) from 0.4 percent to 1 percent.
3. Increase business enterprise sector spending on R&D (percent of GDP) from 0.01 percent to 0.21 percent.
4. 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 FY2023/24. 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 Banana Industrial Research and Development Centre (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), Ministerial Policy Statements (MPSs), and quarterly work plans, progress and performance reports of ministries, departments and agencies (MDAs). A total of seven interventions out of 23 under the PIAP were monitored¹. The selection of the interventions to monitor was based on the following criteria:

1. A significant contribution to the programme objectives and national priorities.
2. Level of investment and interventions that had a large volume of funds allocated were prioritized.
3. 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 prioritized.
4. 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, MPS, and progress reports of the respective agencies for monitoring. To aid in mapping PIAP interventions against annual planned targets stated in the programme MPS and quarterly work plans, a 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.

¹ Design and implement special programmes for Nano technology, space exploration, nuclear technology, bio sciences, ICT and engineering; Design and implement special programmes for Nano technology, space exploration, nuclear technology, bio sciences, 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 & Gas, Minerals, Energy, Health, Transport; Support the establishment and operations of Science and Technology Parks to facilitate commercialization; Support the establishment and operations of Technology & Business incubators and Technology Transfer centers; and Create capacity on application of drones, satellite imagery through GIS, real- time disaster modelling, and widespread connectedness, improve emergency response and production.



2.3 Data Collection and Analysis

Data collection

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

- i) Literature review from key policy documents including, MPS FY 2022/23; National and Programme Budget Framework Papers, A Handbook for Implementation of NDPIII Gender and Equity Commitments, PIAPs, NDP III, quarterly progress reports and work plans for the respective implementing agencies, Quarterly Performance Reports, Budget Speech, Public Investment Plans, 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.

Data Analysis

The data was analyzed 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 analyzed 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 criterion in Table 2.1. Based on the rating assigned, a BMAU colour-coded system was used to alert the policymakers and implementers on 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 2023/24**

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

Source: Author's Compilation

Ethical considerations

Introduction letters from the Permanent Secretary/Secretary to 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 Limitations

1. Lack of reliable and real-time financial data on subventions on the IFMS.
2. Mis-aligned PIAP interventions that do not relate to outputs and sub-programmes in the work plan which affects performance assessment.
3. Limited funds and time to conduct comprehensive monitoring visits to STI grantees.

2.5 Structure of the Report

The report is structured into four chapters. These are the Introduction, Methodology, Programme Performance, Conclusion and Recommendations respectively.



CHAPTER 3: PROGRAMME PERFORMANCE

3.1 Introduction

The Innovation, Technology Development and Transfer (ITDT) Programme contributes to objective four of the NDPIII to enhance the productivity and social well-being of the population. During the FY2023/24, the Science, Technology and Innovation (STI) continued to support the 65 research projects by providing funds to grantees however, most of them had not been granted permission by the STI secretariat to spend by the 31st December 2023.

The annual monitoring FY 2023/24 focused on two votes; STI and UIRI as well as three subventions of Kiira Motors Corporation (KMC), Uganda National Council for Science and Technology (UNCST), and the Banana Industrial Research and Development Centre (BIRDC).

3.2 Overall Performance

3.2.1 Financial performance

The approved budget for the ITDT Programme is Ug shs 256.656 billion (bn) and revised upwards to Ug shs 456.616bn. A total of Ug shs 229.121bn (89.3%) was released and Ug shs 126.892 bn (55.4%) spent by 31st December 2023 (Table 3.1). The release was very good while expenditure was fair. The fair absorption was attributed to the delay by the STI to approve the expenditure of released funds to the STI grantees and lengthy procurement under the BIRDC. Vote 167-STI had the biggest share of the annual budget (94%) but with the least absorption.

Table 3.1: Financial Performance for the ITDT Programme FY2023/24 (Bn Ug shs)

Entity	Approved Budget	Released	Spent	% Budget Released	% Releases Spent
Science, Technology and Innovation	241.591	221.641	120.045	91.70	54.20
Uganda Industrial Research Institute	11.956	5.978	5.831	50.00	97.50
Uganda Registration Services Bureau	2.41	1.201	0.77	49.80	64.10
Uganda Embassy in Russia, Moscow	0.119	0.02	0.019	16.90	94.90
Ministry of Foreign Affairs	0.581	0.281	0.227	48.40	80.90
Total for Programme	256.656	229.121	126.892	89.30	55.40

Source: Quarter Four PBS Report FY2023/24

Physical performance

The overall ITDT Programme performance was fair at 61.3% (Table 3.2). All sub-programmes performed fairly and most activities were implemented under the Industrial Value Chain Development Sub-programme. Three Intellectual Property (IPs) were registered against a target of five, although with funding from the previous FY. The National E-mobility Strategy was approved and clinical trials for 3 vaccines were completed.

The infrastructure development outputs registered fair performance though all were behind schedule. The construction and equipping of the NSTEIC and TIBIC were nearing completion while equipment installation at the Kiira Vehicle plant was ongoing. The commercializing of the Tooke plant registered slow progress attributed to the lengthy procurement of required equipment. The research-related outputs posted poor performance since most were in the initial stages of implementation attributed to delayed disbursement of funds by the STI and delayed approval to spend.

**Table 3.2: ITDT Programme Output Performance by 31st December 2023**

Sub-programme	Performance (%)	Remark
Research and Development	66.5	Fair performance
Industrial Value Chain Development	57	Fair performance
STI Ecosystem Development	60.4	Fair performance
Total	61.3	Fair performance

Source: Field Findings

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

3.3 Research and Development Sub-programme

The sub-programme contributes to the objectives of building institutional and human resource capacity in STI, and strengthening Research and development capacities and applications. The overall sub-programme performance was fair at 66.48%. One intervention and one output were planned under the sub-programme.

3.3.1 Strengthen the Intellectual Property (IP) value chain management

The intervention contributes to the objective of strengthening Research and Development (R&D) capacities and applications. The planned output under the intervention for FY2023/24 is model value addition services. The intervention attained fair performance at 66.5%.

Model value addition services: To Strengthen the IP value chain management, the STI planned to register five intellectual property rights with the Uganda Registration Services Bureau (URSB). By 31st December 2023, a total of three new IPs were registered with URSB (Annex 2). However, this was not a direct cost to the STI Secretariat in FY 2023/24, as it was funded in the context of grant funds for FY 2022/23. The expenditure under this intervention and output were on general staff salaries, social security contributions, guard and security services, and welfare and entertainment among others.

Table 3.3: Performance of the Research and Development Sub-programme as at 31st December 2023

Output Performance								Remark
Intervention	Output	Financial Performance			Physical Performance			
		Annual Budget (Ug shs bn)	% of budget received	% of budget spent	Annual Target	Cum. Achieved Quantity	Physical performance Score (%)	
Equip and support all lagging primary, secondary schools and higher education institutions to meet the basic requirements and minimum standards	Model Value Addition Services	10.19	15.0	53	3	0.30	66.48	Fair Performance with 3 IP registered with the URSB though with funding from FY2022/23.
Average Output Performance							66.48	Fair Performance

Source: Field Findings



Conclusion

Overall, the sub-programme performance was fair, with 3 out of the planned five intellectual property rights registered with URSB. There was no direct funding for the activity from the budget for FY2023/24.

3.4 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 57%. Table 3.4 gives the summary performance of the sub-programme interventions as at 31st December 2023.

Table 3.4.: Performance of Interventions under the Industrial Value Chain Development Sub-programme by 31st December 2023

Intervention	Colour code	Remark
Design and implement special programmes for Nanotechnology, space exploration, nuclear technology, biosciences, ICT and engineering	82.1	Good performance
Strengthen the function of technology acquisition, promotion as well as transfer and adoption	38.2	Poor performance
Increase investment in R & D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, Transport	50.8	Fair performance
Total	57	Fair performance

Source: Field Findings

3.4.1 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 FY2023/24 is Technology and Innovation. Overall intervention performance was good. Detailed performance of the monitored output is discussed hereunder.

Technology and Innovation: The plan is to develop and operationalise a space science programme by revamping and upgrading the Mpoma Earth Station. By the end of December 2023, a concept to inform the study on the status of the aerospace industry in Uganda was completed. The study is aimed at mapping all stakeholders in the country to the various responsibilities as far as aerospace is concerned, identify gaps and challenges and eventually inform the aerospace policy and strategy for the country. Five (5) engineers were supported to receive training in Egypt. In addition, the operationalisation and upgrade of equipment at the Mpoma Earth Station was affected by the delayed release of funds. The planned satellite had been designed but not yet prototyped.

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

The intervention aims at increasing development, transfer and adoption of appropriate technologies and innovations. The planned output during the FY2023/24 include; technology and innovation undertaken, industrial skills developed, and model value addition services



provided. The intervention performance was poor due to the delayed commencement of research. The performance of the monitored output is discussed hereunder.

Technology and Innovation: The plan is: clinical trials completed for three (3) selected vaccines, develop and commercialise five (5) beauty and dermatology products from indigenous materials; develop cassava value chains putting three (3) cassava products on the market, build capacity to develop and produce Industry 4.0 products locally, and 3 partnerships and collaborations formed with industry experts.

In a bid to develop and commercialise dermatology products from indigenous materials, support was extended to shea butter producers in Northern Uganda through trainings in business development and marketing. In addition, the mosquito repellent vaseline and lotion were developed from shea butter and ethnomedicinal plants through funding from FY2022/23.

To support the leather value chain, a needs assessment on developing the leather value chain was undertaken. A visit was made to Kawumu Leather Tannery to establish the types of raw leather products manufactured by the tannery to develop strategies for advancing the leather value chain in the country through the local manufacture of value-added leather products. The findings from the need assessment indicated that the main challenges experienced by local leather products manufacturers were difficulty in sourcing high-quality raw leather and accessories for the manufacture of leather products like belts, bags, and shoes since there is no local production of accessories for leather products.

The STI Secretariat carried out a field survey to identify players along the cassava value chain. Additionally, the STI secretariat was undertaking research in collaboration with Muni University to support innovators producing products from cassava. This is aimed at developing the cassava value chain to put cassava products on the market.

To establish an ecosystem to support industry 4.0 potential ideas into mature technologies, the STI operationalized the academia-to-research initiative to valorise the research and development from universities. The STI finalized funds allocation of funds to the Academic research initiative and was working with the Regional Universities Forum to identify and incubate research projects at academic institutions across Uganda. Additionally, funds were allocated to the MDA tech support program, starting with the Ministry of Internal Affairs. The aim is to work with local developers to build a pilot immigration system. On the other hand, the establishment of the robotics centre differed to FY2025/26 due to funds limitations and a renewed focus on electronics prototyping and manufacturing as a foundation for robotics.

In forming partnerships and collaborations with industry experts, the STI linked with Professor Ralf Bergmann of Silicon Wafer Manufacturing, Biocubafarma, and Prof. Kanene for Vaccine Manufacturing to support local research into commercialise. The also STI identified three innovators namely; 1) Production Acceleration Services to support PDM, 2) Shea nut butter tree variety improvement, and 3) Portable/mobile farm-based tomato process development. Also, the District processing facility functionalization and sustainability innovation concept was completed.

Under the **coffee value chain development**, the plan is to establish a coffee processing facility for soluble and roasted coffee with a capacity of 4,000 tonnes per annum. By 31st December 2023, the coffee value chain analysis was reported to have progressed to 90% while the coffee roasting and instant coffee processing facility in Ntungamo was reported at 30% completion. The development of coffee secondary hubs for green coffee aggregation progressed at 20%.



The tools were developed for the digitalization of coffee farmers for the supply of coffee to support roasted coffee bean production and export.

Research and Development: The plan is to complete clinical trials for 3 selected vaccines, prepare plans for the construction of the pathogen economy industrial park and support researchers to undertake research and innovation in various fields.

By 31st December 2023, the expansion of the colonies of the humanised mice was ongoing to support the clinical trials. The pilot pre-clinical trials in swiss mice were concluded for Inactivated and Adeno-vector vaccines (immunogenicity and safety studies).

A total of 67 grantees were supported to undertake research and innovation in various fields however, most of the grantees were in the preliminary stages of implementation. Whereas funds were released to the grantees, they had not received permission to spend. During the period under review, three grantees were monitored to ascertain progress and the findings are discussed below;

1. Novel Adeno-vector vaccine preclinical immunogenicity assessment GMP process transfer

The project aimed at developing a SARS-CoV-2 vaccine using an Adenovirus vector and viral spike (S-glycoprotein) from Ugandan viral strains. The key objectives are; 1) Complete immunogenicity studies in humanized mice, 2) Produce bulk stock for clinical trials under cGMP conditions. The project's 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.

Using funds from the previous financial years, the following progress was registered; completed genotypic characterization of 73 faecal samples collected from chimpanzees; adeno-vector backbone was generated; three vaccine candidates (A23.1, Delta and Omicron) were generated from E1 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 capacity for multivalent vaccines.

The project budget during the FY2023/24 is Ug shs one billion which was all disbursed to the implementer by 30th October 2023 but the researcher had not received permission from the STI Secretariat to spend by January 2024. A pilot study on the vaccines to evaluate the safety and immunogenicity of the vaccines is ongoing with most of the results on safety obtained and meeting the minimum safety standards.

There are two objectives to be achieved under the immunogenicity study of the vaccine: humoral and cellular immune responses to the vaccine. By 31st December 2023 optimisation and validation of the immuno-assays (enzyme-linked immunosorbent assay (ELISA) and neutralisation assays) to be used to determine the humoral immune responses to the vaccine was ongoing. Preliminary results indicated that there was no evidence to support serious adverse effects regarding these vaccines. Most of the products tested did not have any negative effects on the function of organs (liver, kidney, heart, brain, and skeletal muscle).

The request for patent rights for the indigenous vaccine backbone was registered with the African Regional Intellectual Property Organization (ARIPO). The GMP process was not done because there is no GMP facility in Uganda however, plans were underway by the STI to establish a mini-GMP and the process is underway to identify space within the UVRI. The key



challenges to the project are the lack of a bioreactor that uses different cells to multiply the genes, inadequate resources and delayed approval from the STI Secretariat to use the disbursed funds. The project faces a risk of delayed achievement of the intended outcomes of the vaccine due to the lack of an active GMP facility.

2. *In-Vitro Studies of Natural Therapeutics of Uganda Program (INVONAT)*

The project started in FY 2020/21 to evaluate the in-vitro anti-bacterial, anti-fungal and anti-viral capacity of natural therapeutic products in Uganda and for effective compounds to evaluate the related mechanisms of control. The specific objectives are to determine the bacterial/ fungal sterility, cytotoxicity invitro anti-virus activity, in-vitro anti-bacterial activity, in-vitro anti-fungal activity, in-vitro anti-diabetic activity, in-vitro anti-cancer activity, in-vitro anti-inflammatory/antioxidant activity, and the in-vitro anti (condition/disease) activity of the natural products.

The project budget in FY2023/24 is Ug shs 900,000,000 which was all received in October 2023 but the researcher had not received permission to spend from STI. By 31st December 2023, the following had been achieved; One comprehensive and amended protocol for Invitro studies was approved by the Research Ethics Committee (REC) and Standard operating procedures were developed for 5 out of the 6 new assays.

Sterility testing was done for all the 16 (including 3 anti-dental) samples received in 2023. The cytotoxicity assays were completed for 10 products (5 liquid smoke products, 1 filtered alcohol guard product and 4 Natural Chemotherapeutic Research Institute-NCRI products). Six out of the ten products were identified as toxic and did not qualify for efficacy studies (antiviral, anti-fungal and anti-bacterial) while 4 products passed this stage and were ready for the next stage of study (efficacy).

Three out of four antiviral samples received from NCRI passed the cytotoxicity tests and qualified for the efficacy assessment while one product did not. An additional 26 new prototypes were in the pipeline for the tests.

Sterility tests were done for three anti-dental products but still pending further assays because of the non-availability of reagents and the anti-alcohol assessment was not done for the same reasons. The key challenge is delayed release and approval to spend from the STI Secretariat which resulted in delayed procurement, payments, and implementation of planned outputs.

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

This project builds on earlier preliminary research with the objectives of; 1. To evaluate the anti-hyperglycemic 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 analyze the phytochemical composition and contaminants of the most efficacious formulated prototype; 4. To assess and optimize the pharmaceutical properties of the most efficacious formulated antidiabetic prototype; and 5. To establish a GLP facility to support the preclinical evaluation of natural therapeutics in Uganda. The STI is therefore funding a prototype into a viable product that can be commercialised.

The project budget is Ug shs 1.3bn, which was all disbursed to the grantee. A total of shs 0.195bn (15.5%) was spent by 31st December 2023. The project is an extension to a previous innovation fund that developed a prototype therapy to treat COVID-19 code-named Tazcov.



The project has two components which are; research, and infrastructure development. On the research component, the study was permutating the five plants (*Tamarindus indica*, *Aloe vera*, *Erythrina abyssinica*, *Kigelia Africana*, and *Entada abyssinica*) that were identified at the prototype stage to be able to optimise a few without losing the purpose and content.

On the infrastructure side, the ground floor of the GLP facility was completed under the first phase of funding, the construction under the new funding had progressed to 40% with the casting of the slab for the second floor ongoing. The progress of both components was slowed down by the delayed approval by STI to spend the funds that were received in October 2023. Additionally, the project was affected by the delays in the procurement process and dependence on other projects for certain processes, stages and approvals. Moreover, there was a lack of clarity in IP sharing rights which left out the innovators but focused on the funder and the host institutions thus affecting the morale of innovators.

Recommendations

1. There is a need to harmonise the IP sharing rights between the researcher/grantee, host institution and the STI.
2. The STI Secretariat should accompany the funds with instructions to spend to mitigate the delayed execution of projects.



The Good Laboratories Practice facility under construction at the Busitema University Natural Products Research and Innovation Centre in Mbale District

3.4.3 Increase investment in R & D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, Transport

The intervention contributes to the objective of strengthening research and development capacities and applications. The planned outputs for FY2023/24 include; industrial skills development and model value addition. The performance of the intervention was fair.



Industrial Skills Development: The plan is to support students in industrial skills training. By 31st December, a total of ten out of the planned twenty interns were received at the STI Secretariat and they were undergoing training. The training aims to develop a pool of young people who can eventually be taken on to work and promote the integration of STI in the various sectors of the economy. In addition, discussions were held with the Uganda Institute of Professional Engineers to conduct skills training at the skills training centre in Namanve and Rwebitete under the NSTEI-SEP project once it is completed.

The Banana Industrial Research Development Centre (BIRDC)

The planned outputs for FY2023/24 include, operationalizing the BIRDC model, the banana pilot plant and research laboratories commercialized, upscale and automate the primary processing for commercialisation to increase the daily output capacities from 1.4MT to 14MT, the warehousing facility and the cold room expanded, five collection centres for the Greater Bushenyi constructed, and global supply chain developed and operationalized.

The approved budget to BIRDC was Ug shs 78.109bn inclusive of non-tax revenue from the sales of *Tooke* products (Ug shs 05bn), a supplementary budget of Ug shs 45.74 and a balance brought forward from FY2022/23 of Ug shs 21.109bn). By 31st December 2023, Ug shs 25.44bn was released (34.5%) and Ug shs 9.269bn spent (36.4%). The poor absorption was attributed to the prolonged procurement of some equipment. The BIRDC generated sales revenue amounting to Ug shs 1.209bn against an annual target of Ug shs 5bn as at 31st December 2023, representing 25.18% of the forecasted annual target.

One double cabin pickup car was delivered during the period under review and one tractor with a trailer was delivered and awaiting deployment to the community. The procurement of two 10-MT truck vehicles was at the Solicitor General, awaiting clearance, while a contract was signed for the marketing van and awaited delivery. It should however be noted that these procurements have dragged on for more than one financial year.

The BIRDC purchased and processed 308 tons of fresh bananas from farmer's cooperatives against an annual target of 4,000 tons and processed 30.9 tons of chips against an annual target of 400 tons which represents a 14.5% achievement of the planned annual targets. Three new products were developed against a target of 12 for both the local and international markets.

The re-certification for raw and instant flour for halal was attained and the preparation for International Standards Organisation (ISO) product certification continued for the fourth year running with the first audit undertaken during the period under review. A total of 919 samples out of 947 samples were analysed in the microbiology laboratory with 85.43% sample integrity achievement while 377 samples were analysed in the chemistry laboratory achieving 34.0% sample integrity. A total of 166 samples were analysed in the Rheology laboratory with 80% sample integrity achieved.

The LCD Screens and public address system for the conference centre were delivered and awaited installation. A contract for the supply, delivery, installation and testing of the drum dryer was signed, while a cookie machine was procured and installed. The bills of quantities (BoQs) and design consultancy for the warehousing expansion, and Central Processing Unit (CPU), were initiated. Construction of one out of the planned three hubs to support product distribution and franchising was ongoing in Jinja at 50% progress.

The number of *Tooke* Farmer Cooperatives registered increased to 24, with a total membership of 6,500. In addition, 10 cooperatives (Bumbeire, Shuuku, Kyabugimbi, Rubindi, Kyamuhunga, Kazo, Kitagata, Bunyaruguru Modern and Mitooma supplied raw materials to



Left: Procured LCD screen for the conference hall yet to be installed. Right: Closed Circuit Monitoring station at the Banana Industrial Research and Development Centre in Bushenyi District

the plant for processing. A total of 127 farmers were registered and trained in the ToT against the planned 250. The modules included: training in commercial Banana production and quality standards in Rubindi-Mbarara and Bunyaruguru Modern Cooperative.

To develop and operationalize the global supply chain, the BIRDC participated in five out of the planned eight international trade exhibitions. These were in the USA, Dubai, Philippines, Serbia and Nigeria organized by the Presidential Advisory Committee on Exports and Industrial Development (PACIED), Climate Change, and Uganda Airlines.

Table 3.5: Performance of the Industrial Value Chains Development Sub-programme as at 31st December 2023

Outputs Performance								Remark
Intervention	Output	Financial Performance			Physical Performance			
		Annual Budget (Ug shs 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, bio sciences, ICT and engineering;	Technology and Innovation	18.48	0.4	92	3	0.01	82.14	Good performance with a National Aerospace Strategy and Policy approved.
Strengthen the function of technology acquisition, promotion as well as transfer and adoption	Technology and Innovation	37.3	95.1	89	11	4	38.23	Poor performance as most of the researchers were in the initial stages of implementation.
Increase investment in R & D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, Transport	Industrial Skills Development (BIRDC)	78.1	32.6	36	127	21	50.75	Fair performance. Commercialization was progressing at a slow pace with procurement of equipment behind schedule and other procurements still at initial stages.
Overall sub-programme Performance							57.0	Fair performance

Source: Field Findings



Conclusion

The overall sub-programme performance was fair as most planned outputs and activities were at the initial stages of implementation. safety and immunogenicity of the Novel Adeno-vector vaccines was ongoing with most of the results on safety obtained and meeting the minimum safety standards. The Banana Industrial Research Development Centre generated sales revenue amounting to Ug shs 1.209bn against an annual target of Ug shs 5bn as at 31st December 2023. Implementation of activities by the researchers/grantees was affected by delayed approval to spend from the STI Secretariat, and delayed procurement of equipment and sloppiness in acquiring ISO certification by the BIRDC which hampered the full commercialisation of the pilot banana plant.

3.5 STI Ecosystems Development Sub-programme

The sub-programme contributes to the five ITDT Programme objectives and has nineteen (19) interventions, of which four were funded and monitored. The sub-programme performance was fair at 60.4%. The intervention of Strengthen the function of technology acquisition, promotion as well as transfer and adoption had good performance while the interventions of; Increase investment in R&D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, and Transport; and Support the establishment and operations of Science and Technology Parks to facilitate commercialization registered poor performance. The summary performance of the monitored interventions is given in Table 3.6.

Table 3.6: Performance of Interventions under the STI Ecosystem Development Sub-programme by 31st December 2023

Intervention	Colour Code	Remark
Support the establishment and operations of Science and Technology Parks to facilitate commercialization	48.8%	Poor Performance
Support the establishment and operations of Technology & Business incubators and Technology Transfer centres	64.6%	Fair performance
Strengthen the function of technology acquisition, promotion as well as transfer and adoption	100%	Very good performance
Increase investment in R & D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, Transport	24%	Poor performance
Total	60.4%	Fair performance

Source: Authors' Compilation

Detailed performance of the sub-programme interventions and outputs is discussed here under:



3.5.1 Support the establishment and operations of Science and Technology Parks to facilitate commercialization

The intervention contributes to the programme objective of the development of requisite STI infrastructure. The annual planned outputs for FY2023/24 include: Model value addition services, and industrial skills development. The overall intervention performance was poor because activities were in the initial stages of implementation. The detailed performance of the planned outputs is discussed below.

Model Value Addition Services: The plan is to secure one contract manufacturing for Global Vehicle Manufacturers, an e-mobility strategy developed and establish three mass mobility solutions for public transport by KMC.

The National E-Mobility Strategy was developed and awaited approval by the Inter-Ministerial Committee. The process to secure contract manufacturing for global vehicle manufacturers was initiated and negotiations were ongoing with Green Hub in collaboration with TVS from India, for contract manufacturing at the Kiira Vehicle Plant. Additionally, a draft project proposal for the pilot of the electric public transport system for Jinja was developed in a bid to establish mass mobility solutions for public transport.

Industrial Skills Development: The establishment of two well-furnished laboratories in research and academic institutions was at the planning stages where identifying the specific details of the particular laboratories to be established was ongoing. The laboratories were envisaged to support the pathogen economy, Industry 4.0, and STI infrastructure. With funding from FY2022/23, nine laboratories were furnished as follows: Four laboratories at Makerere University-COVAB, one at UVRI, one at MAK-BRC, one at Mbarara University of Science and Technology (MUST), and two laboratories at Busitema University.

3.5.2 Support the establishment and operations of Technology & Business incubators and Technology Transfer centres

The intervention contributes to the ITDT Programme's objective: to develop the requisite STI infrastructure. The planned and monitored budgeted outputs for FY2022/23 under the interventions are: Model Value addition services provided, and Industrial skills developed. The intervention performance was fair.

Under the model value addition services output, an online and physical support facility for technology development and innovations advancement was developed and it is operational. On the other hand, the procurement of equipment for the TIBIC in Namanve was ongoing to operationalise the skilling centre-TIBIC under the industrial skills development output. The equipment under procurement include: sound audio systems, smart display and video capture, an assistive listening system for the smart conference hall; fixed 75" and flexible 86" interactive touch display for smart video-conferencing meeting rooms. other are: reception multiple display and booking pads; f Light ICT hardware and office equipment including printers, desktops, laptops and shredders. This was however behind schedule.

3.5.3 Increase investment in R&D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, Transport

The intervention contributes to the objective of strengthening research and development capacities and applications. The planned outputs for FY2023/24 include; industrial skills



development, research and development, and infrastructure development and management. The performance of the intervention is good. Findings are presented hereunder.

Industrial skills development: The plan is to complete plans for the automotive park development, and land for construction prepared, complete plans for the STI park development, a fully operational vehicle manufacturing plant-Phase I and II, and equipment purchased and installed.

Land was acquired in Kayunga district for the development of an automotive park and during the period under review, a masterplan for the park was completed and approved. Under the development of an STI park, 50 acres of land were secured in Nakasongola, a master plan was developed, and preparation of the detailed design for the diagnostics pilot plant was ongoing.

Infrastructure Development and Management: The output supports the establishment of a fully functional Technology Business and Incubation Center under the National Science Technology Engineering Innovation-Skills Enhancement Project (NSTEI-SEP), and the establishment of a vehicle manufacturing plant by Kiira Motors Corporation.



Ariel view of the Kiira Motors Complex in Jinja as of 18th January 2024

Kiira Vehicle manufacturing plant fully constructed: The overall construction and tooling of the Kiira Vehicle Plant (KVP) was at 80%. Phase 1 of the Kiira vehicle plant was completed (100%) with facilities such as an assembly shop, research and development and general offices, biological wastewater treatment plant, 1.75km master drainage channel, water tank, perimeter fence, gates and 3.5km road.



Phase II of the facility constituting the production facility, principal access road, paved yard, solar plant 6MW substation, wastewater treatment facility and landscaping was at 81% progress. The Kiira Vehicle Plant Production System was at 53% progress, with detailed designs and technical specifications done.



Left: The 3-ton and a 10-ton chassis crane; Right: Diesel and electric fork lifters at the Kiira Vehicle Plant in Jinja District

The materials, machinery, equipment and tools for the production facility, trim shop, Quality Inspection and testing (QIT) and body shop were delivered and installation was ongoing. Construction of the principal access road was 59% complete. The construction of the 25m watchtower was at 30%, the KVP substation (grid and solar) was at 97% awaiting clearances from UMEME to become fully functional, and the last mile fibre connection was at 100%.

The production parts and materials for 28 buses which were sourced last financial year were delivered and assembly and production of the buses (23 electric and 5 diesel buses) at Luweero Industries Limited (LIL) in Nakasongola progressed at 50.5%. A total of 3 buses were completed and the others were at different stages of the production line. Subsequently, Uganda was allocated the very first World Manufacturing Identifier (WMI) and eventually the first Vehicle Identification Number (VIN).

The electric bus operator skilling program attracted 377 applicants, of which 137 were shortlisted and 72 selected after meeting the requirements. These commenced the skilling at the Luweero Industries Limited. By 31st December 2023, the first and second cohort of five e-bus drivers was trained, tested and certified. The training of the third cohort of 20 e-bus drivers that commenced on 7th January was ongoing. Overall progress was at 45%.



Left: Joining of panels to the bus chassis. Middle: Bus in the spray shop. Right: A bus nearing completion at Luweero Industries, Nakasongola District



The overall progress on the development of the 3-1 trike for mobility (one tone payload), Irrigation (6,000 litres per hour) and power generation (6kW) stood at 49% with the KMC supporting the innovator to obtain an IP. The design, engineering, manufacturing and test case specification progressed at 75%, the engineering prototype at 85%, the manufacturing prototype at 25%, and four (4) production intent prototypes at 10%.

The National Science Technology Engineering Innovation-Skills Enhancement Project The (NSTEI-SEP) is a multi-year project implemented by the Uganda National Council for Science and Technology (UNCST) that started on 1st July 2019 with an end date of 30th June 2024. The project is funded through a loan from the Government of the People's Republic of China and counterpart funding by the GoU. The FY2023/24 GoU approved budget for the NSTEI-SEP is Ug shs 21.8bn, of which Ug shs 15.91bn (69% of the budget) was released and Ug shs 0.007bn (0.05%) spent by 30th June 2023. Overall project progress was 95% against financial progress of 85% (as of the end of November 2023) and time progress of 100%. The completion time was revised from May 2023 to 24th March 2024.

Civil works for the National Science, Technology, Engineering and Innovation Centre: The National Science, Technology and Engineering Innovation Centre (NSTEIC) is located in Rwebitete, Kiruhura District. It is being established to enhance the technological and innovative base of Ugandans through *a flexible factory learning and infrastructure model*. The progress of construction works at NSTEIC in Rwebitete was at 95% pending furniture supply, landscaping, and tree planting.

All equipment was in the country (some on-site in Rwebitete, while others were at the contractor's yard in Kampala) and installation was ongoing at different levels for the different structures. Most of the equipment in the workshops was installed and testing by the Ministry of Works and Transport was ongoing.

The procurement of the following was ongoing and at varying levels; i). Start-up raw materials (steel and aluminium) for trial production and skills development in machining, ii) Light ICT hardware - office equipment (printers, desktops, laptops and shredders, iii). Other machinery and equipment including furniture and fittings for offices, hostels conference hall, guest house, kitchen, library, and villas.

Civil works for the Technology Innovation and Business Incubation Centre: The Technology Innovation and Business Incubation Centre (TIBIC) is located at Kampala Industrial and Business Park-Namanve. It is to act as a platform for technology development via the Process Industry Learning Factory Model, including common user facilities and shared workspaces for scientists and innovators. The civil works for the TIBIC and equipment installation and testing in the maintenance workshop at TIBIC were completed.

The ongoing procurements include: a smart conference hall (sound audio systems, smart display and video capture and assertive listening system), smart video conferencing meeting rooms (fived 75" and flexible 85" interactive touch display), reception multiple display and booking pads, light ICT hardware-office equipment such as printers, desktops, laptops and shredders, office furniture and fittings for the office, conference hall, kitchen and gym, physical and virtual innovation spaces and infrastructure; natured and nucleated innovation-driven start-ups; specialised finished leather processing training workshop; and textile design workshops. It was noted that the procurements were behind schedule.



Additionally, a five-acre piece of land was acquired in Namanve for the planned equipment parking yard, and procurement of a contractor to construct a perimeter wall around the land was initiated. Security is also provided to fend off trespassers and encroachers.

Technical Service Company established and operationalized: The project is expected to establish a technical service company with engineering machinery and equipment for hire to enhance the capacity of local and other contractors. By 31st December 2023, the third and final batch of engineering machinery, equipment and spare parts had been delivered by the contractor. All the equipment was tested and accepted by the client.

A functional equipment leasing and machinery rental program was implemented through the operationalization of the Memorandum of Understanding (MoU) between UNCST and National Enterprise Corporation (NEC) for the rental of some units of engineering machinery and equipment to generate revenue. Subsequently, thirty (30) officers of the UPDF under NEC were trained in Lyatonde as machinery and equipment operators.

By 31st December 2023, some equipment had been leased to M/s Rohi Investments and M/s National Enterprise Corporation at Olwiyo-Pakwach and King-Fisher oil well respectively. The rest of the equipment remains parked at Court Yard Hotel-Lyantonde, unused.

NEC was yet to remit rental fees amounting to Ug shs 890,000,000 for September and October 2023 to the UNCST bank account, as well as the November and December invoices totalling Ug shs 768,200,000 were still being reviewed by the UNCST before issuance to NEC.

NSTEI-SEP Operationalization: A phased recruitment of 40 technical staff for the NSTIEC in Rwebitete-Kiruhura commenced and as of 31st December 2023, a total of 25 staff (one architect, one surveyor and 23 agricultural engineers, research and design engineers, machinists and machine operators) were recruited and were undergoing training in China. However, recruitment of the first 15 staff for TIBIC in Namanve was halted by the Minister of STI until the final revision of the operational plan and approval by the governing council and the management committee. The recruitment of other administrative staff has not been initiated.

An Engineering Development and Innovation Centre (EDIC) website was developed and deployed. It is aimed at showcasing innovation and products, acting as a valuable resource repository, and facilitating networking and collaboration. The integration of the EDIC website with the TIBIC business intelligence system was ongoing.



L-R: A robotic arm and a vertical CNC machine installed at the National Science, Technology, Engineering and Innovation Centre in Rwebitete, Kiruhura District



The TIBIC Digital ID App was being updated with new modules and advanced security measures such as QR codes. This was aimed at improving access to digital resources and ensure seamless integration with other TIBIC systems and services. Development of the online assessment system is at the prototype testing stage and an integrated project management information system is being developed on a modular basis.

A general curriculum was developed for the NSTEIC and the operational plan and guidelines were developed while the one for TIBIC is being reviewed.

The procurement of NSTEIC/EDC hardware infrastructure (servers, telephony system, internet fibre, wireless points); other machinery and equipment including furniture and fittings for (office, hostel, conference hall, guest house, kitchen, library, and villas); and Generators for the skilling centre was ongoing at varying levels of progress.

Project Risk: The inadequate budget for GoU counterpart funding and poor releases from the STI secretariat to the subvention caused the extension of the project completion date and risks of cost overruns. For example, no resources were made available to recruit and build the capacity of instructors before project handover. In addition, the ceiling on counterpart finding at Ug shs 19.4bn yet the operational plan requires Ug shs 40bn poses a risk of delayed operationalisation.

Research and Development: Under the Uganda Industrial Research Institute (UIRI), the plan is to analyse 10 samples of edible and non-edible products through the microbiology, chemistry and textile labs to improve export quality to global market standards, conduct at least two demand-driven research for development of technologies, and value-added products and production processes undertaken.

By 31st December 2023, a total of 474 samples (both edible and non-edible products) were reportedly tested using ISO, and the Association of Official Analytical Chemists (AOAC) approved methodologies in the microbiology, chemistry and textile laboratories at the UIRI.

Some of the analyzed products include; packaged and potable water, alcoholic beverages, soft drinks, animal feeds, poultry feeds, dairy products, meat and its products, grain and pulses and good grain snacks. Others were: food spices and additives, kombucha, laundry soaps and liquid detergents, cosmetic products and toiletries, herbal products, and wastewater. The UIRI also conducted research and development in the production of activated carbon from maize cob for use in; water purification and fume hoods for air purification.

3.5.4 Create capacity on application of drones, satellite imagery through GIS, real-time disaster modelling, and widespread connectedness, improve emergency response and production

The intervention contributes to the programme's objective of strengthening R&D capacities and applications. The intervention NDPIII output is National Space Science and Aeronautics Program Feasibility Study and Strategy developed. The planned outputs for the FY2023/24 - national aerospace policy and strategy in place.

The aerospace policy and strategy are yet to be developed however, a Think Tank on Aeronautics and Space science was instituted and it developed a concept to inform the study of the ecosystem in Uganda. The study is aimed at mapping all stakeholders in the aerospace industry, their activities and mandates and identifying gaps that need to be filled. This will result in the development of an Aerospace Agency.

**Table 3.4: Performance of the Industrial Value Chains Development Sub-programme as at 31st December 2023**

Output Performance								Remark
Interventions	Output	Financial Performance			Physical Performance			
		Annual Budget (Ug shs bn)	% of budget received	% of budget spent	Annual Target	Cum. Achieved Quantity	Physical performance Score (%)	
Support the establishment and operations of Science and Technology Parks to facilitate commercialization	Model Value Addition Services	1.97	1.4	100	3	0.02	48.84	Poor performance with delayed establishment of GLP facility
Support the establishment and operations of Technology & Business incubators and Technology Transfer centres	Model Value Addition Services	0.100	75.0	76	1	0.5	66.67	Fair performance
	Infrastructure Development and Management (NSTEIC & TIBIC)	19.4	63.9	-	2	0.8	62.62	Fair performance with delayed procurement of ICT equipment to operationalise the centres
Strengthen the function of technology acquisition, promotion as well as transfer and adoption	Research and Development	167.28	2.4	2	8	1.2	100	Good performance
Increase investment in R & D in key priority sectors like; agriculture, Oil & Gas, Minerals, Energy, Health, Transport;	Infrastructure Development and Management	97.78	62.5	65	2	0.3	23.99	Poor performance as activities are behind schedule
Average Output Performance							60.42	Fair performance

*Source: Field Findings***Sub-programme challenges**

1. Delayed approval to grantees to spend the funds by the STI secretariat which hinders progress.
2. Delayed release of funds for continuing research projects in FY2022/23.
3. Delayed completion of the NSTEI-SEP project activities which is affecting operationalisation.



Conclusion

The overall sub-programme performance was fair with the intervention to strengthen the function of technology acquisition, promotion as well as transfer and adoption registering good performance. The National E-Mobility Strategy was developed and a masterplan for the automotive park was completed and approved. The equipment installation in the production facility, trim shop, Quality Inspection and testing (QIT) and body shop of the Kiira Vehicle Plant was ongoing. Civil works for the TIBIC and NSTEIC were complete pending external works. The procurement of NSTEIC and TIBIC hardware infrastructure progressed at varying levels though behind schedule with risks of cost overruns due to inadequate funding.



CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The overall Innovation, Technology Development and Transfer (ITDT) Programme performance was fair at 61.3%. All three sub-programmes registered fair performance and most of the activities were implemented under the Industrial Value Chain Development Sub-programme. There is however misalignment of PIAP interventions that were not related to the planned outputs and sub-programme under which they were placed.

The Programme is making strides to achieve the key program objectives, outcomes and targets over the NDP III period. There has been an increase in expenditure on research and development over the last three years. The human resource capacity for the STI is being built through the various protégés recruited and PhD students enrolled on the various research and innovation projects. The legal and regulatory framework has been improved with the development of regulations and strategies such as the National E-mobility Strategy.

The development of the requisite STI infrastructure is being undertaken albeit at a slow pace. This is evidenced by the nearly completed civil works and equipment installation under the NSTEI-SEP and the Kiira Vehicle Plant. These were however behind schedule. The development, transfer and adoption of appropriate technologies and innovations have seen the approval of clinical trials for three vaccines and ongoing clinical studies for the safety and immunogenicity of the Novel Adeno-vector vaccine but this is behind schedule partly due to intermittent releases and lack of some critical facilities in the country.

However, increasing the number of IP Rights registered per year from 2 to 50 is slow with one IP registered and two under review against an annual target of five by the third year of the NDP III. The slow progress on this indicator is partly due to the unfair sharing rights of proceeds from the IPs that do not favour the innovator but the funders and the host institutions of the innovations.

There were delays in the procurement of equipment for the NISTEIC and TIBIC which was affecting project completion. The procurements under the BIRDC such as the two 10-ton trucks that have been at the Solicitor General's Office for clearance since FY2022/23 were further complicating the anticipated commercialisation of the pilot plant. The delay by the STI to authorise the use of funds by the grantees affects the implementation of planned outputs. Additionally, the absence of a GMP facility was affecting the completion of some studies. The STI was taking on many grantees despite inadequate resources and therefore some projects were not receiving sufficient funding to actualise the objectives for which they were conceived.

4.2 Recommendations

1. 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.
2. The STI Secretariat should timely authorise grantees to spend the funds disbursed to facilitate the timely achievement of set objectives.
3. The UNCST should expedite the installation of requisite equipment and hardware to operationalise the NISTEIC Project and prioritise the operation and maintenance of the outputs delivered by the project.
4. The STI Secretariat should review the portfolio supported with a view of phasing, postponing and terminating some of the studies given the fiscal limitations.



5. The STI should also review the policy on sharing of proceeds from the IP rights to include the innovators as opposed to only the STI and host institutions.
6. The BIRDC and the Solicitor General should iron out the issues that are delaying the finalisation of procurement for certain equipment to expedite the full commercialisation of the pilot banana plant.
7. The STI should streamline communication of the next steps to innovators whose research has successfully progressed beyond prototyping and is ready for commercialisation to act as a catalyst for innovation.
8. The STI Secretariat together with MFPED and NPA should align the outputs in the work plan to the respective sub-programmes and the PIAP.



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4. Vote 167: Science Technology and Innovation, Annual and Quarterly Workplans FY2023/24.
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6. Uganda Industrial Research Institute Annual and Quarterly Workplans FY2023/24.
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Annex 1: List of Grantees funded by STI during the FY2023/24 and summarised progress by 31st December 2023

Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31 st December 2023 (Implementation Progress)
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 the 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 commercialize a packaging manufacturing facility for affordable and quality flexible packages.	Value Chain Mapping and Analysis of flexible packaging value chains is complete.
Direct Technology Reduction for Metallization 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 a capacity of 1 tonne per cycle. Objectives: 1) Process design 2); Prototype fabrication; 3) Prototype testing and validation.	Process design completed through simulation. Physical designs complete. The equipment supplier was identified and the procurement process was underway.
Fabrication of lithium and sodium ion batteries for electric vehicles 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 characterize 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 a 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.	Characterisation of lithium and graphite iron ore composition ongoing.
Development of a solar water pump	600,000,000	This project will result in the local manufacture of 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.	Design of pump components and systems ongoing. Local technology partner working on pump electronic controller.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
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 optimize 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 a scaling plan for mass production of IONPs-based water treatment systems.	Process optimization is complete. Water treatment system design underway.
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.	Engineering prototype complete. Production line for egg incubators under construction.
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 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).	SMT line established.
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.	Incubation space designed and equipment was procured. Partnerships and Linkages with Industry, Private Sector and Research Institutions established.
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 bn 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 the pilot plant.	Established a relationship with a lab in Germany where the sand will be characterised. Sand collection protocol developed.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
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.	Needs assessment completed with the Ministry of Internal Affairs (Immigration system).
Commercialization 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.	Analysis of STI ecosystem vis a vis incubation of businesses complete. Engagements with Universities complete. Framework for selection of promising products complete.
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 the 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.	Secure contactless ticketing and payment system developed. The system was launched at National Science Week 2023.
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 distribution model for the Productivity Acceleration Support Service 3)	As of 31st December 2023, the project had validated the prototype of the Productivity Acceleration Support Service in line with household incomes.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Developing Sustainable Mushroom Agribusiness Support Services (MASS) for improving livelihoods and sparking competitive agro-industrialization in the Bukedi sub-region.	900,000,000	<p>Establish a cooperation that will drive the commercialization of the Productivity Acceleration Support Service.</p> <p>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 commercialization of the mushroom agribusiness support-based substrate for mushroom growing.</p>	Developed and validated at least three prototypes of the substrate combinations for mushroom growing using crop residues.
Production and commercialization of mosquito repellent lotions from ethnomedicinal plant oils and shea butter	500,000,000	This project aims at utilizing Shea Nut 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 the 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.	Developed the Mosquito repellent product with a brand mRepel and a pilot production facility. The product was pending certification to enter the market.
Improved Indigenous Chicken Line	200,000,000	This project aims to identify and preserve 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 the on-farm performance of the Improved Indigenous Chicken Line 2) Stabilizing and mass production of the improved chicken line 3) Market-oriented supply chain platform for the improved indigenous chicken line set-up.	The innovation team at Gulu University has already identified the first family of the breed stock which is ready for evaluation. The performance index under controlled experiment has been developed for the improved indigenous chicken.
Sweet Potato Value Development 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 bread. Objectives: 1) To support the development of the supply chain and the support activities of producing the bread, sanitizer 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, sanitizer and spirit,	The innovation team at CURAD has already developed recipes for sweet potato bread as well as other products from the sweet potato plant parts.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Piloting An Activity Based Learning and Teaching Approach For Advanced Level Science Students	199,509,910	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. 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.	Had developed a layout of the tools to be developed for capacity development and practical skilling among A-Level science students. Tools development is ongoing.
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 the 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 of communities. Objectives: 1) Establish the Suitability of the Arapai Campus for the Agro-science park. 2) To profile basic information to guide on the product 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	The team has identified partners for the agro-science park. Studies to facilitate Business Proposal development are ongoing.
Science Reagents (SLaRP)	450,000,000	This project will develop science laboratory re-agents from our local minerals and other inputs. It has a high potential for import substitution. Objectives: 1) Map/profile local sources of raw materials for the production of school chemicals and reagents, 2) To test, select and optimize appropriate methods-protocols and procedures for the production of products, 3) To produce prototypes of chemicals and reagents namely: (NaOH, H2SO4 and HNO3).	Profiling of raw materials ongoing.
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 <i>Helicobacter pylori</i> and diarrhoea	Starter cultures are characterised, performance analysis conducted and results demonstrate high efficacy.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Pearl Breakfast Cereal	150,000,000	<p>causing <i>Escherichia coli</i>, 4) Incubate the production of the prototype into commercializable local starter cultures.</p> <p>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 for 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.</p>	<p>Recipes and prototypes developed. Product development was ongoing.</p>
Development of Canned Matooke and Gonja in Retort Pouches: A Proof of Concept for Sustainable and Convenient Agricultural Innovation	600,000,000	<p>This project focuses on value addition to matooke and Gonja, our heritage crops. Novel products that are ready to eat and packed in retort pouches/cans as well as vacuum sealed matooke shall be explored. Objectives: 1) Characterization of matooke/gonja products, 2) To optimize ingredient and processing conditions for canned matooke/gonja, 3) To Evaluate Product Quality and Safety, 4) To Assess Market Potential and Consumer Acceptance.</p>	<p>Characterisation complete. Optimisation of ingredients and processing conditions were ongoing.</p>
Space Weather Science and Education Project for Disaster Management and Preparedness	2,000,000,000	<p>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.</p>	<p>The project was delayed owing to the PI being sick. A stand-in PI was appointed and the project is now underway.</p>
Laboratory scale production of beta propiolactone (BPL) from cassava for application in the pharmaceutical industrial value chains	450,000,000	<p>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) Optimizing production process for beta propiolactone, 2) Synthesize the intermediate chemicals (ethanol, ethylene and ethylene oxide) required for BPL production, 3) Produce beta propiolactone at laboratory scale for</p>	<p>The production process for BPL was under optimization.</p>



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Preclinical evaluation and standardization of herbal anti-diabetic prototypes - GLUCOKAT PROJECT	1,300,000,000	inactivation of viruses during vaccine development, 4) Determine the quality profile of the synthesized BPL. This project aims to develop a natural anti-diabetic therapeutic through the reformulation of an existing product. Objectives: 1) To evaluate the antihyperglycemic and anti-diabetic potential of the formulated prototypes using animal models, 2) To assess the toxicity profiles of the most efficacious formulated anti-diabetic 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 optimize the pharmaceutical properties of the most efficacious formulated anti-diabetic prototype, 5) To establish a GLP facility to support preclinical evaluation of natural therapeutics in Uganda.	Evaluation of the antihyperglycemic and anti-diabetic potential of the formulated prototypes using animal models nearing completion.
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.	Engineering design ongoing.
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 the 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.	Pilot plant design ongoing. UBV-01 under reformulation.
Innovative re-usable unisex sanitary pads and protective gears 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.	Needs assessment complete. Product design ongoing. Partnership established with UIRI for production and testing.
Medicinal Plants for Sickle Cell Disease and	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	Ethnobotanical survey ongoing.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Respiratory Disorders Tract		prototype against sickle cell, 3) Phytochemical analysis, 4) Undertake toxicity analysis of a 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	ACE2 mice breeding accomplished (166 mice); Trials for vaccines in humanized mice nearing completion.
Establishment of a Biomarker Research Facility	1,500,000,000	This is a common user facility that supports 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. Objectives: 1) Finalize 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-COV2 patients, 4) To evaluate the stability and usability of a newly assembled diagnostic test for monitoring SARS-COV2 patients.	Lab remodelling was completed and equipment purchased. Monoclonal antibodies developed.
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	The project acquired the VP Sigma 300 High-Resolution Scanning Electron Microscope. Nano adjuvant prototypes were developed and tested. Reformulation for lipid nano-adjuvant delivery system-SARS-CoV-2-complex ongoing.
Smart Post-partum Haemorrhage Volumetric Drape	200,000,000	The focus is on the 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	Requirements analysis complete. Device design completed. Prototyping ongoing.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Baby saver device for Neonatal Resuscitation with Intact Umbilical Cord at Birth in Uganda	350,000,000	The focus is on developing a baby saver device: a mobile resuscitation unit that can help every newborn 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.	Development of minimum viable product ongoing.
Vitamin D as a therapy for Chronic Conditions	300,000,000	The project has previously shown that the majority of persons in Uganda are Vitamin D deficient. The 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.	Strategy for stakeholder engagement developed. Meetings held with hospitals, research institutions etc.
Local research and production of a dual vaccine for Lumpy Skin Disease and Foot and Mouth Disease in Uganda	175,000,000	The focus is on the 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.	New outbreak viruses were collected and sequenced. LSD virus vectors created.
Preclinical studies and GMP Production for Inactivated Vaccine	1,000,000,000	This is one of the pioneer human vaccine projects utilizing Inactivated Vaccine Technology. Objectives: 1) Complete animal trials--preclinical immunogenicity assessment 2) Produce bulk stock for clinical trials in a cGMP facility.	Virus stocks isolated and produced. Virus inactivation and purification completed. Animal trials in Swiss mice complete. Animal trials in humanized mice nearing completion. Pilot production preparation for clinical trials was ongoing.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
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 a prototype, 2) Undertake phytochemical analysis 3) Undertake preliminary efficacy and safety studies	Prototype under development
Formulation and preclinical evaluation of herbal toothpaste for management of oral diseases	500,000,000	The focus is on the 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	Prototype formulated.
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) Formulate two prototypes for preclinical and clinical trials.	Seedlings propagated. Candidate prototypes identified and undergoing reformulation
ICT Platform for the Pathogen Economy	1,150,000,000	The focus is on the 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 a framework to support incubation.	Cervical cancer screening platform utilizing mobile colposcopy ready for clinical validation. Sensitivity and specificity both >90% (better than human experts).
Development and evaluation of nanobody-based point-of-care diagnostic kit for detection of COVID-19 in saliva	400,000,000	The focus is on the 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)	Nanobodies generated, lateral flow assay developed and evaluated, lateral flow assay strip for detection of antibodies on COVID-19 developed.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
In-vitro studies of natural therapeutics of Uganda (INVONAT Program)	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).	16 experimental drugs taken through in vivo studies. 26 new prototypes pipelined (malaria, diabetes, cancer etc)
Herbal Extract Larvicide	300,000,000	The focus is on the 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 kill 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 trail using the formulated herbal extract Larvicide in Arocha Division, Apac district.	Larvicide formulated. Phytochemical and pharmaceutical analysis was ongoing.
Clinical Trials for Natural Therapeutics	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.	2 drugs completing clinical trials. 3 pipelined.
Commercialization 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.	Preparations for invitro and invivo studies were ongoing.
Formulation of Herbal Products for the 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 phytochemicals 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.	Ethnobotanical survey ongoing. Phytochemical analysis was ongoing.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Adenovector vaccine: Preclinical immunogenicity assessment and GMP Process Transfer	1,000,000,000	This project developed a candidate COVID vaccine using the Adenovirus technology. We developed our indigenous vaccine backbone which we have patented and shall use for other vaccines. Objectives: 1) Complete immunogenicity studies in humanized mice, 2) Produce bulk stock for clinical trials under cGMP conditions.	SARS COV-2 vaccine prototypes developed from our patented adenovectors isolated from Chimpanzee faecal samples. Preclinical immunogenicity studies in humanized mice nearing completion.
Development and evaluation of recombinant sub-unit SARS-COV2 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	Delta and Omicron spike antigen was successfully cloned and expressed. Safety and immunogenicity studies completed.
Development of a telemetric shunt system for hydrocephalus treatment	200,000,000	The focus is on development of a telemetric shunt for the treatment of hydrocephalus. Objectives: 1) Design and prototype, 2) Take device through regulatory approvals, 3) Undertake clinical validation.	The project was paused due to the ill health of PI.
COVID-19 Biobank	300,000,000	Aims to establish and maintain a biobank for COVID-19 biosamples 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 commercialization 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.	Biobank established. Samples were shared with researchers on a request basis at no cost.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
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.	For the first time, the country can boast of a "Fill and Finish" facility which can be used for rapid production of any vaccine (animal or humans) should there be any emergency in the country); Significant opportunities for technology transfer and contract manufacturing are already opening up.
PCR and Antibody Diagnostic Kits Factory	7,000,000,000	The focus is on R&D, pilot production and commercialization of PCR and Antibody Diagnostic Kits. Objective: Construct and Equip a Pilot Plant for production.	PCR kits developed by the team have been used for more than 2 million COVID tests and saved the nation ~USD 37 million (made tests 50% Cheaper). The pilot plant will be in Biosciences Park. Master Plan and Detailed Designs Complete. Ground-breaking by the end of March 2024.
Development of a Uganda-single-source-origin high altitude grown and roasted coffee product for the 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 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 Kgs of medium to high-quality green coffee beans annually by the end of 2024. 3) To establish a tertiary hub for making Standardized 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	The team has already profiled the pilot farmers, Establishment of a roastery and instant coffee manufacturing facility is ongoing. A coffee Aggregation system from the farm to the tertiary hub was being developed. Initial coffee bean aggregation for high-end processing was ongoing.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
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, and asparagus flowers. 2) Develop an export system for the transportation and distribution of fresh flowers to Eastern Europe.	Developed protocols for handling flowers and fresh produce from Uganda to Eastern Europe. Has established a holding facility in Greece.
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 in the Serbia Market.	A product branded as Bilitong - Ankole longhorn dried Beef has been developed and tested on the local and international markets.
Establishment of a brand-based traceability system for export using a case of fresh vegetable and fruit exports	771,401,500	This project aims to develop a protocol for a traceability system for fresh produce to meet 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 the international market. 2) To validate the effectiveness of the developed traceability system using vegetables and fruits as a case study in the international market	Farmers engaged in fresh produce have been profiled in the country. A data management system has been developed.
Biodegradable banana fibre hair extensions for hairdressing	450,000,000	This project is undertaking R&D in the development of biodegradable hair from banana fibre. Prototype products are promising. Objectives: 1) To undertake product optimization, 2) To perform manufacturing process optimization, 3) Establish a pilot plant for manufacturing, 4) Market validation of products	Product and manufacturing process optimization ongoing
Local manufacturing of high-quality shoe brushes from cowtail hair	300,000,000	Undertaking R&D in the 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	Physical designs for production facility and line complete.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
Operationalizing the Cassava Processing Plant Business in Gulu University	588,000,000	This project focuses on amplifying the efforts to develop high-end value-added products from the cassava value chain. This will reduce imports of wheat into the country. Objectives: (1) Streamline the commercialization 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 operationalizing the business incubation centre to complement research and training. (2) Fix and operationalize the existing infrastructure utilizing the existing capacity of about 4000 kg per day to commercialize 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.	A basic pilot production facility has been established at Gulu University.
Silkworm 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 a silkworm egg-producing facility 2) Distribute viable silkworm eggs to cocoon producers in the country.	A farm with mulberry and base structures has been set up in Gomba. Construction and set up of silkworm egg-producing facility is ongoing.
Developing a medicinal product for relief of hangover, alcohol poisoning and pain.	881,800,000	The team has developed a natural remedy for hangovers, with the 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	In vivo studies complete. Production line design ongoing.
Apokor Cassava Value Addition Project (ACAVAP)	300,000,000	his project focuses on amplifying the efforts to develop high-end value addition products from the cassava value chain. This will reduce imports of wheat into the country. Objectives: 1) Develop cassava products brands such as HQCF, and starch among others 2) Develop a distribution model for the cassava products brands.	A mini-pilot production plant has been established. Cassava value-added prototypes and products have been developed.



Venture Title/Project	Grant Amount	Brief Description of Grant and Key Objectives	Achievements as at 31st December 2023 (Implementation Progress)
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 National Network, 2) Develop training curricula, 3) Train 18 protégé scientists.	15 protégé scientists on-boarded and completing year 1 of training. Profiled STI institutions (human capital, resources, competences).

Source: Project Implementers Reports and Field Findings



Annex 2: List of interventions monitored

Sub-programme	Intervention
Research and Development Sub-programme	Strengthen the Intellectual Property (IP) value chain management
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 & Gas, Minerals, Energy, Health, Transport
STI Ecosystems Development Sub-programme	Support the establishment and operations of Science and Technology Parks to facilitate commercialization
	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
	Create capacity on application of drones, satellite imagery through GIS, real-time disaster modelling, and widespread connectedness, improve emergency response and production

**Annex 3: List of Intellectual Property Rights Registered**

Category	Title	Inventors	Bureau	Status
1 Patent	Novel Chimpanzee Adeno-Vectors (E1_UgUVRI_ChAdVec)	Sheila Balinda et al (UVRI)	Pathogen Economy	Under Review AP/P/2023/015068 (ARIPO)
2 Utility Model	Solar Electric Cooker	Peter Tumutegereize, Sodgo Paul (Makerere University)	Infrastructure Innovations	Granted UG/U/ 2022/14 (URSB)
3 Patent	PCR proficiency test for COVID-19)	Moses Joboba et al (Mak-BRC)	Pathogen Economy	Under Review (URSB)





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