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ARTIFICIAL INTELLIGENCE FOR DEVELOPMENT AFRICA

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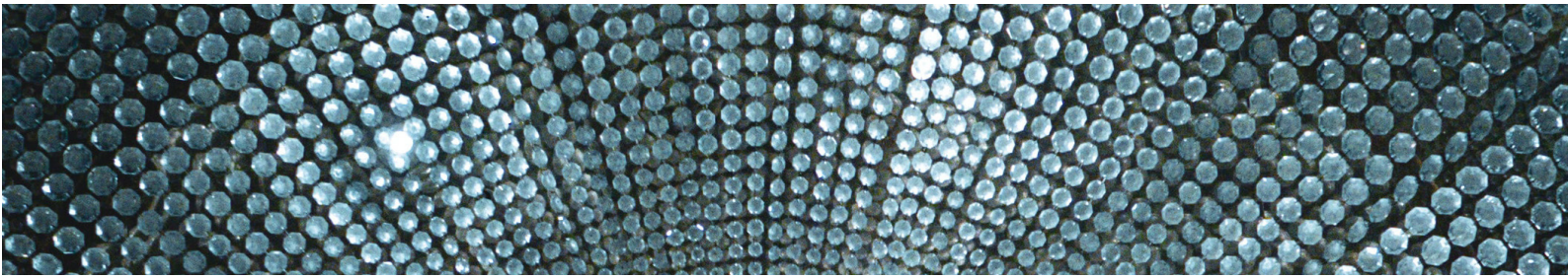
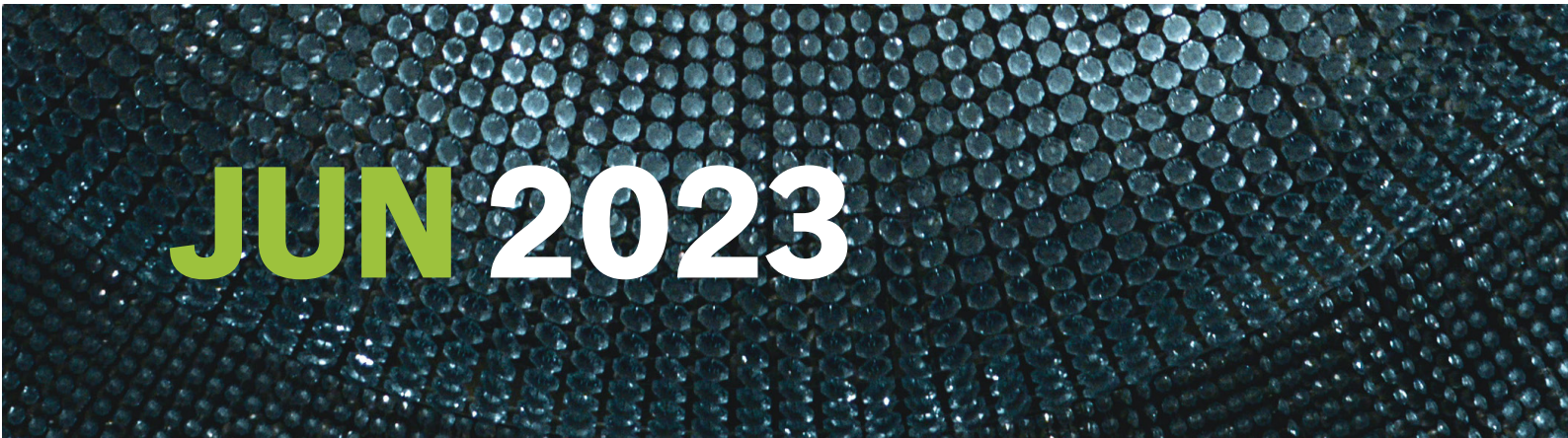


# STATUS OF TECHNOLOGY TRANSFER AND COMMERCIALIZATION OF R&D OUTPUTS IN AI4D AFRICA PARTICIPATING UNIVERSITIES



JUN 2023

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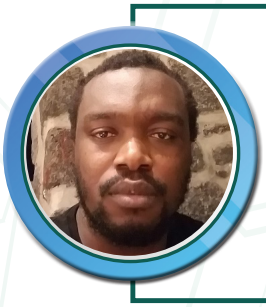

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# CHAPTER 1.

## Introduction

### 1.1 Background and objectives of the AI4D Africa Scholarship Project

Since March 2021, the African Centre for Technology Studies (ACTS), in collaboration with five regional partners and three international partners, has been implementing – on **the Artificial Intelligence for Development in Africa (AI4D Africa ) Scholarship Project,** funded by the International Development Research Centre of Canada (IDRC) and the Swedish International Development Agency (SIDA). The overall objective of the project l is to design and administer a scholarship program to foster the talent needed to meet a growing demand for research and development in responsible Artificial Intelligence (AI) and Machine Learning (ML) in African public universities through 3 specific objectives:

**a.** Support at least 12 scholars to undertake and successfully complete PhD research in AI and machine learning (ML) in African universities for a period of up to 36 months;

**b.** Support at least 8 Early Career Academics (ECA) to strengthen their R&D capacities in AI and ML for a period of at least 24 months; and

**c.** Facilitate professional development for the PhD and ECA scholarship holders.

### 1.2 Consortium partners

The project is being implemented by several partners (Figure 1). These are briefly discussed here below:

**a.** **Co-applicants:** ACTS has formally partnered with g two universities - Eduardo Mondlane University (EMU), Mozambique and University Cheikh Anta Diop de Dakar (UCAD), Senegal. The former is – to support beneficiaries from Lusophone speaking countries (Angola, Cape Verde, Equatorial Guinea, and Sa Tome and Principle); the latter is coordinating the scholarship program in Francophone countries.. As co-applicants, they have formed part of the program steering committee, with ACTS as the chair.

**b.** **International Co-Applicants:** ACTS has formally partnered with University of California (USA); University of Linkoping (Sweden) and University of Kassel (Germany). The three universities are supporting the scholarship program through – being part of the review panel; mentorship; professional development short courses, mobility, and joint proposal development for sustainability of the program. This support is being coordinated directly by ACTS.

**c.** **Institutions offering complementary capacity building programs:** To support the professional development activities, four organizations were contracted to develop and deliver online short courses to the beneficiaries of the scholarship program – ACTS ( technology transfer and commercialization of R&D outputs), Kwame Nkrumah University of Science and Technology, Ghana (Intellectual property and Artificial Intelligence); Human Science Research Council of South Africa (Gender and Artificial Intelligence); University of Linkoping, Sweden (Responsible AI development and deployment); University of California, USA (Artificial Intelligence and Ethics). Their involvement has been coordinated directly by ACTS.

d. **Participating Universities:** Initially it was envisaged that the project would work with at least 8 universities; two each from the four regions of Africa – East Africa, West Africa, Southern Africa and Central Africa.

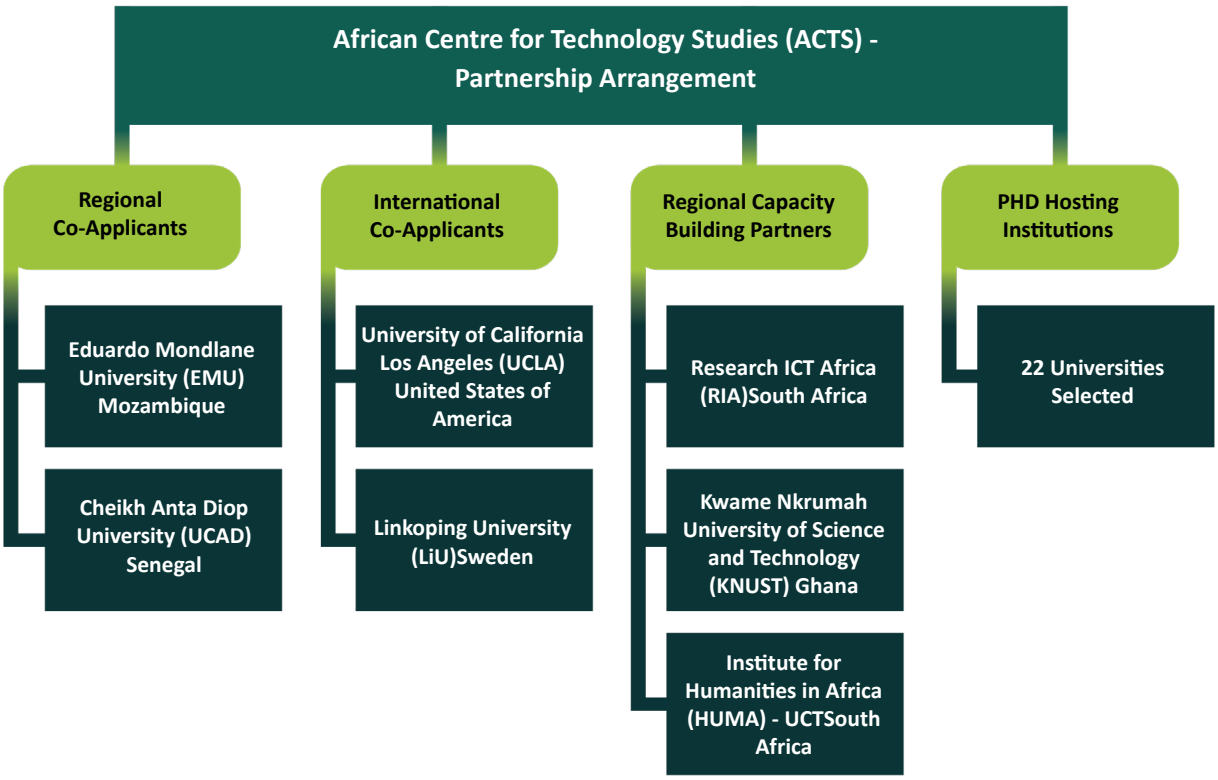



**Figure 1: ACTS Partnership Arrangement**

## 1.3 Project beneficiaries

The project is supporting 18 MSc Students, 20 PhD candidates and 10 Early Career Academics (ECAs) or post-Docs that apply AI and machine learning. Around 40% of the beneficiaries are women. The beneficiaries are developing AI solution across several SDG areas such as agriculture, health, climate action, and energy, among others. These beneficiaries are drawn from a total of **22 universities** that are spread evenly across the continent as follows

### Beneficiary Universities

Addis Ababa University; Addis Ababa Science and Technology University; Bahir Dar University; Virtual University of Côte d'Ivoire; Lilongwe University of Agriculture and Natural Resources; University of Abomey-Calavi; University of Zambia; University of Rwanda; Univesite Cheikh Anta Diop de Dakar; Nelson Mandela African Institute of Science and Technology; University of Dar es Salaam; Makerere University; University of Nairobi; Jomo Kenyatta University of Agriculture and Technology; University of KwaZulu Natal; University of Fort Harare; University of Yaounde I; University of Ndjamena; Abdou Moumouni University of Niamey; University of Port Harcourt; University of Cape Verde; and Eduardo Mondlane University – Higher School of Rural Development.

## 1.4 Policy and institutional support structures for technology transfer and commercialization of R&D outputs

The AI4D Africa scholarship project is currently supporting 30 research projects, all of which are developing AI solutions in agriculture, health, energy, and climate change (Table 1).

**Table 1: Solutions being developed by the beneficiaries**

1. Mobile-Based Peer-to-Peer Learning Prototype for Smallholder Dairy Producers
2. Mobile Based Recommender System for Smallholder Dairy Farmers to increase their productivity
3. Image Segmentation Deep Learning Model for Early Detection of Banana Diseases
4. Development of Deep Learning Model for Early Detection of Maize Diseases in Tanzania
5. Machine Translation for a west African low resource language: Dioula
6. Development of IoT-based Tool for prediction and control of Mycotoxin in Maize
7. Conversational Artificial Intelligence Platform for Aflatoxin Knowledge
8. Bank Activity as a proxy to measure Poverty.
9. Machine Learning on Satellite Imagery for Targeting Aid Beneficiaries
10. Learning from Mobile Phone Datasets: Proxy for Targeting Aid Better
11. Bank Account Transactions Datasets as Proxy to Measure Poverty Trends
12. Using satellite and ground data for water productivity monitoring in croplands
13. Application of satellite derived data to improve agricultural practices
14. Application of Machine Learning for Irrigated Cropland Mapping
15. Machine Learning Techniques for the Efficient Social Networks analysis on Multicore Architectures
16. Parallelization of Recurrent Neural Networks for the Detection of Hateful Messages
17. Using parallel Convolutional Neural Networks for Malaria Detection
18. Real time Assessment of the indoor air pollution in Sub-Saharan households
19. Smart Bus Monitoring, Seat Reservation and Notification system using an Android Technologies
20. Performance on E-Learning Using xAPI and AI
21. Efficient Ransomware detection and prevention model using advanced convolution neural network.
22. Predictive Model for Crop Yield using Hybrid (RF, SVM) Machine Learning Algorithms
23. Android Based Pneumonia diagnosis system using Naïve Bayes Algorithm

The beneficiaries have been effective in generating publications and other knowledge products from their research work, which aligns with the project's objective e of African scholars contributing to AI knowledge in the continent. However, until the solutions are taken up and deployed at a large scale, . the development objective will not be realized. There is therefore need to ensure that most of these solutions are commercialized and deployed.

In May 2021, ACTS launched the AI4D Africa Scholarship Network, whichbrings together 75 AI scholars (beneficiaries and their supervisors). During the project's PhD Academy, in which the entire AI4D Africa Scholarship network (the PhD candidates, their supervisors, the ECAs, and the MSc students of the ECAs) converged in Mombasa in mid-December 2022, the Network members identified- at least 5 key activities be persued.

One of these activities was to undertake assessment of the institutional capacities of the beneficiary universities to support technology transfer and commercialization of R&D outputs.

Members of the network noted with appreciation the progress made by all the network universities in technology transfer and commercialization of research outputs. However, the progress wasnot uniform across the universities, which provides a big opportunity for peer-to-peer learning and collaboration. As a result, the partners agreed that the network will prepare a booklet on the status of technology transfer and commercialization of R&D outputs. The booklet will be in the form of country profiles (one per chapter), preceded by a synthesis of key findings. The university profiles would cover the following seven issues:

**a.** Brief profile of the universities

**b.** Existing structures to support technology transfer and commercialization of R&D outputs

**c.** Policy framework to facilitate technology transfer and commercialization of R&D outputs

**d.** Resources (skills and finances) available for technology transfer and commercialization of R&D outputs

**e.** Protection of intellectual property rights

**f.** Access to information for Technology Transfer and commercialization

**g.** University-Industry linkages

## 1.5 Methodology

In light of the above, the ACTS team prepared a draft data collection tool to guide the network partners to collect the required information. In filling in the questionnaire, the supervisors and the PhD students were supported by internal officials at the universities who have the relevant information e.g. director of research and innovation, technology transfer manager or IP officer among others. The data collection and preparation of the reports. Which took two months to complete, were undertaken by the network members.

## 1.6 This booklet

This booklet provides a compilation of the institutional reports, a chapter on synthesis and another chapter on conclusions and recommendations.

# CHAPTER 2.

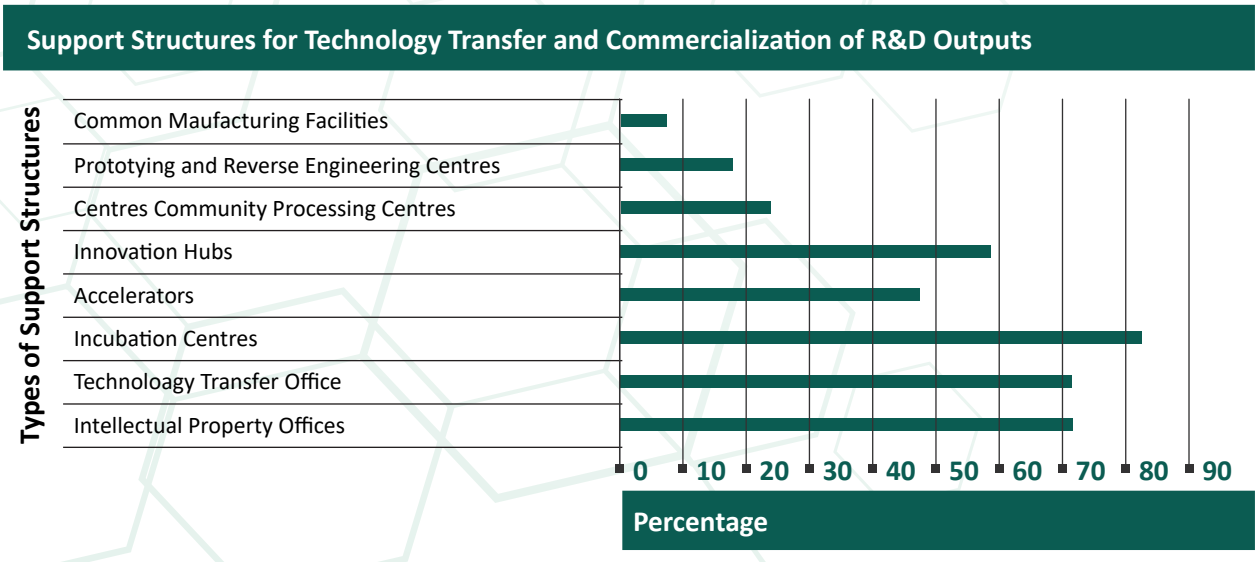
## Synthesis

### 2.1 Introduction

The synthesis chapter provides a comprehensive overview of the existing support structures, policies, strategies, and challenges related to technology transfer and commercialization of research and development (R&D) outputs in various AI4D Africa Scholarship beneficiary universities across Africa. It delves into the initiatives taken by these universities to promote innovation, entrepreneurship, and the effective utilization of intellectual property (IP). The chapter explores the support structures implemented by universities such as Intellectual Property management offices, technology transfer offices, business incubation facilities, and innovation hubs. It also examines the policies and strategies adopted by universities to govern IP management, technology transfer, and commercialization. Further, the chapter highlights the protection of innovations, the skills and financial resources required for technology transfer, access to information, and the collaboration between universities and industries. By analyzing these aspects, the synthesis chapter aims to provide insights into the current landscape of technology transfer and commercialization in African universities and identify areas that require attention and improvement.

### 2.2 Existing Support Structures for technology transfer and commercialization of R&D outputs

Among the 17 universities mentioned, a significant number of them have established various innovation-related facilities and offices to support technology transfer and commercialization from the research outputs, as presented below.



1. **Intellectual Property Offices: Twelve universities (71%) have Intellectual Property (IP) offices,** indicating their commitment to managing and protecting intellectual property rights. These universities include Makerere University (Uganda), Université Abdou Moumouni De Niamey (Niger), Universidade de Cabo Verde, University of Dar es Salaam and Nelson Mandela African Institution of Science and Technology (both in Tanzania), University of Nairobi (Kenya), Jomo Kenyatta University of Agriculture and Technology (Kenya), Addis Ababa University (Ethiopia), The University of Zambia, Eduardo Mondlane University (Mozambique), Université Cheikh Anta Diop de Dakar (Senegal), and University of Port Harcourt (Nigeria). Two universities indicated that they are still in the early stages of establishing their intellectual property management offices (IPMOs).
2. **Technology Transfer Offices: Similarly, 12 universities (71%) have Technology Transfer Offices (TTOs) in place**, demonstrating their dedication to transferring knowledge and technologies to external parties. These universities include many of the previously mentioned ones, such as Université Abdou Moumouni De Niamey, Universidade de Cabo Verde, University of Dar es Salaam, Nelson Mandela African Institution of Science and Technology, University of Nairobi, Jomo Kenyatta University of Agriculture and Technology, University of Yaoundé I (Cameroon), Addis Ababa University, University of Rwanda, The University of Zambia, Université Cheikh Anta Diop de Dakar, and University of Port Harcourt.
3. **Incubation Centres**: Fourteen (**14) universities (82%) have established incubation centers** that foster the growth and development of startups and innovative ventures. These institutions include most of the aforementioned universities along with Virtual University of Côte d'Ivoire.
4. **Accelerators**: **Eight universities (47%) have accelerators**, which support and accelerate the growth of startups and entrepreneurial ventures. These universities include Université Abdou Moumouni De Niamey, Nelson Mandela African Institution of Science and Technology, University of Nairobi, University of Yaoundé I, Addis Ababa University, Virtual University of Côte d'Ivoire, University of Port Hare, and The University of Port Harcourt.
5. **Innovation hubs: Ten (10) universities have innovation hubs (59%)**, which serve as collaborative spaces for innovation and knowledge sharing. These universities include Université Abdou Moumouni De Niamey, Universidade de Cabo Verde, University of Dar es Salaam, Nelson Mandela African Institution of Science and Technology, University of Nairobi, University of Yaoundé I, University of Rwanda, Eduardo Mondlane University, Université Cheikh Anta Diop de Dakar, and The University of Port Harcourt.
6. **Community Processing Centres: Only four universities (24%) have community processing centers**, aiming to provide processing facilities for local communities. These universities include Universidade de Cabo Verde, Addis Ababa University, Virtual University of Côte d'Ivoire, and University of Port Harcourt.
7. **Prototyping and Reverse Engineering Centres: Only three universities (18) with prototyping and reverse engineering facilities or centers**: Universidade de Cabo Verde, Addis Ababa University, and Virtual University of Côte d'Ivoire.
8. **Common Manufacturing Facility**: **Lastly, the Virtual University of Côte d'Ivoire is the only university mentioned to have a common manufacturing facility**, while two universities, University of Dar es Salaam and Nelson Mandela African Institution of Science and Technology, have established Networks of SMEs, Hubs, and TTOs as part of their innovation ecosystems.

These universities' efforts reflect a growing emphasis on fostering innovation, entrepreneurship, and knowledge transfer within the academic and research landscapes of the respective countries.

## 2.3 Existing Policies and Strategies to support technology transfer and commercialization of R&D outputs

Policies and strategies critical to facilitating technology transfer and commercialization of R&D outputs include national IP policies and strategies, institutional IP policies, institutional commercialization policies, and institutional consultancy policies. Others include universities-Industry partnership frameworks, policies for establishing spinoffs and policies for funding innovation.

1. **National Intellectual Property Policies: Twelve 12 universities have national policies related to intellectual property and/or commercialization.** These universities operate within the framework of national policies that guide intellectual property, technology transfer, and commercialization in their respective countries. They include Makerere University – Uganda, University of Dar es Salaam (UDSM) – Tanzania, Nelson Mandela African Institution of Science and Technology - Tanzania (NM-AIST), University of Nairobi – Kenya, Jomo Kenyatta University of Agriculture and Technology – Kenya, University of Abomey-Calavi (UAC) – Benin, University of Yaoundé I (UYI) – Cameroon, Addis Ababa University – Ethiopia, University of Rwanda (UR), University of Zambia (UNZA), Eduardo Mondlane University (UEM) – Mozambique, and University of Port Harcourt – Nigeria.
2. **Intellectual property policies and strategies:** All the universities mentioned above have intellectual property policies or strategies incorporated either from the national or university policies. Apart from one university that is in the process of creating a national policy for IP, 11 out of 17 universities have commercialization policies or strategies: Makerere University – Uganda; University of Dar es Salaam (UDSM) – Tanzania; Nelson Mandela African Institution of Science and Technology - Tanzania (NM- AIST); University of Nairobi – Kenya; Jomo Kenyatta University of Agriculture and Technology – Kenya; University of Abomey-Calavi (UAC) – Benin; University of Rwanda (UR); University of Zambia (UNZA); Eduardo Mondlane University (UEM) – Mozambique; Université Cheikh Anta Diop de Dakar (UCAD) Senegal; and Virtual University of Côte d'Ivoire. These universities have specific policies or strategies in place to facilitate the commercialization of intellectual property and innovations generated within the university.
3. **Consultancy Policies: Nine universities have consultancy policies:** University of Dar es Salaam (UDSM) – Tanzania; University of Nairobi – Kenya; Jomo Kenyatta University of Agriculture and Technology – Kenya; University of Rwanda (UR); University of Zambia (UNZA); Université Cheikh Anta Diop de Dakar (UCAD) – Senegal; Virtual University of Côte d'Ivoire; University of Fort Hare (UFH South Africa; and University of Port Harcourt – Nigeria. These universities have established policies or guidelines for the provision of consultancy services by their faculty and staff. These policies outline the processes, requirements, and revenue sharing related to consultancy services offered by the university.
4. **Policies on industry collaboration, establishment of spinoffs and funding of innovation:** Very few universities reported having in place policies on university collaboration, establishment of spinoffs and funding of innovation.

## 2.4 Protection of innovations

Despite having in place support structures and policies to facilitate technology transfer and commercialization of R&D outputs, the number of IP applications and protection remain very low amongst the participating universities. Some of the challenges listed by the universities include:

a. limited awareness of IP rights
b. inadequate legal frameworks

c. lack of financial resources
d. Limited human resources to support the drafting of IP applications.
e. Lack of incentives structures for IP protection and commercialization
f. Promotion criteria that are based on publications
g. Poor understanding of IP laws
h. Time-consuming registration processes

**Institutions need to improve awareness, establish robust IP frameworks, provide support and funding to protect and commercialize innovations effectively and review promotion criteria to include recognition of IP application, IP grants and IP commercialization.**

## 2.5 Skills for technology transfer and commercialization of research outputs

Lack of skills has been identified as a major challenge facing universities with regards to technology transfer and commercialization of research outputs. Skills lacking include drafting of IP applications, IP licensing, IP valuation, and IP auditing. Other important skills lacking are communication, business development, and networking. Currently access to these skills outside the universities is also difficult. As a result, universities are coming up with some innovative coping mechanisms. For example, Makerere University in Uganda, which faces challenges due to understaffing, plans to leverage existing staff in College Registrars to identify outstanding innovations. For example:

1. The University of Niamey in Niger also reports average availability of skills and financial resources, with a need to enhance skills for technology transfer and commercialization.
2. The University of Zambia recognizes skills gaps in intellectual property management and commercialization, suggesting partnerships with industry for expertise.
3. Nelson Mandela African Institution of Science and Technology in Tanzania identifies inadequate capacity and a need for training programs to address skills gaps. Similarly, the University of Nairobi and Jomo Kenyatta University of Agriculture and Technology in Kenya recognize the importance of skills such as communication, business development, and networking, with ongoing training initiatives to bridge gaps.
4. The University of Abomey-Calavi in Benin acknowledges a lack of accredited personnel for leading innovators through the accreditation process, emphasizing the need for training more experts. The University of Yaoundé I in Cameroon highlights the absence of a dedicated technology transfer and commercialization service, with financial support provided through government grants.
5. Eduardo Mondlane University in Mozambique acknowledges reasonable availability of skills for technology transfer but highlights complex intellectual property registration processes and low financing.
6. The University of Fort Hare in South Africa faces challenges related to intellectual property rights and funding but is exploring collaborations with government bodies and industry partners. Finally, the University of Port Harcourt in Nigeria reports skills challenges in technology transfer and commercialization.

**Collectively, there is a need for increased skills development to support t effective technology transfer and commercialization of research outputs across the universities mentioned.**

## 2.6 Funding for technology transfer and commercialization of research outputs

Funding is a major challenge for protection and commercialization of outputs from research and development projects. The technology transfer offices (TTOs) are inadequately funded, and rarely have resources for IP protection; and whereas most universities do fund research at institutional level, they do not have financial resources to take the outputs of these funded research projects to the market. For example, the University of Niamey in Niger reports inadequate availability of financial resources, to support IP protection, technology transfer and commercialization; Nelson Mandela African Institution of Science and Technology in Tanzania has prioritized the importance of funding for addressing challenges related to inadequate skills, protection of innovations and commercialization. Similarly, University of Yaoundé I in Cameroon highlights the absence of a dedicated technology transfer and commercialization service, with financial support provided through government grants. Addis Ababa University in Ethiopia notes the insufficient budget for its innovation and incubation functions, while the University of Rwanda expresses a need for increased funding to support incubation/hub operations. The University of Zambia and the University of Port Harcourt in Nigeria have also recognized the need for funding intellectual property management and commercialization and have suggested partnerships with industry for expertise.

**Collectively, there is a need for increased funding to support effective technology transfer and commercialization of research outputs across the universities mentioned. Collaborations with industry, government bodies, and external partners are recognized as potential solutions to address these challenges**

## 2.7 Access to information

Access to information is crucial for universities to support research, innovation development, and technology transfer. Several universities provided insights into their information requirements and challenges faced in accessing such information. For example

1. Makerere University in Uganda emphasizes the need for researchers and inventors to provide detailed documentation of their work for intellectual property (IP) protection. The main challenge lies in the lack of awareness about IP services, which they plan to address through awareness campaigns and providing IP application forms.
2. The University of Nairobi in Kenya acknowledges the availability of information in the digital age but highlights the need for a dedicated structure for filtering, analyzing, and linking information to industry, particularly regarding common sources of innovation.
3. The University of Abomey-Calavi in Benin outlines various types of information necessary for research, innovation, and technology transfer. This includes funding opportunities, market intelligence, IP protection, collaborative research opportunities, technology transfer mechanisms, and regulatory and legal frameworks.

4. The University of Port Harcourt in Nigeria follows a structured approach to support innovators and researchers. They require information on problem identification, implementation and assessment of inventions/projects/processes, and strategies for distribution, adoption, and scaling in the real world.

**Generally, these universities recognize the importance of access to information and highlight the specific types of information they need to facilitate research, innovation, and technology transfer. Overcoming challenges related to awareness, information filtering, and partnerships can enhance their access to relevant and timely information.**

## 2.8 Collaboration and university industry linkages

The collaboration between universities and industries plays a crucial role in driving innovation, advancing research, and preparing students for the workforce. Several universities in different African countries have recognized the importance of such collaborations and have made efforts to strengthen their linkages with industries. Collaborations cover many aspects including scientific validation, standardization and marketing of products developed from universities, curriculum design, scholarships, internships and industrial attachments, training, funding of research projects, and community outreach. Examples are given here below.

1. In Uganda, Makerere University has established collaborations with other African universities and natural products companies through the Natural Products Industry Advancement Network Africa (NAPIANA) initiative. These collaborations focus on scientific validation, standardization, and marketing of natural products. Additionally, partnerships with industry players like Huawei, MTN, and various associations further enhance industry-university linkages.
2. Similarly, the University of Nairobi in Kenya engages with industry through professional societies, curriculum design, scholarships, internships, and consultancy services. Jomo Kenyatta University of Agriculture and Technology also emphasizes collaboration and partnership with industry, with ongoing collaborations with numerous universities and organizations. They have a dedicated Community Collaboration Department that focuses on environmental stewardship, training for economic empowerment, and workshops for sustainable development.
3. The University of Yaoundé I(UYI) in Cameroon collaborates with organizations such as Cameroon Telecommunications (CAMTEL) and Port Authority of Kribi (PAK). CAMTEL benefits from UYI's training and problem-solving capabilities, while CAMTEL supports the establishment of AI laboratories, funds research work, and offers internships to UYI students. The University of Zambia collaborates with Zambia Breweries, First Quantum Minerals, and the Ministry of Health on various research projects and capacity-building initiatives.
4. In Ethiopia, Addis Ababa University has established collaborations with organizations such as Ethiopian Shipping and Logistic Services, the Ministry of Innovation and Technology, and Addis Ababa City Administration. They have successfully implemented projects such as a charging station and a fluorine medication initiative. The University of Rwanda focuses on collaborations and partnerships in emerging technology fields like AI, IoT, data science, and computer engineering.
5. While some universities, like the University of Abomey-Calavi in Benin and Université Cheikh Anta Diop de Dakar in Senegal, have not provided specific information on their collaborations with industries, efforts are ongoing to strengthen collaboration and establish linkages.

All these examples highlight the diverse ways in which universities in Africa are fostering collaboration with industries, ranging from joint research projects and internships to capacity-building programs and community outreach. These collaborations have the potential to drive economic growth, address societal challenges, and provide valuable experiential learning opportunities for students.

## 2.9 Success Stories

### *2.9.1 Introduction*

Universities play a crucial role in fostering innovation, driving research excellence, and contributing to socio-economic development. Across various countries in Africa, universities have showcased remarkable success stories that highlight their achievements in areas such as technology transfer, intellectual property management, industry collaborations, and entrepreneurial ventures. These success stories not only demonstrate the universities' commitment to academic excellence but also their dedication to translating research outcomes into tangible solutions that benefit society. Below or some examples.

### *2.9.2 Makerere University – Uganda*

In 2011, Makerere University's College of Engineering, Design, Art and Technology (CEDAT) achieved a remarkable technology transfer success with the development of the Kiira EV, a two-seater plug-in electric vehicle. With a vision to revolutionize the transportation sector and promote sustainable mobility solutions, the Kiira Motors Corporation embarked on scaling up the production of the Kiira EV. The government, through GovUG, acquired a significant stake of 96% in the company, while Makerere University retained a 4% ownership and the corporation scaled up Kiira EV production.

Funding from the Government of Uganda (GovUG) led to the formation of Kiira Motors Corporation, Uganda's pioneering electric vehicle manufacturer. Kiira Motors Corporation aimed to revolutionize transportation and promote sustainable mobility.

During this time, the university's legal office managed the intellectual property (IP) rights since the IPMO had not yet been established. This protected the university's interests and facilitated technology transfer to the newly formed corporation. The Kiira EV project showcased Makerere University's ingenuity, commitment to innovation, and its role in fostering collaborations. The success positioned Uganda in sustainable transportation and contributed to job creation, economic growth, and environmental sustainability. Today, Kiira Motors Corporation continues to innovate, inspiring Makerere University's community and reinforcing the institution's commitment to research excellence, technology transfer, and socio-economic development in Uganda and beyond.

### *2.9.3 Abdou Moumouni University of Niamey – NIGER*

One memorable success story from Université Abdou Moumouni De Niamey (UAM) is the development of a low-cost solar-powered water purification system. A team of researchers and students from the Department of Engineering collaborated on this project with the aim of providing clean drinking water to communities in rural areas of Niger.The team at UAM designed and built a compact water purification system that utilizes solar energy to purify water from various sources such as rivers, lakes, and wells. The system employs advanced filtration and disinfection techniques to remove impurities and harmful pathogens, making the water safe for consumption.

The project received funding from both governmental and non-governmental organizations, recognizing its potential to address the water scarcity and health challenges faced by rural communities in Niger. The

successful implementation of the solar-powered water purification system has had a significant impact on improving access to clean drinking water in remote areas, reducing waterborne diseases, and enhancing the overall well-being of the local population.

The innovation has garnered attention both nationally and internationally, earning accolades for its effectiveness, affordability, and sustainability. It has become a model for similar initiatives in other regions facing similar water challenges. The collaboration between UAM researchers, students, and external stakeholders has not only led to the development of groundbreaking technology but has also fostered knowledge exchange, capacity building, and community engagement.

The success of this project has further strengthened UAM's reputation as a leading institution in research and innovation, showcasing its commitment to addressing societal challenges through technological advancements. The university continues to strive for impactful collaborations and groundbreaking innovations that contribute to the development and well-being of Niger and beyond.

### *2.9.4 Nelson Mandela African Institution of Science and Technology TANZANIA (NM-AIST)*

One of the noteworthy success stories of the Nelson Mandela African Institution of Science and Technology (NM-AIST) in Tanzania includes the successful registration of various innovations. These innovations range from anti-plagiarism software to products like NM19-Lablab, NM20-Lablab, organic lather tanning product, Nutrano product, nanofilter-water filter, and wastewater management through wetland implantation. The registration of these innovations showcases the institution's commitment to fostering research and development across diverse fields.

Furthermore, NM-AIST's Technology Transfer and Commercialization Office has played a pivotal role in facilitating the transfer of technology and commercialization of these innovations. Through a continuous process of learning and implementation, the office has successfully brought two innovations to the market with significant achievements. These include the nanofilter-water filter and waste water management/ treatment technologies.

These success stories highlight NM-AIST's commitment to promoting innovation, technology transfer, and industry partnerships. By registering innovative solutions, commercializing technologies, and fostering collaborations, the institution contributes to socioeconomic development, employment creation, and the advancement of scientific knowledge in Tanzania.

### *2.9.5 University of Nairobi – Kenya*

The University of Nairobi in Kenya has achieved significant success in various areas, including the commercialization of Biofix, an organic fertilizer. This innovative fertilizer eliminates the need for top dressing fertilizers, resulting in a 50% reduction in farming costs. The commercialization of Biofix, which is one of the most successful licensing arrangements by an African university, enabled the private sector to supply the product in several African countries including Uganda, Ghana, Nigeria, Malawi and Zambia. This showcases the university's commitment to sustainable agriculture practices and its contribution to enhancing the efficiency and affordability of farming methods.

Another success story of the University of Nairobi lies within its C4D Laboratory. This laboratory has played a crucial role in incubating and supporting over 60 new startups. One of the successful stories is Marketforce, a company established in 2018 with the aim of digitizing retail distribution in emerging markets. Marketforce enables consumer brands to effectively manage their field sales activities and expand their distribution channels across Africa. The company empowers merchants by providing opportunities to earn additional income through digital financial services such as selling airtime and offering agency services for banking, bill payments, and insurance.

The achievements of the University of Nairobi in commercializing Biofix and incubating startups through the C4D laboratory exemplify the institution's dedication to fostering innovation, entrepreneurship, and sustainable development. By introducing eco-friendly agricultural solutions and supporting the growth of technology-driven enterprises, the university contributes to the advancement of Kenya's agricultural sector, the digital transformation of retail distribution, and the economic empowerment of individuals and communities.

### *2.9.6 Jomo Kenyatta University of Agriculture and Technology (JKUAT) - Kenya*

Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Kenya has witnessed remarkable success in technology transfer and the commercialization of innovations. Some evident success stories include:

a. **Taifa Electronics:** JKUAT's industrial park has developed, assembled, manufactured, and packaged brands such as Taifa laptops, Taifa Elimu tablets, and the digital literacy program. These devices contribute to enhancing access to technology and digital education in Kenya.

b. **Rehau Homegas:** This innovative biogas solution is designed for farms with two or more cows. It offers an easy installation process, utilizing cow dung and water to produce high-quality biogas and organic fertilizer. The system provides an environmentally friendly and cost-effective energy source for farmers.

c. **Shujaa Contractor:** Developed in collaboration with JKUAT, SRISTI, and USAID India, this technology transfer project promotes farm mechanization. By reducing reliance on unreliable animal draft power or human labor, Shujaa Contractor offers an effective and affordable solution for farmers. It enhances agricultural production in the Kenyan rural setup and contributes to addressing the issue of food security in the country.

These success stories highlight JKUAT's commitment to leveraging technology and innovation to address key challenges in agriculture, education, and rural development. Through the commercialization of these innovations, the university contributes to sustainable economic growth, improved livelihoods, and technological advancement in Kenya.

### *2.9.7 University of Yaoundé I (UYI) – Cameroon.*

The University of Yaoundé I (UYI) in Cameroon has achieved outstanding success in fostering entrepreneurship and innovation through its incubator program. Over 25 enterprises have been created and are independently managed by their owners, who are responsible for their respective policies. Some of the successful enterprises emerging from the UYI incubator include:

a. **Caysti:** An innovative online education platform that offers students multimedia resources co-created with the government, teachers, and AI technology for personalized learning. Caysti can be accessed at https://www.caysti.com/.

b. **Kiro'o Games:** A platform that showcases African video games. Kiro'o Games provides a unique gaming experience with their products, which can be found at https://kiroogames.com/en/.

c. **Giftedmom:** A digital health infrastructure tailored for emerging markets, Giftedmom focuses on providing pregnant women and new mothers with access to vital health information and strengthening linkages to antenatal care. Their services can be accessed at http://www.giftedmom.org/.

The commercialization of these products is handled by the respective owners, who also oversee recruitment, development policies, and daily operations. The University has no ownership rights over these enterprises. However, the agreements made upon joining the Technipole state that the companies established as a result of the project will contribute financially to support the development of the Technipole. Additionally, these enterprises provide valuable internship opportunities for UYI students.

Through its incubator program, the University of Yaoundé I encourages entrepreneurship, empowers innovators, and fosters economic growth in Cameroon. The success of these enterprises highlights UYI's commitment to nurturing a vibrant startup ecosystem and providing practical opportunities for students to gain real-world experience in their chosen fields

### *2.9.8 Addis Ababa University in Ethiopia*

Addis Ababa University in Ethiopia has witnessed several success stories in the commercialization of research and development (R&D) projects. Here are some important examples:

**a.** Utility model innovation by Kumlachew Dejene: Kumlachew Dejene, a Mechanical Engineer, developed an impressive product while participating in the incubation center located at Addis Ababa University. Over a period of three years, he successfully refined his idea, resulting in a product that aids individuals selling books on the street. This innovation received recognition from both the university and the government. It is now ready for mass production and commercialization.

**b.** Innovation by Tesfaye Alemayehu and Dr. Afrasa Mulatu: These researchers devised a groundbreaking solution to address diseases affecting coffee crops, a crucial industry in Ethiopia.

**c.** Innovation by Professor Yonas Chebude: Professor Yonas Chebude, a Chemistry professor at Addis Ababa University, invented a solution to counter the issue of water fluoride that affects the discoloration of teeth in the Zewy area of Oromia, Ethiopia. Their invention has been patented in America, Spain, and Mexico, benefiting both the professor and the university.

In addition to these successes, there have been collaborative achievements such as the Butagera Charge Station project led by Getachew Teshome, a staff member at AAiT, and the Zeway project involving fluorine medication, led by Professor Yonas Chebude from the Natural Science and Computational College.

These success stories demonstrate the commitment of Addis Ababa University to fostering innovation, supporting entrepreneurial endeavors, and addressing critical challenges through research and development. The university's efforts in commercializing these innovations contribute to economic growth and societal development in Ethiopia.

### *2.9.9 University of Rwanda (UR)*

KLab (Startups Academy) and FabLab Rwanda: These innovation spaces, namely kLab and FabLab Rwanda, serve as platforms for members to transform their innovative ideas into tangible products, particularly in the hardware and electronics domain. They also provide training and support to graduate students from the university, nurturing their entrepreneurial skills and encouraging them to become creators and innovators. The collaborations between the University of Rwanda and industry partners, as well as the initiatives like kLab and FabLab Rwanda, promote knowledge exchange, skill development, and practical application of ideas. These success stories demonstrate the university's commitment to fostering innovation, entrepreneurship, and experiential learning, empowering students to contribute to Rwanda's socio-economic development and technological advancements.

### *2.9.10 University of Eduardo Mondlane (UEM) - Mozambique*

Eduardo Mondlane University has achieved remarkable success through various initiatives and partnerships that promote innovation and entrepreneurship. These success stories include:

**a.** **Establishment of a Public-Private Partnership (PPP):** UEM has formed a strategic collaboration with the company BJ AGROPEC to produce disinfectants. This partnership not only enhances the university's research and development capabilities but also contributes to addressing public health challenges by ensuring the availability of quality disinfectant products.

**b.** **Competitions and Innovative Solutions:** UEM actively organizes competitions to foster creativity and

the development of innovative solutions. These competitions serve as platforms for students and researchers to showcase their ideas and receive support for transforming them into practical solutions. By encouraging entrepreneurship and innovative thinking, UEM nurtures a culture of innovation within its academic community.

c. **Collaborations with Government and Private Sector-Civil Society:** UEM has implemented initiatives in collaboration with the government, private sector, and civil society organizations. Through partnerships with entities such as UNICEF and UCT, UEM has conducted training programs in design thinking. These initiatives aim to equip individuals with the necessary skills and knowledge to drive innovation and entrepreneurship projects in Mozambique. By building a strong network of trainers and promoting massification of innovative practices, UEM contributes to the overall development of the innovation ecosystem in the country.

These success stories exemplify UEM's commitment to fostering innovation, promoting entrepreneurship, and addressing societal needs. By forging strategic partnerships and implementing initiatives that support innovative solutions, UEM plays a vital role in driving economic growth, social progress, and sustainable development in Mozambique

### *2.9.11 University of Fort Hare- South Africa*

The Research Unit at the University of Fort Hare (UFH) have made significant contributions, resulting in illustrious outputs and impactful outcomes. One such achievement is the success of the George Mukhari Research Development Centre (GMRDC), which has played a vital role in creating employment and funding opportunities for researchers.

The GMRDC has facilitated collaborations between UFH researchers and prominent financial institutions such as Standard Bank and FNB. This partnership has allowed researchers to work in these renowned banks, gaining valuable industry experience while contributing their expertise to the financial sector.

Moreover, the GMRDC actively promotes research innovation and supports postgraduate students in their academic journey. It offers a postgraduate tuition fee waiver, alleviating the financial burden for students pursuing advanced degrees. Additionally, the center provides supervisor-linked bursaries, enabling postgraduate students to receive financial support while working closely with experienced mentors.

These initiatives demonstrate UFH's commitment to fostering research excellence, promoting innovation, and creating tangible opportunities for researchers and students. By facilitating collaborations with industry partners and providing financial support, UFH empowers its research community to make significant contributions, drive economic growth, and advance knowledge in South Africa and beyond.

### *2.9.12 University of Port Harcourt - NIGERIA*

The implementation of Intellectual Property Policies at the University of Port Harcourt has resulted in notable successes. Since the establishment of the Intellectual Property and Technology Transfer (IPTT) Office, several patent applications have been received, with a significant number of them successfully cleared by NOTAP (National Office for Technology Acquisition and Promotion) and registered with the Patent Registry. As of now, the university holds a commendable count of 12 patents derived from various research projects ("Patent Held," n.d.).

The University of Port Harcourt has fostered fruitful collaborations with industries, resulting in numerous success stories. These collaborations have been formalized through the signing of several Memorandums of Understanding (MOUs) between the university and various industry partners.

These collaborations have facilitated knowledge exchange, joint research projects, and the development of innovative solutions. By working together, the university and industries have leveraged their respective

expertise and resources to address industry challenges, promote technological advancements, and drive economic growth.

The success stories emerging from these collaborations demonstrate the university's commitment to industry engagement and its significant role in contributing to the socio-economic development of Nigeria. Through effective partnerships with industries, the University of Port Harcourt has been able to enhance research outcomes, foster innovation, and create avenues for technology transfer and commercialization.

## 2.10 Conclusions

In conclusion, the synthesis of existing support structures for technology transfer and commercialization of R&D outputs in various universities across Africa reveals both progress and challenges. The universities recognize the importance of innovation, entrepreneurship, and intellectual property management in driving economic growth and societal development. They have implemented support structures such as Intellectual Property Management Offices, Technology Transfer Offices, Business Incubation Facilities, and innovation hubs to facilitate the commercialization of research outputs.

However, challenges exist in different areas. Some universities face limitations in terms of funding, incomplete implementation of support structures, or limited resources for certain facilities or programs. In addition, there are challenges related to IP protection, including limited awareness of IP rights, inadequate legal frameworks, and difficulties in commercialization. The universities also acknowledge the need to enhance skills and provide financial resources for technology transfer and commercialization. Furthermore, access to relevant and timely information is crucial for research, innovation, and technology transfer, and efforts are needed to overcome challenges in accessing such information.

Collaboration with industries and university-industry linkages are recognized as important drivers of innovation and research advancement. Several universities have established collaborations with industries through joint research projects, internships, curriculum design, and consultancy services. These collaborations provide valuable opportunities for students, enhance research outcomes, and contribute to economic development.

Largely, while the universities have made significant efforts to establish support structures and policies for technology transfer and commercialization, further attention is needed to address the challenges and gaps identified. Increased funding, improved awareness, strengthened policy frameworks, enhanced skills development, and expanded collaboration with industries can contribute to more effective and successful technology transfer and commercialization of research outputs in Africa.

## 2.11 Recommendations

The synthesis chapter provides an overview of the existing support structures, policies and strategies, protection of innovations, skills and financial resources, access to information, and collaboration and university-industry linkages in technology transfer and commercialization of research and development (R&D) outputs across various universities in Africa. Here are the key recommendations:

1. **Strengthen Support Structures**: Universities should further develop and enhance their support structures for technology transfer and commercialization. This includes establishing dedicated Intellectual Property Management Offices (IPMOs), Technology Transfer Offices (TTOs), and Business Incubation Facilities. Efforts should be made to address challenges such as limited human and

financial resources, visibilities, access, effectives of these support structures.

2. **Improve Policies and Strategies**: Universities should work towards improving their policies and strategies related to intellectual property (IP) management, technology transfer, and commercialization. This includes developing IP policies, IP management strategies, commercialization strategies, university-industry collaboration framework and guidelines on establishing and managing spinoffs. These should be supported with internal regulations for IP and product commercialization, strengthening innovation projects, and enhancing engagement of entrepreneurship centers. Universities should also provide training programs to improve skills for technology transfer and commercialization.
3. **Enhance IP Protection**: Universities should prioritize increasing awareness of IP rights among researchers and inventors. They should establish robust legal frameworks, allocate sufficient financial resources, and provide support for protection and commercialization of innovations. Collaboration with industry experts and legal professionals can help streamline the IP protection process and ensure effective commercialization.
4. **Develop Skills and Financial Resources**: Universities should invest in training programs to bridge skills gaps in technology transfer and commercialization. Skills such as IP drafting, valuation, auditing, and licensing are required. Other skills important for commercialization include communication, business development, networking, and IP management should be emphasized. Adequate financial resources should be allocated to support innovators and researchers throughout the commercialization process.
5. **Improve Access to Information**: Universities should establish dedicated structures for filtering, analyzing, and linking information to industry. This includes providing researchers and inventors with detailed documentation on IP protection, funding opportunities, market intelligence, collaborative research opportunities, technology transfer mechanisms, and regulatory and legal frameworks.
6. **Foster University-Industry Collaboration**: Universities should actively seek collaborations and partnerships with industries. This can be achieved through joint research projects, internships, curriculum design, consultancy services, and scholarships. Strengthening university-industry linkages can drive innovation, enhance research outcomes, and prepare students for the workforce.
7. **Address Challenges and Gaps**: Universities should identify and address the challenges and gaps in technology transfer and commercialization. This includes securing funding resources, improving awareness, establishing efficient registration processes, and streamlining technology transfer mechanisms. Collaboration with government bodies, industry experts, and external partners can provide valuable support and expertise.

By implementing these recommendations, universities can strengthen their support for technology transfer and commercialization, enhance collaboration with industries, and create an environment conducive to innovation and entrepreneurship.

# CHAPTER 3.

## Makerere University – UGANDA

### 3.1 University Profile

MakerereUniversity is the leading institution of higher education in Uganda. The institution was first established in 1922 as a technical school. It later became a centre for higher education in East Africa in 1935, and in 1949 it became a university college. Its final transition into an independent university happened in 1970. Since then, Makerere University has been offering its own undergraduate and postgraduate degrees. The university celebrated 100 years in 2022. Currently, Makerere University has 10 colleges through which serve an average of 35,000 undergraduates and 3,000 postgraduates each year.

**Summary Profile**

1. Year of establishment: 1970
2. Number of faculties/schools & colleges: 10
3. Number of students/Population: around 38,000
4. Number of lecturers/researchers:
5. Docket responsible for Research, innovation and Technology Transfer: the Directorate of Research and Graduate Training (DRGT).

The university's leadership structure starts with The Chancellor who is the titular head of the university; then the University Council which is the supreme governing body; then the University Management which implement the council's resolutions. A key figure in the council and management is the Vice Chancellor who is the chief coordinator of all administrative, academic and public relations affairs of the university. Lastly, the Directorate of Research and Graduate Training (DRGT) coordinates and monitors graduate research and innovation, including the management of intellectual property (IP) and technology transfer at the university.

### 3.2 Institutional framework for Technology Transfer and commercialization of R&D outputs

The management of IP at Makerere University is done by the **Directorate of Research and Graduate Studies** (DRGT) through its Intellectual Property Management Office (IPMO). Currently, the office is mainly involved in raising awareness of IP rights within the university. They also document research innovations and support the inventors in protecting their IP and commercializing their innovations. With regard to the latter, IPMO covers the cost of registration and gazettement of the innovations. IPMO was set-up on 1st December 2020 and many of its components are still being developed in close collaboration with the Uganda Registration Services Bureau (URSB) and the African Regional Intellectual Property Organization (ARIPO).

### Success story

Prior to the creation of the IPMO, one success story in technology transfer at Makerere University was in 2011, when staff and students from the College of Engineering, Design Art and Technology (CEDAT) developed a two-seater plugin electric vehicle called Kiira EV. With funding from the Government of Uganda (GovUG), this work was scaled up to form the Kiira Motors Corporation, an electric vehicle manufacturing company. Currently, GovUG owns a 96% stake in the company and Makerere University owns the remaining 4%. Since IPMO was not yet formed at that time, the Makerere University legal office managed the IP for this innovation.

## 3.3 Policy framework for Technology Transfer and commercialization of R&D outputs

The national Copyright Act Cap 2158, the Patent Act Cap 2169 and the Trademarks Act Cap 217 constitute the national legislation supporting technology transfer and commercialization of innovation in Uganda. At the institutional level, Makerere University has an IP management policy which governs the ownership, protection and commercialization of IP and innovations that arise out of the research activities done by the staff and students. Some of the IP assets covered under this policy include copyright, research data and software, collaborative agreements, and licenses. This policy has a strong integration with the national Copyright Act Cap 2158, the Patent Act Cap 2169 and the Trademarks Act Cap 217.

## 3.4 Skills and financial resources

IPMO currently has two highly skilled staff, one main manager and a legal officer. Despite this, IPMO is severely understaffed and a proposal has been made to have IPMO representatives at each of the 10 colleges at the university. The idea is not to hire new staff but rather to have the College Registrars double as IPMO representatives. The Registrars often have records of the research work going on within the college, and as such they are well positioned to identify the outstanding innovations that are worthy of receiving IP protection. In terms of funding, currently, funding for the IPMO only comes from Makerere University. This office has recently received its first round of funding through the Makerere University Research and Innovation Fund. These resources have been provided to enable IPMO to sensitize and raise awareness of IP management throughout the university. This work is planned to commence on 1st March 2023. Further, IPMO has not yet been granted the authority to seek out funding from external partners, therefore, the office is only working with the limited resources provided by the university. This restricts their level of progress.

## 3.5 Challenges

Currently, the main challenge of accessing this information is the lack of awareness about these IP services. The IPMO anticipates that this will be solved by the awareness raising campaigns. After this, the office plans on providing IP application forms through which the researchers and/or inventors may provide detailed information about the works for which they seek IP protection.

# CHAPTER 4.

## Université Abdou Moumouni De Niamey (Uam) / Abdou Moumouni University Of Niamey – NIGER

### 4.1 University Profile

Abdou Moumouni University started in 1971 as the Higher Education Center (CES) of Niamey, as per the Law No. 71-31 of September 6, 1971. In 1973, it became the University of Niamey, administered by a University Council and directed by a Rector appointed by decree. From 1984, the University of Niamey, this time under the supervision of a Ministry of Higher Education and Research, took on a new appearance. By application decree n°84-8/PCMS/MES/R of January 12 of the same year, the schools become Faculties. Currently, these faculties are administered by elected Deans and Faculty Councils under the authority of the elected Rector. In August 1992, the institution was named Abdou Moumouni University in honor of the late Professor Abdou Moumouni Dioffo, a former Rector of the University of Niamey.

**Summary Profile**

1. Year of establishment: 1971
2. Number of faculties/schools & colleges: 10
3. Number of students/Population: 29071 (academic year 2021 – 2022).
4. Number of lecturers/researchers: 458
5. Senior management structure of the university: Recteur / Vice-Chancellor
6. Docket responsible for Research, innovation and Technology Transfer: Direction du Dévelopement, de la Prospective et des Innovations (DDPI) / Directorate of Development, Prospective and Innovations.

### 4.2 Institutional framework for Technology transfer and commercialization of R&D outputs

The university has the following support structures for technology transfer and commercialization of R&D outputs:

a. **Intellectuel Propreté Office:** Cellule d'Appui à la Technplogie et à l'Innovation (CATI)
b. **Technology Transfer Office:** Direction de Vulgarisation et de Transfert de Technologie / Directorate of Vulgarization and Transfer of Technology
c. **Business Incubation Facility**: Incubation Centre
d. **Innovation Hub :** CellAQ, CATI et FARSIT

## 4.3 Policies and strategies

The university has Intellectual property policy and/or strategy: CATI - attached to the DDPI, CATI serves as an intellectual property structure for the researchers. This policy supports technology transfer and commercialization of R&D outputs. However, the university does not have commercialization strategy, framework for university industry collaboration, and consultancy policy.

## 4.4 Skills and financial resources

Availability of skills and financial resources is rated average. Availability of the skills required for technology transfer and commercialization of research output as well as the skills of researchers to support technology transfer and commercialization of innovations are not adequate. Furthermore, the level of financing of the operation of the TTO/IPO as well as general commercialization activities in the university is rated average. The skills required for technology transfer and commercialization of research outputs are communication and networking, business development, commercial awareness, etc. At UAM, the directorate of research and external relation is in charge of the development of these skills. The financing operation of research and innovation at UAM, is supported by the ministry of higher education and research through FARSIT Fund.

## 4.5 Collaboration and university industry linkages

One of the prerogatives of the directorate of research and external relation is to fortify and broaden the collaboration and partnership with industries and other organizations. This directorate is also making links with various distinguished institutions, generally. UAM has collaboration with national and international universities. For research and development, it is linked with various organizations (partners and donor bodies).

# CHAPTER 5.

## Universidade de Cabo Verde

### 5.1 University Profile

The University of Cabo Verde is the largest university in Cabo Verde with more than 50% of the students enrolled in higher education. It's amongst the 100 best African universities, and the 5th best university from the African Portuguese speaking countries. The institutionalization process that opened the way to the creation of Uni-CV came with the establishment of three public institutions dedicated to higher education in the country: the Higher Institute for Education (ISE) created in October 1995, the Higher Institute for Engineering and Marine Sciences (ISECMAR) in October 1996 and the National Administration and Management Institute (INAG) in October 1996.

n November 2006 the University of Cabo Verde was created through a Council of Minister Law (53/2006), first integrating ISE in Praia and ISECMAR in Mindelo. In 2007, a third institution officially joined the university: The National Institute of Agrarian Research and Development (INIDA), located in São Jorge dos Órgãos. Uni-CV offers several study programs at different levels: 4 doctoral programs, over 22 Masters' programmes, 43 Bachelor programmes and 9 technical-vocational courses in various areas of training.

**Summary Profile**

1. Year of establishment: 2006
2. Number of faculties/schools & colleges: 5
3. Number of students/Population: around 5,000
4. Number of lecturers/researchers: - 4 doctoral programs, over 22 Masters' programmes, 43 Bachelor programmes and 9 technical-vocational courses in various areas of training.
5. Docket responsible for Research, innovation and Technology Transfer: …

Uni-CV has roughly 5000 students enrolled in graduate and postgraduate programs distributed in 5 faculties and schools: Faculty of Social Sciences, Humanities and Arts, Faculty of Science and Technology, Faculty of Education and Sports, School of Business and Governance, School of Agriculture and Environmental Sciences. It is involved in several national and international research projects, including student and staff mobility programmes such as Erasmus+ International Credit Mobility and over 200 international agreements in 52 countries. Uni-CV also hosts several research centres, chairs and research groups that help sustain and consolidate its higher education offer, training and research. In July 23, 2021, the University of Cabo Verde inaugurated a new campus financed by the Chinese Government. Estimated in about 50 million euros, new campus is the biggest infrastructure in Cabo Verde with a total area of 11 hectares.

## 5.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The following support structures are available in the university:

a. Intellectual Property Office: is **planned** to be integrated with the Centre for Entrepreneurship and Service Provision, but has **not yet been implemented;**
b. **Technology Transfer Office**, located at the Centre for Entrepreneurship and Service Provision
c. **Business Incubation Facility,** located at the Centre for Entrepreneurship and Service Provision
d. **Innovation Hub** - iCUB Cubo de inovação tecnológica
e. **Reverse Engineering and Prototyping Centres** - prototyping at iCUB

Services offered include iCUB: prototyping and hosting business ideas for development. Furthermore, the Centre for Entrepreneurship and Service Provision help students to create startups. foster entrepreneurship and offer consultancy services for companies. However, the university does not have an accelerator, a common manufacturing facility, maker spaces, networks of SMEs, hubs and TTOs, and community processing centres.

## 5.3 Policies and strategies

The university is in the process of develop appropriate policies to support technology transfer and commercialization of R&D outputs. In the meantime, the university is guided by the existing national policies of the Institute for Quality Management and Intellectual Property. These include: Intellectual property policy and/or strategy, commercialization strategy, framework for university industry collaboration, and consultancy policy. However, the following gaps exist:

a. Lack of internal regulations for intellectual property and product commercialization
b. Few innovation projects hosted at iCUB
c. Weak engagement of the Centre for entrepreneurship
d. Non-consensual overhead for consulting services
e. Lack of skills for technology transfer ad commercialization of R&D outputs
f. There are no data on the number of IP applications and protection
g. Access to information to support technology transfer and commercialization is also a challenge

# CHAPTER 6.

## University of Dar es Salaam (UDSM) - TANZANIA

### 6.1 University Profile

The University of Dar es Salaam (UDSM) is a public university located in Dar es Salaam, Tanzania. It was established in 1961 as an affiliate college of the University of London and became a full-fledged university in 1970. The university is known for its academic excellence and is one of the oldest and most prestigious universities in East Africa. The university comprises 2 constituent colleges, 7 campus colleges, 7 schools, 5 institutes, and 4 directorates, which offer a wide range of undergraduate and postgraduate programs in various fields of study, including arts, humanities, social sciences, law, education, engineering, science, technology, and business. The faculties include the College of Information and Communication Technologies, College of Engineering and Technology, College of Natural and Applied Sciences, College of Social Sciences, College of Arts and Humanities, College of Education, and College of Health Sciences.

**Summary Profile**

1. Year of establishment: 1970
2. Number of faculties/schools & colleges: 2 constituent colleges, 7 campus colleges, 7 schools, 5 institutes, and 4 directorates.
3. Number of students/Population: around 39,958
4. Number of lecturers/researchers: - 1,500.
5. Docket responsible for Research, innovation and Technology Transfer: The Directorate of Research and Publications (DRP) and The Directorate of Innovation & Entrepreneurship (DIEN).

As of 2021, the University of Dar es Salaam has a student population of 39,958, with over 1,500 academic staff and researchers. The university is dedicated to producing highly skilled and knowledgeable graduates who can contribute to the development of Tanzania and the African continent. The senior management structure of the university consists of the Vice-Chancellor, who is the chief executive officer and is responsible for the overall management and administration of the university. The Vice-Chancellor is assisted by several deputy vice-chancellors, including the Deputy Vice-Chancellor for Academic Affairs, Deputy Vice-Chancellor for Planning, Finance and Administration, and Deputy Vice-Chancellor for Research, Innovation, and Entrepreneurship.

The dockets responsible for research, innovation, and technology transfer at the University of Dar es Salaam are: the Directorate of Research and Publications (DRP) and The Directorate of Innovation & Entrepreneurship (DIEN). The directorates are responsible for promoting research and innovation, providing support to postgraduate students and researchers, and facilitating the dissemination of research findings. The DRP and DIEN work closely with other research and innovation units at the university, such as the University of Dar es Salaam Computing Centre (UCC), the University of Dar es Salaam Business School (UDBS), and the University of Dar es Salaam Entrepreneurship Centre (UDEC).

## 6.2 Existing support structures for Technology Transfer and Commercialization of R&D outputs

### *6.2.1 Intellectual Property Office (IPO)*

The IPO at UDSM is responsible for managing the university's intellectual property portfolio, including patents, trademarks, copyrights, and trade secrets. The office works closely with researchers and faculty members to identify and protect intellectual property rights and to develop strategies for commercialization. The IPO also provides training and guidance on intellectual property law and assists in negotiating licensing agreements and other technology transfer deals.

### *6.2.2 Technology Transfer Office (TTO)*

There is the Technology Development and Transfer Centre (TDTC) at College of Engineering and Technology (CoET). The main role of TDTC is coordination of technology development and transfer activities of the CoET. The ultimate focus of the Centre is technology innovation, development and transfer on the basis of In-house technology innovation, development and transfer; technology brokerage; business / technology incubation; and contracted research that originate from a specific request by a client(s).

### *6.2.3 Business Incubation Facility*

UDSM has a business incubation facility that provides start-up companies with office space, mentoring, networking opportunities, and access to funding. The facility is designed to support the growth and development of new businesses and to foster innovation and entrepreneurship. The incubator also provides training and support for business planning, marketing, and financial management. The college of Information and Communication Technologies has an incubator unit (known as University of Dar es Salaam Information and Communication Technology Incubator - **UDICTI**) responsible for nurturing UDSM student's ICT related businesses by developing their ideas into sustainable businesses through incubation training.

UDSM's innovation hubs are collaborative space that brings together students, researchers, entrepreneurs, and industry partners to exchange ideas and develop innovative solutions to real-world problems. The hubs provide access to cutting-edge technology, prototyping equipment, and mentorship from industry experts. Two leading hubs are Youth for Children Innovation Hub (Y4C) and University of Dar es Salaam Innovation and Entrepreneurship Centre (UDIEC). Information regarding such programs couldn't be established. The only accelerator programs which are available is through incubators and innovation hubs.

### *6.2.4 Networks of SMEs, Hubs, and TTOs*

UDSM has established networks of SMEs, hubs, and TTOs to promote collaboration and knowledge sharing among stakeholders in the innovation ecosystem. These networks facilitate the exchange of ideas, resources, and expertise to support the development and commercialization of new technologies. UDSM through the Directorate of Innovation & Entrepreneurship (DIEN) offers the following business development services to Industries and SMEs: business plan development; technology assessment and its economics including product marketing; advertising and marketing; management and financial advisory; business counselling, coaching and mentorship; networking; process machinery specifications, design and selection; identification of machinery supplier; and evaluation of the existing manufacturing industry - process and machinery for improved productivity. UDSM also has other support structures for innovation and technology transfer, such as specialized training programs, entrepreneurship competitions, and partnerships with industry and government agencies. These structures are designed to promote innovation and entrepreneurship and to facilitate the commercialization of research outputs.

## 6.3 Policies and strategies

Tanzania has a comprehensive legal framework for intellectual property protection, including patents, trademarks, copyrights, industrial designs, and trade secrets. The government has enacted laws such as the Copyright and Neighboring Rights Act of 1999, the Patents Act of 1987, and the Trademarks Act of 1986 to regulate intellectual property in the country. The University of Dar es Salaam (UDSM) has implemented the national intellectual property policy and strategy through various initiatives, including research and development, capacity building, and collaboration with industry and government agencies. UDSM has established a Technology Transfer Office (TTO) to manage intellectual property arising from research activities and facilitate commercialization. One of the successes of UDSM's implementation of the policy is the establishment of the UDSM Science and Technology Park, which provides a platform for researchers and entrepreneurs to collaborate and develop innovative solutions. The TTO has also facilitated the licensing of various technologies developed by UDSM researchers to local and international companies, generating revenue for the university and contributing to economic development.

The University of Dar es Salaam has the following policies and strategies:

a. **Intellectual Property Policy and/or Strategy:** The Intellectual Property Management Office (IPMO) of University of Dar es salaam is established under the UDSM Intellectual Property Policy, 2018 and is currently managed under DVC Research. IPMO was established so as to ensure favorable environment that supports and encourages inventions, innovation and development of research results in the course of research taking place within various academic programs at the University of Dar es salaam and beyond. Since its establishment, the IPMO has, among other, consistently pursued to promote innovation through promotion, protection and commercialization of Intellectual Property. In order to achieve this focus and to generally promote Intellectual Property at the University, IPMO carries different activities including training, consultations, IP applications, networking, collaborating and connecting with stakeholders. The UDSM Intellectual Property Policy - 2018 outlines the procedures for identifying, protecting, and commercializing intellectual property developed by UDSM researchers, staff, and students.

b. **Commercialization Strategy:** Through the UDSM Research Policy and Operational Procedures – 2015 and Intellectual Property Policy – 2018, UDSM has commercialization strategies that aim to promote the commercialization of research outcomes and technology transfer. The university has established the IPMO and TTO to facilitate the identification and commercialization of intellectual property resulting from research and innovation.

c. **Framework for university industry collaboration:** The UDSM Strategic Corporate Plan (SCP) strategic objective number six is "...to enhance linkages with productive sectors and the society, support for government reforms and poverty reduction efforts". The UDSM CSP was formulated in the light of government policies, including Vision 2025; Poverty Reduction Strategy; Higher Education Policy; Science and Technology Policy; Civil Service and Local Government reforms; National ICT policy, etc. Also, through the University Consultancy Bureau, UDSM facilitates its colleges, schools, faculties and institutes to provide consultancy/community services. The UCB Consultancy Policy and Procedures of April 2005, provides guidelines on operational procedures and the role of UDSM in university industry linkage. These frameworks are aimed at promoting partnerships between the university and industry for mutual benefit. The frameworks outline the procedures for identifying potential partners, negotiating agreements, and establishing collaborations.

d. **Consultancy policy:** The UDSM Consultancy Policy and Operational Procedure of 2017 provides guidelines and procedures for conducting consultancy services by UDSM staff and researchers. The policy aims to ensure that consultancy services provided by UDSM are of high quality, meet ethical standards, and generate income for the university. Consultancy agreements are required to be signed between the client and UDSM, and the terms of the agreement must comply with the policy and relevant laws and regulations. The policy requires that consultancy services should not conflict with the academic and research duties of UDSM staff and researchers. The policy provides guidance on consultancy fees and their distribution between the consultant and the university. The policy also

outlines the procedures for managing consultancy funds, including reporting, auditing, and monitoring of consultancy activities.

## 6.4 Main Challenges

The main challenges faced by innovators and researchers at UDSM in protecting their innovations include:

**a.** Limited awareness and understanding of intellectual property rights;
**b.** Inadequate legal and regulatory frameworks;
**c.** Lack of financial resources to cover the costs of intellectual property protection;
**d.** Difficulties in commercializing the intellectual property;
**e.** Partnering with industry or other stakeholders to leverage resources and expertise.

# CHAPTER 7.

## Nelson Mandela African Institution of Science and Technology - TANZANIA

### 7.1 University Profile

The Nelson Mandela African Institution of Science and Technology (NM-AIST) in Arusha has been established as one of the universities in a network of African Institutions of Science and Technology (AISTs) in Sub-Saharan Africa (SSA). The AISTs are tasked to train and develop the next generation of African scientists, engineers and technologists, who will impact on the continent's development through the application of science, engineering and technology (SET). NM-AIST is a public institution which was established in 2010 with the motto "Academia for Society and Industry".

**Summary Profile**

1. Year of establishment: 2009
2. Number of faculties/schools & colleges: 4
3. Number of students/Population: 600
4. Number of lecturers/researchers: 74
5. Senior management structure of the university: Council, Senate, VC, DVCs, Schools, Directorates, Units
6. Docket responsible for Research, innovation and Technology Transfer: Directorate of Research and Innovation.

The goal of NM-AIST is to catalyze development of world-class SET through the production of high–quality scientists and engineers in EA to stimulate economic growth and employment creation. Pursuant to this goal, the objective of NM-AIST is to educate the next generation of African scientists and engineers by equipping them with the technical, entrepreneurial and leadership capacities to solve African problems thereby contributing to the economic and social transformation of EA and SSA. The main objectives of NM-AIST are to:

a. To provide the best facilities for Graduate and Postdoctoral studies and research
b. To catalyze the development of world class sciences and technology in Africa
c. To bridge between innovation and industrial development.

### 7.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs.

The University has in place an Intellectual Property Office, Technology Transfer Office, and Innovation Hub. However, the university does not have an Accelerator, nor Reverse Engineering and Prototyping Centres, while a common manufacturing facility or maker spaces is on the making. There are also networks of SMEs, Hubs and TTOs: These include Sahara ventures, Enrich Africa, Eurocentric, Buni hub, ndoto hub, twende hub. Some of the services provided by these structures include:

a. Filling of IP for various innovations to protect inventions.
b. Commercialization by linking innovators with potential investors.
c. Fund raising for prototypes development and product scale-up.
d. Working space to innovators/incubatees.
e. Training workshops for knowledge creation and networking purposes.

The NM-AIST is a young institution, however among various higher learning NM-AIST is providing a benchmark on how academics should operate and manage innovations through this unique directorate. So far, the directorate has reached 60% of its vision. To achieve the 100% the directorate is venturing on commercialization aspects. Some success stories of technology transfer and commercialization of R&D products include:

a. Registration of various innovations example; anti-plagiarism software, NM19-Lablab, NM20-Lablab, Organic lather tanning product, Nutrano product, Nanofilter-Water Filter, wastewater management through wetland implantation etc.
b. Technology transfer and commercialization office has been successful for the various innovations, which is an ongoing process through learning. Two innovations have been put to market with significant achievement. These are the nanofilter-water filter and waste water management/treatment.

## 7.3 Policies and strategies that support technology transfer and commercialization of R&D outputs

The university is guided by the existing National Research Agenda 2021-2026. This framework highlights the national strategic areas for a period of time and it gets updated as needed. The presence/availability of this framework has helped the NM-AIST directorate for Research and Innovation to come up with its own research agenda, as well as the following:

a. **Intellectual property policy and/or strategy**
b. **Commercialization strategy:** tools to support commercialization have been prepared and implementation is ongoing.
c. **Framework for university industry collaboration,** which is available for one of the centres of excellence (Centre of Excellence in ICT at east Africa – CENIT@EA)
d. **Consultancy policy:** under the institutional consultancy bureau

To date, the university has registered IP as follows: patents and copyrights – 4; trademark - 1; utility model - 1; plat breeders' rights - 2. Long process of application and processing of the request by respective government organs, which also hinders publication of the same.

## 7.4 Existing gaps and challenges

The institutional IP policy is stringent to support innovators because it guides a 80/20 distribution of the rights for the institution and innovator, respectively. So far, this challenge has been a factor for many students not to think about commercialization once they innovate various solutions. However, to improve its deliveries, the directorate is working towards a proposal to revise this policy so it can better favour the innovators.

Limited funding resources for innovators to have a support structure towards commercialization. These include the needed trainings, maker space/labs, advisors and mentors from the industry.

The country's innovation plans are expected to work for higher learning where students already are grown up and have significant issues which can deprive them from having creativity. This has been consolidated from lower learning levels like primary schools.

Inadequate capacity on the areas which need to be improved by having short courses to the staff so they can be more relevant.

Many researchers still have the mentality of hiding their work/outputs to avoid being stolen or implemented by industry without their consent. The directorate conduct induction workshops for awareness creation.

Significant level of the existing challenges would be solved if funding was made available. Here the national government has a big role to play. The NM-AIST directorate for research and innovation is one in Tanzania with a diversified roles to support innovation. As such, it was somehow difficult to propose its existence until recently.

# CHAPTER 8.

## University of Nairobi – KENYA

### 8.1 University Profile

University of Nairobi (UoN) was established in 1970 and it is the largest and oldest university in Kenya. Before its establishment, UoN was before a constituent college of the University of East Africa, which was set up in 1963 to serve Kenya, Uganda and Tanzania. The main campus of the University of Nairobi is situated along University Way in Central Nairobi. It has 10 Faculties, namely Agriculture, Arts and Social sciences, Built Environment and Design, Business and Management Sciences, Education, Engineering, Law, Health Sciences, Science and Technology, and Veterinary Medicine. In addition, it has 8 Research Centres and Institutes, namely The African Women's Studies Center, The Centre for Environmental Law and Policy, Centre for Bioinformatics and Biotechnology, Centre for Translation and Interpretation, The East African Kidney Institute, The Institute of Climate Change and Adaptation, The Institute of Development Studies, and the Institute of Nuclear Science and Technology. The university has one constituent college, The Koitalel Samoei University College, situated in the Nandi County of Western Kenya.

**Summary Profile**

1. Year of establishment: 1970
2. Number of faculties/schools & colleges: 10 Faculties and 8 research centres
3. Number of students/Population: around 37,000
4. Number of lecturers/researchers: - 2,200.
5. Docket responsible for Research, innovation and Technology Transfer: The University is headed by a Vice-Chancellor, who is assisted by two deputies, one in charge of academic affairs, the other in charge of Research, Innovation and Enterprise; the latter is the docket responsible for matters of Research, Innovation and Technology Transfer.

Currently (2023), the university has about 37000 students; the ratio of undergraduates to postgraduates is 80:20, while the ratio of males to females is 60:40. The university has about 2220 academic staff, 450 of them being Professors of diverse disciplines; Amongst the academic staff, the ratio of males to females is about 70:30 The university is headed by a Vice- Chancellor, who is assisted by two deputies, one in charge of academic affairs, and the other in charge of research, innovation and enterprise; The latter is the docket responsible for matters of research, innovation and technology transfer.

## 8.2 Existing support structures for Technology Transfer and Commercialization of R&D outputs

### 8.2.1 *The Intellectual Property* Management Office (IPMO)

This was set up in 2009. Its main function is to assist the university community, and the general public in securing protection of any intellectual property (IP - principally patents and copyrights) that may be due from their books, theses, reports, designs, music compositions, etc. They also assist in the commercialization of innovations. Outside the university, IPMO deals principally with the Kenya Industrial Property Institute (KIPI) and the Kenya Copyright Board (KECOBO). Staff that want to apply for patents and copyrights approach IPMO, which advises them and helps them to send their applications to KIPI or KECOBO, as the case may be. In the last 3 years, about 70 IP protection applications have been processed through IPMO. Some of these eventually go on to the African Regional Intellectual Property Organization (ARIPO) and the World Intellectual Property Organization (WIPO). Since its inception, IPMO has helped secure at least 90 IP protections and commercialized at least 15 innovations. One success story in respect of the latter is the commercialization of Biofix, an organic fertilizer that eliminates the need for top dressing fertilizers, hence cutting down the cost of farming by about 50%. However, IPMO capacity to deliver on its mandate is limited by both financial and human resources. IPMO is better placed to train and advice university staff and the public on matters of intellectual property.

### 8.2.2 *The C4D (Computing for Development) Laboratory*

This laboratory was set up in 2013 in the then School of Computing and Informatics. It has three broad mandates:

**a.** Incubating and accelerating startups through provision of resources and services to startup companies.

**b.** Research and product development through partnerships with government, the private sector and multinationals.

**c.** Innovation Ecosystem development through training, innovation boot camps and exhibitions at the annual University of Nairobi Innovation Week.

So far over 60 new startups have been incubated by the lab, and success stories include **Marketforce**, which was formed in 2018 to digitize retail distribution for emerging markets by enabling consumer brands to manage their field sales activities and grow their distribution channels in Africa. It enables merchants to earn more money by engaging in digital financial services like selling airtime, and providing agency services for banking, paying bills and insurance.

## 8.3 Policies and Strategies

The national laws that guide issues of intellectual property everywhere in Kenya, including the University of Nairobi, include:

**a.** The Constitution of Kenya 2010, Section 40(5), which says that...The state shall support, promote and protect the intellectual property rights of the people of Kenya.

**b.** The Industrial Property Act 2001, through which KIPI was set up.

**c.** The Kenya Copyright Act 2019, through which the Kenya Copyright Board was set up.

In terms of institutional policies, the university has the following:

a. An intellectual property policy that encourages the development of inventions, innovations and other intellectual property creations for the benefit of the public, the creator and the research sponsor.
b. University/industry collaboration, and also on consultancy – provides for, among other things, the need for industry to be involved in curriculum development, and in the provision of attachments and internships to students, in addition to funding of relevant research.
c. The consultancy policy is implemented through the University of Nairobi Enterprises and Services (UNES) unit which is able to engage the large pool of qualified staff the university as consultants to public, private, civil society and international organizations.

## 8.4 Collaboration and University / Industry linkages:

Currently, the university collaborates with industry on various fronts, such as engagement with professional societies and regulatory bodies during curriculum design, donation of student scholarships and prizes by industry, provision of attachments and internships by industry and offering of consultancy services to industry by university staff.

## 8.5 Challenges

Some of the challenges of technology transfer and commercialization in the university include:

a. Not enough staff applying for protection of their intellectual property rights through patents, copyrights, etc., due to limited exposure and motivation.
b. Staff preferring to carry out consultancy on their own rather than through UNES in order to gain more financially.
c. Very limited number of industry players who come to the university to seek solutions to their problems through research.
d. No dedicated funds are allocated by the university to promote intellectual property protection or commercialization of research outputs. The university puts on an annual research and innovation week, in which innovative research outputs are showcased to the public.
e. The challenges staff face in protecting their intellectual property include lack of adequate awareness and also funds to use for the protection applications.

# CHAPTER 9.

## Jomo Kenyatta University of Agriculture and Technology - KENYA

### 9.1 University Profile

Jomo Kenyatta University of Agriculture and Technology is situated in Juja, 36 kilometres North East of Nairobi, along Nairobi-Thika Highway. It was started in 1981 as a Middle Level College (Jomo Kenyatta College of Agriculture and Technology (JKCAT)) by the Government of Kenya with the generous assistance from the Japanese Government. Plans for the establishment of JKCAT started in 1977. In early 1978, the founding father of the nation, Mzee Jomo Kenyatta donated two hundred hectares of farmland for the establishment of the college.

**Summary Profile**

1. Year of establishment: 1977/8
2. Number of students/Population: around 36,000
3. Docket responsible for Research, innovation and Technology Transfer: The office of the Deputy Vice Chancellor (RPE).

The first group of students were admitted on 4th May 1981. H.E. Daniel Arap Moi formally opened JKCAT on 17th March 1982. The first graduation ceremony was held in April 1984 with Diploma Certificates presented to graduates in Agricultural Engineering, Food Technology and Horticulture. On 1st September 1988, H.E. Daniel Arap Moi, declared JKCAT a constituent College of Kenyatta University through a legal Notice, under the Kenyatta University Act (CAP 210C). The name of JKCAT officially changed to Jomo Kenyatta University College of Agriculture and Technology (JKUCAT). It was finally established as a University through the JKUAT Act, 1994 and inaugurated on 7th December 1994. The University Vision is, A University of global excellence in Training, Research, Innovation and Entrepreneurship for development. The University Mission is to offer accessible quality training, research, innovation and entrepreneurship in order to produce leaders in the fields of Agriculture, Engineering, Technology, Enterprise Development, Built Environment, Health Sciences, Social Sciences and other Applied Sciences to suit the needs of a dynamic world.

The management organizational structure of the University comprises the Chancellor, the University Council, the Vice Chancellor who is the CEO of the Institution and the senate. Research, Production and Extension (RPE) Division is one of the three divisions in the University. The office of the Deputy Vice Chancellor (RPE) coordinates the following services: Research, including fundraising and dissemination, production and income generating activities; extension and technology transfer services including shows and exhibitions as well as Linkages services including community collaboration services.

## 9.2 Existing Support Structures for Technology transfer and commercialization of R&D output

Jomo Kenyatta University College of Agriculture and Technology has the following existing support structures for technology transfer and commercialization of R&D outputs.

## 9.3 Directorate of Intellectual Property Management and University-Industry Liaison (DIPUIL)

The precursor of the Directorate of Intellectual Property Management and University-Industry Liaison (DIPUIL) was the University-Industry Liaison Office (UILO) created on August 05, 2010 under the Vice Chancellor's office. UILO had a singular mandate to address some gaps that had been identified as impediments to effective relationships between the university, industry and the national economy. Among the gaps was the ineffective flow of knowledge generated in the university into the economy to promote a knowledge driven economy. The other gap was lack of a channel through which the industry and public authorities could access expertise in any particular area or a person to contact for help with a specific problem.

UILO was thus tasked among other things to establish an Intellectual Property (IP) Office to provide for a channel through which inventions and knowhow could reach the society and industry for commercial exploitation and economic growth. The idea of creating a separate IP office was dropped upon visit to developed world Universities and a more effective vehicle to sharpen the university's role in the society as stipulated in its Charter.. Consequently, DIPUIL was created on 1st April 2014. The directorate consists of two sections, i.e., Intellectual Property Management and University-Industry Liaison.

## 9.4 Directorate of Production and innovation

This directorate aims at transferring JKUAT innovations into income-generating activities. It also coordinates the income generating units (IGUs) within the university. Examples of the income generating units (IGUS) include farm machinery, livestock, crops, bookshop, cafeteria, Food Technology Centre (FOTEC), Chemistry Production Centre (CPC) and engineering workshops.

## 9.5 Directorate of Extension and Technology Transfer

The directorate spearheads the transfer of technology developed at JKUAT to end-users. This is done through shows, exhibitions, and television programs. The Directorate is also responsible for nurturing good relations between JKUAT and its neighbouring communities.

## 9.6 JKUAT industrial park (JKUAT IP).

With an aim to accelerate innovation and commercialization of R&D output, the university operates under **JKUAT industrial park** (JKUAT IP). This was formerly known as Nairobi Industrial and Technology Park. This entity works towards achievement of Kenya Vision 2030 which fully recognizes SME industrial and technology park as a way to fast track growth of the manufacturing sector.

## 9.7 Success stories of Technology Transfer and commercialization of innovations at JKUAT

a. **Taifa Electronics:** These are brands developed, assembled, manufactures, packaged by JKUAT industrial park. These devices include Taifa laptops, Taifa Elimu, tablets and digital literacy programme. (How to Apply – Jkuat Industrial Park, n.d.)

b. **Rehau homegas:** This is an easy to install biogas solution that was developed for farms with two or more cows. It works by feeding the cow dung and water into the system on a daily basis, which in turn produces high quality biogas and organic fertilizer at no cost.

c. **Shujaa contractor:** This solution was developed in collaboration with JKUAT, SRISTI and USAID INDIA as a technology transfer project. It promotes farm mechanization hence reducing dependence on unreliable animal draft power or human labour. It is effective and affordable for farmers, which is a great boost to agricultural production in the Kenyan rural setup; and, in the long run, addresses food insecurity in the country.

## 9.8 Policies and Strategies

The university has in place intellectual property policy of 2009, which has since been revised.

## 9.9 Skills and financial resources for technology transfer and commercialization of research outputs

The common skills required for technology transfer and commercialization of research outputs are communication, business development, IPR management skills, commercial awareness, networking, domain knowledge, and negotiating. At JKUAT, these skills are hosted at the Division of Research, Production and Extension. Currently, the division offers regular trainings to bridge the skills gaps.. At JKUAT, research, innovation and production functions is funded through the JKUAT Innovation Projects Fund kitty.

## 9.10 Protection of innovations

The university has made considerable efforts to protects its innovations; some of the intellectual property rights granted so far are 7 Patents, 5 utility models, 3 copyright protections and 25 trademarks . Some of the patents registered include:

**a.** KE 529 A trap for controlling bont ticks in pastures
**b.** KE 648 Anti-aging cosmetic product derived from plants and ruminant animals oil extract
**c.** KE 769 Shoe polish composition comprising blackjack extract
**d.** KE 773 Process for the preparation of yoghurt-like beverages having a high content of papaya puree
**e.** KE-805 Multipurpose mini-machine for macadamia nuts Shelling

While utility models are

**a.** KE-U 160-System that determines, displays and controls liquid level of any commodity stored in a storage tank
**b.** KE-U 161-Sorghum threshing machine
**c.** KE-U 162-Process of synthesizing biocontrol-chitosan-silica nanocomposite pesticide and control bacterial wilt in tomato
**d.** KE-U 164-Smart soil sampler
**e.** KE-U 165-Automatic irrigation management system.

### *9.10.1 Challenges of innovators protecting their innovations and mechanisms to cope*

At the end of the research we were not able to get through to the innovators.

# CHAPTER 10.

## University of Abomey-Calavi (UAC) – BENIN

### 10.1 University Profile

The University of Abomey-Calavi was founded in 1970 as the "University of Dahomey (Université du Dahomey)". In 1975, the institution was renamed "National University of Benin" before taking its current name in 2001. The University of Abomey-Calavi has five (5) classical faculties, eighteen (18) schools and training programs, ten (10) doctoral schools, and seventy-seven (77) laboratories and research units. According to the statistical yearbook of 2020-2021, the UAC has 64686 students and 856 teachers/researchers. The Abomey-Calavi University is led by a Rector who is assisted by three Vice-Rectors. In addition to the university secretary and accounting office, the university's management team is supported in fulfilling their responsibilities by several administrative services.

**Summary Profile**

1. Year of establishment: 1970
2. Number of faculties/schools & colleges: 5 classical faculties, 18 schools and training programs, 10 doctoral schools, and 77 laboratories and research units
3. Number of students/Population: around 64,686
4. Number of lecturers/researchers: - 856
5. Docket responsible for Research, innovation and Technology Transfer: …

### 10.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

In Benin, despite the promulgation of Decree No. 2012-139 of 7 June 201 on the creation, attributions, organisation and functioning of the Beninese Agency for the Valorisation of Research Results and Technological Innovation (AbeVRIT), research and innovation actors have resorted to the legal protection mechanisms for innovations. This is evidenced by the statistics of the National Agency for Industrial Property (ANAPI) which, over 10 years, has recorded very few patent applications from university research actors.. Yet the costs and the procedure are potentially within the reach of the actors. The economic potential of innovations in terms of creating value and jobs is thus almost lost.

At the university level, the Scientific Council of the UAC provides for perspective, planning, and valorisation of research results. . However, this provision is yet to be actualized.  has not yet been implemented. The UAC has, nevertheless, made  efforts to support innovators. For example, the university introduced the first Science and Innovation Day in 2022, where the top five innovations were awarded. In addition, the university has implemented a project supported by the Agence Universitaire de la Francophonie,  thanks to an agreement with the UAC Start-up Valley. The goal of the call for applications was to choose 20 UAC researchers and innovators and support them up to the point of being awarded a patent. Only 13 candidates submitted applications, and all of them were selected. Some of the services offered by the university include:

a. Access to databases of technical literature and patents;
b. Help and counsel on managing intellectual property; commercialization; drafting and filing for patents;
c. Advising on managing intellectual property; licencing; and technology transfer;
d. Help with using databases and tips on doing so;
e. State-of-the-art, innovation patentability, and validity of research are three key concepts.
f. Support and recommendations for using databases;

## 10.3 Policies and strategies

A public body of social, cultural, and scientific nature has been created called the "Agence Nationale de la Propriété Industrielle (ANaPI). It is a national liaison structure with the African Intellectual Property Organisation (OAPI) and other international organizations in charge of industrial property issues.

The Agence Béninoise de Valorisation des Résultats de la Recherche et de l'innovation Technologique (ABeVRIT) or Beniness Agency for the Valorization of Research Results and Technological Innovation was created by Decree No. 2012-139 of 7 June 2012. The aim of ABeVRIT is to implement the national strategy for technical and industrial development, working with the relevant public and commercial organisations and institutions, particularly through the utilization of research findings

In addition, the Agence Nationale de la Propriété Industrielle" (ANaPI),is charged with managing intellectual property and depends on the African Intellectual Property Organization (OAPI) based in Cameron.

## 10.4 Skills and financial resources for technology transfer and commercialization of research outputs

a. In terms of competence, there is a lack of accredited personnel that can support innovators on protection of their innovations. Benin has only one OAPI-accredited expert who supports innovators to patent their innovations.. There is urgent to train more experts.
b. Addressing skills gaps to promote technology transfer and commercialization of innovations requires a holistic approach that involves raising awareness of the intellectual property and patenting, and strengthening intellectual property rights protection and promotion. For this purpose, the university is training researchers through the VaBRINOV and RVRI-UAC projects.
c. The UAC, in partnership with the UAC startup valley, began by supporting the researchers in the technology transfer and commercialization of innovations in 2022 with the support of the UNDP fund.

## 10.5 Access to information

The University of Abomey-Calavi needs various types of information to support research, innovation development, and technology transfer. Some of the key types of information required include:

a. **Funding opportunities:** Information on funding opportunities for research and innovation, including grants, fellowships, and other funding sources.

b. **Market intelligence:** Information on market trends to identify potential commercialization opportunities and develop relevant research and innovation projects.

c. **IP protection and management**: Information on patents, copyrights, trademarks, licensing, and commercialization strategies.

d. **Collaborative research opportunities:** information on collaborative research opportunities with other universities, research institutions, and private sector organizations. This can help facilitate partnerships and collaborations that lead to more impactful research and innovation projects.

e. **Technology transfer:** including licensing, spinoffs, and start-up incubation are crucial in technology transfer.

f. **Regulatory and legal frameworks**: Information on regulatory and legal frameworks, including ethics, governance, and compliance, which is crucial to ensuring that research and innovation projects are conducted in a responsible and sustainable manner.

## 10.6 Challenges:

a. Limited IP knowledge: Many innovators and researchers in Benin have limited knowledge of IP protection and its importance. This can result in a lack of protection for their inventions, which can then be easily stolen or copied.

b. Inadequate IP legal framework: Benin has an inadequate IP legal framework, making it difficult to protect inventions and innovations. Laws are not enforced, or there may be insufficient resources to support IP protection.

c. Limited financial resources: Innovators and researchers lack the financial resources to obtain patents or other forms of IP protection or to pursue legal action against infringers.

d. Lack of institutional support: Many institutions in Benin do not have the resources or expertise to support innovators and researchers in protecting their innovations.

# CHAPTER 11.

## University of Yaoundé I (UYI) – CAMEROON

### 11.1 University Profile

The University of Yaoundé I (UYI) was created by Decree No. 93/036 of January 29, 1993. It is a Public, Scientific and Cultural Establishment with legal identity and financial autonomy. It is accessed on the URL **https://uy1.uninet.cm/.** The UYI is placed under the supervision of the Ministry in charge of Higher Education. The goals of UYI are:

**a.** To develop and transmit knowledge;

**b.** To develop human research and training;

**c.** To bring higher forms of culture and research to the highest level and at the best rate of progress;

**d.** To provide access to higher education to all those who have the vocation and the ability;

**e.** To contribute to support for development and social and cultural promotion, practice of bilingualism.

The UYI is led by a Rector appointed by presidential decree; the Rector is chosen from among the members of the Teaching Corps of University

**Summary Profile**

1. Year of establishment: 1993
2. Number of faculties/schools & colleges: 7
3. Number of students/Population: around 60 000
4. Number of lecturers/researchers: around 1800
5. Senior management structure of the university: Rector, SG, 3 deputy rectors, 1 tech adviser
6. Docket responsible for Research, innovation and Technology Transfer: Deputy Rector in charge of cooperation, research and relationship with the industries

Institutions. The Rector is assisted by three Vice-Rectors: Vice-Rector in charge of Education, Professionalization and Development of Information and Communication Technologies (VR-EPDTIC); Vice-Rector in charge of Research, Cooperation and Relations with the Business World (VR-RCRME); and a Vice-Rector in charge of Internal Control and Evaluation (VR-CIE).

### 11.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The University of Yaoundé I has two principal entities in charge of innovations located at the National Advanced School of Engineering of Yaoundé: - a structure called Technipole has been created, - and the department of research valorization.

### *11.2.1 Technipole:*

An incubator whose mission is to serve young people (student or not), researchers with ideas and help them mature these ideas, move them to viable projects and finally to commercialize the products. This structure serves as a business incubator office, innovation hub, in addition to being an accelerator. Some of the services provided include: advising the project owner by supporting him/her r to structure the idea, prototype it, identify the target market, undertake feasibility studies for commercialization; and provide equipment to develop the idea. More than 25 enterprises have been created from the incubator. All these enterprises are managed by the owners who are responsible for their policies. Some of them are:

a. **Caysti.** Smart online education platform that provides students with multimedia resources co-created with the Government, teachers, and AI for personalising. It is accessed on **https://www.caysti.com/.**
b. **Kiro'o Games.** This platform provides an African video game. Some of its products could be found on **https://kiroogames.com/en/.**
c. **Giftedmom.** A digital health infrastructure for emerging markets (http://www.giftedmom.org/), the main service is to provide pregnant women and new mothers access to health information and strengthen linkages to antenatal care

The commercialization of these products is done by the owners. S/he is also in charge of recruitment, development policy, daily structure management, etc The university has no right on the structure. The contracts with Technipole state that companies created through the support of the incubator will provide financial contribution to support the development of Technipole and also provide the internships to students. To be accepted in the Technipole, innovators should provide the business plan, which is evaluated to ascertain its viability.

### *11.2.2 Department of research valorization:*

In the national Advanced School of Engineering of Yaoundé, the department of research valorization has been established but its activities have not yet started. The role of this department is to transfer research output to industry. The idea of the department of valorization should be extended to other higher schools and faculties of the University of Yaoundé I. In general, in each faculty, the Vice-dean in charge of Research and Cooperation has also as a task the research outcomes valorization. These activities are coordinated at the University level by the Vice-Rector in charge of Research, Cooperation and Relations with the Business World (VR-RCRME).

## 11.3 Policies and strategies

The national policy of Intellectual property is managed by the Direction of the Intellectual Property of the Ministry of Mine, Industry and Technological Development. All other state entities are required to contact this direction for the intellectual property concerns. Therefore, all inventors (researchers or students in the Technipole or not) should contact this entity for the intellectual property. But some can also go to OAPI (African Organization for Intellectual Property) for the protection of their works. The decision of protecting intellectual property of an invention is done by the owner, not by the University. The commercialization of research outcomes or other inventions is done and supported by the researcher or inventor. The owner defines the commercialization strategies and policies. Many collaborations have been put in place between the University of Yaounde I and industries. But each collaboration defines its terms and conditions. There is no general framework that follows these collaborations.

## 11.4 Skills and financial resources for technology transfer and commercialization of research outputs

In general, there is no service in charge of the technology transfer and commercialization of the research outputs. Meanwhile, the policy is to put in place the department of valorization in different schools and faculties. These structures of valorization would develop skills about. Concerning the financial resources, as the structures of valorization are not in place, there is no financial support affected. But the government policy is to grant quarterly to each university researcher, this grant helps researchers to develop their research and commercialization of the outputs. The researcher remains the main owner, and he is responsible for all activities about. The gap remains entirely to be addressed.

## 11.5 Protection of innovations

It is difficult to have statistics about applications and grants. This is because each researcher remains the owner of his research outputs and is responsible forintellectual rights. In Cameroon, there are many structures of Intellectual Property. The Ministry of Mines, Industry and Technological Development is the responsible for supporting innovators to protect their works. Also in Cameroon, the intergovernmental organisation OAPI (African Organization for Intellectual Property) is also supporting innovators to protect their innovations.

## 11.6 Collaboration and university industry linkages

Many collaborations exist between university and industry such as CAMTEL and PAK.

The University of Yaounde 1works closely with CAMTEL (Cameroon Telecommunications), by raining the personnel, where the university organises and offers training about the new technological advances.. The university also provide specific solutions to technological problems facing CAMTEL through . AI labour, a technological arm of the university. . In return, CAMTEL equips and upgrades the Genie-telecom laboratory. A memorandum has been signed between the UYI and CAMTEL for the creation of a AI laboratory in the National Advanced School of Engineering of Yaounde. Based on this memorandum, CAMTEL equips and upgrades this laboratory. and also also funds research work in the lab. CAMTEL is also the main financier of the AI laboratory and also offerinternships to students. At the end of their training, many students of UYI request the internship in the AI lab and other CAMTEL sites, during which they can contribute in solving the problems submitted to the lab.

Under PAK (Port Autonome de Kribi) partnership, the main activities include continuous training of the PAK and the UYI where both parties share their different expertise in the studies and joint development of common projects and organizing scientific events. The UYI and PAK often organize joint workshops, conferences, and trainings, PAK also receives and supervises the student trainees of the UYI.

# CHAPTER 12.

## Addis Ababa University - ETHIOPIA

### 12.1 University Profile

Addis Ababa University (AAU), which was established in 1950s, is the oldest and the largest higher learning and research institution in Ethiopia. Since its inception, the university has been the leading center in teaching-learning, consultancy, research, and technology transfer and community services.

Over the course of its existence, AAU developed a sizable capacity that has a ripple effect on the transformation and organizational development of both public and private organizations in the nation. Beginning with enrollment capacity of 33 students in 1950, AAU in 2020/21 Academic Year counted 47,610 students (29,872 undergraduate, 15,398 Master's and 2,340 PhD students) and 8,709 staff (3,110 academics, 4,346 admin support staff and 1,253 health Professionals). In its 14 campuses, the University runs 76 undergraduate and 385 graduate programs, and various specializations in Health Sciences. Over 228,000 students have graduated from AAU since its establishment. At present the University has 10 colleges, 2 technology institutes, 4 institutes that run both teaching and research, and 7 research institutes that predominantly conduct research. Within these academic units, there are 55 departments, 13 centers, 19 schools, and 2 teaching hospitals.

**Summary Profile**

1. Year of establishment: 1950
2. Number of faculties/schools & colleges: 10 colleges, 2 technology institutes, 4 institutes that run both teaching and research, and 7 research institutes that predominantly conduct research.
3. Number of students/Population: 47,610 students (29,872 undergraduate, 15,398 Master's and 2,340 PhD students).
4. Number of lecturers/researchers: 8,709 staff (3,110 academics, 4,346 admin support staff and 1,253 health Professionals.
5. Docket responsible for Research, innovation and Technology Transfer:

In recent years, the university has been undertaking various reform schemes in order to cope with and respond to the fast-changing national and international dynamics. Currently, the university is working hard with a focus on the requirements to become a full-fledged research university and to acquire legal institutional autonomy for more discretion in fulfilling its mission.

Overall, the University is constantly contributing its share to scientific and technological knowledge by enhancing its achievements through updating systems based on national and global conditions. In light of that, Addis Ababa university has granted remarkable achievements in the areas of teaching, research and community service over the past five years. In that case, according to the Times Higher Education World University Rankings 2022, Addis Ababa University is 1st in East Africa, 6th in Africa and 402nd in the world. With this, the University is committed to collaborative engagement with the industry to scale up the mutual knowledge and technology transfer endeavors.

## 12.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The university has an office at the vice president level that is responsible for innovation, commercialization or R&D. The university hosts tenants/incubates in Technology Business Incubation Center (AAU-TBIC) conducting periodic innovation competitions and provide various supports during their stay in the center that extends from 2 to 3 years. The innovators are provided various services , including co-working spaces, internet access in each co-working rooms, facilitation of intellectual patent rights for the innovators, trainings on entrepreneurship skills and business development, coaching and mentoring services, business development consultations, lab and workshop facilities in any of the Colleges/Institutes/Departments in the University, partnership and market linkage opportunities including exhibition events. The support we provide to our tenants in the AAU-TBIC in a way to help the Start-ups survive the complex competitive market.

a. **Intellectual Property Office:** Although there is no formally established IP office in the university of Addis Ababa, there is a personnel working on IP issues and processes. For example, university research products that can be sold are patented by the university to get a patent right. The institution can then legally transfer the right to use the technology and begin collecting royalties from the industry, incorporating it into processes, goods, and services.
b. Business Incubation Facility: As stated above, the university has incubation center in its technology college. Tenants are registered and currently developing their products.
c. Reverse Engineering and Prototyping Centers: There are no dedicated centers for prototyping. But, at the end of three years, tenants who develops their ideas under the incubations are expected to develop some kind of prototype
d. **Community Processing Centers:** The University has community and outreach services center/ unit.

Many services are provided by the technology and transfer office. Typical services include: register patents, utility models, industrial designs reated by staff of the university; facilitate the implementation of the different strategies and policies regarding patent registration, benefit sharing, procurement of necessary inputs for developing the product/ service; and facilitate the commercialization process. Some success stories about commercialization of R&D include the following:

1. **Utility model Innovation by Kumlachew Dejene:** The innovator of the product is a Mechanical Engineer who has developed his idea in the incubation center at 5 kilio of Addis Ababa university. At the end of his 3 year period, he developed his product. This is a product that helps people who sell books on the street. His innovation is impressive and has got recognition by both University and government. The product is ready for mass production and commercialization.
2. **Innovation by Tesfaye Alemayehu and Dr Afrasa Mulatu:** These researchers came up with an innovation that addresses the problem of diseases affecting coffee.
3. **Innovation by Professor Yonas Chebude:** This innovator is a professor of Chemistry at Addis Ababa University. He invented solution for water chloride that affects teeth color of people living around zewy area in Oromia, Ethiopia. Their invention was patented (registered) in America, Spain, and Mexico. The professor and the university has benefited from this patent.
4. **Innovation** by Getachew Teshome

## 12.3 Policies and strategies

The university has developed: University-Industry linkage policy, innovation and technology transfer policy, and technology transfer implementation manual. The university also has Patent proclamation 123/1995, Copyright and neighboring right proclamation 410/2010, Trade proclamation, Plant breeding right, and Biodiversity proclamation. The university also has:

**a.** Intellectual property policy and/or strategy;
**b.** Commercialization strategy;
**c.** Framework for university industry collaboration;
**d.** Consultancy policy.

## 12.4 Challenges

**a.** Policy implementation guidelines not being ready (finalized) and ready for use
**b.** Poor & sluggish procurement practices
**c.** Poor fund administration (transferring funds on time)
**d.** Budget constraints, and purchasing system of the university.
**e.** The designed organizational structure regarding how technology transfer and university-industry linkages are not efficient.
**f.** Guidelines for implementing student internship and externship is also not yet finalized
**g.** University/ government budget allocated for this office is also not sufficient to expand the implementation of some of the strategies and policies.
**h.** There is also problem of infrastructures for incubation center

## 12.5 Skills and financial resources for technology transfer and commercialization of research outputs

The Office use government budget to finance incubation and technology transfer activities. Basically, the budget for its innovation and incubation functions is not sufficient. The office mostly finances the procurement of materials and respective services with the fund from AAU-Sida project (lapsed in the 2022). Furthermore, collaboration between the researchers and our office is the missing link. The budget allocated to this office is not proportional to what the office demands. But, we feel that this is likely to change shortly, as the university is heading towards independent university.

## 12.6 Protection of innovations

The Office has university-wide Intellectual Property Policy. There are about four utility models and one patent right registered by the Ethiopian Intellectual Property Right Authority under the facilitation of our office. But, informally the office has learned that majority of the innovations and inventions are processed outside of the university (our office). Many researchers use university resources while researching on their innovation (invention). But, once they realize their product is of high quality that can be patented, they do the rest of the patenting process by themselves outside of the university system. Laborious and time taking registration processes and procedures. Researchers don't like long procedures and do not want to spend much time of administrative issues. There are also fears by researchers of their invention (innovation) might be stolen by employees of IPO.

## 12.7 Collaboration and university industry linkages

| UIL Pillars | Status/Performance |
|---|---|
| **Consultancy and Training** | **a.** UIL policy is developed and endorsed by the AAU Senate<br>**b.** The office is effectively coordinating university-wide consultancy and training services/agreements. The office facilitates the signing of the contracts by the VPRTT and the President, process payments by processing datasheets for each contract documents. This starts since the liquidation of the AAU Business Enterprise in 2019.<br>**c.** Implementing manuals pertinent to the policy are developed. These include:<br>**i.** Internship/Externship/Industry staff exchange implementation manual<br>**ii.** Consultancy and training implementation manual<br>**iii.** Testing and recruitment services implementation manual<br>**iv.** Innovation and technology transfer policy has also been developed and awaiting for validation. |
| **Internship and externship program** | The office set a policy environment. Colleges and units under the academic vice president are coordinating the internship service. The UIL policy was endorsed in 2021.<br>Externship and staff exchange from the industry has limited practices. |
| **Industry-sponsored adaptive researches** | There are limited attempts. The office sets a policy environment for the industry- sponsored adaptive researches. |

Success stories of commercialization include: Butagera charge station - a project of Getachew Teshome, a staff member of AAiT; and Zeway project Fluorine Medication - a project by Professor Yonas Chebude, a member of Natural Science and Computational College.

# CHAPTER 13.

## University of Rwanda (UR)

### 13.1 University Profile

The University of Rwanda (UR) was established by the Government of Rwanda through the law no 71/2013 of 10/09/2013. It resulted from the merge of the nation's seven public Higher Learning Institutions into a consolidated entity governed by the Board of Governors and an Academic Senate with strong staff and student representation, along with the Vice Chancellor who is the University's chief executive officer. UR consists of the following six Colleges: Arts and Social Sciences (CASS); Agriculture, Animal Sciences and Veterinary Medicine (CAVM); Business and Economics (CBE); Education (CE); Medicine and Health Sciences (CMHS); and Science and Technology (CST).

**Summary Profile**

1. Year of establishment: **2013**
2. Number of faculties/schools & colleges: **6 colleges.**
3. Number of students/Population: **26,850 by academic year 2020-2021.**
4. Number of lecturers/researchers: **1,256.**
5. Senior management structure of the university: **Chancellor/Vice-Chancellor.**
6. Docket responsible for Research, innovation and Technology Transfer: **University of Rwanda Center for Innovation and Entrepreneurship**

The Vice-Chancellor leads the University's senior management team that will include 3 deputy Vice Chancellors and 6 College Principals. This ambitious project of merging nation's seven public HLIs started in 2013 and has been guided by a Task Force led by key individuals in higher education nationally, regionally and internationally. The main purpose of creating one national institution is to enhance the quality of Rwanda's higher education provision, while achieving economies of scale and efficiency in operation. The University of Rwanda offers a wide range of academic programs – some that are quite specialised in nature, others that are more interdisciplinary and/or problem-based in focus. The university operates from departments and schools that make up Colleges– and its students undertake their studies at various locations across the country and abroad, both through classes offered at its several designated campuses and through access to distance learning opportunities.

It is intended that UR shall be known for its innovative approaches to teaching, learning, research and connections with the community and with the nation's vision for development, and it shall be recognized as an exemplary employer. University of Rwanda's educational programs will feature student-centred learning, and its research mission will be central to the country's and the region's economic development. Its reputation for excellence and academic freedom will propel its positive recognition internationally, and its campuses will be prized in their respective locations.

## 13.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The University of Rwanda Center for Innovation and Entrepreneurship, which serves as a technology transfer office, has a Business Incubation Facility and Innovation Hub. There is also the Grid innovation and incubation Hub (GIIH), Data-driven incubation hub (DDIH) and IoT and AI Incubation Hub. These hubs are still at the initial stage.

## 13.3 Policies and strategies

University of Rwanda intellectual property policy (2020): This policy provides a framework guiding the University of Rwanda employees, students, visitors and its partners on the ways through which University IP is disclosed, owned, managed, and commercialised, or utilised for the general benefit of the society. The policy also guides how UR IP can be disclosed, owned, managed, and commercialised, or utilised for the general benefit of the society. There is also University of Rwanda Innovation policy and strategy (October, 2020): This policy aims at providing new solutions which work in specific challenges faced by the society. It guides the University of Rwanda community in significantly contributing to the Rwandan economy by fostering innovations that are relevant to the national needs and priorities. Finally, the university has a Consultancy policy: UR consultancy Policy (June, 2016): This policy encourages University staff to engage in consultancy services wherever appropriate. It intends to provide the information required to undertake consultancy work in accordance with the university's rules and regulations.

## 13.4 Collaboration and university industry linkages

There is need strengthening collaboration, partnerships and linkages with industries on innovation and technology especially in AI and related emerging technology fields, IoT, Data Science, computer Engineering/ Computer Vision and Mechanical Engineering. Each year, the industries offer internships to the university students. There are also the kLab (Startups Academy) and FabLab Rwanda, which provide spaces for members to turn innovative ideas into products specifically in the hardware and electronics domain. They offer training to the university graduate students.

## 13.5 Challenges

1. The availability of the skills required for technology transfer and commercialization of research outputs: The hubs were established by university and its partners and are still in the initial stage and they financially rely on external funding.
2. The skills of researchers to support technology transfer and commercialization of innovations rating and gaps: There are still gaps especially in the emerging technologies (AI, IoT,..) Our academic researchers are not specialised in many areas and thus not enough experts; this may limit the technology transfer and commercialization of the innovations.

3. The University of Rwanda Center for Innovation and Entrepreneurship, is mandated to monitor and support the incubations/hubs. The funds from the university budget to support the innovators is not enough and there is need to compete for external grants. Hubs affiliated to the university have won grants to finance the operations of innovations and its commercialization. This is a big gap as the number of commercialised projects are still low.
4. Other challenges include low level of IP awareness, lack of the incentives; and the university not fully grasping the importance of IP. It is recomendended that t the TTO should work closely with the university innovators/researchers to create awareness and provide incentives to them.

# CHAPTER 14.

## University of Zambia (UNZA)

### 14.1 University Profile

The University of Zambia (UNZA) is a public research university located in Lusaka, Zambia. Established in : 1966, the university has 11 faculties/schools & colleges with 11 faculties and schools.: As of end of 202 the university had , a population of around 27,000 students, both undergraduate and graduates with over 800 academic staff members who serve as lecturers, researchers, and administrators. The senior management structure of the University of Zambia consists of a Vice Chancellor, Deputy Vice Chancellor (Academic Affairs), Deputy Vice Chancellor (Administration), Registrar, and Chief Financial Officer. The Directorate of Research and Graduate Studies is responsible for research, innovation, and technology transfer at the University of Zambia. This office oversees the research activities of the university and provides support to faculty and students engaged in research projects. The directorate also promotes collaborations with other institutions and organizations to enhance the impact of research and innovation at the university.

#### Summary Profile

1. Year of establishment: **1966**
2. Number of faculties/schools & colleges: **11 faculties and schools.**
3. Number of students/Population: **As of end of 2021, a population of around 27,000 students, both undergraduate and graduate.**
4. Number of lecturers/researchers: **over 800 academic staff members who serve as lecturers, researchers, and administrators.**
5. Senior management structure of the university: **a Vice Chancellor, Deputy Vice Chancellor (Academic Affairs), Deputy Vice Chancellor (Administration), Registrar, and Chief Financial Officer.**
6. Docket responsible for Research, innovation and Technology Transfer: **The Directorate of Research and Graduate Studies is responsible for research, innovation, and technology transfer at the University of Zambia.**

### 14.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The support structures discussed in this article include the Technology Development and Advisory Unit (TDAU), the Centre for Innovation and Entrepreneurship (CIE), and industry-academia linkages. These support structures provide a conducive environment for researchers and entrepreneurs to develop innovative ideas and turn them into commercial products and services. The University of Zambia has the following innovation and technology transfer support structures:

a. **Intellectual Property Office:** The IP office at UNZA provides services related to the protection and management of intellectual property generated by UNZA researchers. These services include patent and trademark registration, copyright management, and licensing agreements.

b. **Technology Transfer Office:** The TTO at UNZA is responsible for the commercialization of UNZA research outputs. The office provides services related to the identification, protection, marketing, and licensing of UNZA technologies. The TTO also facilitates the formation of partnerships between UNZA researchers and industry partners.

c. **UNZA Holding Company:** UNZA has established company that facilities and maker spaces to support the development and prototyping of innovative products. The company manages subsidiary companies (spinoffs) coming out of research and scientific output after passing the prototyping stage

## 14.3 Policies and strategies

### *14.3.1 National policies*

There are national policies, strategies, and frameworks that guide intellectual property (IP) at the University of Zambia. The key policies and frameworks include:

a. **The Industrial Property Act, No. 16 of 2010:** This is the principal legislation governing IP in Zambia. It provides for the registration and protection of patents, trademarks, industrial designs, and utility models. The Act also establishes the Patents and Companies Registration Agency (PACRA) as the main registration authority for IP in the country.

b. **The National Science and Technology Policy:** This policy provides a framework for promoting science, technology, and innovation (STI) in Zambia. It aims to foster an enabling environment for the development and application of STI, including the protection and commercialization of IP. The policy seeks to promote partnerships between universities, research institutions, and industry to facilitate technology transfer and commercialization.

c. **The National Intellectual Property Policy:** This policy provides a comprehensive framework for the protection, management, and commercialization of IP in Zambia. It outlines the government's vision, objectives, and strategies for promoting innovation and creativity in the country. The policy recognizes the role of universities and research institutions in generating and disseminating new knowledge and provides guidelines for the protection and commercialization of IP generated in these institutions.

### *14.3.2 University Policies*

The University of Zambia has the following policies/strategies/frameworks:

a. **Intellectual Property Policy:** The university has an Intellectual Property Policy which provides guidance on the management, protection, and commercialization of intellectual property created by the university's faculty, staff, and students. The policy also outlines the ownership and sharing of benefits from intellectual property.

b. **Commercialization Strategy:** The university has a commercialization strategy which aims to facilitate the transfer of knowledge, technology, and intellectual property from the university to the private sector for commercialization. The strategy includes the establishment of a Technology Transfer Office to facilitate the commercialization process and to promote university-industry partnerships.

c. **Framework for University-Industry Collaboration:** University of Zambia has a framework for university-industry collaboration which outlines the process for collaboration between the university and industry partners. The framework includes guidelines for the protection and commercialization of intellectual property resulting from collaborative projects.

d. **Consultancy Policy:** University of Zambia has a Consultancy Policy which provides guidelines on the

provision of consultancy services by the university's faculty and staff. The policy requires the registration of all consultancies and the sharing of revenue generated with the university.

The policies/strategies/frameworks demonstrate the university's commitment to promoting innovation and entrepreneurship and to promoting collaboration with industry partners. The establishment of a Technology Transfer Office has facilitated the commercialization process and has increased the number of successful technology transfers from the university.

## 14.4 Access to information

UNZA requires various kinds of information to support innovation development, and technology transfer. Some of the important types of information needed include:

a. Market research: Information on market trends, consumer needs, and industry requirements, which can help researchers and innovators to develop solutions that meet the needs of the market.
b. Intellectual property information: Information on patents, trademarks, copyrights, and other intellectual property rights that can help researchers and innovators to protect their innovations and commercialize them effectively.
c. Regulatory information: Information on regulations and standards related to the development and commercialization of products and services, which can help researchers and innovators to ensure compliance and avoid legal issues.
d. Industry contacts: Information on industry contacts, partnerships, and collaborations that can help researchers and innovators to access the resources, expertise, and funding needed to develop and commercialize their innovations.
e. Technology transfer opportunities: Information on technology transfer opportunities, such as licensing and spin-off companies, which can help researchers and innovators to commercialize their innovations effectively.
f. Entrepreneurship and business development: Information on entrepreneurship and business development, such as business planning, marketing, finance, and management, which can help researchers and innovators to establish and grow successful ventures based on their innovations.

## 14.5 Collaboration and university industry linkages

a. **Collaboration with Zambia Breweries:** In 2019, UNZA signed a memorandum of understanding (MoU) with Zambia Breweries, a subsidiary of AB InBev, to collaborate on research, teaching, and community outreach. As part of this collaboration, UNZA and Zambia Breweries have jointly developed a graduate program in brewing and malting, which aims to build local capacity in the brewing industry. In addition, they have worked together on research projects related to brewing, water management, and entrepreneurship.
b. **Collaboration with First Quantum Minerals (FQM):** UNZA has an ongoing partnership with FQM, a mining company operating in Zambia. Through this collaboration, UNZA and FQM have worked together on a range of research projects related to mining, including environmental management, occupational health and safety, and mineral processing. UNZA has also provided training to FQM staff on topics such as project management, leadership, and communication.

c. **Collaboration with the Ministry of Health:** UNZA has a longstanding collaboration with the Zambian Ministry of Health, which has included joint research projects, training of health professionals, and community outreach. One notable success story from this collaboration is the development of the Zambia Electronic Perinatal Record System (ZEPRS), a digital health platform for tracking maternal and child health data. UNZA researchers worked closely with the Ministry of Health and other partners to develop ZEPRS, which has been implemented in health facilities throughout Zambia and has helped to improve maternal and child health outcomes.

### *14.5.1 Gaps and Challenges*

1. **Limited awareness and understanding:** There is limited awareness and understanding of the policies, strategies, and frameworks among faculty and staff at the university. This leads to a lack of utilization and effectiveness of these policies, strategies, and frameworks. In addition many innovators/ researchers at UNZA are not aware of the importance of protecting their intellectual property. They do not know how to file for patents or trademarks, and may not understand the potential benefits of doing so.
2. **Inadequate funding:** The implementation of these policies, strategies, and frameworks is inadequate due to limited resources and funding. Lack of funds also make it difficult to establish and maintain effective support structures for TT and commercialization of R&D outputs.
3. **Lack of clarity on ownership and benefit sharing:** The policies and strategies at the university do not provide clear guidelines on ownership and benefit sharing for intellectual property developed through university research. This has potential to create confusion and potential disputes.
4. **Limited engagement with industry partners:** While the university has a framework for university-industry collaboration, there is limited engagement with industry partners. This limits the opportunities for commercialization and technology transfer from the university.
5. **IP costs:** Filing for IP rights at Patents and Companies Registration Agency (PACRA) is expensive, and many innovators/researchers at UNZA may not have the financial resources to do so. This is especially challenging for those who are working on projects that are not yet generating revenue.
6. Lack of institutional support: UNZA does not have a strong institutional framework in place to support IP protection.
7. **Limited legal expertise:** Innovators/researchers do not have access to legal expertise that can help them navigate the intellectual property protection process.

# CHAPTER 15.

## Eduardo Mondlane University (UEM) – MOZAMBIQUE

### 15.1 University Profile

**Summary Profile**

1. Year of establishment: **1962**
2. Number of faculties/schools & colleges: **11 faculties, 6 colleges.**
3. Number of students/Population: **39,391 (Bsc – 35596; Msc – 3644; Phd – 151).**
4. Number of lecturers/researchers: **1,717.**
5. Senior management structure of the university: **University Council – Rector – Vice Rectors (one for Administration and one for Academic Affairs).**
6. Docket responsible for Research, innovation and Technology Transfer: D**irectorate of Research.**

### 15.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The university does not have Intellectual Property Office. However, there is a Policy and Strategy for Intellectual Property, which has provided for such office. But there is an **Innovation Hub called** the UEM Innovation Space. The UEM Innovation Space was established in partnership with the iCAMP and the Ministry of Science and Technology, Higher Education and Professional Technical (MCTESTP). This is an initiative that aims to incubate innovative ideas, contributing to the promotion of innovation and entrepreneurship at different levels and areas of knowledge, having Information and Communication Technologies as one of its supports.

As an example of success story, establishment of a Public-Private Partnership (PPP) with the company BJ AGROPEC for the production of disinfectants; (ii) Organization of competitions of ideas and development of innovative solutions in EdI; and (iii) Implementation of initiatives to development of innovative solutions with the Government, Private Sector-Civil Society (through the EdI contacts were made with UNICEF and UCT to carry out training in design thinking, involving the training of trainers for later massification of this initiative in the innovation and entrepreneurship projects carried out by CIUEM).

## 15.3 Policies and strategies

At the national level, there a National Code for Industrial and Intellectual Propriety. At the institutional level, the university has an Intellectual property policy and/or strategy and commercialization strategy: Covered in the Intellectual Propriety policy and strategy.

## 15.4 Skills

The availability of skills for technology transfer is reasonable. The skills of researchers to support technology transfer is reasonable! The main challenge is that the process of intellectual propriety registration is extremely complex and in many cases is not concluded at all. The level of financing of the operation of the TTO/IPO is very low! The university is almost all the time working under budget shortage so TTO/IPO are not top priorities at all.

# CHAPTER 16.

## Université Cheikh Anta Diop de Dakar (UCAD) - SENEGAL

## 16.1 University Profile

### Summary Profile

1. Year of establishment: **February 24, 1957**
2. Number of faculties/schools & colleges: **6 Faculties, 6 schools and institutes, 20 university institutes, 14 faculty institutes and 7 doctoral schools.**
3. Number of students/Population: **85,000 students**
4. Number of lecturers/researchers: **1,488 teacher-researchers (PER)**
5. Docket responsible for Research, innovation and Technology Transfer:

## 16.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The university has the following: Intellectual Property Office; Business Incubation Facility; and Innovation Hub. To support technology transfer and commercialization of research outputs, UCAD has set up the following structures:

a. Intellectual Property and Research Valorization Division at the Research and Innovation Department
b. Incubation, Dissemination/popularization and Community Support Department
c. Center for Incubation and Development of Innovative Businesses
d. Entrepreneurship and Innovation Division of the Valuation Service of Ecole Supérieure Polytechnique (ESP).

## 16.3 Policies and strategies

The university has the following policies and strategies that support technology transfer and commercialization of R&D outputs:

a. Intellectual property policy and/or strategy
b. Commercialization strategy
c. Framework for university industry collaboration
d. Consultancy policy

Some of the success stories of technology transfer and commercialization in the university include the following:

a. Sale of expertise by the Chemical Engineering and Applied Biology department of ESP in the field of food analysis and control, particularly for import and marketing authorizations.
b. Sale of expertise by the laboratories of the civil engineering department of ESP (e.g. Types of Soil Tests for Building Construction).
c. The Valuation Service of ESP organises training sessions financed by the 3FPT for company employees. The Professional and Technical Training Financing Fund, commonly known as 3FPT, is a public utility structure set up by the Government of Senegal to provide a concrete response to the capacity building needs of the private sector and to the problem of youth employability.
d. The Resource and Expertise Center (CRE) is a body of the Computer Engineering department of ESP which was created in October 2015 for the implementation of ESP software projects but also of external organizations which express the need for it.

# CHAPTER 17.

## Virtual University of Côte d'Ivoire

### 17.1 University Profile

**Summary Profile**

1. Year of establishment: **2015**
2. Number of faculties/schools & colleges:
3. Number of students/Population: **10, 479**
4. Number of lecturers/researchers: **70**
5. Senior management structure of the university: Senior management structure of the university: **General Director, Director of Academic and Pedagogical Affairs, Director of Administrative and Financial Affairs**
6. Docket responsible for Research, innovation and Technology Transfer: **Dr Euloge KOUAME**

### 17.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

TThe university has the following support structure for technology transfer and commercialization of R&D outputs: Business Incubation Facility, Accelerator, Common Manufacturing Facility/Maker spaces, Reverse Engineering and Prototyping Centres, and Community Processing Centres.

Business Incubation Facility and Accelerator: Trainings, workspace provision for one year, small seed investment from the university. Common Manufacturing Facility/Maker spaces, reverse engineering and prototyping Centres, which facilitate access to a modern well equipped FabLab (3D printer, milling machine, etc.); organize workshops for teaching the usage of diverse equipment, and organize hackathons to foster creativity among students. The Community Processing Centres provide regional workspaces across the countries to allow students to gather and learn together as our university is fully virtual

### 17.3 Policies and strategies

The university has in place an Intellectual property policy and/or strategy and is currently developing a framework for university-industry collaboration. However, the university does not have a commercialization strategy.

# CHAPTER 18.

## University of Fort Hare (UFH) – SOUTH AFRICA

### 18.1 University Profile

The University of Fort Hare (Afrikaans: Universiteit van Fort Hare) is a South African public university located in Eastern Cape. The University of Fort Hare (UFH) consists of three campuses, the Alice campus (main), the East London campus, and the Bhisho campus. From 1916 to 1959, it was a key institution of higher education for Africans, providing a Western-style academic education to students from all over Sub-Saharan Africa, thereby creating an African elite. Many alumni of Fort Hare were involved in subsequent independence movements and governments of newly independent African countries. It has produced notable alumni such as Nelson Mandela, Robert Mugabe, Desmond Tutu, Robert Sobukwe, Oliver Tambo, Seretse Khama, and others. UFH has six faculties (Education, Health Sciences, Law, Management & Commerce, Science and Agriculture, Social Science and Humanities).

**Summary Profile**

1. Year of establishment: 1916 to 1959.
2. Number of faculties/schools & colleges:
3. Number of students/Population: 13,300
4. Number of lecturers/researchers: over 1000 academic staff.
5. Senior management structure of the university: General Director, Director of Academic and Pedagogical Affairs, Director of Administrative and Financial Affairs
6. Docket responsible for Research, innovation and Technology Transfer: Dr Euloge KOUAME

As of 2015, the University of Fort Hare has a student population of 13300, with over 1000 academic staff. The university is dedicated to producing highly skilled graduates who can contribute to the development of the African continent. The executive structure of UFH consists of the chancellor, who is the chief executive officer and is responsible for the administration and management of the university. The chancellor is assisted by a VC (vice-chancellor) and faculty deans. The Govan Mbeki Research and Development Centre (GMRDC) is responsible for research and innovation at UFH. The GMRDC collaborates with The Fort Hare Institute of Social and Economic Research (FHISER) to promote research and technology transfer, providing support to postgraduate students and researchers, and facilitating the dissemination of research findings.

### 18.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

a. **Intellectual property office:** At UFH, the GMRDC is in charge of managing the university's intellectual property portfolio, which includes patents, trademarks, copyrights, and trade secrets.

b. **Technology Transfer office:** The Centres of Excellence (CoEs) in all the faculties together with the

GMRDC offer training on research commercialization.

c. **Business incubation:** UFH has a business incubation facility, FOSST Discovery Centre that provides mentoring, networking opportunities, and funding to research professionals.

The GMRDC has been effective in creating employment and funding opportunities for researchers. Some of the researchers are placed in popular banks like Standard Bank and FNB. The GMRDC promotes research innovation by providing a postgraduate tuition fee waiver and a supervisor-linked bursary to postgraduate students.

## 18.3 Policies and strategies

To enforce the protection of intellectual property, the government has implemented policies for instance, the Protection of Personal Information Act (or POPI Act) and the Copyright Act 98 of 178. The 2019 UFH Research Ethics Policy provides guidelines and procedures for researchers who provide consultancy services. The policy aims to ensure that UFH consultancy services are of high quality, adhere to ethical standards, and generate revenue for the university. The policy discusses the conflict of interests and possible disciplinary action. The policy states that consultancy services must not interfere with the academic and research responsibilities of UFH researchers.

## 18.4 Protection of innovations

The following are applicable with regards to protection of intellectual property rights:

a. **Copyright laws** protect the original expression in, inter alia, written material, works of art, etc., and prohibit its unauthorized duplication, distribution, display, and performance. Employees of the University are prohibited from producing, distributing, or altering copyrighted materials from literature, computer software, or playing visual or audio recordings thereof without the permission of the copyright owners or their authorized agents; Computer software used in connection with university business must be properly licensed and used only by the license.

b. **Patent rights:** If an employee during his/her employ by the University invents or makes a discovery that is related to the University's product or service, such an invention will be regarded as the exclusive property of the University, unless an alternative agreement has been entered into with the University.

c. **Protection of data and commercialization:** Data (including electronic data) must be recorded in a durable and appropriately referenced format. Data management should comply with relevant privacy protocols, as stipulated by the Department of Health Charter of Ethics in Health Research Principles, Processes and Structures (2015). The Principal Investigator/s are responsible for data storage and retention and such should be stated within the research protocol. This policy will be reviewed and revised by UREC (UFH Research Ethics Committee) every three years.

## 18.5 Challenges

### *18.5.1* Financial resources and challenges for technology transfer and commercialization of research output.

The main challenges that UFH researchers encounter in safeguarding their innovations are a lack of a grasp of intellectual property rights, inadequate legal and regulatory frameworks, a lack of funds to cover the costs of safeguarding their intellectual property, and obstacles in commercializing intellectual property. A possible solution the GMRDC is implementing is to gather funds from government bodies such as NRF (National Research Foundation) and collaborate with companies such as Telkom, Standard Bank, Absa, and Nokia. UFH is part of the ACTS-AI4D Africa network. The AI4D Africa researchers from UFH are improving the policies for research development by disseminating information hosted by AI4D. Some of the policies are already implemented in the Computer Science and Agriculture Department at UFH. Researchers are now aware of research output commercialization and researchers are getting employed by our industry partners.

Other challenges that UFH Challenges researchers encounter in safeguarding their innovations are

**a.** A lack of a grasp of intellectual property rights,

**b.** Inadequate legal and regulatory frameworks,

**c.** A lack of funds to cover the costs of safeguarding their intellectual property, and

**d.** Obstacles in commercializing intellectual property.

# CHAPTER 19.

## University of Port Harcourt - NIGERIA

### 19.1 University Profile

The University of Port Harcourt was established in 1975 as University College, Port Harcourt and was given University states in 1977. The University was ranked the sixth in Africa and the first in Nigeria by times Higher Education in 2015. The University of Port Harcourt is located in Choba in Port Harcourt Rivers State, Nigeria. The University of Port Harcourt address is local government, Abuja campus, University of Port Harcourt, 500272. The working hours opens and closes by 4pm. The motto for University of Port Harcourt is "FOR ENLIGHTMENT AND SELF RELIANCE". The numbers of faculties in University of Port Harcourt are twelve (12) faculties. The University of Port Harcourt has two (2) schools and one (1) college. The number of students in the University of Port Harcourt are about 35,000- 39,999. The numbers of lecturers/ researchers in the University of Port Harcourt are: 1,300.

**Summary Profile**

1. Year of establishment: 1975.
2. Number of faculties/schools & colleges: 12
3. Number of students/Population: 35,000- 39,999.
4. Number of lecturers/researchers: 1,300
5. Senior management structure of the university: University Vice Chancellor
6. Docket responsible for Research, innovation and Technology Transfer: Technology Transfer Office (IPTTO)

### 19.2 Existing Support Structures for Technology transfer and commercialization of R&D outputs

The university has the following support structures for technology transfer and commercialization of R&D outputs:

a. **Technology Property Office:** There is an Intellectual Property and Technology Transfer Office (IPTTO), which is responsible for sensitizing and creating awareness about opportunities that exist in original research. The office also facilitates Patent Right Acquisition and through linkage with the National Office for Technology Acquisition and Promotion (NOTAP) and licensing of new inventions and discoveries made by students, lecturers or staff.

b. **Business Incubation Facility:** University of Port Harcourt has Business Incubation facility at the Business School Port.

c. **Entrepreneur center**: There is an entrepreneurial center, which was established to complement the university's compulsory entrepreneurial courses for all undergraduates and post graduate students to serve as a link between theory and practices. Through this, the University of Port Harcourt is building an entrepreneurial mind set in all students before their graduation.

d. **Innovation Hub:** The National Information Technology Development Agency (NITDA) has commissioned an Information Technology Innovation and Incubation Park Building at the University of Port Harcourt, Rivers State as part of its ICT Intervention Projects.

e. **Reverse Engineering and Prototyping Centers**: Mechanical Reverse Engineering is available in our book collection an online Rapid Prototyping, Rapid Tooling and Reverse Engineering Kaushik Kumar; Wohler's report Rapid Prototyping University of Port Harcourt; Using Delcam Power mill; Delcam Power Inspect Manual;

f. **Community Processing Centers**: The University of Port Harcourt have/offer community services as Health Services Department of the University of Port Harcourt. The Health Services Department caters for the curvature and preventive health care of the University community.

## 19.3 Policies and strategies

At national level there is the National Office for Technology Acquisition and Promotion (NOTAP) as a parastatal of the Federal Ministry of Science and Technology. Among other things, NOTAP was mandated to facilitate the acquisition and absorption of foreign technology, encourage the development of indigenous technology and promote the commercialization of research and development (R&D) results in Nigeria. Importantly also, NOTAP was charged with the responsibility to help facilitate the process of patenting products of original research and creative activities at the universities and R&Ds in Nigeria with eye on job and wealth creation.

At the institutional level, the University of Port Harcourt, has:

a. **Intellectual property policy and/or strategy**: The Intellectual Property Policy of the University of Port Harcourt spells out the provisions that governs the process of Intellectual Property as well as Commercialization strategy.

b. **Commercialization strategy**: The strategy for commercialization is all enshrined in the University's Intellectual Property Policy.

c. **Framework for university industry collaboration**: The university industry collaboration in Nigeria mostly takes place in the form of Corporate Social Responsibilities (CSR). There is no framework yet that outlines the university industry collaboration (Umar, n.d).

### *19.3.1 Successes and Challenges in Implementing Intellectual Property Policies*

The implementation of the Intellectual Property Policies has given birth to some success stories. Available record indicates that right from its commissioning the IPTT Office has received applications for patent rights, out of which patentable ones had been cleared by NOTAP and passed on the Patent Registry for Patent Right. As it stands the University holds 12 patents on research projects ("Patent Held," n.d). However, there are also some challenges in implementing these policies which are given below as reported by the report of a novel 5-day workshop on intellectual property, technology transfer and entrepreneurship:

a. The poor state of Infrastructure, including Power.

b. Nigeria's Judicial System: where Court Cases tend to drag on for unreasonably long periods.

c. Security: where in trying to commercialize one's development, one is exposed to threats from both the criminal world and the crime-fighting world.

d. Government Policies: where most of the policies in Nigeria seem targeted at discouraging commercialization and policies that were established decades ago are left unchanged and used to

manage current developments in the economy.

e. Regulators: where in Nigeria, there seem to be too many regulators to deal with as one tries to bring a product or service to the marketplace, and in some cases, the regulators act as if their purpose is to shut your activities down, and where some of these regulators are duplicated at different levels of government.

f. Financing Facilities: where most entrepreneurial developments in Nigeria are unable to grow beyond the proof-of-concept stage due to the difficulties in raising appropriate funds for commercialization.

## 19.4 Protection of innovations

The Office of intellectual property has received a total of 22 requests for patent rights between August 12, 2010, and January 24, 2012, of which one had been approved by NOTAP (National Office for Technology Acquisition and Promotion) and had been forwarded to the Patent Registry for Patent Right, with the remainder being processed at various stages. We have 1456 academic staff with close to 90% possessing a PhD or equivalent, Females constitute 30.13% while 320 full professors (females 25%). Currently the university has over 20 patents, 4 Nigeria National Merit Award winners including Claude Ake, Kelsey Harrison, Charles Nnolim and Ebiegberi Alagoa. In 2015, the university of port harcourt was ranked as 1st in Nigeria and 6th in Africa for research impact (THE). There are several statistics that are currently being collated and would be available soon. However, the challenges need to be addressed:

a. Generating Valuable Intellectual Property: Studies have found that about 80% of patents go dormant, proving that not all intellectual property (IP) is valuable.

b. Managing Intellectual Property litigation: IP lawsuits brought against a innovator by rivals and non-practicing entities (NPEs) can result in significant financial losses.

c. Poor Understanding of IP Laws: not having a robust understanding of the laws that guide the IP environment can lead to mistakes that would affect your invention.

Some of the main challenges innovators face is gathering the information needed by institutions are:

a. Integrity in every facet of the research: Having cut corners in achieving results for a research work would imply that the researcher has little knowledge in that field and so the invention cannot be properly owned or defended to ensure they get the support they require.

b. Meticulousness, thoroughness, and research brilliance: When conducting research, the researcher should make sure that the proper methodologies are used, that the protocol is followed when appropriate, that interpretations and conclusions are drawn from the study effort or process, and that the results are communicated. If these precautions are not taken, getting help may become tiresome.

c. Lack of Experience: most times experience comes a long way in getting the needed support from institutions. This experience might come in the form of knowing the right office for getting a kind of support or it might even be as simple as putting in a request using the right format.

## 19.5 Collaboration and university industry linkages

### *19.5.1 Areas of Strengthening Collaboration with Industries*

University of Port Harcourt Operates Triple Helix Partnership Model, where relationships are between the academia, the government and all the other various industries. Below are some of the areas of collaborations

1. **Internships**: The University of Port Harcourt has extensive internship programs with industry players to provide hands-on and on-the-job training as a complement to academic instruction. This will give graduates in-depth knowledge and appropriate work experience in their particular fields of study.
2. **Provision of Industry Based Scholarships**: The goal is to create a solid base of Nigerians who can anchor important industries vital to the economic and social development of the nation. Through this, the Nigerian government and Nigerian businesses build a unique collaboration. Awarded scholars may attend the university to complete their undergraduate and graduate degrees.
3. **Links between Research and Industry**: Currently, the links I believe exist between the university and industries can be group into four categories:
    i. **Consultative Partnership:** Receiving public feedback on change or gathering policy ideas is the goal here.
    ii. **Contributory Partnerships:** this was created in order to help and industry or the community.
    iii. **Operational Partnerships:** With this type of work-sharing arrangement, certain partners are assigned certain parts of a given task.
    iv. **Collaborative Partnerships:** They are designed to share decisions, risks, and resources.
4. Encouraging entrepreneurial and research efforts: encourage networking and mutual learning between well-known businesses in various sector and university entrepreneurs, also to aid in the training of young entrepreneurs and student start-ups in entrepreneurship skills.
5. Bringing Research and Innovation into the Curriculum: By requiring an entrepreneurship module as part of the core curriculum for all final-year undergraduate students as well as all postgraduate programs, the Nigerian University Commission (NUC) ensures that students have the knowledge and skills necessary to commercialize their abilities.

### *19.5.2 Existing Collaboration between University of Port Harcourt and Industries.*

Listing a few of the existing collaborations between my university and various institutions as available on the uniport directory:

a. The Institute Française du Pétrole,(IFP) Paris, France has a permanent Linkages/Collaboration agreement that commenced in 2005 till date on the Exchange of staff for teaching and research, Award of joint Degrees, Exchange of students for study and research, Exchange of information including library resources etc.

b. Safety, Engineering & Fire Consultants (Nig.) Ltd., has a running Linkages/Collaboration agreement that has been renewed twice in the past for the Post-Doctoral Training and HSE Mgt.

c. Songhai Centre, Benin Republic, has a running Linkages/Collaboration agreement for Industrial Training (IT) at Songhai Centre for Agricultural Students from the University of Port Harcourt.

d. Kwame Nkrumah University of Science and Technology (KNUST), has a running Linkages/Collaboration agreement for Exchange of Staff and Students, Joint Research Activities, Exchange of Publication, reports, information, etc.

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