BlendED

Deliverable D3.2, WP3 – Implementation

ABC BlendEd Pilot Report

Describes the first three editions of the course

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Contents

1 Introduction 5
2 Pilot course Year 1 (2024) 5
2.1 Challenges 5
2.1.1 Call for companies to participate in the ABC-BlendEd project 5
2.1.2 Challenges or proposals generated from the interested companies 6
2.1.3 Criteria used and proposals/challenges selected 7
2.1.4 Challenges that the universities encountered in engaging the companies 7
2.2 Selection of students and establishment of student teams 8
2.2.1 Selection criteria of the successful students 8
2.3 Kick-off meeting of the African ABC-BlendEd Project Edition 2023/24 held on 20 – 24 May 2024 at Makerere 10
2.3.1 Project Objectives and programme of the 5 day kick-off meeting 11
2.3.2 Proceedings of the kick off meeting 12
2.3.3 Day five (24th May 2024): Student teams' Final projects presentations and way forward 25
2.4 Preparatory phase – webpage (from the students) 28
2.5 Online phase: interim student team assessment to check progress 28
2.5.1 Reactions to the Seed Bank team 28
2.5.2 Reactions to the waste management team 29
2.6 Closure meeting for 2023/24 Edition or year one (22nd -26th July, 2024) at FUTMINNA, Nigeria 29
2.6.1 Day one (22nd July 2024): Opening day and pending management issues 29
2.6.2 Day two (23rd Jul 2024): Focus on evaluation procedure for the course 31
2.6.3 Day three (24th July 2024): Brief on student progress and project issues 32
2.6.4 Day four (25th July 2024): Students final project pitches, status of web conference equipment and closure of the meeting 34
2.6.5 Other Consideration of the ABC-BlendEd project for future editions 36
2.6.6 Closing Remarks 37
2.7 Student teams' product/ deliverables: product, transfer of results, exploitation/sustainability plan 37
2.7.1 Product/ proposed solution for the challenge on how to improve availability of quality improved seed using community banks - Mozambique 37
2.8 Product/proposed solution to challenge on how to manage poultry/pig waste in a way that eases its drying for use and neutralizes the offending odor – Nigeria 40
2.9 Grading of the students 43
2.10 Assessment of the ABC BlendEd internship by students 44

2.10.1 Students' individual experiences given their participation in the project 44
2.10.2 Skills gained as a result of participating in the ABC BlendEd program 45
2.10.3 Advantages, testimonials and disadvantages of ABC BlendEd course as experienced by the students 45
2.10.4 Expert tips to friends interested or willing to jpoin the next ABC BlendEd course edition 46
2.10.5 Suggestions for improvement of the ABC-BlendEd project/course 47
2.10.6 Student testimonies or testimonials on personal and professional growth realized 47
2.11 Conclusions and Recommendations 48
2.12 Appendix A: List of participants – African ABC BlendEd Kick-off Meeting in Makerere University, (20th -24th May 2024) 50
2.13 Appendix B: List of participants for the Closure meeting held at FutMinna, Nigeria (22nd -26th July 2024) 54
3 Pilot course Year 2 (2025) 57
3.1 Selection of Company challenge 57
3.1.1 Call for companies to participate in the ABC-BlendEd project 57
3.1.2 Submitted challenges by the interested companies and farmer associations 58
3.1.3 Criteria used for challenge selection 59
3.1.4 Challenges that the universities encountered in engaging the companies 60
3.2 Selection of Students 60
3.2.1 Selection of students and establishment of student teams 60
3.2.2 Selection criteria of the successful students 61
3.3 Kick-off meeting of the African ABC-BlendEd Project Edition 2024/25 held on 19 – 23 May 2025 at Nsukka 1
3.3.1 Day 1 (19-5-2025): Opening and Challenge Presentations 3
3.3.2 Day 2 (20-5-2025): Challenge Clarification and Team Formation 8
3.3.3 Day 3 (21-5-2025): Skills Development and Project Refinement 12
3.3.4 Day 4 (22-5-2025): Project Pitches and Technical Feedback 15
3.3.5 Day 5 (23-5-2025): Final Pitching and Excursion 19
3.3.6 Excursion and Dinner 24
3.4 National Exhibition of Young Entrepreneurs (Mostra Nacional de Jovens Empreendedores) 27
3.5 Steering committee online June meeting with the students 27
3.5.1 Students Presentations 28
3.6 Closing meeting of the African ABC-BlendEd Project Edition 2024/25 held on 21 – 25 July 2025 at Angónia 32
3.6.1 FINAL PITCH (FINAL PRESENTATIONS) 38
3.7 BlendEd Community of Practice (BlendEd CoP) 52
3.8 Final remarks 52

4 Pilot course Year 3 (2026) 54
4.1 Challenges: Call for Companies, Proposals, Selection Criteria and Selected Challenges 54
4.1.1 Identification of business challenges 54
4.1.2 The challenges presented by companies 55
4.1.3 Challenges selected and criteria for selecting the challenges 63
4.2 Call for application, selection and establishment of student teams 64
4.2.1 Advertisement of the internship opportunity 64
4.2.2 Selection criteria 64
4.2.3 Establishment of student teams 65
4.3 Third Edition Kick-off Meeting 66
4.3.1 Objectives and programme 67
4.3.2 Student presentations of progress 67
4.3.3 Project implementation and reporting 68
4.3.4 Closing meeting planning 68
4.4 Online Phase: Interim Student-Team Assessment and Progress Monitoring 69
4.5 Third Edition Closing Meeting 71
4.5.1 Student progress presentations of the final products 71
4.5.2 Assessment and grading of students 71
4.5.3 Student Products/Deliverables 73
4.5.4 Solution for the challenge 1: Digital traceability for the coffee value chain 73
4.5.5 Solution for the challenge 2: Scalable farmer support and pre-financing 73
4.5.6 Challenge 3: Digital platform and e-commerce for Atari Farms 74
4.5.7 Challenge 4: Temperature regulation and control for a solar dryer 74
4.5.8 Challenge 5: Affordable quality fish feed in Gaza Province, Mozambique 75
4.5.9 Challenge 6: Digital monitoring of seed outgrowers in Nampula, Mozambique 75
4.5.10 Cross-cutting transferability and sustainability 75
4.6 Conclusions, Recommendations and Next Steps 76
4.6.1 Conclusions 76
4.6.2 Recommendations 76
4.7 Annexes 77
4.7.1 Annex 1. Kick-off meeting programme (25–29 May 2026) 77
4.7.2 Annex 2. Minutes of the kick off meeting at Eduardo Mondlane University (25–29 May 2026) 83
4.7.3 Annex 3. Attendance lists of participants to the kick off meeting (25–29 May 2026). 97
4.7.4 Annex 4. Closing meeting programme (27–31 July 2026). 100
4.7.5 Annex 5. Minutes of the closing meeting (27–31 July 2026) in Soroti 107

4.8 Annex 6. Attendance list for the closing meeting (27–31 July 2026) 120

1 Introduction

This report provides a comprehensive account of the three pilot editions of the ABC BlendEd course, documenting the process, achievements, challenges and lessons learned over the three-year implementation period. It traces the journey from the established European BlendEd model to its adaptation and successful implementation in the African higher education context, with a particular focus on agricultural studies.

Throughout this process, the course model and its implementation have been progressively refined in response to practical experience, feedback and the evolving understanding of the partnership. European and African partners have worked together to adapt the pedagogical approach, learning activities, organisational arrangements and stakeholder engagement mechanisms to the specific needs and realities of African universities. This has been a collective learning process, enabling all partners to develop a shared understanding of the model and the conditions required for its effective implementation.

The outcome is a consolidated and well-established African version of BlendEd: a distinctive teaching and learning approach that combines blended international collaboration, multidisciplinary teamwork and challenge-based learning around real-world problems. With the experience, knowledge and capacity developed through the three pilot editions, African partner universities are now taking the model forward, supported by the European partners through continued guidance and technical assistance. This transition towards African ownership is already underway, with the fourth edition of the course having started in October 2026.

2 Pilot course Year 1 (2024)

At the first edition of the ABC BlendEd we had a class of 12 students, 2 per partner university, organized in two teams to solve two challenges between May and July 2024.

2.1 Challenges

The internship programme under the ABC BlendEd project was aimed at student teams under guidance of the university lecturers/coaches coming up with workable and sustainable solutions to challenges that were identified among the communities. The development of the solution(s) to the identified challenge was possible through collaboration with the community or company that presented the challenge and therefore desired to have a workable solution.

2.1.1 Call for companies to participate in the ABC-BlendEd project

Identification of challenges to work with was a process that involved stages. In the first stage, all the participating African universities were requested to identify and approach potential agrarian companies, organisations or communities to inform them and raised their awareness about the ABC-BlendEd approach. The intention was to raise interest and understanding of the project so that the organisations choose to engage from an informed point of view. In the second stage, the organisation(s) or companies then identified the challenges that they faced and needed solutions.

A form was provided to guide on the articulation of the challenge and proposal that the company sought. A company, community or organisation that picked interest and was willing to take part in working with the project was free to give more than one issue of concern/challenge for which they needed a solution. The principle of filling the form was one challenge/proposed solution idea per form. In the form, information sought was a description of the organisation or company and description of the challenge proposed or desired solution to give the project an understanding of what the company actually did and the context of the

challenge or problem. Understanding the context of the challenge is important in designing feasible proposals to solve or manage the challenge. Presentation of a challenge was no guarantee that it would be selected.

2.1.2 Challenges or proposals generated from the interested companies

The challenges/proposals that the participating universities managed to get from the companies following the filled forms that were successfully submitted are presented below. For each challenge, there is a brief description of the context and country. The challenges are the way they were presented and may read unclear at this level.

a) **Faeces disposal and management in poultry and pig farms** – this was from Zulinks agro and vet services farm that was located in Nigeria. Zulinks is an Agro based company with special emphasis on animal production. The farm had a challenge of the offending odour (bad smell) that came from the faecal material produced by breeding pigs and poultry; as well as how to manage the volumes of faecal produced on a daily basis. The odour affected the neighbouring homes in the community and was a health concern. The main challenge then was *how to manage the pig/poultry waste* in a way that makes it not to be a nuisance to the farm and surrounding community?

b) **Climate-resilient and market-oriented agriculture** that was faced by the District service of economic activities (SDAE) in Angonia Mozambiue. In light of Ministerial Diploma No. 145/2009 of 24 June, the District Service of Economic Activities (Angonia), abbreviated as SDAE, is a body of the State District Apparatus for planning, directing and coordinating the sector's activities. And this Service under Article 3 of the same Diploma has following duties:-Guarantee the implementation of national policies, their development based on the plans and programs defined by higher-ranking State bodies and the district government for the sector;-Direct and control the activities of bodies and institutions in the sector, guaranteeing them technical, methodological and administrative support;-Support the work of entities that carry out their activities in their field of activity;-Promote the participation of organizations and associations in the implementation of the policy defined for their respective area of activity.

Mozambique is one of the African countries most vulnerable to disasters mainly due to its geographical location and level of poverty. Over the last 20 years, the high frequency, alternation and intensity of extreme weather events has become a growing threat to national development (Master Plan for Disaster Risk Reduction 2017-2030). These climatic events have mostly been characterized by floods, cyclones and drought and, the District of Angónia (which is considered one of the country's breadbaskets in agricultural production), with an area of 3,427 km2, a population estimated at 582,465 has not been unaware of the negative impacts imposed by climate change on agricultural production, which has been characterized by irregular rainfall and poor distribution. This, combined with other factors, also contributes to the record of high rates of chronic malnutrition (at 34%).Thus, the recurring problems or challenges faced by producers are:-High fertilizer prices and low purchase prices for their products, compromising the following production season.-High post-harvest losses resulting from insufficient knowledge about the storage and conservation of the respective products;-Insufficient knowledge of agro-processing techniques, which limit crop value chains;-Incidence of pests and diseases such as the caterpillar in corn, aphids in beans and Asian rust in soybeans, which has worried producers in recent campaigns, due to climate change.

c) **Sustainable technological showcase and on-farm conservation of new varieties in rural communities as a way of valuing the role of farmers in seed conservation**. This was a challenge presented by Mozambique Agricultural Research Institute (IIAM) from Angonina Mozambique. One of the biggest problems in rural communities is the lack of a community seed bank as a strategy to strengthen the diversity and food security of smallholder farmers and traditional communities, enabling access to seeds and the use of food plants. It is a way to reduce the loss of seed viability as a major problem for rural producers due to inadequate storage and attacks by pests and diseases.

d) **Best management practice/alternatives to increase egg yield and minimize cost of production** – this was a challenge presented by Ebigbo intergrated farm in Nsukka Nigeria. Ebigbo integrated farms is a 12000 layers bird capacity and a 2000 broiler capacity farm and integration of goats around the premises.

e) **Reduction in productivity of farm layers and broilers** that was presented to be a challenge from a company that is/was within and owned by University of Ngeria – Nsukka (UNN). The company is called university of Nigeria Agricultural projects. The company, University of Nigeria Agricultural projects Limited was incorporated into CAC since 1986. It has the mandate of producing crops, animals and processing those along their respective value chains for attraction of higher economic returns to the University.

It had been observed since May, 2023 that a layers' feed worth one million naira would be bought and fed to layers at optimum period of lay and eggs worth eight hundred thousand naira would be picked causing a loss of two hundred thousand naira instead of making gains. Also, broiler birds fed for eight weeks with broiler feed worth five hundred thousand naira will give a return of four hundred and fifty thousand naira in return giving a loss of fifty thousand naira. This had been happening repeatedly with very minimal improvements.

f) **Harnessing the efficiency of local flowers in impacting golden yolk coloration in eggs -** a challenge that was presented by a company called Hybrid Feeds in Kaduna Nigeria. Hybrid Feeds specialized in the production of livestock feed with range of feed products designed to meet the nutritional needs of various types of livestock, including cattle, poultry, and swine. With nearly two decades of experience and continuous innovation, Hybrid Feeds has established itself as a trusted provider of high-quality feed formulations, helping farmers optimize the health and performance of their animals. 1: The main goal is to achieve golden yolk eggs using locally available flower2: use of synthetic material claimed to contain xanthophyl3a: To determine the best organic material that can replace the synthetic ones3b: To determine the best inclusion level that can impact on the yolk to a colour fan of 12min3c: To determine the ability of the local flowers to improve on the egg quality 3d: cost benefit of using locally available flower to synthetic colorants

2.1.3 Criteria used and proposals/challenges selected

Out of the six generated challenges, only two were selected through voting. The lecturers or contact coaches in the African participating universities voted with guidance of perceived feasibility of the challenge as a project. This process could have been very subjective but at that time, feasibility of the ABC-BlendEd project delivering on the challenge given the time of 10 weeks engagement with the students was important. The two challenges that registered the highest numbers of votes were selected and they were:

1. Faeces disposal and management in poultry and pig farm
2. Sustainable technological showcase and on-farm conservation of new varieties in rural communities as a way of valuing the role of farmers in seed conservation

2.1.4 Challenges that the universities encountered in engaging the companies

In efforts to identify and engage the agro companies, organisations, farms/firms for the ABC-BlendEd project, participating African Universities, represented by the contact persons/coaches involved in the project, encountered some challenges that could be attributed to assumptions that universities made that time. These assumptions included:

(a) the contact university person had sufficient information and understood the ABC-BlendEd project approach that they relayed to the company
(b) the organisations, firms or farms adequately understood what the ABC BlendEd project approach was about as informed by the university
(c) company contact person was the right person that could make decisions on behalf of the farm/organisation like working with the ABC-BlendEd project, or that the person consulted with colleagues in the company to come up with the appropriate view of the challenge
(d) the companies would comfortably fill the form and send it to the contact university coach on time – there was a deadline provided

The main challenge encountered was getting the companies fill and turn in the forms. This could have been attributed to the following:

1. In some situations, contact persons at some universities adopted the approach of sending forms in an electronic version to companies, expecting the companies to fill it appropriately and return it on time. This did not only delay the process of presenting the challenges/proposals but led to few challenges

generated. Online method of filling forms is not so much a culture of many African companies yet. Some companies were reportedly more comfortable with face to face or physical interaction with the university contact person supporting them in completing or filling the form appropriately. Online discussions with some potential farms that were far (as reported in the case of Nigeria) did not provide adequate information, which contributed to filling failure and/or inadequate completion of the form.

2. Miss understanding and false expectations about the project. This was partially attributed to Inability of the companies or farms to understand what the ABC-BlendEd project was all about. There was a misunderstanding by some companies, farms approached that the ABC-BlendEd project would directly provide them with some funds. This false expectation is likely to have made some companies to look like interested yet actually not. This tendency spoils an opportunity that could be used by organisations that genuinely would benefit from engaging with the project
3. Limited numbers of agro – related companies especially within reach to engage. The universities in this case, at that time, took the potential companies to be actual industrial or factory scale (as might be the case in Europe). The word company was interpreted to mean high level factories or agro industries but it included NGOs, CBOs, Small Scale agro-businesses, communities etc.
4. Some companies were not comfortable exposing or sharing their challenges. They interpreted sharing their challenges as a weakness that their competitors could come to know about and use it against them – they preferred to say they never had any challenge
5. Some companies took time to give a response, they delayed to fill the form with the reason that they were busy. They needed to be followed up

These challenges served as learning points. The lessons will be carried over in a more effective implementation of Edition 2024-25 of cohort II. All universities participating have a much better understanding of what is expected and what should be done to have the project more effectively implemented through the remaining years successfully.

2.2 Selection of students and establishment of student teams

Each of the universities made internal advertisements to make students know about the opportunity. The targeted students in this case were undergraduate students mainly in agricultural and ICT units. The adverts were made in different ways that included use of email to students and staff to share, use of printed adverts on notice boards within the schools or faculties and office doors of contact lecturers, lecturers announcing the opportunities to students during their lectures with them, lecturers speaking to individual students, sharing pictures of the advert on WhatsApp platforms of the students. The massage on the advert was three fold: one, was to inform students and lecturers about the existence of ABC BlendEd project in the university; two, provide brief information of what the project is/was all about; three to provide the criteria of eligible students; and four to provide contact address where interested students would take their written applications/expressions of interest.

Students due for related engagements referred to as field attachment, industrial training, and internship, depending on the nomenclature of the university, were the main target. The study years of the students varied across universities and programs. For example in the Federal University of Technology, Minna (FUTMINNA) in Nigeria it was 4th year students, in Zambeze University in Mozambique it was 3rd year students, in Soroti university it was 2nd years, in Makerere University, school of Agricultural Sciences, it was 3rd years. These were the study years where students in these universities were expected to do their internship as one of the requirements for their graduation on completion of the course. The numbers that expressed interest depending on the timing of the call were Soroti University 8, Zambeze 8, University of Nigeria 18, Makerere University 6 (many had been placed by the time the call was out), 6 from FUTMINNA, and Eduardo Mondlane 4.

2.2.1 Selection criteria of the successful students

The criteria used to select students from among those that expressed interest included the following:

- Good academic performance by current cumulative grade point – CGPA. A good CGPA was used as a reflection of serious and hardworking students
- Absence of a retake or carry over course to avoid students running on and off the program. Those that had no retakes or carry over courses were expected to concentrate on the project and do their work whole heartedly with no disturbances

- Where the students with best grades where more than one (considering males and females), they were exposed to an interview. The contact university lecturer co-opted a colleague from among the staff on the project to conduct the interview where they sought for the following: level of exposure, extent to which the student displayed qualities of a team player, and to some extent the ability to conceptualise the project
- Among the best performers, the best female and best male student were selected – a total of 12 students with 6 males and 6 females were selected to do their internship with the ABC-BlendEd project/course Edition 2023/24 – First cohort (Table 1)

Table 1: Students that were selected to participate in The ABC-BlendEd Edition 2023/24

	Name of Student	Sex	University and unit	Country
1	Kisuule Ismael	Male	Makerere University, School of Agricultural Sciences, Department of Extension and Innovation Studies	Uganda
2	Monge Macklyn Adongo	Female	Makerere University, School of Agricultural Sciences, Department of Extension and Innovation Studies	Uganda
3	Bongo Joshua	Male	Soroti University, School of Engineering and technology, Department of Electronics and computer Engineering	Uganda
4	Kusiima Teddy	Female	Soroti University, School of Engineering and Technology, Department of Electronics and computer engineering	Uganda
5	Augustinho Filipe Guambe	Male	Universidade Eduardo Mondlane, Faculty of Agriculture, Department of Plant Production	Mozambique
6	Marcia Marcelo Mucache	Female	Universidade Eduardo Mondlane, Faculty of Agronomy and Forestry Engineering, Department of Plant Production	Mozambique
7	Osvaldo Paulo Pessuro	Male	Unversidade Zambeze, Faculty of Agricultural Sciences, Department of Agro-livetsock Engineering	Mozambique
8	Maimuna Lucia Manuel	Female	Universidade Zambeze, Faculty of Agricultural Sciences, Department of Agro-livestock Engineering	Mozambique
9.	Ayuba Abdul Waheed	Male	Federal University of Technology, Minna, School of Agriculture and Agricultural Technology, Department of Animal Production and Food Science	Nigeria
10.	Napoleon Glory	Female	Federal University of Technology, Minna (FUTMINNA), School of Agriculture and Agricultural Technology, Department of Animal Production and Food Science	Nigeria
11.	Chukwuka Anthony	Male	University of Nigeria (UNN), Faculty of Agriculture, Department of Economics	Nigeria
12.	Onuchukwu Goodness	Female	University of Nigeria, Faculty of Agriculture, Department of Agricultural Extension	Nigeria

The contact persons or coordinators of the ABC-BlendEd project briefed their students in preparation for their engagement with the project. However, the detailed information was provided during the kick-off meeting. The students were supposed to have been distributed or allocated to two teams following the two challenges that were selected (Waste management and seed) prior to the kick off meeting but it was decided that this exercise be done during the kick off meeting.

2.3 Kick-off meeting of the African ABC-BlendEd Project Edition 2023/24 held on 20 – 24 May 2024 at Makerere

The kick-off meeting was hosted and facilitated by Makerere University from 20th to 24th May 2024 at the Makerere University Agricultural Research Institute, Kabanyolo, (MUARIK) in the Graduate Training and Research Laboratory building. The meeting was mainly attended by the project partners and the two (Appendix B: List of participants for the Kick-off meeting). Participation was blended. A total of 32 participants were registered with majority attending physically and few participating online. The farmer from Nigeria (Emmanuel) and the scientist or representative from the National Research Organisation in Mozambique whose challenges were selected (Animal waste management and certified seed availability

among farmers respectively) came in (online) when they were requested to listen in to the students and provide more information for clarity of the challenge.

2.3.1 Project Objectives and programme of the 5 day kick-off meeting

The overall project goal of the ABC-BlendEd project/course is to enhance responsiveness and employability of graduates from agricultural related institutions/units of Higher Education by engaging them in blended mobility projects. The objectives of the project are to foster student employability and generate added value to the local communities; to stimulate the effective adoption of BlendEd courses by its key stakeholders, students, teachers, and beneficiary companies; and to promote multiplier effects to mainstream the adoption of BlendEd courses in Africa. In working as a team, participating undergraduate students from different partner Universities and disciplines are required to develop projects that generate relevant solutions to real-life challenges faced by local farming communities, companies, farms or firms. This would ultimately enhance students' communication, teamwork, problem-solving, critical thinking, and adaptability skills

Objectives of the kick off meeting (20-24th May 2024 at Makerere)

The specific objectives of the kick-off meeting were mainly four and included the following: (1) to enable partners know and interact with each other – there is warmth is knowing the faces and physically seeing the persons in the project; (2) to provide more information that enhanced partners' understanding (clarity) of ABC BlendEd project; (3) to prepare students/supervisors for their roles in implementing the project; and (4) clarity on the challenges that were selected. It was expected that the challenges were discussed and focused for the students and teachers to actually engage more effectively and efficiently.

Program for the 5-day kick off meeting at Makerere

The program of the days and consequently the entire 5 days of the meeting formed as the meeting progressed. We had a working program and the final schedule was as presented below. Each day began at 9:00a.m. and ended at 5:00pm.

Program for the ABC- BlendEd project kick-off meeting that was held in Makerere (20-24 May 2024)		
Day	Content/activities of the day	
Day 1 Monday 20th May 2024	• Welcome Remarks • Participant Introductions and Expectations • Opening Remarks • Project Overview • Detailed Explanation of Selected Challenges	Mak All IPP, RUFORUM UNN, Zambeze
Day 2 Tuesday 21st May 2021	• Recap for Day 1 • Further clarity of the selected challenges • Grouping of students into teams to discuss the challenges • Discussions on project management, finances, and operation	All
Day 3 Wednesday 22nd	• Recap for Day 2 • Student team presentations • Reactions from the plenary • Things to ponder on about project implementation • Visit to the poultry unit within MUARIK - Kabanyolo	All
Day 4 Thursday	• Recap for Day 3 • Student team presentations – progress status • Reactions from the plenary	

23rd May 2024		
Day 5 24th May 2024	• Recap for Day 4 • Student team presentations of final projects • Immediate next steps for students • Team visits/tours the main campus and RUFORUM	

2.3.2 Proceedings of the kick off meeting

The proceedings of the kick off meeting are presented following what happened each day

Day one (20th May 2024): Setting the Scene

Welcome and opening remarks

The Makerere University ABC BlendEd project contact person, Dr. Prossy Isubikalu welcomed all participants to the Kick-off meeting of the first edition of the African ABC BlendEd project. She highlighted the purpose and objectives of the ABC BlendEd project in general, and the kick-off meeting in particular. She noted that the kick-off meeting aimed at enabling the different partners to know and interact with each other, as well as to get a better understanding of the project, and how it would be implemented and managed. She concluded by encouraging everyone to participate in all activities of the five-day meeting with interest and dedication, as this would help in ensuring the success of the project.

Opening remarks were given by representatives from RUFORUM, Soroti University, and ABC BlendEd Project coordinator. Mr. Emmanuel Okalany, on behalf of RUFORUM welcomed all participants to the first kick-off meeting of the ABC BlendEd project. He gave an overview of RUFORUM's, mission and vision, as well as their role in and expectations of the project. He informed the meeting that RUFORUM is developing a Community of Practice (CoP) on problem-based learning, so he expected that this meeting would discuss the potential of a joint CoP co-created by RUFORUM and the ABC BlendEd partners to foster a deeper impact. Prof. Francis Ejobi, on behalf of Soroti University expressed his enthusiasm for expanding networks and creating more opportunities through the project. He also assured of Soroti University's commitment to the successful implementation of the project. Prof. Nuno Escudeiro, as the overall coordinator of the ABC BlendEd project, welcomed all participants to the kick-off meeting of the first ever ABC BlendEd project in Africa. He emphasized the importance of fostering student employability and generating added value for local communities as well as the desire for effective adoption of the ABC BlendEd course by all partners and stakeholders.

Participant introductions and expectations

Each participant was requested to introduce him/herself by giving his/her name, University of affiliation, and expectations of the meeting. Generally, participants gave the following as their expectations from the 5 days and the project in general:

- Networking and making new friends
- Learning more about the project
- Sharing knowledge and lessons on how to identify and solve agricultural challenges
- Learning how research is done in each of the partner Universities
- Sharing lessons on how Universities can contribute to community and national development
- Finding new ways to connect universities and companies
- Improving communication skills

Project overview

Prof. Nuno Escudeiro, gave a detailed overview of the ABC BlendEd project during which he mentioned the project rationale, partners, objectives, and key deliverables. He further explained that the project is organized in three work units: Design, implementation, and Mainstream. The Design unit focuses on analyzing the specific

circumstances of the African higher education market and design a BlendEd course by adapting the model currently used in Europe. The Implementation unit focuses on establishment of three pilot editions of the course while the Mainstream unit focuses on dissemination and assuring sustainability of project outputs.

He said the key objectives of the project are to foster student employability and generate added value to the local communities, stimulate the adoption of BlendEd courses by its key stakeholders, students, teachers, and beneficiary companies, and promote multiplier effects to mainstream the adoption of BlendEd courses in Africa. He also mentioned that the project had three expected outputs by the end of the three-years of implementation: an effective BlendEd course running and generating relevant outputs in the field of agriculture; sound results produced by the course and transferrable to the local communities; and an active Community of Practice developed.

Introduction and clarification of the two selected Challenges

The two selected challenges presented as they were received from the community members that desired a workable solution or proposal were not clear enough for the students to start deliberating on them. It was then agreed that prior to dividing the students into teams, it was very important for all the project partners to have a clear understanding of what the issue or development challenge was. This would not only (1) "Feces disposal and management in poultry and pigs" in Zulinks Agro and Vet Services farm owned by Mr. Emmanuel Ozuluonye Ugwu from Nigeria, and (2) Sustainable technological showcase and on-farm conservation of new varieties in rural communities as a way of valuing the role of farmers in seed conservation as was presented by Maria Adelina Vulalo, a representative from the Mozambique Agricultural Research Institute in Angonia. Maria and Emmanuel both hold masters' degrees.

The two representatives (Maria and Emmanuel) from the two companies Zulinks and Agro services, and the National Agricultural Institute of Mozambique were engaged (on appointment) online to provide more information to the meeting participants present for purposes of clarifying the main issue of concern and hence the challenge at table. Each was engaged at a time to provide a brief background to what they presented as challenges and requested to point out what they actually sought the project to extend a hand on in search of a solution. It was preferred that the two people speak then the participants engage them there after with questions and/or points for clarification.

Brief background information about the seed situation in Mozambique Agricultural Research Institute: Maria, who made the presentation, preferred to use Portuguese, one of the participants/lecturers from Mozambique translated to English for the benefit of those that did not know Portuguese especially participants from Uganda, Nigeria, and Belgium.

According to Maria, the main issue of concern/challenge was the inability of farmers to take up or plant improved seed. Low yields from available adulterated or fake seed on the market contributed to loss of farmer interest and trust in using improved seed. The national seed authority in Mozambique was reportedly inefficient in ensuring control of quality in the seed available on the market. Instead of wasting resources on the expensive yet not worth improved seed, farmers sought refuge and resorted to their easily accessed yet relatively cheap local/traditional varieties. For their local varieties, grain served as seed and was recycled season after season, a situation that still contributed to poor or low yields realized. From the research institute's point of view (represented by Maria), there was need to establish a system or mechanism where farmers would access trusted quality improved seed. It was against that background that the research institute proposed setting up functional community seed banks as a means of availing accessible quality improved seed. Contribution from one participant from Mozambique pointed to the problem likely to be policy. There seem to have been no relationship between gaining trust and seed bank. This brief pulled the challenge away from what had been presented that read like a project that could have been already proposed or even running in the research institute to *how to improve availability of improved quality seed among farmers through community seed banks in Mozambique*.

Brief background information about the poultry and pig feces in Zulinkx Agro and Vet Services Company in Nigeria: Emmanuel, the owner of the company made the presentation in English. Besides having a farm with piggery, poultry and fish farming or aquaculture, the company also had other businesses like selling agro inputs (like seed, fertilizers, feeds), veterinary supplies, as well as provision of extension or advisory services to farmers (consultancy arm). Focus of the presentation was on the pig and poultry unit.

The poultry and pig units generated manure (call it animal waste) on a daily basis. The numbers lead to high volumes of animal waste whose disposal and consequently the offending or bad odour became an environmental issue both to the surrounding communities and the local government. Complains from the community and fines from local authority impacted negatively on the farm income. The manure is/was bulky yet very few farmers bought it to use in their gardens. The rate at which the manure is produced is way higher than the rate at which it is taken for nutrient replenishment in crop fields. As a result, a lot of the waste is/was just heaped in the farm. The thought of drying to make it lighter and packaged or stored for sell proved expensive and not worth it. Drying depended on the natural sun and was a problem especially during the rainy season. Health issues come into play. Inability to manage the manure pauses health risks to both the people and animals in and around the farm, besides impacting on income generation negatively. It was against this background that Emmanuel desired to get a feasible solution that helps to effectively manage the waste for the safety of the environment of both people and animals.

After the presentations, participants raised some questions to Maria and Emmanuel. To Maria, the issues were whether the seed problem was not a policy issue and how trust would be related to availability of quality seed using a seed bank. To Emmanuel, questions that participants sought more information about were size of the farm, the solutions that the farm/company was using and how effective they were, and what the company expected from the students. Unfortunately, these questions were not attended to due to poor network connectivity of Maria and Emmanuel. It was then agreed that another meeting be scheduled the following day to enable Emmanuel and Maria explain their challenges further and answer questions from participants.

Day two (21st May 2024): More Clarification about the challenges, student grouping and project management issues

Every day began with a reflection of what was covered in the previous day so as to get a smooth link of blend with the day's work. The focus was on getting the challenges clearly understood especially by the students who were expected to think through feasible solutions or proposals. You can best think through a feasible solution after understanding the problem and context.

Further clarity on the seed and waste related challenges

The two representatives from the two companies that shared their challenges were invited again online to give more details about their challenges and respond to the questions from the participants. The two companies represented by Maria and Emmanuel were engaged yet another time online with expectation that they understood their problem/challenge and would consistently explain it to the participants. Below is what transpired in the second time engagement.

Seed Bank challenge of Mozambique Agricultural Research Institute: From the presentation of the previous day, Maria mentioned that the challenge was low use of improved seeds (especially legumes) among farmers largely due to limited availability of improved seed on the market. Seed available on the market had issues of quantity and quality. It could have a policy implication but the institute desired to get a solution within is mandate. In spite of being little, seed was expensive and some of it adulterated or fake. Farmers shied away from buying improved seed whose quality was questionable. The local recycled seed of farmers gave poor yields. The institute proposed setting up a community seed bank where farmers could access preferred varieties of quality seed at an affordable price. In the proposed seed bank mode farmers would take a given quantity of seed from the seed bank (on loan in-kind) and pay back twice the quantity taken after harvest. Return of twice the

quantity is aimed at ensuring adequate seed available and easily accessible in the seed bank for other farmers. To ensure quality of the seed, the institute staff would supervise the planting. From the information and discussions held with Maria on day one and two, the working challenge was phrased to read, "***How to improve availability of improved quality seed among farmers using community seed banks in Mozambique***". This was clearer than the very first form in which the challenge was presented. Students were expected to refine it further as they sought for an appropriate solution to the challenge.

Pig and Poultry (animal) waste management challenge: The poultry unit had about 10,000 layers under battery cage system, and 1,300 breeder pigs. Breeder pigs feed a lot and produce more dung. The farm remains with the problem of the huge amount of waste from the pigs and birds. Emmanuel reported that he used trucks to collect and dump the waste in not used or undeveloped land far from the farm at three weeks interval. However, the method proved expensive and not sustainable. Wet animal waste is bulky and smelly. What he expected from the students and project in general was an economically feasible solution that he would use to manage the waste effectively and earn income out of selling the waste. He also requested for a solution that he would use to dry the manure more effectively and efficiently because spreading it to dry under the sun was not only labor demanding but took long to have the waste dry. The long period of drying it makes that area polluted with foul air unpleasant to be breathed in. When asked if he had tried to work with any research institution to solve his problem, he answered no. He also said that use of biogas was not popular in Nigeria, so he hadn't also tried it. From the two engagements with Emmanuel, the clear challenge was tentatively phrased to read as, "***How to manage poultry/pig waste in a way that eases its drying for use and neutralizes the offending odor***". The students were at liberty to revisit and refine the challenge as they worked on it with the guidance of the lecturers and more information collected from the farm.

Grouping students into two teams to discuss the challenges

With the two challenges then clarified as "*How to improve availability of improved quality seed among farmers using community seed banks in Mozambique (abbreviated as the **seed bank challenge**); and "How to manage poultry/pig waste in a way that eases its drying for use and neutralizes the offending odor in Zulinks agro farm – Nigeria (abbreviated as **animal waste management challenge**) the 12* students were divided into two groups/teams. Each team, with one member from each participating African University, was assigned a challenge (Table 1). Although the allocation of students to groups/teams was largely guided with interest of the student, attention was put on the following criteria that guided the grouping:

a) No two students coming from the same university belonged to the same team. That meant each of the students from the same university was allocated to a different group.
b) A group would have no less than 30% female or male students, that meant that a group was expected to have not less than 2 females or males.

The composition of each group/team was as presented in the table 1 below. Each group was then provided a room in which they convened to deliberate on the challenge assigned. In their group deliberations, the students were expected to revisit the challenge to ensure they understood what it was all about and needed, brainstorm and think through probable alternative solutions to manage the challenge in context. During their group discussions, students were reminded to think through realistic and most implementable alternative solutions that could appropriately address the specific challenges. Scalability of the established solution/proposal to other communities with similar challenges was important

Table 1: Names of students addressing the identified challenges

Challenge		Group/team members	Sex	Affiliated University
Seed bank	1	Bongo Joshua	M	Soroti University
	2	Goodness Onuchukwu	F	University of Nigeria
	3	Marcia Marcelo Mucache	F	Universidade Eduardo Mondlane
	4	Osvaldo Pessuro	M	Universidade Zambeze
	5	Monge Macklyne	F	Makerere University
	6	Napoleon Glory	F	Federal University of Technology, Minna
Animal Waste management	1	Kusiima Teddy	F	Soroti University
	2	Anthony Anigbogu	M	University of Nigeria
	3	Abdul Waheed	M	Federal University of Technology, Minna
	4	Maimuna Manuel	F	Universidade Zambeze
	5	Kisuule Ismael	M	Makerere University
	6	Agostinho Filipe Guambe	M	Universidade Eduardo Mondlane

Discussions about management, finances, and operation of the project

As the two student groups engaged in independent rooms, the lecturers or university coaches too engaged in a separate meeting to discuss and clarify on some project management related issues. Prof. Nuno Escudeiro the overall ABC-BlendEd project coordinator chaired the meeting with the intention of providing more information to remind the university partners present about project management, finances, and operations. He explained the different parts of the budget, and guided on how each partner could navigate the different parts of the budget document on TEAMS. It was observed that some activities were under budgeted and there would be a challenge in accomplishing them if the budgets remained the way they were. For example, amounts allocated to travel (flights and visa fees) was way below, almost half, the current market prices whose cost is further heightened by the procurement processes that universities used. Universities used travel agencies to procure travel tickets. Partners that travelled from Nigeria, Mozambique and Portugal to Uganda testified to this. They met costs that more than doubled the amount in the budget. To manage such differences, Prof Nuno advised partners that in such eventualities, they could agree with their university administrators to use some of the money under the indirect costs (what we call administrative costs) that corresponds to 7% of the total budget. From experience shared by the partners, it was not possible to access and use the indirect costs. The university administrators hardly allowed this! The other alternative was to get some funds from the staff time funds if possible but this too was debatable and depended on how the partners perceived its effects on their engagements.

Prof Nuno indicated that all project related documents were and should be shared and accessible from folders uploaded in Teams App. Accessing the Teams needed one to have subscribed. However, several partners had not been able to access the project documents yet given that some did not have the Microsoft team's app successfully downloaded on their computers and others could not easily navigate the folders and files uploaded. This then provided an opportunity of the partners to be supported in having and navigating the Teams app on their computers. Prof. Nuno, Prof. Kristien and Dr. Aluku assisted each partner that was present to download, create accounts and sign in to the Teams App on their computer. By the end of the day, most of partners could access and navigate the different project documents on Teams.

Day three (22nd May 2024): Outcomes from student teams, support guidelines suggested and visit to poultry unit in Kabanyolo

Day three started with a recap of what happened the previous day so as to create an appropriate link with the day's program. Students from the two teams presented what came out of their deliberations on the assigned

challenges (seed and waste management). University lecturers made comments and suggestions for improvement for the effective deliberations on the projects that students suggested. The afternoon was reserved for a visit to the poultry unit to make participants learn and think through the most feasible waste management alternative.

- Recap for Day 2
- Student team presentations
- Reactions from the plenary
- Things to ponder about regarding project implementation
- Visit to the poultry unit

Students' teams Presentations – Proposed alternatives

Each group/team presented their initial thoughts on the solutions to the allocated challenge. At the end of each presentation, there was a plenary discussion regarding what the group had presented.

a) Presentation by the Seed Bank team – proposed alternative solutions

The Seed bank group proposed a number of alternative solutions based on how they understood the challenge. They choose handle the assignment through first analyzing the problem by identifying the probable causes and root causes of low uptake of improved seed by farmers inn Mozambique, Angonia. The root causes generated provided a guide to generation of the solutions that would be suggested as appropriate solutions. This team understood the problem to be low adoption of improved seed. From the team, the identified probable causes of low adoption were:

- Lack of community awareness of the disadvantages of using recycled seed which include low productivity as a result of reduced crop vigor
- Loss of trust in the available improved seeds on the market from both government and private seed companies.
- Limited availability of improved seed.
- Low palatability/taste of cooked grain from improved seed,
- poor crop growing conditions - low tolerance to harsh climatic conditions

Based on the above analysis, the team suggested the following alternative solutions

I. Enhance sensitization through media to the rural farmers about the disadvantages of using recycled seed. This could be done through using radios to target rural communities, and using television and social media for the communities in urban areas.
II. Government should intensify quality checks of the improved seed varieties on the market.
III. Organizing farmer group discussions to enable them differentiate between good quality and poor-quality seed.
IV. Design a computer model (i.e. machine learning or artificial intelligence) that can distinguish between good and poor-quality seed.
V. Establishing demonstration sites to show farmers the difference in field performance between improved seed and recycled grain. This would motivate farmers to adopt improved seed.
VI. Set up a seed bank with many out let stores to increase access to good quality seed.

Feedback/Remarks from the plenary to the seed bank team presentation

Following what the seed bank team presented, the lecturers raised questions and suggestions that were meant to help the students improve on their selected proposals (the projects).

- Is the problem availability of seed at production or distribution nodes of the value chain? You need to make a value chain analysis to be able to identify where the actual problem is.
- Different players of the value chain contribute to the problem so your solution should be mindful of the different nodes of the seed value chain.
- You might need to think of a digital tool to trace availability of seed
- How and when should government check for quality seed?
- Think of using computer models to test for quality of seed. For example, you can come up with computer applications to take pictures of seed and test for quality
- Farmers can form associations and buy seed in bulk from seed companies to avoid fake seed as another alternative to the problem of seed availability
- You can think of starting farmer field schools
- Accessibility to improved seed is also a problem. You need to ensure that your proposed solution also takes care of availability issues.
- You need to concentrate on one problem and find a solution to it instead of providing a solution for each problem.
- Get more information about the current situation in Mozambique so that you may have a clearer picture of the causes of low adoption of improved seed.

b) Presentation by the Waste Management team

The waste management group proposed solving the challenge through a number of alternatives that included:

- Compression of the wet dung/animal waste to drain off the excess water so that the residue can be dried easily and faster was the team's prioritized solution. Laborers on the farm would pack manageable quantities of wet animal waste in sacks that would be compressed to drain out the liquid. The resultant residue product would be dried and packed for sale as manure to interested farmers. The group thought that this would mitigate the bad smell from the waste and improve its marketability as manure.
- Developing a more efficient waste collection and packaging system,
- Exploring biogas production as an alternative waste management solution, and investigating market opportunities for processed manure.

Although the provided solutions could all work in an integrated way, the students felt they would more easily handle the compression with the assumption that it would be a little cheaper to implement – financial investment would be low and affordable.

Feedback/Remarks from the plenary to the waste management team presentation

The waste management team too received comments, questions and suggestions that would contribute to an improved output. The remarks included

- *Clarity of focus*: What exactly is your focus? Is it controlling smell alone or controlling smell and coming up with a product? If it is controlling smell alone then the proposed solution of compressing may not work.
- *Cost related issues*:
    - What would be the cost of technical knowledge required to set up and run the proposed technology of compression?
    - How easy will it be for the farmer to set up the technology to have the waste compressed?
    - Think of the size and cost of your experiment because you are dealing with large number of animals
    - A cost-profit analysis of eliminating the smell would help
- *Other alternatives* to think about and weigh:
    - In minimizing the bad smell from the dung or water, could you think of a cheaper technology such as nanotechnology that uses nano adsorbents

  - Think about resource recovery options such as vermi composting
  - Is it possible to include moisture content sensors to monitor the drying process of the waste?
  - You can think of ways of mixing wood ash with the manure powder to increase usability of the manure
  - Think of a more holistic solution to the problem and make use of the wealth of expertise in your team (animal, economics, crop, ICT, extension)
- *Use of the products*/benefits to the farmers
  - How is the farmer benefiting from eliminating the smell?
  - What will the compressed liquid be used for?
  - What will the dried waste be used for?
- *Drying method*:
  - think of how the variation in weather will affect the drying process – remember that the drying is completely dependent on natural sunlight
  - Is there a more efficient way of drying the manure?
- *Atmospheric pollution*: How safe is it to the environment if the gas (ammonia) is being let out into the atmosphere

The comments and questions raised to each team was to open up their minds to think a lot more and have their projects (selected solutions to the challenges) more useful to the intended company/farmer and beyond. Each of the student teams went back to make meaning and use of the questions raised from the plenary. During this round, the lecturers joined the teams briefly to offer guidance. Although the lecturers went to each team, those more knowledgeable with engineering and waste management joined the waste management team and those that were more related to crop joined the seed bank group. Students were free to consult with any lecturer. Prior to joining the student teams, the lecturers first had a brief meeting to identify what needed to be done for the smooth internship or student project implementation.

Guidelines for successful student internship/project implementation and completion

As the days went by and listening to the students' presentations, the lecturers identified issues that would guide the smooth implementation and completion of the student team projects (seed bank and waste management) for their internship. The essence was to put in place guidelines to ensure the students keep the momentum of working together in their teams. The suggestions included the following:

- **Close and continuous contact with company**: In their teams, students need to be in continuous communication/contact with the companies that raised the challenges so as to get more information for clarification, involve the company in developing the solution, and agree on how to have the solution implemented. It would be better if more than the contact persons in the companies could be brought on board given that the thought through solution was for the good of the company and not just the individual. The more we have more company members the higher the chances of the solution to be owned by the company.
- **Team leader (lecturer and student)**: It was important for each student team to have a lecturer to lead them as well as a student who would be the contact person for the team.
  - The lecturer/instructor/coach had the responsibility of connecting the students to the company concerned and ensuring the team members met regularly (online and physical where possible). Coaches had the responsibility of alerting/inviting the rest of the lecturers to the scheduled team meetings. It was agreed that lecturers that presented the selected challenges (seed bank and waste management) automatically became the lead instructors of the teams. Accordingly, Dr. Paulino Sandramo from University of Zambeze was nominated as coach the seedbank group while Dr. Paschal Chukwudi from Zambeze university was the coach for the waste management team.
  - For the students, it was thought worthwhile that the team or contact person be one on the ground and resident in the country/area where the project was being implemented.

Therefore, the lead or contact students were from Nigeria (University of Nigeria) and Mozambique (Zambeze University).

- Sharing or roles and responsibilities – it was important for each team to indicate how they organized themselves, with roles for each member clearly spelt out. This was to indirectly ensure all the members played a role and supported each other in implementing their project.

- ***Weekly student teams meetings***: Students were encouraged to meet weekly to discuss their projects.
- ***Reports from student teams***: Students should present regular progress reports to the project team.
- **Student working hours**: The project team had to agree on how many working hours students were expected to put into their internship team projects (seed and waste), what would be their deliverables per week, and how to keep students motivated to keep working on their projects. This was yet to be munched through because the hours were not discussed
- ***Teacher meetings***: Teachers will be meeting monthly to discuss the overall progress of ABC-BlendEd course, and bi-weekly to discuss progress of student team project progress for.
- ***Criteria for grading students***: There was need to agree on the criteria for awarding marks/grades to students. It was noted that grading criteria varied across universities and that either each university used its criteria and/or shared their other members to borrow a leaf. It was more convenient for each university to use their grading criteria in internship/field attachment related courses. Students needed a mark for this course.

Visit to the poultry unit

In the afternoon, the whole team of teachers and students visited the IBS KOICA poultry unit at Makerere University Agricultural Research Institute, Kabanyolo (MUARIK) to learn how the unit was managing waste from the poultry. The team was welcomed by Dr. David Kibiike, the manager of the unit who took the team through the entire process of feeding and poultry waste management on the farm. The poultry unit had a carrying capacity of 15,000 birds but had 9,563 (about 10,000) layers at the time of the visit.

The education tour began with the feed unit/mill where the feed ingredients were stored and processed. From his starting remarks after welcoming the team, the manager emphasized that waste management in poultry start and depends a lot on what you feed the birds. It therefore starts with the feed mill. When feed is incomplete in composition and not mixed well in their right or proper proportions, chances of having diarrhea are very high. Wet refuse/waste due to diarrhea is difficult to handle. However, when birds are fed on a balanced diet, they develop a strong immune system and produce good quality (not wet) refuse/waste which is easy to handle. He advised that it is important to add prefixes in well-balanced proportions and on-nutritional factors like enzymes, acidifiers and toxin binder to the feed. Toxin binders prevent the absorption of harmful toxins in the gut of the birds whereas acidifiers improve the gut health and digestibility hence promoting nutrient absorption and digestion. When digestion is good, fecal matter will be of good quality (not smelly). Dr. David went ahead to explain to the team the management practices and biosecurity measures on the farm. He also took the team to the waste drying area and explained the process through which the waste/refuse was dried and packed for sale as manure.







Figure 1: Participants visiting the KOICA poultry unit at MUARIK to learn about poultry waste management

Day four (23rd May 2024): Student teams' refined projects presentations

Program for Day 4 (23rd May 2024)

- Recap for Day 3
- Student team presentations
- Reactions from the plenary

The day was largely for the students to pitch their proposed projects to the lecturers and the companies concerned. This was the opportunity for students to present the solutions that they were to carry through as projects between May 24th and July 26th July 2024. After the day's recap, students were given time to continue refining their solutions for about two hours as they integrated comments and suggestions that came from the feedback session of the previous day. Students were encouraged to consult any teachers on areas where they felt they needed further guidance. The students worked in their teams till break tea time when they joined the rest of the members to have tea then have the plenary session. The student teams then presented their selected projects in plenary as below.

Seed Bank team

The suggested project presented by the seed bank team that day was **provision of information for enhanced adoption of improved seed**

The group mentioned that after reflecting on the feedback they received the previous day (Wednesday before the farm visit), they decided to focus on low adoption of improved seed as a result of inadequate information among farmers as the problem. So their efforts were on how to ensure farers accessed appropriate information. The group then went ahead to present strategies that the Mozambique Agricultural Research Institute (IIAM) can adopt to increase awareness among farmers about the advantages of using improved seed over recycled grain. This would ultimately increase the rate of adoption of improved seed.

Team's suggested strategies of managing the information challenge/project:

- Use mass media like radio and television to run awareness campaigns about the advantages of using improved seed.
- Set up farmer field schools to give farmers an opportunity to demonstrate with the improved seed varieties so that they can make informed decisions
- Collaborate with non-governmental organizations in the area to provide extension and advisory services to the farmers.

- Collaborate with a group of contract farmers. This would be through training farmers on agronomic practices of improved seed, provision of seed to the trained farmers to plant under the supervision of staff from IIAM. At harvest time, IIAM would buy the seed from farmers at a relatively high price (to motivate farmers), and sell it to the other farmers in distant locations at relatively lower price compared to prevailing market prices.

Suggestions from plenary to the seed bank team presentation on the suggested project of information provision and shared strategies.

- The suggested problem of adoption seemed still amorphous. The team needed to further break it down to come up with a more feasible solution because adoption is a process that takes time, awareness creation alone may not solve it.
- Clarity would help for the reader to know the exact problem. Is lack of awareness the problem or it is lack of availability and high cost of improved seed?
- You need to look at the model used by Integrated Seed and Sector Development Uganda (ISSD Uganda) project that has enabled farmers to produce quality declared seed under the supervision of ISSD Uganda staff. Through the ISSD model, seed availability was improved and consequently farmers' incomes. Under ISSD context farmers multiplied quality declared seed for income generation. ISSD case could give the seed bank team insights on how to handle the current problem at IIAM.

Waste management group

The waste management group **focused on reducing bad smell** from the pig and poultry waste.

Suggested strategies to reduce or eliminate bad smell from the poultry/pig waste

The team made the following suggestions:

- Ensure that both pigs and poultry are fed on a balanced diet to improve on their health and hence quality of waste produced
- Have separate collection points for dung and urine in the piggery unit.
- Add fly repellants and microbe anti-oxidants such as lime, sodium hypochlorite, hydrogen peroxide, and formalin.
- Reduce water content in the manure,
- Proper storage, drying, and packaging of the dried manure.

The students then went on to describe the technology they had designed to aid in extracting water from the waste.

Suggestions from plenary to the waste management team presentation on the suggested project of reducing or managing smell from the poultry/pig manure.

- Clarity was needed on whether focus was on managing waste from poultry, pigs, or both? This had implications on the design of the technology to reduce water in the wet waste
- Is it possible to make odor neutralizers locally?
- It was important to have indications of the cost of the suggested compressor to be used to remove water from the waste?
- Of the two solutions given (compressing and using adsorbents), the team needed to choose one on which it would focus as the solution
- One of the criteria the team would employ to decide on which solution (compressor or adsorbent) would be cost of the technology whether compressor or adsorbents verses the cost of the final product.

- It is important to have a clue on maximum quantity of the waste that could be processed using a technology in a specific period of time. For instance, how much waste would be handled using the adsorbent or compressor in 1 day? How much waste can be processed from the 25kg of adsorbent?
- Does the farmer need to undergo any training on the use of the proposed solution (e.g. adsorbent use)?
- An indication of the value of the final product after the water has been removed would be necessary

Project Next Steps

In this session students and lecturers first worked independently in their teams prior to all reconvening for the close of the kick off meeting. As student teams reflected on the comments/suggestions to improve their working solutions/projects, lecturers/teachers discussed the next steps of the project. The following next steps were agreed upon:

Sub-committees for smooth project implementation

It was thought worthwhile to have a steering committee and a quality assurance board.

a) The project steering committee:
The main duty of this committee was continuous examination of project progress and scheduling of project activities. Every partner institution participated and nominated a member that represented it on the steering committee. The agreed composition of the ABC-BlendEd project steering committee was as below:

○ Polytechnic Institute of Porto – Nuno ○ University of Nigeria – Anthonia ○ Federal University of Technology, Minna, Nigeria – Egwim ○ Eduardo Mondlane University, Mozambique – Rogério ○ University of Siegen, German – Hubert ○ Odisee, Belgium - Kristien	○ University Zambeze, Mozambiue – Paulino ○ Makerere University, Uganda – Prossy ○ Soroti University, Uganda – Hellen ○ RUFORUM, Uganda – Emmanuel ○ Hellenic Mediterranean University, Greece – George

The project steering committee was to meet on a monthly basis, every first Tuesday of every month at 15hrs Central European Time (CET) starting with 4th June 2024.

b) The Quality Assurance Board (QAB)

This board had the duty and responsibility of monitoring and evaluating the implementation activities and realized outputs to ensure set project deliverables are realized in alignment with the required structure or standards before submission. The composition of the project QAB was agreed to compose of members below

○ University of Siegen – Ruger ○ RUFORUM – Runyararo	○ University of Nigeria – Anthonia ○ Eduardo Mondlane University – Rogério ○ Soroti University – Hellen

Project members present agreed that the board would be led by University of Siegen leads the QA Board.

Mapping and analyzing internship approaches at partner Universities

All the six partner African Universities were to participate in this exercise/task and produce a report that described their current/existing status of how internship was structured in the partner Universities – how the Universities conducted internship outside the ABC BlendEd project. The report would include a set of recommendations for improvement through the ABC- BlendEd project. Makerere would then compile the mini reports from each university into one project report. It would be important for the integrated report to be ready by the time the steering meeting sat in July 2024.

Acquisition of e-video conferencing equipment

In the budget, all the six partner African Universities had a budget of up to euros 8,000 to procure equipment to enable establishment of a hybrid class that would promote the students and partner meetings to be attended physically and virtually. In this mobility project, distance between participants was not expected to limit interaction and continued deliberation on the projects/solutions. Remember that in this project, even when members of the student teams stayed and worked in their home countries/institutions, distance was not meant to limit the implementation of the project. The essence was for each African partner University to establish hybrid classroom. Eduardo Mondlane University was assigned that responsibility of following up with each university on the realization of this task. It was expected that each University would have acquired the equipment by **20th July 2024,** but the process would depend on the procurement procedure used by each university given that most universities don't procure equipment directly from service providers but through pre-qualified agents.

Meeting in Porto

Among the next project activities was a face to face (physical) partner meeting at Porto, to be hosted by the overall project coordinating institution, Institute Polytechnic of Porto, in Portugal under Prof Nuno Escudeiro. The purpose of the meeting, scheduled for 10th and 11th October 2024, was for the partners to collectively review progress so far and plan for the following year/project activities. Although physical participation was limited one representative from each partner institution, the rest of the project team members were invited to participate online (on a link that would be shared).

Closure meeting for pilot Edition 2023-24 or first year at Futminna, Nigeria

A meeting to close the pilot year or Edition 2023-24 of the project was scheduled to be in Nigeria, hosted by the Federal University of Technology, Minna from 22nd -26th July 2024. The arrangement was that from each partner African University, one teacher and the two students would attend. The other partners would have only one representative physically present. The rest of the team members would participate virtually through a link that would be shared. It was during this meeting that the first cohort of student teams (seed bank, and waste management in this case) would make their final project presentation for final evaluation. Participation of the companies for whom the student teams developed solutions (as their internship projects) was very much encouraged. The assumption was that the companies could meet their travel, accommodation and meal costs.

Workshops/ Seminars for students – focus on intake for Edition 2024/25

It was thought worthwhile that students in the subsequent years (II and III) would attend four seminars whose content would support the objective of enhanced employability as was stipulated in the project document. Appropriate possible topical areas thought to be of priority in supporting students to develop the desired skills that would enable them work better together on their projects and consequently enhance their marketability were suggested. For each topic, an institution was selected to develop the content that would be delivered in seminar form just before or during the kick of meeting. A blendEd delivery approach would be used. The topical areas of the seminars and the selected lead institution to develop and deliver were as below:

	Topical area for the seminar	**Responsible institution**
a.	Intercultural cooperation/teamwork	Polytechnic Institute of Porto

b.	Entrepreneurship	Zambeze University
c.	Digital literacy	Federal University of technology, Minna
d.	Career Development (cv and cover letter writing)	Soroti University
e.	Social skills (who am I, how do I relate to others, how do you give feedback)	Makerere University

Partners/institutions that were assigned the lead role were encouraged to select or identify people in their institutions that could handle the content development and hence seminar delivery in the event that the individuals on the project were unable. It was expected that all the content would be worked on by end of June 2024.

2.3.3 Day five (24th May 2024): Student teams' Final projects presentations and way forward

Program for Day 5 (24th May 2024)

- Recap for Day 4
- Student team presentations of final projects
- Immediate next steps for students

Student teams' final projects presentation

Students presented final improved versions of their proposed projects that they would then deliberate on for the 2 months prior to the meeting in Futminna. Below is a summary of the refined solutions.

a) Final project suggested by the Seed Bank student's team – adoption of improved seed

The main challenge was low adoption of improved seed among farmers. The group came out with the following as their final project that would occupy them for the next 8 weeks (from 24th May that marked the end of the kick off meeting -22nd July 2024 that marked the first day of the closer meeting for Edition 2023/24 in Futminna).

- IIAM should identify a group of farmers to work with to produce more of the improved seed to enhance seed available. In working with the farmers, IIAM would: (a) train the farmers on good agronomical practices recommended by research; (b) give the farmers improved seed to plant in their gardens; and (c) provide technical guidance to the farmers throughout the growing cycle of the seed; (d) buy part of the seed from the farmers at a negotiated but motivating price. The other portion would be left to the farers to decide how to use it. The proportions would however be agreed upon later after getting a better understanding of the context in which the two operated. This was expected to increase availability of improved seed and ultimately increase adoption.
- The group also proposed to design a model that IIAM would use to increase distribution of improved seed across the country. The model would include implementation steps/phases, timeline, coverage prediction over time, and a machine learning algorithm to aid in prediction of the expansion. This is expected to increase awareness and availability of improved seed, as well as reduce the cost of improved seed.

Suggestions from plenary for improvement of the final project proposal presented to handle the issue of adoption by the seed bank team. The comments were as below:

- From the presentation, the innovation was use of an internet based mobile model to predict spread of seed across the country. Think of piloting the model first for reliability before handing it over to IIAM, and where to get initial data to pilot the model. Piloting would depend on

availability of data and interest from the institute, otherwise without initial data to test, that model would fail to be an appropriate solution.
- You could use the data collected during the survey as initial data for testing the model. Since not all of you will be on ground, you can simulate the model too.
- You could also do literature review on seed quality and use it as initial data for training/ piloting the model.
- Specify the category of farmers targeted with the proposed solution.
- Indicate a timeline for completing the different activities of the project.

b) Final project suggested by the waste management student's team – managing the bad smell from poultry/pig manure

The team presented a comprehensive waste management plan that included an improved collection and packaging system, potential biogas production, and strategies for increasing manure marketability. This involved applying chemicals like Barn odour/smell manure digester, Accepta 2712 and use of nano silicates to reduce the smell. Accordingly, the manure will be subjected to a drying unit with a heater and fans to quicken the drying process.

The team maintained waste compression but this time added establishment of an underground tank system in which pig waste could be directed. In the tank system, sedimentation would occur with solid waste settling at the bottom and the liquid part directed to flow out into another underground tank containing charcoal as a filter. The filtered liquid could be used for irrigation and cleaning of animal houses.

Suggestions from plenary for improvement of the final project proposal presented to handle the issue of bad smell from pig manure. The comments were as below:

- How will the waste be collected to the compressor?
- What is the return on investment for using the compressor and dryer?
- Was there a possibility of including a system of automatic cleaning of dung from the pig house to the tank?
- The high estimated cost of the proposed design was high was not likely to be affordable to the farmer. USD dollar equivalent costs would apply to a wider range of potential consumers of the solution across the continent.
- The targeted category of farmers should inform the design and size
- Make some computer simulations before implementation to pilot the design

Immediate Next Steps for students – way forward

Each of the teams presented their immediate next steps that would keep them focused on the project and together.

Next steps for the Seed Bank team

- Hold a meeting with the Mozambique Agricultural Research Institute online to discuss the feasibility of the proposed solution – information for adoption
- Develop a questionnaire or interview guide that would be used to collect data from farmers, collect data, analyze the collected data/ information to be used in the model
- Conduct a physical visit to the institute by the contact student for more information to guide further refinement and acceptability of the final solution
- Have regular meetings as students to discuss project activities
- Continue using our WhatsApp group for communication and mobilization of group members
- Watch YouTube videos in line with the proposed solutions.
- Division of roles:

- Team leader – Paulo Osvaldo (Universidade Zambeze)
- Model development - Bongo Joshua (Soroti University); Napoleon Glory (Federal University of Technology)
- Trainings - Marcia Marcelo (Universidade Eduardo Mondlane); Goodness Onuchukwu (University of Nigeria)
- Report writing, adhering to time schedules - All group members

Next steps for the waste management group

- Use various online tools like zoom and google meet to maintain regular communication. WhatsApp calls will be used whenever the need arises.
- Gather more information from farmers to further improve the proposed solution
- Meet twice a week on Mondays and Wednesdays for 2hours and 30 minutes to discuss the project, and one day of the weekend for four hours. (See Appendix 3 for a detailed schedule of activities).
- Division of roles:
  - Team leader - Kisuule Ismael (Makerere University)
  - Documentation - Kusiima Teddy (Soroti University); Kisuule Ismael (Makerere University)
  - Contacting the farmer directly - Anthony Anigbogu (University of Nigeria); and Abdul Waheed (Federal University of Technology)
  - Conducting research and attending meetings - All group members

2.4 Preparatory phase – webpage (from the students)

The project team agreed that it was important for each of the student teams to have a web page that gave a glimpse of who they were and what they did to the public. Each of the teams developed a website and allocated the IT students to take charge of the website. The websites for each team could be accessed at

https://wastemanagementatabcblended.word-press.com for the waste management team and

https://abcblendedseedproject.wordpress.com for the seed bank team.

The teams used the websites to share with the world about who they are, what they did and how. How the website was designed varied between the two teams. For waste management team, the menu included: home, challenge, contact us, Gallery, Team, our work and contact us. For the seed team, the menu is home, our team, project activities, gallery, and about us. They both have a provision where a person can provide feedback or ask a question. The extent to which each menu icon is populated also varied between the two teams.

2.5 Online phase: interim student team assessment to check progress

This was an online activity where project partners held a meeting to check on the progress that the two teams had made 5 weeks after the kick off meeting. Generally, the two teams had made slow progress. Clarity of the actual challenge contributed to the slow progress. To avoid repetition, only comments and suggestions from the steering committee are presented. In this case the reactions or comments from the steering committee were aimed at pointing to areas that each of the teams needed to reflect on or think about as input for improvement of the subsequent activities and versions of the reports.

2.5.1 Reactions to the Seed Bank team

- Availability is a concept that needed to be operationalized to mention the indicators that gave basis of saying seed was (un)available. Quantity, timing of seed availability, cost of seed, distance to access seed were all indicators. What are your indicators of availability in the context of IIAM farmers?
- Was there a possibility of some form of certification for the farmers that would attend the training from the IIAM?
- Tell the story or explain how the solution would be implemented for the farmer to access seed from the IIAM
- The explanation of how the farmer could benefit from using certified seed and how one can become a certified farmer would enrich the flow. What are the steps a farmer needed to go through to become a certified seed farmer?
- What happens to IIAM after making farmers to be certified seed producers and how will IIAM help them to attain the goal of seed availability?
- Kindly come up with a name to combine all the suggested solutions. That would make it easy to be referred to and for both current and future farmers that chose to implement the project
- Is it possible to use one legume crop so as to predict the availability of other crops in the project?
- Do not limit the project to only one dimension of quantity, project it to all the other dimensions as they are interconnected. The implication was that when explaining quantity make a pattern of how distance, cost, time of availability of seed all result into the quantity being low. This would involve explaining the location of province (for distance), cost (actual cost of seed in different times of the year), timing of available seed (whether it's in or off season)
- Whereas the suggestion to publish a paper from the work would be good, it would be pushing the students a bit beyond. It is important to remember the focus of the project – internship of about 10 weeks where undergraduate student teams try to find workable solution (through practice) to an identified farmer challenge. Writing an article is more for the graduate or master students not Bachelor students. The currently enrolled students (undergraduates) need to have a project that can be implemented in a short period of time. Data collected is limited to the learning of the students. Actual focus is to help seed availability.

2.5.2 Reactions to the waste management team

- **Engage the farmer at every step to ensure practical and acceptable Solutions:** it was important to make efforts to involve Mr. Emmanuel the farmer whose problem was being thought through at every stage/ process of establishing the solution. Farmer involvement would help the team to check the extent to which the unfolding proposed solution would meet his needs and would increase farmer level of acceptance. This was in reference to a context where Emmanuel the farmer rejected use of zeolite as a proposed solution, citing its high cost and the lack of direct benefits from his livestock waste. That meant the team dropping zeolite irrespective of the time invested. Without the farmer's input, even well-intended solutions may fail! The team was encouraged to develop approaches that considered the farmer's concerns and realities.
- **Find a low-cost, environmentally friendly Solution:** The team was advised to explore alternatives that minimized costs without compromising environmental integrity. The team was specifically referred to possibility of using Indigenous Microorganisms (IMO) within a deep-litter system. Any solution meant for countrywide application must be affordable to farmers across different financial brackets. Carefully evaluate the cost implications to ensure the solution remains accessible and sustainable for all types of farmers.
- **Provide accurate and location specific cost estimates:** Precise cost calculations, particularly the content and location where the project was to be carried out/executed was important in making the solution work out. Cost estimates, such as those for zeolite, were based on internet research and might not reflect actual market prices or availability. If Emmanuel wanted to try the proposed solution, he must know where exactly to source materials, and how much they would cost. Team was advised to emphasize the importance of field research to gather accurate data on local suppliers and pricing.
- **Enhance the webpage for better organization and professionalism:** The team web page needed to be improved. At the time of presentation, information on the web page was inconsistent of information and photos – the presentation of the web site was not organised. Photos were not uniform in size and design, lots of imagery redundancy, too many similar photos cluttered the platform. The website needed to be reorganised. The website should communicate the team's work clearly and professionally, therefore focus on streamlined content and a cohesive design would make a difference.

2.6 Closure meeting for 2023/24 Edition or year one (22nd -26th July, 2024) at FUTMINNA, Nigeria

The one-week closure meeting for the 2023/24 Edition was held in Nigeria, hosted at the Federal University of Technology, Minna from 22nd to 26th July 2024 in the Africa Centre of Excellence for mycotoxin and food safety (ACEMFS). Prof Egwim together with Prof Alabi John organised the meeting. Abigail, one of the masters' student to Prof Egwim took the minutes/proceedings of the meeting. What she captured is what is presented in this section of closure meeting.

2.6.1 Day one (22nd July 2024): Opening day and pending management issues

Introduction – welcome and opening of the meeting

The first day was mainly to mark the opening of the 5-day closure meeting for the first edition of the ABC-BlendEd project in FUTMINNA. The activities were largely welcome, introductory and reminder of the objective that was to close and finally evaluate the students' internship. Day one was scheduled as below

- Participants' arrival and registration
- Participant introductions
- Welcome and introductory remarks by the director ACEMFS
- Break 9:30 – 10:00
- Courtesy visit to The Vice Chancellor FUTMINNA
- Student teams' presentations of current project status
- Parallel sessions (students work in their teams and teachers engage in project management meeting)

Participation in the meeting was hybrid with majority being physically present and few attending virtually. Among those that attended physically were all the 12 students on the project, the coaches (save the one from Eduardo Mondlane), and the farmer (Emmanuel). Some more members from FUTMINNA participated too given that they were the host (Appendix C). Partners from Portugal, Belgium and Greece besides the other team members from Makerere participated online. Minutes of this Edition 2023/24 closure meeting were documented by Abigail Adegoke, one of the M.Sc. students under Prof. Egwim.

Welcome remarks and courtesy call to the VC

Welcome remarks were made by the project coordinator of FUTMINNA (Prof. Egwim), the Director Africa Centre of Excellence for mycotoxin and food safety (ACEMFS) Prof Hussaini Anthony Makun, and the Vice Chancellor of FUTMINNA. The participants made a courtesy call to the VC FUTMINNA who with the university management team warmly welcomed the participants and addressed them in the university hall. In his remarks, the VC emphasized the importance of collaboration and collective action in managing challenges faced in Africa. He wished the participants a pleasant stay and fruitful deliberations during the 5 days meeting. As a sign of appreciation, each of the coaches received a gift from the VC and the Director of the center where the meeting was hosted.

Student teams' progress status in preparation for the final pitching

The student teams (seedbank team and waste management team) pitched their then current or improved version of the projects to the coaches with focus on what they took to be the main issue in their proposal.

- The seed bank team proposed a strategy to support availability of seed to farmers in Tete region all year round that included a mobile application. The team mentioned that the farmers would share the seed produced with the research institute (IIAM) in ratio of 50:50. It was anticipated that the institute would ensure safe storage in the seed banks.
- The waste management team proposed use of biochar in minimizing the offending smell that came from farm animal (pig and poultry) waste. The idea was that the farmer could sell the odorless manure form income. The project was to be implemented in Ihiale LGA of Anambra State in Nigeria.

Each of the teams was given comments for refinement and clarity of the subsequent drafts. Some of the responses and feedback given included: a cost estimate for each project, the time frame required for full execution, the readiness of farmers to implement and more. Students re-convened in their allocated separate rooms for further reflection and improvement of their work following the comments that were raised. While students broke out into their different groups, the coaches and partners had a Project Management meeting.

Pending management issues - Project management meeting

The main objective of the project management meeting was to review tasks and reflecting on how best to handle pending issues. The specific issues of discussion were as below:

- Task review and pending issues - project tasks, reporting, quality assurance, and Key Performance Indicators (KPIs).
- Priorities for Sub-Saharan Africa: Focusing on human development, employability, digital transformation through workshops and online courses.
- Specific Objectives: Enhancing student employability, adding value to local communities, and promoting BlendED courses among stakeholders.
- Task and deliverables: Reviewed responsibilities and strategic options for stakeholders (IPP, FUTMIN, UEM, RUFORUM, etc.).
- Quality Assurance Board: Led by USIEGEN, the board monitors project progress, quality, and outputs. Tools for support include: Meeting evaluation questionnaire; deliverables control; KPI dashboards; Project logbook
- Project Management Framework (PMF): Tools and Templates – Teams; Committees - QA board, Steering Committee (SC). The SC monthly meeting was the first Tuesday of the month 9:00 – 10:00 AM WET
- Quarterly Reporting: Starting May 2024, covering the first three quarters (November 2023 to July 2024)
- Expenses reporting with supporting documentation

- Activities per WP, deliverables, milestones, blocking factors, risk, and contingency measures
- Communication, dissemination, and impact
    - Dissemination Reports: To be filled daily by all participants for project assessment
    - KPI recording and monitoring: Semestral KPI Dashboard Executive Summary, starting in October 2024
    - Time Sheet Reporting: Document hours worked on the project (e.g., November 2024), with records kept for up to 5 years for audits. All costs are to be reported in Euros, using official exchange rates and documenting sources.
- Next Steps:
    - Follow-up on feedback and corrections from the pitch sessions.
    - Preparation for the next monthly SC meeting and quarterly reporting.
    - Continuous monitoring and recording of KPIs and dissemination activities.

2.6.2 Day two (23rd Jul 2024): Focus on evaluation procedure for the course

Day two of the meeting was mainly on evaluation procedure of the course as the student teams continued working in their independent teams. Agenda of the day (9:30 a.m. – 5:00 a.m.) was as below

- Discussion on evaluation questionnaire moderated by Prof Nuno Breakout Sessions for students continued work and
- Break that was used as an opportunity to give participants gifts/souvenirs

Review of Evaluation Questionnaire

Need for evaluation tools: It was thought important to have a standard questionnaire to guide in evaluating ABC BlendED transnational project meetings. It was important to design evaluation questionnaires for the three categories of the project members: the students, coaches and another for the companies. The results would provide insights about how the different categories felt about the project, and consequently how the subsequent project implementation would be improved. Prof Nuno suggested that the ABC BlendEd could borrow from what the previous European mobility projects used/did and come up with a template that works in the African ABC BlendEd context.

It was noted that the kick-off meeting that was held in Kampala was not evaluated, we did not have the questionnaire then. Prof Nuno thought it would have been very useful if partners used the developed/modified questionnaire and evaluate the kick off meeting retrospectively for consistence in documentation and follow up.

Social skill assessment for Students: Besides the appropriateness of the suggested solution (the project) in line with the challenge, it was important to evaluate student competencies enhanced in social skills that the ABC BlendEd project committed to build among the students e.g. in communication, language (English for the case of the Mozambique students that use Portuguese), teamwork, cultural intelligence, project management familiarity, digital skills, etc. A tailored questionnaire in this case was to be developed and each of the student fills it based on how they felt at the end of the meeting. The tool was meant to capture the progress of the student in the mentioned fields comparing when their participation in the project started to the time it ended.

Certificates of participation to the project partners and action steps

Certificates: It was discussed and agreed that both the students and coaches needed to receive a certificate that appreciates their contribution and engagement in the successful project implementation. These certificates were to be awarded at the end of every edition meeting. A template that was once used for the European Mobility was shared and two members (Prossy and Hellen) tasked to modify it to what suited our students and coaches. The overall project coordinator (Prof. Nuno) and the host coordinator in the university that hosted the close edition meeting were the people to sign on the certificates.

Agreed action Steps: The participants agreed on the following action points

- Finalize and distribute the evaluation and skill assessment questionnaires.
- Student teams continue with their project work and apply feedback from the reviews.
- Prepare for upcoming sessions and ensure all participants are informed about certification decisions.

The day ended at 5 pm

2.6.3 Day three (24th July 2024): Brief on student progress and project issues

Agenda of the day

The agenda of the day was mainly hinged on student team presenting their progress of the planned pitch and coaches discussing project related issues too. The flow of the agenda was as below:

- Reconvening of participants and recap
- Breakout Sessions (students and coaches in separate rooms) 9:30 AM – 12:30PM
- Lunch break 12:30PM – 2:00 PM
- Student briefs on progress on pitch preparatory Reports - 2:00 PM - 3:00 PM
- Break away sessions for final refinements of the student projects

Brief on students' progress: focus on the main issues in the proposed solution

Students were scheduled to present their final project pitch on Thursday day 4 given that the participants agreed to use Friday to visit and know Abuja – to many of the participants, that was their first time to visit Nigeria. It was important for the coaches to provide the very last comments to the students' progress then. The progress shared in the students' presentations was focused on the major issues in the proposed or suggested final solutions to the challenges of waste management and seed bank.

Main issues or points of improvement from the waste management team and the quick comments from the coaches

The improvements pointed to three major things: (1) Based on farmer consultations, sawdust was/is identified as a readily available material for making biochar; (2) The drum method was the most preferable to be used in the preparation of biochar and this would be done using a 200 liter capacity metallic drum in which 150kg of sawdust can be used as fuel at one go; (3) carbon-dioxide (CO_2) and smoke will not be released in the environment but will be taken through a condensation process to produce wood vinegar.

Following the main issues presented by the team, the coaches made the following reminders that would improve the quality of the final pitch presentation of the waste management team.

- Fire setup should ensure no oxygen entry to sustain the fire.
- Explanation needed for the proposal to condense smoke.
- Include a picture of the waste product rather than random pictures seen.
- Find a use for the liquid obtained from condensed smoke.
- Prepare a flowchart for biochar production and application, including cost analysis.
- Focus on solving odor problem from the waste given that it is/was the original problem stated to be solved and presenting solutions effectively.

Main issues or points of improvement from the seed bank team and the quick comments from the coaches

This team too focused on three things that they improved in their previous efforts. These included: (1) Farmers bring 50% of their seed produce to the institute to keep and store as a way of preventing the scarcity of seeds and providing certified seeds for use and re-use; (2) Developing a mobile app for record-keeping, tracking seed distribution and return, and predicting yield based on seed variety, soil fertility, and soil moisture content. (3)

Provided a budget to guide the farmers on the probable costs: $1000 ($400 for soil testing and $600 for pesticides, herbicides, etc.).

The coaches suggested the following to the team as they prepared for the final pitch.
The team received comments/suggestions to refine the final pitch presentation that included the following:

- Clarify that seed scarcity is the primary problem to be solved by making certified seeds available to farmers.
- State the problem clearly and present a flowchart for further understanding.
- The app is a part of the solution and not the entire solution; consider the time required to generate necessary data. It was suggested that the team could use existing databases to collect data instead of taking time gathering and generating new data.
- Assess the socio-economic backgrounds of farmers if the solution being presented will be effectively adopted and implanted by not only the Institute but also by the farmers
- Test the app after development as part of the solution and it must be proven to work well before handing it to the research institute.

Project management issues continued: improving the next Edition of (2025) and suggested pilot report flow

The coaches and partners from Europe engaged in discussions that pointed to two main points (1) how to improve implementation of the next phase/Edition; and (2) the end of Edition one report flow/structure. Summaries under each point are provided:

Suggested improvements to make the next Edition 2024/25 better

From the progression of the first edition, which was more less a learning experience of the African partners, there were observations that needed to be thought about and planned for to make the next edition better. The areas or points that needed attention were mentioned to include the following:

- There was need for a syllabus review – it was important to have the content of the selected topical areas prepared. Delivery of the content would be mainly in seminar model mainly using virtual method like zoom or any related method.
- In budget allocations, there is need to reflect on the realities or contexts of the universities and the students e.g. flight costs, student internet costs and out of pocket costs
- Use of student feedback forms for assessment in subsequent editions
- First get the challenges identified and clarified before selecting the students. The challenges would help guide the type of students to take up by field/discipline. Clarity of the challenge prior to allocating student teams would save on the time that is wasted in the process of struggling to know what exactly the problem or challenge is as it was with edition one. Un expectedly, a lot of time was wasted in refining the problem, the reason the students made slow progress.
- Ensure farmers and/or companies whose challenge will be selected are from the country/university that will host the kick off and edition closure meetings to increase chances of the concerned farmers actively participating with minimal costs. In this case University of Nigeria will be hosting the kick off meeting of edition two while University of Mozambique will host the edition closure meeting. That means the challenges will come from Nigeria and Mozambique.
- Issue certificates to teachers and students for participation every edition/year. Certificate should have logos of all partner institutions. Think through a template to be adopted and used so that we have a ceremony of the members awarded their certificates
- Consider issuing EduCTX block chain certificates alongside certificates (PDF format).

Suggested End of year one report flow template – table of content to be adopted for all the project Editions

The coaches suggested the following as the structure for the year one report and that it would be adopted for all the project edition reports. The suggested table of Contents template was as below:

1. Applicant information: recruitment, criteria, and selection.
2. Challenges: call to companies, proposal, selection criteria, and student teams.

3. Preparatory phases reference.
4. Kickoff meeting details: venue, dates, agenda, minutes, and attendance list.
5. Developed products/deliverables.
6. Online phase and interim assessment.
7. Closing meeting details: venue, dates, agenda, minutes, and attendance list.
8. Grading.
9. Assessment by students, companies, and teachers.

The immediate actions then were

- Students to finalize project work and prepare for final presentations scheduled for the following day. It was agreed that the pitching be done on Thursday 25th July in the morning then certificates be awarded to crown the day.
- Distribute and collect feedback forms for assessment.
- Review and improve the selection process for future editions.
- Finalize certificates ready for distribution (for both coaches and students)
- Complete and standardize the ABC BlendED Pilot Report for all editions.

2.6.4 Day four (25th July 2024): Students final project pitches, status of web conference equipment and closure of the meeting

The day started earlier than the rest of the days (8:00 a.m.) given that it had a number of activities that included students' final pitches and grading, lunch with university management, award of certificates, and discussion on project issues related to procurement of web conference equipment among others.

Agenda of the day

The agenda of the day ran as follows

- Arrival and Breakfast
- Team Breakout and Coach Discussions: students final touches on their presentation as coaches discuss project management related issues
- Family Lunch (With the VC and university management)
- Certificate award (This was done before the student presentations in the interest of fitting in VC's busy schedule).
- Student Final project Pitches and evaluation

Web e-conference equipment status reports from each African University

Status of each university with reference to the e conference equipment

At the time of the End of Edition 2023/24 close meeting, none of the universities had procured yet but there was progress at different levels based on the institutions way of doing things. The individual verbal reports given were as below:

- Soroti University – had not procured yet; issues with funding for a smart board.
- Makerere University – no procurement yet too; had written to principal formally requesting for space where the equipment would be installed
- UNN - Space already allocated; issues with online purchases and budget limitations.
- FUTMinna: Needs a smart screen/board and dedicated laptop; space already allocated.
- Mozambique: Planning procurement by November 2024 for the subsequent years
- Eduardo Mondlane was yet to give its report

According to Prof. Nuno the overall project coordinator, it was very importance for the institutions to have the rooms equipped and ready for student interaction. The interactions facilitated by the equipment may not be limited to online meetings of project online meetings but would be used by all students and staff within the university. Buying the equipment was priority. At the time universities could not access the allocated project money, it was very good that partners improvised.

Web/video conference system/equipment to be procured and procurement report

Expected components: The focus in this case was on the items that Prof Nuno expected the African Partner universities to procure for the web equipment. Depending on the institution and budget, one could buy items that would complement an existing system or fully install one with the following:

1. Video collaboration system, microphone, Logitech rally bar.
2. Computer, UPS.
3. Smart board (target Smart TV or big screen where Smart board cannot be accessed or procured).

Reporting requirements about the web equipment procured: The following were the requirements that the project overall coordinator Prof. Nuno suggested each African partner would submit:

- Upon procurement of the web conference equipment, take photos of the equipment and share with the coordinator
- Submit a two-page report with the following:
    - Detail of the acquired equipment: specifications, cost, and justification for changes related to the plan, if any.
    - Brief mention on procurement and acquisition procedure, explaining how the acquired equipment was selected, and present the several offers from different suppliers involved in the procurement process.
    - How the equipment is being used in the scope of BlendED and other (take picture of the equipment in use), how students use it for their BlendED meetings; presence of a dedicated room/lab

Formerly in the project document, the initial deadline was March 2024 with a report to be ready by April 2024. However, realities failed the process. It was desired that all institutions aim to procure the video conference system/equipment before November 2024. It was agreed that all institutions would share the current status related to the procurement of the equipment during the project meeting that was scheduled in Porto in October 2024. That would provide an informed basis on which the project would seek for an extension for this activity.

Students' teams final project Pitch presentations - Edition 2023/24

Just a reminder of the two project teams. One was on managing waste from piggery and poultry using saw dust as biochar to neutralize unpleasant odor. Saw dust/biochar was cheaper and available. The farmer that presented that challenge was ready to sponsor a trial of using the proposed solution. The other was on using community bank and mobile application to enhance availability of certified seed in Tefe province, Mozambique. The main issues that the team was requested to include in the final report was more logical flow of the report, test and ensure the app is functional, and make efforts to ensure the developed prototype of the mobile app is provided to the research institute to develop it further for use. Each team was given up to 15th August 2024 to submit their team final project report to their respective coaches to be uploaded on the project/team website to be accessed by all. Individual students would tailor the group report to satisfy the requirements of their institutions in line with internship.

Assessment/Grading of the student teams' work Edition 2023/24

The two teams were assessed by the coaches from participating African Universities. Criteria agreed upon was on three aspects, whose summed up scores gave 100% as reflected in the table showing final grades below. The criteria included (a) the **process** of students working together – how the team members organized themselves to work together as a team (with maximum score of 33/100); (b) the feasibility of use or application of the final **product** eventually pitched in solving the challenge (maximum score 34/100); and (c) the **presentation** skills including the efforts to engage all members of the team to actively participate (maximum score 33/100). Each coach gave a score based on how they perceived the performance of each team and the results were as below.

Final grades of the two student teams Edition 2023/24

Team	Max Score	Scores of the waste management student team as assigned by the coaches represented by universities						Average
WASTE		FUTMINNA	UNN	SUN	MAK	EMU	UZ	
Process	33%	28	30	30	30	-	30	29.6
Product	34%	30	30	29	33	-	31	30.6
Presentation	33%	30	30	30	30	-	30	30
Overall	100%	88	90	89	93	-	91	**90**

Team	Max Score	Scores of the seed bank student team as assigned by the coaches represented by universities						Average
SEED		FUTMINNA	UNN	SUN	MAK	EMU	UZ	
Process	33%	26	28	28	29	-	30	28.2
Product	34%	29	29	30	28	-	32	29.6
Presentation	33%	30	30	31	28	-	30	29.8
Overall	100%	85	87	89	85	-	92	**88**

Generally, the students, performed well with an average score of 89% even if their products (the proposed solutions) had not reached a stage of implementation or evaluation of usability. The Waste Management team got a higher overall score of 90%, while the Seed team got 88%. The students were congratulated upon the achievement so far. The coaches were at liberty to use these scores for their students and or complement them with the procedures of the universities for internship.

2.6.5 Other Consideration of the ABC-BlendEd project for future editions

Workshops and Training to build student's skills

The following were agreed upon by members that participated in the close of Edition 2023/24 meeting at FUTMINNA:

- Select 2-3 workshops for students annually. The content of each workshop would be selected and prepared prior to the enrolment of the interns
- Weekly 2–3-hour sessions for student growth and career development.
- Teacher Training Course: Work Package 2 (DigCompEdu): under this were the course syllabus - setting up new BlendED course. The courses included digital competencies (DigCompEdu), Multicultural cooperation, fund raising/Grantsmanship.

Other Project issues to take note of

- ABC BlendEd value proposition
    - Value proposition guidelines – to be done by IPP
    - Word Document, project power point templates – to be done by FUTMINNA
    - Website: merge with BlendEd.
- Community of Practice (CoP)

  - Establishment of a platform for those interested in blended learning.
  - Each partner would attract 10 users.
  - Project-based learning (PBL) discussions with RUFORUM (take a look at Alliance for African-Bridge project for which UNN is a partner).
- Dissemination, sustainability and Communication
  - Document dissemination activities with evidence.
  - Use email campaigns, institutional media, regional media, publications, social media and local workshops with partnership in university website for project awareness.

2.6.6 Closing Remarks

The Edition 2023/24 closure meeting was ended on Thursday. The Friday was given to participants to explore, visit and know a bit of Nigeria. At exactly 4:30 all participants reconvened for formal closure.

The host, Prof. Egwim Evans thanked all the partners that managed to participate in the meeting and called for continuous collective work even beyond the ABC BlendEd project boundaries. One student (Macklyn Monge from Makerere University), chosen to represent the rest of the students too gave some remarks. In her closing remarks, Macklyne expressed gratitude to the coaches, teachers and host institutions for their support, warm welcome and care while they engaged in all project activities. She talked of the need to foster more communication and collaboration among the students, the opportunity to enroll for internship under the ABC BlendEd project/course was just an ignition.

Agreed immediate next Steps following the end of Edition 2023/24 meeting

The following were the agreed upon next steps

- Finalize procurement and reporting by November 2024.
- Implement feedback from pitches for final reports that should be submitted in 2 weeks.
- Continue workshops and training sessions.
- Develop and disseminate reports and certificates.

The closure session was adjourned at 5:30 PM.

2.7 Student teams' product/ deliverables: product, transfer of results, exploitation/sustainability plan

From the internship period that stretched from 20th May to 26th July 2024, the two teams of students developed what they took as feasible solutions to the allocated challenges, but because of limited time and lack of financial resources to but materials that were needed to establish the suggestions, none was implemented. However, each of the solutions was expected to be sustainable and could be used by other farmers that had similar challenges within the study countries and even beyond. Below we present a description of what the students actually developed.

2.7.1 Product/ proposed solution for the challenge on how to improve availability of quality improved seed using community banks - Mozambique

The Deliverable/product on improving availability of improved seed

The National Agricultural Research Institute (IIAM) was the client in this case. The team thought about and developed a model that had a seed community bank and a smart phone application that would be used to monitor quantities of seed available for use in the bank. The team conceived a community seed bank as an appropriate approach of ensuring continuous and sustainable availability of certified seed to the farmers. Apart from contributing to enhanced productivity (short term), in the long run the model was expected to promote self-reliance among the communities/farmers in accessing certified seed on time and at affordable costs and in

a way reducing dependence on external yet not reliable source of quality seed. As more farmers participate and contribute to the seed bank, the overall availability of certified seeds increases, enhancing agricultural productivity across the province. This model is a sustainable, scalable solution that not only addresses the immediate need for certified seeds but also ensures long-term food security and agricultural development

The students suggested a series of activities that included the following:

- ***Select/identify the extension agent to work with*** - IIAM was to identify an extension worker from the community with whom to engage given that IIAM was not popular or known in the communities. Farmers often preferred people they knew and related with more as opposed to strangers. In this case the IIAM would be looked at as outsiders and chances of mobilising the right farmers for this cause would be an uphill task. Extension workers know their communities and are useful in mobilising the communities.
- ***Selection/identification and preparation of farmers/community to be seed producers*** – farmers are very important in the production and availability of the required certified high-quality seed. The extension worker in collaboration with IIAM, and with a well thought through criteria, identify few willing and potential farmers that would actively produce the certified seed with technical guidance or supervision from IIAM. Part of the criteria could include availability or land, education level, commitment, among others. It is easier when the identified farmers are closer to the seed bank infrastructure. These farmers are taken though comprehensive training on what they must technically know/do to produce crop specific quality/certified seed that would be distributed to the rest of the community/farmers at an agreed cost. Start with few farmers (seed producers) and increase the number when it is okay, but maintaining quality. It was envisaged that the IIAM would provide the required inputs (breeder seed varieties, fertilizers, and pesticides) to the prospective selected seed producing farmers and motivate them with 50% of the seed produced (the farmers return 50% to be put in the seed bank and the other 50% is left to them). The percentage may be different depending on context. Before the seed bank starts working, there must be some minimum quantity of seed to begin with.

  The rest of the community would be brought on board when the system is ready and their awareness raised with regard to presence of the community seed bank, how it would operate, what is expected of them and the different roles. Improvement of farmers' knowledge and skill in proper or good agronomic practices in the cultivation of bean or maize using the certified seed from the seed bank would contribute to improved yields and trust in use of certified seed, which eventually leads to increased use of improved seed. Establish a regular schedule to refresh the knowledge and skill of the farmers in appropriately using the certified seed for improved yields hence food and income security. Use a variety of extension methods in training the farmers e.g. field days, demonstrations, visiting model farmers, one to one mentoring/coaching, among others.

- ***Seed bank management committee***: select and adequately prepare a committee that will co-manage the seed bank. This committee should include the extension agent/worker, research institute, and farmers. What is expected of them should be clear
- ***Mobile application***: The Community Seed Bank Mobile Application was designed as a tool for efficient management and operation of community seed banks. The Community Seed Bank Mobile Application would enhance the functionality and efficiency of community seed banks by incorporating detailed record-keeping, accurate yield predictions, seed generation tracking, and streamlined seed distribution and return tracking. The aim of integrating the app in the model was to ensure an effective, efficient, and sustainable operation of the community seed bank, ultimately contributing to increased seed availability and improved agricultural productivity (in Tete province – Mozambique).

  Functionality of the proposed mobile application: Among the functions of the APP, were socio-economic info of the farmer; yield prediction; seed generation tracking. Each function is described below:

(a) Socio-economic information of farmer: This was aimed at supporting a record system that gives detailed and accurate information about the farmers enrolled in the community seed bank service and all seed-related

activities within the community seed bank. Features included farmer's name, location of the farm/garden, farm/garden size, planting date, soil fertility level at planting time, type and quantity of fertilisers applied, type and quantity of pesticides applied, weeding frequency, harvesting date, amount of yield obtained, amount of yield returned to seedbank.

(b) accurate *prediction of yield* before, during and after planting was the major aspect. The student team was expected to train the IIAM staff on the use of the APP and check for its usability and reliability before handing it over to IIAM. This did not happen; the tool was not yet ready at that time. It would help IIAM to get insights about why yield would be low or high and hence a clue on what could be done in the case of predicted low yields. The prediction would help prevent under declaration of harvested seed by farmers - the malpractice of farmers declaring less harvest than what they have actually harvested in order to retain excess seeds and gain more profit is not new. The chosen variables for prediction are; seed variety, soil fertility level and soil moisture content level. During the implementation, one variable can be used at the beginning while studying its output then others later integrated to improve the prediction output. This would also help in identifying the seed variety best suited to the local condition.

(**c**) ***Seed generation tracking*** - Tracking of certified seed in and out of seed bank: This enables the seed bank to know when to discard or replace specific seed varieties. The feature of seed generation is; seed type, seed variety, seeds generation number (time re-played), available quantity in the seed bank. This would also include a notification about seed beyond the required generation therefore they should be replaced. This is because good seed generation enables farmers to produce high-quality seeds.

(d) Monitoring of seed distribution - This app would also streamline and monitor the distribution and return of seeds from the community seed bank, ensuring an efficient process. This would be done through a notification within farmers' record that shows whether a farmer returned all the required 50% of the harvested yield or not.

The Community Seed Bank Mobile Application targeted a range of users that included local farmers, seed bank management/administrators, agricultural researchers, and agricultural extension workers.

The steps were summarised as (1) Select extension agent to work with in community; (2) List all willing potential seed producers; (3) Select focal producers to get first in the program and seed production; (4) Provide production inputs to the elected trained farmers (seed producers); (5) Work with the focal seed producers (training and production); (6) form teams with small producers where they will be responsible for ensuring control of basic conditions, reducing the burden on extension agents; (7) Replicate all activities learned; (8) facilitate agreement between farmers and seed companies; (9) collect and store surplus seeds in the community seed bank; (10) establish a seed loan and recovery system.

Transfer of results and sustainability of the proposed solution of improving availability of improved seed

Transferability: The deliverable of the seed bank and mobile application model is transferrable or scalable and can be applied to different seed/crops and areas. The model can be adapted to suit similar local contexts where it is transferred. Scaling up and out makes it possible to reach more farmers. The overall impact would be an increase in availability and use of improved seed among the farmers hence improved yields, food and income security.

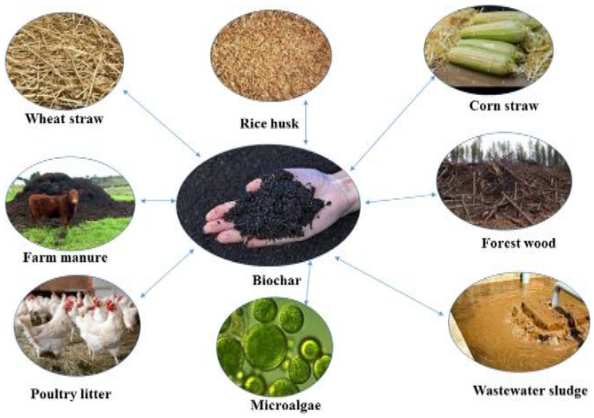
Sustainability: The seed bank system that is supported by the mobile application (model) is a sustainable and affordable approach that promotes collective action between and among the implementing partners (researchers, seed company, farmers, extension workers). The system is expected to ensure a continuous sustainable, effective and efficient seed distribution and availability system in the community. This approach not only meets the immediate needs of farmers but also builds a robust seed reserve for future planting seasons. This also solves the problem of inadequate seeds whenever farmers are affected by disasters such as floods.

2.8 Product/proposed solution to challenge on how to manage poultry/pig waste in a way that eases its drying for use and neutralizes the offending odor – Nigeria

The Deliverable/product on managing poultry/pig waste

The team proposed use of biochar in neutralising the bad odour and also ease drying of the waste. Biochar was the students proposed appropriate solution given that it was easy to make and affordable. They proposed a frame that could be used to produce **biochar** besides encouraging appropriate mixing of animal feed with the right proportions of required ingredients. The main activities were: (1) how to produce biochar; and (2) how to apply the biochar.

Production of biochar is from a pyrolysis process where organic biomass from on-farm waste is burnt under anaerobic conditions or very limited oxygen supply. Organic material includes woody waste, rice husk, sawdust, sugar cane waste, maize stover/straws, animal bones, among others. Biochar solves odour through its high cation exchange capacity that adsorbs ammonia, hydrogen sulphide and other volatile organic compounds known to contribute to manure odour. Its adsorption characteristic provide support to microbial population that further degrade odour causing compounds.

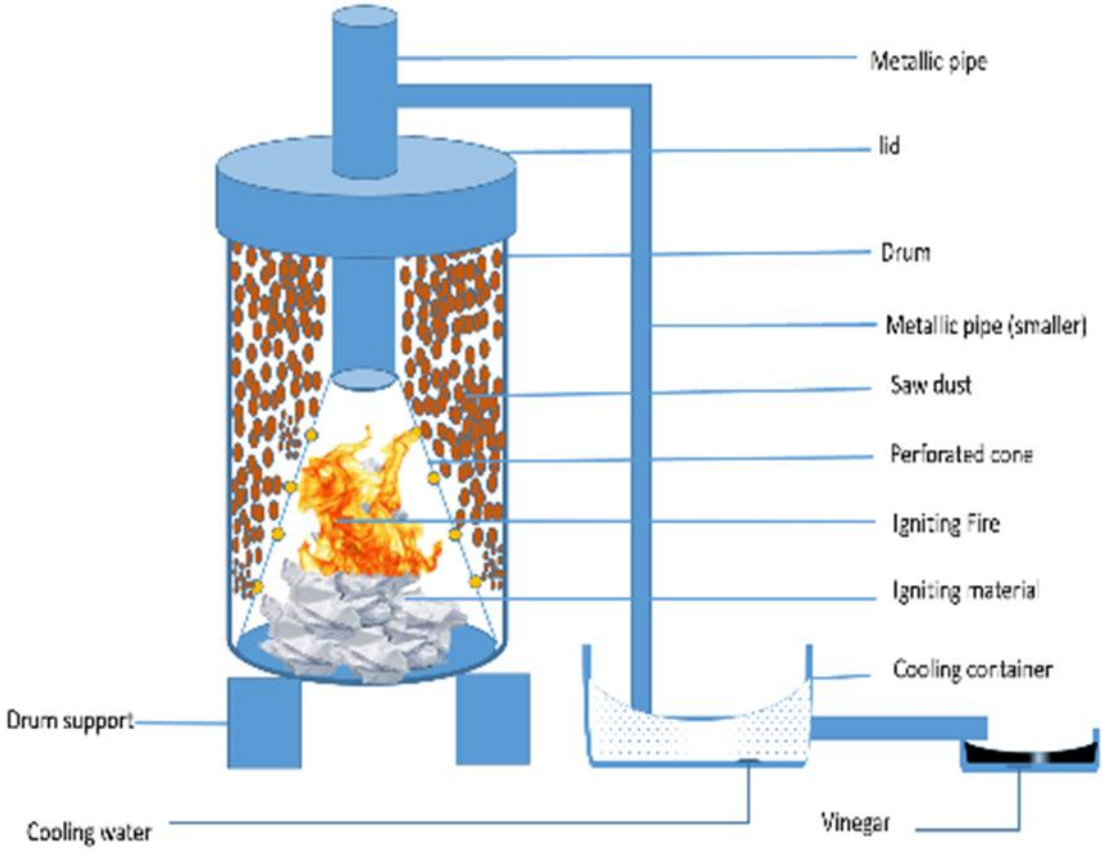


Production of biochar using the drum: The team acknowledged three methods of producing biochar that included drum method; truncated cone and pit method. However, they chose the drum method with reason of less pollution of the environment. The materials needed include biomass or farm waste, metallic drum (about 200 liter capacity) like the one in the photo, water, a pipe (about 10cm diameter) and another of about 3.5 com diameter, bricks/blocks, cooling container and truncated cone.

The procedure:

1. Set the drum on brick for supports.
2. Place a cone at the drum's base from inside.
3. Put the igniting material inside the cone.
4. Cover the cone to keep the sawdust separate from the igniting material, then fill the drum with sawdust up to a level just below the cone cover.
5. Light the fire on the igniting materials inside the cone.
6. Insert a metallic tunnel into the cone's opening.
7. Continue adding sawdust to the drum until it is full.
8. Cover the drum with a metallic or wooden lid.
9. Attach a stainless-steel tube to capture and direct the smoke to a cooling chamber submerged in cold water.

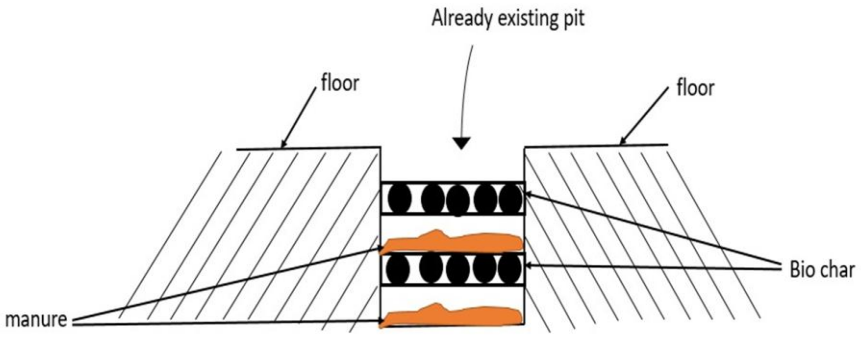




It is important to note that once the pyrolysis is complete, the biochar should be allowed to cool before handling. It is then crushed into smaller, manageable pieces and stored in a dry area until it is ready for application. Time taken for production of biochar depends on the farm material used. For example, production from rice husk would take a maximum of 3 hours, while use of sawdust would take 3- 5 hours. The 'softer' the material, the less the time and the 'tougher' the material, the longer the material. When produced, biochar is light weighted, often weighing 25% of the volume of the un burnt biomass/material. Good biochar has little or no odour. If it smells tarry or sooty, it's not completely burnt/pyrolyzed. You will need to adjust your method to burn it longer or hotter. Processed biochar is black like charcoal, although some biochar would look iridescent. Smash a few larger pieces to make sure the insides are thoroughly charred.

Checking for quality of biochar: When processed (pyrolyzed and cooled) it would be important to check the quality of the produced biochar. To test the quality of the biochar, soak a handful of hot biochar cold water. Signs of poor quality will include: not fully charred material; lots of ash in the water; and a creosote ('old fire') smell if you hold it close to your nose and take a deep sniff.

Application of produced biochar to manage the offending smell and wetness of manure: The biochar could be applied on layers of heaps of the manure whether in a pit or a manure house. The application ratio is 2.5kg of biochar evenly spread to make an 8-10cm thickness of biochar on 20Kg of manure. The layers continue i.e. manure, biochar, manure, biochar. Ensure the biochar is the last layer on the manure as shown in the illustration below.



Number and size of pits would depend on the volumes of manure produced. the odour is controlled immediately while the moisture is removed gradually. It is important to protect the pit and the layered items (manure and biochar) from rain, but also important for the pit to get light and sun to enhance microbial activity. In the case of a manure house, there must be a roof and the floor should allow absorption of moisture. Every layer of manure piled in the pit should be followed by a well distributed layer of Bio-char before another layer is put. After about 3 weeks, depending on quality of biochar used, effectiveness and efficiency of layering the manure with biochar, the offending smell would be neutralised or gone. The "treated manure-biochar would then be removed from the pit and spread under the sun and well aerated environment to hasten drying.

What the students planned to do to ensure success of the biochar option in managing foul odour on Ozuluonye Emmanuel, the farmer's farm.

Odour monitoring: Regular checks to monitor presence and strength of odour using both the subjective method of practically smelling (smell tests) and if possible, the use of gas detection equipment to measure the concentration of ammonia and other odour causing gases in the vicinity of the waste pits. Presence of smell would give an indicator of the effectiveness of the biochar and guide on the decision on the next step (is it about improving on the quantity or quality of biochar used)

Moisture control: It was noted that monitoring of the moisture levels in the treatment waste pits was crucial, as excess moisture could hinder the effectiveness of biochar. Steps would be taken to ensure that the manure remains sufficiently dry to optimize the performance of the biochar.

Biochar efficacy testing: Samples of the biochar-treated manure would be periodically (about bi-weekly) analysed to get indication of biochar's structural integrity and continued ability to adsorb gases. This helps in determining whether additional biochar needs to be added or if the existing application is sufficient.

Building capacity (or training) of the farm workers: It was important to integrate use of biochar in the daily farm operations. All farm workers, especially those in waste management, would be trained on the proper techniques for biochar production, storage and application, including safety precautions and best practices for maximizing odour control. Training would ensure that the biochar is applied consistently and effectively.

Logistical planning: The logistics of biochar production and application would be coordinated with the farm's routine activities. This included scheduling pyrolysis sessions, and ensuring a sustainable supply of biomass, and the timing of biochar application.

Transfer of results and sustainability of the proposed solution of biochar to manage poultry/pig waste smell and drying

Transferability: production and use of biochar is a technology that can be applied in any context of a farm/farmer facing challenges of offending odour and disposal (management) of poultry/pig waste. Its production from

locally available materials, ease of application and the benefits associated makes use of biochar transferrable to more farmers within and beyond with the key outcomes tagged to minimised emission of offending gas to the surrounding environment hence a more comfortable environment both on the farm and in the nearby communities thereby improving the quality of life for residents and reducing potential conflicts related to farm operations; and improved crop yields for food and income security.

Sustainability: Use of biochar is sustainable given its production from on-farm waste that can make it and its benefits. Biochar absorbs and neutralises odours effectively and improves on the quality of air around the farm (piggery or poultry unit). Its production from organic crop/plant waste makes it an environmentally friendly option. The dry odourless product is useful in soil fertility amendment especially through its contribution to water retention capacity of the soil, enhanced microbial activity, and nutrient addition to the soil, hence improved crop yields. The farmer could sell the dry odourless manure for soil fertility amendment to other farmers. Biochar contributes to carbon sequestration thereby reducing emission of green house gases to the environment. Its ease of application is an important factor that promotes its use over and over – sustainable. It fits in the normal farm activities and would not warrant more labour costs on the farm.

For more long-term sustainability of use and benefits from the biochar, it would be a great opportunity for the farmer to explore opportunities of applying biochar-treated manure back into the soil as a fertilizer. Besides, the treated manure would be appropriately packaged in affordable quantities sold to other farmers to use in their gardens too. This ensures effective use and management of the product. In a way, the product would improve on the crop yields hence food and income security among the farmers. It would be important for the farmer/farm to work with agricultural research institutions to explore further innovations in biochar use and animal waste management in general.

In as much as biochar was a more friendly option in managing smell of animal waste in a piggery/poultry farm, it was important to take note of issues that would limit its effectiveness. ***Quality of the biochar vary*** and its effectiveness depend on the feed stock used (quality of feed given to the animals) and conditions observed under the pyrolysis process. Results could be inconsistent. Determining the ***optimal application rates*** of biochar for odour control can be complex and may require site-specific trials and adjustments. There may be ***regulatory hurdles and safety concerns*** associated with the production and application of biochar, particularly if not properly managed.

2.9 Grading of the students

The students were graded collectively in their teams during the final pitch presentations of their proposed solutions to the allocated challenge (improved seed availability and animal waste management) – see section 6.4.4 under the closure meeting (at Futminna). With the agreed upon criteria of (a) the process of working together (marked out of 33); (b) usability of the solution/product (marked out of 34) and (c) presentation skills (marked out of 33); the final score was 90% for the waste management team and 88% for the seed team.

The coaches adopted the mark of 90% and 88% for the related internship course for the students that belonged to their universities, save University of Zambeze that did not have yet a course on internship. Whereas university of Nigeria, Federal University of Technology, Minna; Eduardo Mondlane, and Soroti university took the project score for the final mark of their students, the situation of Zambeze university and Makerere were little different. For Makerere university, the two students were required to fit the ABC BlendEd internship program into the institutionalized internship procedure of the university for an individual assessment and mark. They each produced a log book and a report. A logbook is like a journal where the student is expected to record everything they do, how they do it and outcomes of the activity plus process. It holds each student accountable of their internship time in the field. The two students from Makerere each produced a logbook that indicated all activities done, when they were done, outcomes of the activities, skills and knowledge learnt. The report was recast following the structure of the BARI program. An average score was then calculated from the individual

student score (log book out of 40% and report out of 60%) and the team score for the final mark that was entered into the university system as the student's internship mark.

2.10 Assessment of the ABC BlendEd internship by students

The 12 students from the 6 participating universities in Africa assessed the internship with guidance of questions using google forms. The questions generally sought to find out the extent to which individual students improved and gained in the different skills. The major areas sought included: The students experience with the project exposure activities, skill gained (extent) as a result of participation in the project, advantages and disadvantages observed in/with the participation in the project activities

2.10.1 Students' individual experiences given their participation in the project

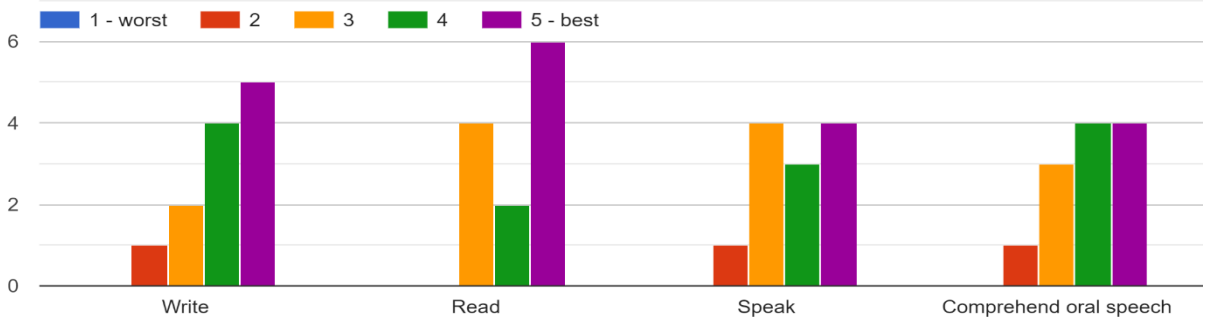
Students' perceived experiences in the different skills as exposed by the ABC blended course activities are summarized in the table below with a scale of 1 (worst experience) to 5 (best experience).

Table: Extent to which individual students liked the experiences presented in the project (1 = worst and 5 = best)

For the English Language, the figure below suggested that majority of the students had a very good experience especially in reading and writing.

Experience presented in the ABC BlendEd project	Percentage how students perceived the experience (Scale of 1-5)				
	1	2	3	4	5
Working in teams of students from different universities and background	0	0	0	42	58
Cultural intelligence/sensitivity	0	0	8	58	33
Working virtually (virtual team work)	0	0	17	50	33
Familiarity with project management tools	0	0	8	50	42
Working with real life projects to deliver results/prototypes	8	25	25	25	17

4. English skills in general



2.10.2 Skills gained as a result of participating in the ABC BlendEd program

The students too were requested to give their position that represented the extent to which they gained or improved in the same skill areas. With a five-point scale that had 1= decreased, 2 = more or less the same, 3 = improved, 4 = improved much and 5 = improved very much, the results were as below

Table: Students' individual perception of extent to which they gained skills

Skill	Percentage of how students perceived skills gained as individuals				
	Decreased	More or less the same	Improved	Improved much	Improved very much
English Language (writing, reading, speaking and comprehending)	0	25	8	42	25
Teamwork (international team)	0	0	0	17	83
Cultural intelligence / sensitivity (ability to make sense of unfamiliar contexts and blend in well	0	8	9	33	50
Virtual teamwork (working with team members from a distance, no physical contact	0	0	8	33	58
Level of familiarity with project management tools that teams use to meet a common goal	0	0	0	50	50
Familiarity with working with real life projects / problem	0	0	0	42	58

The students were exposed to project management tools that they had not used before or did not use them as much before. These included Microsoft teams, google meet and zoom. Of the three, the Microsoft team was the newest to them. Google meet was more appropriate because it did not need a license for their meetings and compared to zoom whose time of use was limited when one did not have a license.

2.10.3 Advantages, testimonials and disadvantages of ABC BlendEd course as experienced by the students

Advantages of the course

The students were asked to list what each of them regarded as the biggest advantage of the ABC BlendEd course. The responses were as below verbatim:

- Gained knowledge in solving real life problem and gained international network
- Gaining new knowledge educationally, socially, cultural.
- Opportunity to solve an agrarian challenge with a multidisciplinary team which has given a very exciting cultural experience.

- Context of operations straight from the challenge, solving and implementation has changed very much my way of viewing and handling things or tasks and challenges.
- improve teamwork and learn about different cultures.
- It made me understand how to go about my dream, solving farmers problem and the international connection
- Working with people from other parts of the world and collaborating with brilliant minds
- It has given me a platform to boost my confidence,
- taught me to balance my schedules to get work done,
- thinking critically on the challenge being handled and be more responsible whenever am working with a team.
- It has also given me chance to work on a real-life challenge, make friends and be more social
- Working with international people and learning public speaking
- Working with a multi-national team that has people belonging to different careers
- Improved my English and gave me much experience to practice
- Exposure to real situations; Possibilities for interaction with teachers and colleagues with different experiences.
- Learning more, update my skills and knowledge

Disadvantages of the ABC BlendEd project course as observed or experienced by the students

The question to the students was, “What has been the biggest disadvantage of this course”? The responses from the students were as below:

- Misunderstanding of companies involved about the project
- Having limited access to the materials needed to solve the problems, lack of resources to experiment the proposed solution for the challenges
- Not getting the information needed from the origin of the challenge in the possible time needed.
- Limitations in ensuring all team members are on the same page since were very used to different languages and country (community) settings.
- language difference which made communication a little difficult
- Universities have different class periods and activities sometimes coincide with critical periods (evaluations) for certain students, which is why there were certain absences in the online sections.
- Very meagre funds for student upkeep during the work

Among the disadvantages, language barrier and lack of funds to buy materials to implement the proposed solutions were the most popular.

2.10.4 Expert tips to friends interested or willing to jpoin the next ABC BlendEd course edition

Students were asked the three 'expert tips' they would give a friend of theirs interested or willing to take participate in the next edition of the ABC BlendEd course? The responses were as below:

- Be committed and able to work charitably under no supervision
- Research more,
- Be confident and
- Be open to learn new things
- Think outside the box,
- Be flexible and

- Be ready to work on meeting tight deadlines with convincing results of or task work allocated to you.
- Learn multiple languages, Learn English for those that use Portuguese
- have the ability to work in a team and
- Respect different cultures
- Respect colleagues
- Relate well with people, especially, people from different cultural backgrounds Build your management skill and international connection,
- Be a fast and deep thinker.
- Have good listening and speaking abilities or skills – build them.
- Build your adaptability, flexibility, and communication skills
- Have clear goals of engaging and be focused on the project
- Actively and proactively engage with members of your team to solve the problem or challenge allocated/presented
- Reflect and think through the solutions or comments suggested
- Be active and interested in all sessions in order to learn more

2.10.5 Suggestions for improvement of the ABC-BlendEd project/course

The guiding question to the students was, "What can be done to improve the ABC BlendEd course?" The suggestions included the following:

- A clearer framework guiding students on how to manage the project
- Provide funding for the students, sufficient funds for students up keep
- Specify the challenges well before accepting them to be solved in the project
- Students should be well facilitated with facilities or ways to ease their online engagements. This can be in form of better Internet access devices.
- Coaches should follow up and monitor each individual student to find out how they are performing towards solving of the challenge given
- Provide enough resources for experimenting solutions to challenges being presented for research - provision of funds to run the program.
- Enroll students that would be graded by the course – whose mark counts in the university system
- The challenges or problems should come from the countries that are planned to be visited (kick off and closure meeting places)
- Select participating students early enough and support those from Portuguese as official language to learn English
- Have a practical phase of actually implementing and evaluating the application of the solution to the challenge to know if the solution is appropriate or not

2.10.6 Student testimonies or testimonials on personal and professional growth realized

Students' testimonials on the advantages and registered personal and professional improvements

Students were requested to share their individual testimonial(s) on the advantages and improvements at personal and professional level realized as a result of their experience or participation in the BlendEd program (2 or 3 sentences). The examples given for guidance on what they could mention/write were general impact, best features, skills learned or improved, employability impact, other gains, lessons learned. The testimonials given were broadly categorized under developing solutions to real life challenges, making

friends or networking, social skills improved and responsibility level of the self. The testimonies were:

- Developing solutions to real life challenges among the communities
    - Provided solution to a real-life challenge, professional advancement and gained international network.
    - Got opportunity to solve another agricultural real-life problem, improved more on the skill of social relationships, and gained more knowledge.
    - I learned how to solve challenges by consolidating the practical part with the theoretical part and carrying out a phased investigation and looking for more theoretical bases
    - Improved on process of how to solve a problem
- Making friends, networks, teamwork
    - I have been able to make friends from other countries who are also from different professions which has grown my connection base.
    - I have made friends and made connections, gained experience in working with people different cultures.
    - ABC BlendEd program has created a link between us students and coordinators, we hope to continue to work together.
    - Working with people from other parts of the world.
    - Learnt that despite each person's differences and culture, it is possible to work as a team in harmony and obtain good results
    - Improved my interaction with others
- Improved social skills
    - The program has improved my ability to be patient skill and understanding others
    - Among the skills I have learnt and improved are communication skills – speaking with focus and clarity, presentation skills, and problem-solving skills
    - I have particularly improved my English
    - I learned how to work with people and also how to speak publicly
    - Ability to adapt fast and be productive when working under limited time.
    - enhanced my communication (listening and speaking) prowess.
    - the program has enhanced my reasoning faculty to see things from far and beyond and to provide a befitting solution to any encountering challenge(s), that can be proven beyond doubt.
    - I have improved my team spirit - learnt more to work in teams
    - I developed critical thinking about many situations and the reality of many farmers.
- Improved level of responsibility for own learning
    - I was able to concentrate and hear aspects regarding matters from different contexts during the brain storming sessions and discussions,
    - It has transformed my learning experience by allowing me to take ownership of my learning (providing solutions), explore new interests, and develop skills in collaboration, critical thinking, and problem-solving.

2.11 Conclusions and Recommendations

Conclusion: The ABC BlendEd course provided valuable experiences to the students and created opportunities for the students to improve on social skills especially working in teams, being sensitive to differences in culture,

problem solving, presentation and communication skills and self-responsibility. It also created a platform for lecturers involved to create networks that could be used in future to develop more collaborative activities amongst them. Based on the advantages and opportunities for personal and professional growth/development from the hands on, interactive and problem-based orientation of the program, it is important that the approach is sustained for universities to produce responsive graduates.

Recommendations

For the ABC BlendEd course/program to be more successful, it is important the following be thought about.

1. **Clarity of the problem or challenge before allocating them to the students**, this would save a lot of time that the students and coaches would waste in focussing the problem. Unless the problem or challenge is clear, it would be difficult for the students to proactively engage on the appropriate solution. Clarity of the problem early enough also would help in identifying the appropriate students to be enrolled on time.
2. In **selecting the students**, emphasis was put on best performance but commitment level of the student should be integrated
3. To enhance **participation of the farmers or companies** whose challenge is selected, it is more appropriate to position the kick off and closure meetings in the countries and specifically sites where the companies/farmers can easily reach.
4. In the **selection of the farmer/challenge**, it is important to get one who clearly understands the operation of the course and willing to invest in the solution in terms of information for clarity, funds to buy some equipment or materials, labour etc. The project does not provide any funding towards solving the identified challenge
5. Students are the focus of the course given that they are the ones working through the most appropriate solution (in collaboration with the company/farmer) with guidance from the coaches but they are not catered for well in the budget for **upkeep and internet/data**.
6. In the student **assessment or evaluation**, only a group/team mark was given. This does not give a true reflection of individual student performance and commitment. The individual student score should be established too – this would make every student to work even harder for a better mark. Best students would be rewarded for their extra efforts.
7. The idea of **certificates** of participation in each year and activity should be maintained but thought about in advance so that the participants receive and go back home with their certificates

2.12 Appendix A: List of participants – African ABC BlendEd Kick-off Meeting in Makerere University, (20th -24th May 2024)

	ABC BlendED project Kick - Off meeting in Kampala, Uganda					
	Hosted at Makerere University Agricultural Research Institute, Kabanyolo (MUARIK)					
	Graduate Training and Research Lab, MUARIK					
	List of participants for the ABC BlendEd project Kick off meeting (20th -24th May 2024)					
	Name of Participant	**Institution**	**Country**	**mode of participation**	**Phone contact**	**Email**
1	Prof. Nuno Escudeiro	Polytechnic University of Porto Instituto Superior de Engenharia do Porto	Portugal	Physical	+351966554443	nfe@isep.ipp.pt
2	Prof. Kristien Van Assche	Odisee University College of Applied Sciences, Technologiecampus Gent	Belgium	Physical	+32495939661	kristien.vanassche@odisee.be
3	Prof. Rogério Marcos Chiulele	Eduardo Mondlane University	Mozambique, Maputo	Physical	+258849551721	chiulele.rogerio@gmail.com
4	Dr. Paulino Bartolomeu Sandramo	Zambeze University	Mozambique, Angónia	Physical	+258843322097	paulinosandramo@gmail.com
5	Prof. Egwim Evans	Federal University of Technology, Minna	Nigeria	Physical	+2347065809474	c.egwim@futminna.edu.ng

6	Dr. Uchechukwu Paschal. Chukwudi	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	Physical	+2347039761027	Uchechukwu.chikwudi@unn.edu.ng
7	Prof Anthonia Ifeyinwa Achike	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	**online**	+2348034234147	anthonia.achike@unn.edu.ng
8	Dr. Hellen Aluku	Soroti University - School of Engineering and Technology	Uganda	Physical	+256773501693	haluku@sun.ac.ug
9	Prof, Francis Ejobi	Soroti University - School of Engineering and Technology	Uganda	Physical	+256772492236	Francis.ejobi@sun.ac.ug
10	Dr. Prossy Isubikalu	Makerere University - College of Agricultural and Environmental Sciences	Uganda	will be Physically present	+256772345398	isubikalu@gmail.com or prossy.isubikalu@mak.ac.ug
11	Dr. Mubebezi Rebecca	Makerere University - College of Agricultural and Environmental Sciences	Uganda	will be Physically present	+256704910568	mukebezir@gmail.com
12	Dr. Fred Bagamba	Makerere University - College of Agricultural and Environmental Sciences	Uganda	Physical	+256774246156	fbagamba2015@gmail.com
13	Assoc. Prof. Ahmada Zziwa	Makerere University - College of Agricultural and	Uganda	Physical	+256777636253	engzziwa@gmail.com

		Environmental Sciences				
14	Dr. Drake Mirembe	Makerere University, College of Computing and Information Sciences	Uganda	Physical	+256776844343	dpmirembe@gmail.com
15	Dr. Joeline Runyararo Rukarwa	RUFORUM	Uganda	Online (day 1)	+256701624260	r.rukarwa@ruforum.org
16	Mr. Emmanuel Okalany	RUFORUM	Uganda	Physically	+256774927973	e.okalany@ruforum.org
17	Yamungu B. Alongo	RUFORUM	Uganda	physical	+256701693785	b.yamungu@ruforum.org
18	Frank Mufuruki	Makerere University	Uganda	Physical	+256756094400	mufurukifrank@gmail.com
	Students enrolled for 2024 Edition					
19	Osvaldo Paulo Pessuro	Zambeze University	Mozambique, Angónia	Physical	+258855431503	osvaldopessuro@gmail.com
20	Maimuna Lúcia Manuel	Zambeze University	Mozambique, Angónia	Physical	+258845632258	Maimunamanuel185@gmail.com
21	Márcia Mucache	Eduardo Mondlane University	Mozambique, Maputo	Physical	+258844155185	marciamarcelomucache@gmail.com
22	Agostinho Filipe Guambe	Eduardo Mondlane University	Mozambique, Maputo	Physical	+258866561225	Agostinhoguambe64@gmail.com
23	Napoleon Glory	Federal University of	Nigeria	Physical	+2348183519704	Napoleonglory18@yahoo.com

		Technology, Minna				
24	Abdul Waheed Ayuba	Federal University of Technology, Minna	Nigeria	Physical	+2349058483677	Abdulwaheedayuba1@gmail.com
25	Goodness Chisom Onuchukwu	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	**online**	+2349075629671	Goodness.onuchukwu.245856@unn.edu.ng
26	Anthony Chukwuka Anigbogu	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	physical	+2349028357699	Anthony.anigbogu241022@unn.edu.ng
27	Bongo Joshua	Soroti University - School of Engineering and Technology	Uganda	Physical	+256787439888	bongojoshua01@gmail.com
28	Kusiima Teddy	Soroti University - School of Engineering and Technology	Uganda	Physical	+256782420308	kusiitedi@gmail.com
29	Monge Macklyne Adong	Makerere University - College of Agricultural and Environmental Sciences	Uganda	Physical	+256776373411	macklynetevin@gmail.com
30	Kisuule Ismael	Makerere University - College of Agricultural and Environmental Sciences	Uganda	Physical	+256786833953	Ismaelkisuule1@gmail.com

2.13 Appendix B: List of participants for the Closure meeting held at FutMinna, Nigeria (22nd -26th July 2024)

	ABC BlendED project Closure meeting for the 2023/24 Edition					
	Hosted at Federal University of Technology, Minna (FUTMINNA) – African Centre of Excellence for Mycotoxin and Food Safety (ACEMFS)					
	List of participants for the ABC BlendEd project Closure meeting (22nd -26th July 2024)					
	Name of Participant	**Institution**	**Country**	**mode of participation**	**Phone contact**	**Email**
1	Prof. Nuno Escudeiro	Polytechnic University of Porto Instituto Superior de Engenharia do Porto	Portugal	online	+351966554443	nfe@isep.ipp.pt
2	Prof. Kristien Van Assche	Odisee University College of Applied Sciences, Technologiecampus Gent	Belgium	online	+32495939661	kristien.vanassche@odisee.be
3	Prof. John Alabi	Federal University of Technology, Minna	Nigeria	Physical	+2349030083008	Shola.alabi@futminna.edu.ng
4	Dr. Paulino Bartolomeu Sandramo	Zambeze University	Mozambique, Angónia	Physical	+258843322097	paulinosandramo@gmail.com
5	Prof. Egwim Evans	Federal University of Technology, Minna	Nigeria	Physical	+2347065809474	c.egwim@futminna.edu.ng
6	Dr. Uchechukwu Paschal. Chukwudi	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	Physical	+2347039761027	Uchechukwu.chikwudi@unn.edu.ng

7	Prof Anthonia Ifeyinwa Achike	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	Physical	+2348034234147	anthonia.achike@unn.edu.ng
8	Dr. Hellen Aluku	Soroti University - School of Engineering and Technology	Uganda	Physical	+256773501693	haluku@sun.ac.ug
10	Dr. Prossy Isubikalu	Makerere University - College of Agricultural and Environmental Sciences	Uganda	Physical	+256772345398	isubikalu@gmail.com or prossy.isubikalu@mak.ac.ug
11	Dr. Mubebezi Rebecca	Makerere University - College of Agricultural and Environmental Sciences	Uganda	online	+256704910568	mukebezir@gmail.com
	Students enrolled for 2024 Edition					
12	Osvaldo Paulo Pessuro	Zambeze University	Mozambique, Angónia	Physical	+258855431503	osvaldopessuro@gmail.com
13	Maimuna Lúcia Manuel	Zambeze University	Mozambique, Angónia	Physical	+258845632258	Maimunamanuel185@gmail.com
14	Márcia Mucache	Eduardo Mondlane University	Mozambique, Maputo	Physical	+258844155185	marciamarcelomucache@gmail.com
15	Agostinho Filipe Guambe	Eduardo Mondlane University	Mozambique, Maputo	Physical	+258866561225	Agostinhoguambe64@gmail.com
16	Napoleon Glory	Federal University of Technology, Minna	Nigeria	Physical	+2348183519704	Napoleonglory18@yahoo.com

17	Abdul Waheed Ayuba	Federal University of Technology, Minna	Nigeria	Physical	+2349058483677	Abdulwaheedayuba1@gmail.com
18	Goodness Chisom Onuchukwu	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	Physical	+2349075629671	Goodness.onuchukwu.245856@unn.edu.ng
19	Anthony Chukwuka Anigbogu	University of Nigeria, Enugu State - Faculty of Agriculture	Nigeria	physical	+2349028357699	Anthony.anigbogu241022@unn.edu.ng
20	Bongo Joshua	Soroti University - School of Engineering and Technology	Uganda	Physical	+256787439888	bongojoshua01@gmail.com
21	Kusiima Teddy	Soroti University - School of Engineering and Technology	Uganda	Physical	+256782420308	kusiitedi@gmail.com
22	Monge Macklyne Adong	Makerere University - College of Agricultural and Environmental Sciences	Uganda	Physical	+256776373411	macklynetevin@gmail.com
23	Kisuule Ismael	Makerere University - College of Agricultural and Environmental Sciences	Uganda	Physical	+256786833953	Ismaelkisuule1@gmail.com
24						

3 Pilot course Year 2 (2025)

The ABC BlendEd initiative continued into its second year with the same overarching goals: to foster collaborative, challenge-based learning across African and European universities, and to strengthen the bridge between academic inquiry and real-world problem solving. Building on the foundational experiences of Year 1, the 2025 cohort maintained its commitment to interdisciplinary engagement and community-driven innovation.

This second edition benefited from an additional twelve students and six teachers when compared to the first edition. The total number of students and teachers for the African partners was twenty-four students (four each from the six African partner universities) and twelve lecturers (two from each African institution).

3.1 Selection of Company challenge

3.1.1 Call for companies to participate in the ABC-BlendEd project

In preparation for the second edition of ABC BlendEd, African partner universities renewed their efforts to engage local agrarian companies, community organizations, and startups identify real-world challenges suitable for student-led innovation. Building on lessons from Year 1, the outreach strategy emphasized clarity, accessibility, and relationship-building. Following the resolution that hosting countries (if possible, the hosting universities) should provide the challenge, the call for companies to participate in the second edition was restricted to the University of Nigeria, Nsukka, Nigeria and Zambezi University, Mozambique.

As in Year 1, the identification of challenges in Year 2 followed a structured process. First, participating African host universities reached out to agrarian companies, organizations, and communities to raise awareness of the ABC BlendEd approach and encourage participation. Interested organizations then submitted specific challenges using a standard google form designed to capture both the organizational context and the problem to be addressed. Each form outlined one challenge, with organizations free to submit more than one entry. This process ensured that the project team and students clearly understood the nature and context of the challenges, enabling the design of feasible and impactful proposals. It was also emphasized that submission of a challenge did not automatically guarantee its selection. Companies were informed that while ABC

BlendEd does not provide direct funding, selected projects would benefit from student-led research, design, and prototyping, with full ownership of results retained by the client.

3.1.2 Submitted challenges by the interested companies and farmer associations

The process of identifying challenges for the second edition of ABC BlendEd was coordinated by the University of Nigeria, Nsukka being the host for the second edition kick off meeting. The received challenges spanned key sectors such as crop production, livestock management, agro-processing, and value chain optimization. Each submission was carefully reviewed by facilitating university, who assessed the feasibility of the proposed challenges, their relevance to local contexts, and their alignment with the program's 10-week timeline.

1) **Vertex Agro Ltd**, based in Nigeria, submitted a challenge focused on improving the post-harvest processing of cashew nuts. The company highlighted a persistent issue in their production line: the presence of an astringent taste in the final product, attributed to acid leaching during high-pressure steaming. The company expressed interest in solutions that balance efficiency, cost-effectiveness, and scalability for small and medium-sized processors.
2) **ONAH-DUBEM Integrated Farms**, located in Nigeria, proposed a challenge centered on maggot-based feed innovation. The farm has been experimenting with the use of black soldier fly larvae as a protein-rich supplement for poultry and fish feed. However, they face technical hurdles in scaling up production, ensuring hygienic processing, and optimizing nutrient retention. The company is particularly interested in models that could be adopted by other small-scale producers, contributing to a more sustainable and circular agricultural economy.
3) **Chelsea Farms Ltd**, another Nigerian enterprise, submitted a systems integration challenge that explores the feasibility of combining oil palm cultivation with cattle rearing. The company owns land with mixed soil and drainage conditions and is seeking to understand whether a dual-use model could enhance land productivity and diversify income streams. Students are asked to assess agronomic compatibility, design spatial layouts that minimize environmental degradation, and evaluate the economic viability of

such a system. The challenge touches on land use planning, agroecology, and farm management, offering a rich interdisciplinary canvas for exploration.

4) In Mozambique, the **Corn Meal and Feedstuff Processing Plant** proposed a challenge aimed at strengthening the local soybean and corn value chain. The factory currently relies heavily on imported raw materials, despite the presence of capable local producers. The company is particularly interested in models that could foster long-term partnerships with local cooperatives, reduce input costs, and enhance the nutritional profile of their final products.
5) **So Plantas Moz**, a horticultural enterprise also based in Mozambique, submitted a challenge focused on sustainable pest management for fruit crops. The company cultivates mangoes, guavas, and peaches, all of which are highly susceptible to fruit fly infestations. Current control methods rely heavily on chemical pesticides, which raise concerns about environmental impact, consumer health, and export compliance.
6) The **Farmers Association in Angonia**, Mozambique, presented a challenge related to seasonal livestock nutrition. During the dry season, pasture availability declines sharply, leading to weight loss, reduced milk production, and increased vulnerability to disease among cattle and goats. The association seeks solutions that could help farmers maintain animal health and productivity year-round.

3.1.3 Criteria used for challenge selection

The second edition planned to use four company challenges to match the increased number of students. Hence, out of the six submitted challenges, four were selected by the two hosting universities. Since each hosting country submitted three challenges, the steering committee recommended that the best two from each country should be selected. This selection method will give ABC BlendEd teachers and students enough time to interact physically with the company during the physical meeting in each country. Allowing the hosting universities to select the challenges assumed that they are more familiar with the company, the challenge and the environment where the challenge exists. The four selected challenges were:

1) **Vertex Agro Ltd** in Abuja, Nigeria, represented by Daniel Gemana in collaboration with FUT Minna, proposed the challenge of developing a method to remove the astringent taste from processed cashew.

2) **Chelsea Farm Limited** in Anambra State, Nigeria, represented by Ebubedike Ugochukwu in collaboration with the University of Nigeria, Nsukka, posed the challenge of assessing the feasibility of integrating oil palm plantation and cattle rearing given the edaphic, climatic, and socio-economic realities.
3) **Escolha do Povo Factory of Angonia Mozambique (Corn meal and feedstuff processing plant)**, represented by Keith Jooste in partnership with Zambeze University, presented the challenge of studying soybean and corn value chain variables as factors contributing to the factory's competitive advantage.
4) **Farmers Association, Angonia Mozambique**, represented by Faustino Graciano in collaboration with Zambeze University proposed the challenge of promoting sustainable methods of production, harvesting, and conservation of pastures for animal supplementation in cattle and goats.

3.1.4 Challenges that the universities encountered in engaging the companies

Limited numbers of agro-based companies within the vicinity of the hosting universities to engage remained the main challenge that was experienced by the hosting universities that were tasked with obtaining the challenge.

3.2 Selection of Students

3.2.1 Selection of students and establishment of student teams

Each of the universities made internal advertisements to inform students about the opportunity. The targeted students in this case were undergraduate students mainly in agricultural departments and ICT departments. The adverts were made in different ways that included use of email to students and staff to share, use of printed adverts on notice boards within the schools or faculties and office doors of contact lecturers, lecturers announcing the opportunities to students during their lectures with them, lecturers speaking to individual students, and sharing pictures of the advert on WhatsApp platforms of the students. The message on the advert was threefold: one, to inform students and lecturers about the existence of advert of the ABC BlendEd project in the university; two, to provide brief information about what the project is all about; three to provide the criteria of eligible students; as well as link that interested students would use for the application. Table 1 showed that 76 undergraduate students applied the 24 positions in the second edition.

Table 1. Number of students and challenges received and selected per African universities

Applications	2025 - second edition			
	Students		Challenges by farmers	
	applicants	enrolled	proposed	selected
Zambeze University	9	4	3	2
Eduardo Mondlane University	4	4		
Federal University of Technology Minna	20	4	1	1
University of Nigeria Nsukka	15	4	2	1
Makerere University	15	4		
Soroti University	13	4		
Total	76	24	6	4

3.2.2 Selection criteria of the successful students

The criteria used to select students from among those who expressed interest included the following:

- Good academic performance by current cumulative grade point (CGPA). A good CGPA was used as a reflection of serious and hardworking students
- Absence of a retake or carry-over course to avoid students running on and off the program. Those that had no retakes or carry over courses were expected to concentrate on the project and do their work wholeheartedly with no disturbances
- Where the students with the best grades were more than one (considering males and females), they were exposed to an interview. The contact university lecturer co-opted a colleague from among the staff on the project to conduct the interview where they sought the following: level of exposure, extent to which the student displayed qualities of a team player, and to some extent the ability to conceptualise the project
- Among the best performers, the best female and best male students were selected – a total of 24 students with 11 males and 13 females were selected to do their internship with the ABC-BlendEd project/course Edition 2024/25 – second cohort (Table 2)

Table 2: Demographic information of selected students for the ABC-BlendEd second edition

Full Name	Gender	Email Address	Institution	Department	Country
Graça José Macuácua	Female	gjmacuacua18@gmail.com	Eduardo Mondlane	Agricultural Engineering	Mozambique
Jorge Langa	Male		Eduardo Mondlane	Agricultural Engineering	Mozambique
Tarcília Agnaldo Marurele	Female	oziamarurele@gmail.com	Eduardo Mondlane	Agronomic Engineering	Mozambique
Chelsea Paulina Agostinho Fernando	Female	chelseapaulina15@gmail.com	Eduardo Mondlane	Agronomic Engineering	Mozambique
Amole Olayemi Felicia	Female	amoleolayemi230@gmail.com	Federal University of Technology, Minna	Microbiology	Nigeria
Favour Ifeoluwa Obanro	Female	favourobanro@gmail.com	Federal University of Technology, Minna	Biochemistry	Nigeria
Jeremiah John Omale	Male	jeremiahjohn2021@gmail.com	Federal University of Technology, Minna	Biochemistry	Nigeria
Peter Toluwani Joseph	Male	toluwanip5@gmail.com	Federal University of Technology, Minna	Animal production technology	Nigeria
Akol Merab	Female	akolmerab3@gmail.com	Makarere University	Agricultural Extension and Innovation	Uganda
Kagoya Jackline	Female	jacklinekagoya8@gmail.com	Makarere University	Agribusiness and natural resource economics	Uganda
Tugume Joab	Male	jotugume577@gmail.com	Makarere University	Agricultural Extension and Rural Innovation	Uganda

Ssekandi Bedan	Male	ssekabedan@gmail.com	Makarere University	Agriculture	Uganda
Isabirye Simon Peter	Male	kaswadaniel100@gmail.com	Soroti University	Electronics and Computer Engineering	Uganda
Kawuma Latif	Male	kawumalatiif5@gmail.com	Soroti University	Computer Engineering	Uganda
Chelangat specioza	Female	speciozachelangat@gmail.com	Soroti University	Computer science and engineering	Uganda
Anirwoth Rachel	Female	rwothania@gmail.com	Soroti University	Electronic and Computer Engineering	Uganda
Owubokiri Felix Tamunominabo	Male	felixowubokiri@gmail.com	University of Nigeria, Nsukka	Animal Science	Nigeria
Okoro Ruth Chimuanya	Female	chimuanyaruth20@gmail.com	University of Nigeria, Nsukka	Soil Science	Nigeria
Ozota Leticia	Female	ozotaleticia@gmail.com	University of Nigeria, Nsukka	Agricultural Extension	Nigeria
Eyah Christian Tochukwu	Male	eyahtochukwu7@gmail.com	University of Nigeria, Nsukka	Animal Science	Nigeria
Maria Mário santa Maria	Female	maria07.santamaria@gmail.com	Zambezi University	Animal production	Mozambique
Edmundo Isaquiel Silvestre Manjacapolo	Male	edmundoisaquielsilvestre@gmail.com	Zambezi University	Agricultural Engineering	Mozambique
Quenade Antonio Ferro	Male	quenadeferro13@gmail	Zambezi University	Food Science Technology	Mozambique
Justência António Francisco	Female	justenciaantoniofrancisco@gmail.com	Zambezi University	Food Engineering	Mozambique

The selected students were briefed by their ABC-BlendEd coordinators on the aims of the project before travelling to the University of Nigeria, Nsukka, for the kick-off meeting.

3.3 Kick-off meeting of the African ABC-BlendEd Project Edition 2024/25 held on 19 – 23 May 2025 at Nsukka

The ABC BlendEd second edition kick-off meeting was organized and hosted by University of Nigeria, Nsukka 19 to 23 May 2025 at the Africa Centre of Excellence for Sustainable Power and Energy Development (ACE-SPED). The one week physical meeting was used for the launch and orientation for the ABC BlendEd 2025 cohort, including challenge clarification, team formation, and project planning. It also served as a platform for interaction with the host community and delivering of public lectures. Table 3 presents the 5-day program for the Nsukka Kick off meeting.

Table 3: Program for the 5-day kick off meeting at Nsukka

Day/ Time	Activity	Responsible Person	Remarks
Monday 19-05-2025			
08:30 – 09:00	Registration	UNN Organizing Team	All participants
09:00 – 09:30	Welcome Address by Dean/Courtesy Visit		
09:30 – 10:00	Opening Remarks and Cultural Dance Performance	Project Coordinator, UNN	
10:00 – 10:30	Goodwill messages from invited Deans		
10:30 – 11:00	**Health Break**		
11:00 – 11:30	Overview of ABC BlendEd Project and Objectives	Prof. Nuno, Coordinator (IPP, Portugal)	
11:30 – 13:00	Introduction to the Four Company Challenges	Representatives from Partner Companies	
13:00 – 14:00	**Lunch Break**		
14:00 – 15:00	Forming Teams and Role Orientation	University Partners and Supervisors	
15:00 – 16:00	Developing strategies on how to address the identified challenges	All participants	
16:00 – 16:30	**Health Break**		
16:30 – 17:30	Team presentations on strategies developed	All participants	Plenary
Tuesday 20-05-2025			

09:00-09:15	Recap and Overview of the Day		Plenary
09:15–10:15	Team Project Work on Challenges	Student Teams A–D	Parallel sessions
10:15-10:45	**Health Break**		
10:45–12:00	Course Presentation 1: *LinkedIn - Professional Presence Online*	Prof. Cláudia Rodrigues ISCAP – Polytechnic of Porto	Plenary
12:00–13:00	Course Presentation 2: *Intercultural Teamwork*	Prof. Tatjana Welzer University of Maribor, Maribor	Plenary
13:00-14:00	**Lunch Break**		
14:00–14:30	Group Reflection & Discussion on Course Applications	Facilitators	Plenary
14:30-16:00	Team Project Work on Challenges	Student Teams A–D	Parallel sessions
16:00–17:00	Review and Feedback from Supervisors	Parallel Sessions	Plenary and Parallel sessions
Wednesday 21-05-2025	Registration		
09:00-09:15	Recap and Overview of the Day		
09:15–10:15	Course Presentation 3: Social Skills	Dr. Prossy Isubikalu Makerere University, Uganda	
10:15–10:45	**Health Break**		
10:45–13:00	Challenge Solutions – Deep Work and Consultation with Mentors	Supervisors + Company Mentors	
13:00–14:00	**Lunch break**		
14:00–16:30	Prototype Refinement and Final Pitch Preparation	Team Sessions	
16:30–17:00	Teachers/Coordinators Strategy Meeting	Closed Session	
Thursday 22-05-2025			
09:00–10:30	Final Rehearsals: Team A & B	Peer and Mentor Review	
10:30–11:00	**Health Break**		
11:00–12:30	Final Rehearsals: Team C & D	Peer and Mentor Review	

12:30–13:30	**Lunch Break**		
13:30–15:30	Reflection and Peer Assessment Activity	Facilitated Group Activity	
15:30–16:30	Coordinators Debriefing and Evaluation Meeting	Internal Meeting	
Friday 23-05-2025			
09:00–10:30	Final Pitches: Team A & B	Evaluators, Company Reps	
10:30–11:00	**Health Break**		
11:00–12:30	Final Pitches: Team C & D	Evaluators, Company Reps	
12:30–13:30	**Lunch Break**		
13:30–14:30	Evaluator and Company Feedback	Plenary	
14:30–15:30	Reflections, Lessons Learned, and Certificates	Project Coordination Team	

3.3.1 Day 1 (19-5-2025): Opening and Challenge Presentations

3.3.1.1 Courtesy call and opening session

The meeting commenced with a courtesy call to the Vice Chancellor's office. Professor Mrs. Anthonia Achike, the team leader of ABC BlendEd UNN, introduced the delegation and outlined the purpose of the visit. In attendance were the Dean of the Faculty of Agriculture, UNN, Professor J.I. Eze; the Dean of the Faculty of Agriculture, ESUT, Professor Emeka Nze, teachers and some students from the six partner universities from Africa, while the European partners participated online (Pictures 1 and 2). Principal officers of the University of Nigeria led by Professor Romanus Ezeokonwo, the Deputy Vice-Chancellor Administration representing the acting Vice-Chancellor, Professor Oguejiofor Ujam, reaffirmed institutional support for the ABC BlendEd initiative.



Picture 1. ABC BlendEd Team reception in the Vice chancellor's conference room, UNN.



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Picture 2. UNN administration Team with ABC BlendEd Team and invited guests

After the courtesy visit, the meeting continued at the Africa Centre of Excellence for Sustainable Power and Energy Development (ACE-SPED), where the program's objectives and structure for the 2025 edition were outlined by UNN coordinator.

Prof. Nuno Escudeiro joined virtually to present an overview of the ABC BlendEd model, emphasizing its pedagogical foundation and the importance of real-world challenge engagement. Institutional representatives introduced their teams and shared expectations for the week, setting a collaborative tone for the activities ahead. Welcome addresses were delivered by the dean of the faculty of Agriculture, UNN (Picture 3) and other deans of agriculture from universities close to UNN. The Director of ACE-SPED, Professor Emenike Chinedozi Ejiogu, also welcome the participant to the center and to Nigeria.



Picture 3. Welcome address by the Dean, Faculty of Agriculture UNN during the opening ceremony of the second edition Nsukka Kick off meeting

After the introduction, the session transitioned to the presentation of company challenges. Four company challenges were formally presented:

- **Chelsea Farms Ltd** introduced a systems integration challenge exploring the feasibility of combining oil palm cultivation with cattle rearing, considering land conditions and socio-economic realities.

- **Vertex Agro Ltd** presented a food processing challenge aimed at removing the astringent taste from cashew nuts caused by acid leaching during steaming.
- **Escolha do Povo Factory of Angonia** highlighted supply chain inefficiencies in maize and soybean sourcing, seeking strategies to strengthen local procurement and reduce reliance on imports.
- **Farmers Association, Angonia** raised concerns about seasonal feed shortages for cattle and goats, proposing a challenge focused on sustainable pasture production and conservation.

3.3.1.2 Grouping students and coaches into four teams to address the challenges

The company representatives (excluding Escolha do Povo Factory of Angonia) presented their challenges to the teachers and students. Questions were asked by the students and teachers for clarity on the challenges and feedback were given. After the challenge presentation, the twenty-three students (Jorge Langa joined online) were divided into four groups to manage the four challenges. The assignment of students to a group followed the similar guiding rule like in first edition. Briefly outlined below:

c) No two students coming from the same university belonged to the same team. That meant each of the students from the same university was allocated to a different group.
d) A group would have no less than 30% female or male students, which meant that a group was expected to have not less than 2 females or males.
e) The student's field of study was considered in group allocation.

Students were briefed on the challenge themes and informed of their group assignments for the following day. Students were tasked with selecting a catchy group name related to their assigned challenge and appointing a group leader. They were told to summarize and present a recap of the Day 1 activities to ensure a smooth transition into the next day. The students were guided to their group rooms for discussion. While the students were engaged in their tasks, the coaches were assigned to the four different groups based on their expertise and the challenges to be addressed. Coaches were designated to support each team throughout the project cycle (Table 4).

Table 4: Names of students and coaches addressing the identified challenges.

Challenges	Group Name	Student Name	Coach Name
Elimination of the astringent taste in cashew nuts	Sweet Cashew	Anirwoth Rachel	Prof. Egwim Evans
		Maria Mario Santa maria	Dr. Musa Chemisto
		John Jeemaih Omale	Abigail Adegoke
		Tugume Joab	
		Graca Jose Macuacua	
		Ozota Leticia	
Sustainable Land-Smart Agro-Enterprise Plan for Chelsea Farms	AgroFit	Kawuma Latif	Prof. Anthonia Achike
		Akol Merab	Prof. Uchechukwu Paschal Chukwudi
		Ifeoluwa Obanro	Mr. Emmanuel Okalany
		Quenade Ferro	Dr. Rebecca Mukebezi
		Okoro Ruth Chimuanya	Dr. Hellen Aluku
		Jorge Langa	
Enhancing the Production and Quality of Maize and Soybean for E. Colha Dopovo Company in Angonia	ZeaBean	Edmundo Isaquiel Silvestre	Quisito Chico F. Raiva
		Amole Olayemi Felicia	Dr. Arsenio Daniel Ndeve
		Kagoya Jackline	Dr. Benedict Unagwu
		Tarcilia Agnaldo Marurele	
		Owubokiri Felix Tamunominabo	
		Isabirye Simon Peter	
Sustainable Feed Production in Angonia	Sustainable Feed Production	Ssekandi Bedan	Dr. Inacio Mateus Assane
		Chelsea Fernando	Dr. Prossy Isubikalu
		Chelangat Specioza	
		Justenia Antonio Francisco	
		Peter Totuwani Joseph	
		Eyah Christian Tochukwu	

3.3.2 Day 2 (20-5-2025): Challenge Clarification and Team Formation

Day two began with an opening remark by Prof A. I. Achike and a recap of the previous day's presentations. Escolha do Povo Factory manager and facilitator were present to provide more information on the company's challenge. The manager stressed on the following:

- **Maize Quality Concerns**: The maize supplied by local farmers is of poor quality due to crossbreeding with inferior varieties and improper storage practices.
- **Soybean Harvesting Practices**: Farmers often harvest soybeans while still green to increase weight, compromising quality.
- **Pricing Discrepancies**: Local farmers charge high prices for low-quality produce, prompting the company to consider imports.

Dr. Paulino emphasized the need for solutions addressing both quantity and quality. He specified that for maize, uniform-sized grains are required, and for soybeans, a brown coloration is preferred over green. The plant's annual requirements are 10,000 tons of maize and 5,000 tons of soybeans. The coordinator acknowledged the clarification and tasked the students with exploring solutions.

3.3.2.1 Course Presentation

3.3.2.1.1 Social Media for Professionals by Mr. Emmanuel Okalany

Mr. Emmanuel Okalany, a RUFORUM staff, delivered a presentation on "Social Media for Professionals," focusing on effective communication and building meaningful networks on behalf of Prof. Cláudia Rodrigues. He advised professionals to maintain a professional online presence, avoiding the sharing of personal life details. The coordinator commended Mr. Emmanuel Okalany for his insightful presentation. The session concluded with a health break.



Figure Mr. Emmanuel delivering the course on social media for professionals.

3.3.2.1.2 Intercultural Teamwork by Prof. Tatjana Welzer

Prof. Welzer, who participated online, delivered a lecture on " Intercultural Teamwork." She defined culture as the collective sum of ways of living, encompassing behavioral norms, linguistic expressions, communication styles, patterns of thinking, and beliefs. She introduced several models to illustrate the complexities of culture:

- **Iceberg Model**: This model suggests that only a small portion of culture is visible (e.g., language, food, clothing), while the majority lies beneath the surface, including values, beliefs, and thought patterns.
- **Onion Model**: Proposed by Geert Hofstede, this model likens culture to an onion with multiple layers, from visible symbols to deep-seated values.
- **Cultural Matrix Model**: This model views culture as a complex system of interrelated elements that influence behavior and perceptions.

- **Hofstede's Cultural Dimensions**: Hofstede identified dimensions such as power distance, individualism vs. collectivism, and uncertainty avoidance to compare cultural differences.
- **Lewis Model**: Developed by Richard D. Lewis, this model classifies cultures into three categories: Linear-Active, Multi-Active, and Reactive, based on communication and behavior patterns.

Prof. Welzer highlighted the beauty of diversity and the importance of understanding and respecting cultural differences to foster effective collaboration. The UNN coordinator expressed gratitude to Prof. Welzer for her enlightening and interactive presentation.

3.3.2.2 Plenary session

After lunch, there was one hour breakout session aimed to encourage collaborative problem-solving and innovative thinking among participants. The **expected outcomes of the breakout sessions were:**

1. **Catchy Topic for the Challenge**: Each group was to formulate an engaging and concise title that encapsulates their challenge.
2. **Understanding of the Challenge**: Groups were expected to gain a deep understanding of the problem at hand, considering all its facets.
3. **Preliminary Solution**: Each group was tasked with proposing initial ideas or strategies to address the challenge.

Each team began clarifying their challenge scope and brainstorming preliminary solutions. Breakout sessions allowed for in-depth discussion, with coaches facilitating problem analysis and guiding students in framing their approach.

Group One: Sweet Cashew

The first group presented their topic under the title Sweet Cashew. Their challenge cantered on the astringent taste of cashew nuts, which is attributed to high tannin content. The group proposed both pre-processing and post-processing methods to reduce or eliminate this undesirable flavour. Pre-processing techniques included anaerobic storage of cashew nuts at 25°C for a duration of two to nine days, roasting the dried nuts, and steaming at high temperatures to neutralize tannins. For post-processing, they suggested soaking cashews in a

salt solution to extract tannins or applying activated charcoal treatment, noting that the latter could slightly darken the nuts.

During the discussion, the panel clarified that anaerobic storage would indeed be carried out before breaking the nuts. The group further explained that post-processing methods, particularly soaking in salt solution or the use of activated charcoal, would remove the astringent taste. Although concerns were raised about the darkening effect of activated charcoal, the group reassured that only a minimal amount would be used and, if necessary, the salt solution method could serve as an alternative.

Group Two: AgroFit

The second group introduced their topic as AgroFit, focusing on the challenge of managing over 10,000 hectares of virgin land owned by the company. Their task was to develop strategies to maximize the utilization of this vast resource. They emphasized the importance of conducting thorough assessments before making investment decisions. These assessments should cover the biophysical characteristics of the land, including soil type, topography, and climate; economic and market considerations, particularly profitability and demand for potential enterprises; and management as well as operational challenges that might arise. The panel highlighted that comprehensive answers to these assessments would guide the selection of suitable and sustainable projects.

Despite this structured approach, the panel noted that the topic as framed was not sufficiently engaging. The group was advised to reframe their topic in a way that more clearly reflects the practical challenges faced by the company.

Group Three: ZeaBean

The third group presented under the title ZeaBean. Their challenge focused on the poor quantity and quality of maize and soybean supplied to processors. To address this, they suggested several preliminary solutions. These included training farmers on good agricultural practices such as proper planting, pest and disease management, and improved post-harvest handling. They also recommended adopting optimal planting dates to align with climatic conditions, promoting the use of high-yielding and disease-resistant crop varieties, and offering competitive prices to incentivize farmers to produce better quality outputs. Additionally, they proposed the establishment of irrigation systems to provide consistent water supply during dry spells.

The group further advanced additional strategies such as contract farming, which would guarantee a steady supply of quality produce, and backward integration, where processors could directly invest in farming to maintain greater control over the quality and quantity of raw materials.

In response, the group was advised to strengthen their work by exploring existing literature more deeply, particularly regarding farmer training, so that their solutions could be better refined and contextualized.

Group Four: Integrating Forage Management in Angonia

The fourth group worked on the theme Integrating Forage Management in Angonia, identifying the inadequate supply of forage crops for livestock as the primary challenge. Their preliminary solutions included maximizing forage production during the rainy season, adopting smart conservation measures such as mulching and water harvesting, practicing regenerative pasture management to improve soil health, and employing cut-and-carry systems to better manage grazing pressure. An additional suggestion was to provide farmers with training in haymaking so that forage could be preserved for use throughout the year.

During the feedback session, the group was encouraged to first identify the root causes of forage inadequacy before implementing proposed solutions. The group was advised to refine their title to more accurately reflect the scope of their work. Further recommendations were made on calculating the biomass of animals prior to cutting forage for preservation, to ensure efficient use of resources. The panel advised the group to revisit their strategies and return with improved suggestions for presentation the following day.

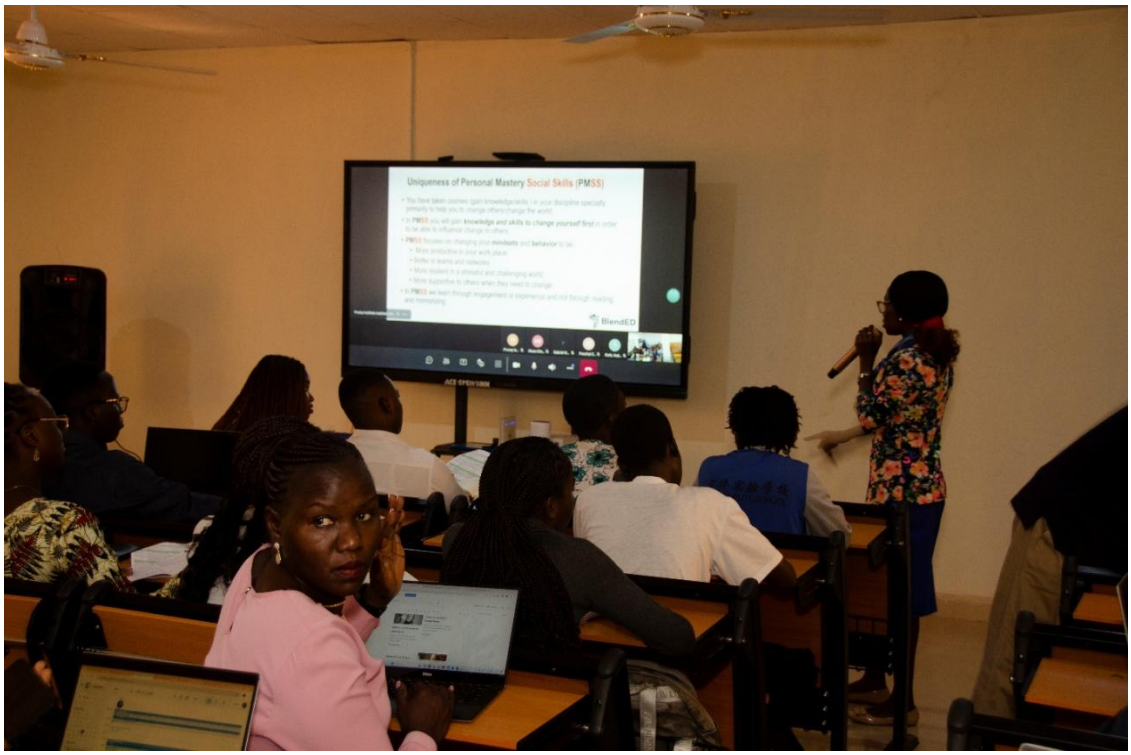
3.3.3 Day 3 (21-5-2025): Skills Development and Project Refinement

The third day started with a recap of the previous day and opening remark by the coordinator of the host university.

3.3.3.1 Course Presentation

3.3.3.1.1 Social Skills by Dr. Prossy Isubikalu

Dr. Prossy Isubikalu presented a course on Social Skills. Her session explored self-awareness, interpersonal relationships, and effective feedback mechanisms. The main objective of the presentation was to initiate self-discovery, enhance personal understanding, and foster improved relationships, performance, and productivity.



Picture 4. Dr. Prossy Isubikalu presenting a course on Social Skills

Dr. Prossy introduced the concept of Personal Mastery Social Skills (PMSS), stressing that personal transformation is essential for influencing positive change in others (Picture 4). She differentiated between two dimensions: Personal Mastery, which focuses on self-awareness and personal growth, and Social Skills, which emphasize effective interaction with others. According to her, social skills are integral to daily life and require continuous development. Among the key competencies highlighted were self-confidence, computer literacy, and reading effectiveness.

The principles of effective teamwork were also emphasized, with Dr. Prossy encouraging participants to appreciate rather than blame, accept faults while offering sincere apologies, respect shared responsibilities, and uphold confidentiality. To aid self-discovery, she recommended techniques such as self-reflection, conducting an honest personal SWOT analysis, and applying the Johari Window model to better understand how others perceive them. An interactive activity followed, where participants reflected on the implications of expanding or reducing the “Open” quadrant of the Johari Window, deepening their awareness of interpersonal dynamics.

3.3.3.2 ABC Community of Practice (CoP) Session

The next session was facilitated by Mr. Emmanuel Okalany in collaboration with Prof. Humbert. Together, they proposed expanding the ABC-BlendEd initiative to a global scale, highlighting its potential to tackle educational challenges beyond Africa. The discussion generated consensus among members on the possibility of renaming the initiative to better reflect its broadened international scope.

After the CoP session, the coaches joined students for interactive engagements and discussions before going for a lunch break.

3.3.3.3 Staff Session on ABC-BlendEd Accreditation Report and Staff Training Course Materials

After the lunch break, the students continued their group discussion, while the teacher discussed the progress of integrating ABC BlendEd into various university curricula. Reports were shared from institutions such as FUTMinna, UNN, Makerere University, and Soroti University, all of which had successfully embedded the initiative into programs including internships, SIWES, and industrial training. Grading systems for ABC-BlendEd students were also in place, with some institutions adopting a 60/40 ratio.

However, the panel noted that the two partner universities from Mozambique (Eduardo Mondlane University and Universidade Zambeze) had not yet integrated ABC BlendEd into their curricula. They were strongly encouraged to adopt the program, either as a practical component or as part of research work. Emphasizes were laid on the importance of institutional backing for ABC BlendEd, particularly the need to incorporate its grading into official academic assessments.

The discussion then shifted to the training materials required to prepare staff for implementing and managing ABC-BlendEd courses. Prof. Humbert led the conversation, and although significant progress was made, the group agreed to finalize the materials the following day due to time limitations as well as the absence of Prof. Nuno.

Prof A. I. Achike concluded the day's program by expressing gratitude for the active participation and valuable contributions made throughout the sessions. With this appreciation, the activities of the third day were formally ended.

3.3.4 Day 4 (22-5-2025): Project Pitches and Technical Feedback

The fourth day commenced with an opening prayer and welcome remarks delivered by Prof. Mrs. Anthonia Achike. This was followed by student group presentations, chaired by Dr. Assane.

3.3.4.1 Group 1: Sweet Cashew

The first presentation, titled Sweet Cashew, focused on eliminating the astringent taste in cashew nuts, which was identified as being primarily caused by tannins. The group proposed a combination of pre-processing and chemical treatments.

Pre-processing methods included roasting, enzymatic treatment, and chemical treatment. For enzymatic treatment, the group discussed the use of polyphenol oxidase and laccase to break down tannins, thereby reducing catechins and astringency, though they acknowledged this could alter the color of the nuts. They outlined a procedure involving dissolving enzymes in water and adjusting the pH to optimal levels for activity.

Chemical treatments involved the use of sodium bicarbonate or sodium chloride. In the bicarbonate procedure, the nuts will be pre-soaked, rinsed with clean water, and then soaked for 30–60 minutes. In the salt treatment, a 2–5% solution will be prepared, and the nuts will be soaked for 10–20 minutes with gentle stirring before being rinsed and dried.

During the feedback session, Dr. Prossy questioned whether the solutions were sourced from literature and what success rates had been recorded in practice. Dr. Helen raised concerns about possible salt residue on the nuts after rinsing, while Dr. Rebecca advised the group to conduct a cost-benefit analysis of the proposed treatments.

3.3.4.2 Group 2: AgroFit

The second group presented on Sustainable Land-Smart Agro-Enterprise Planning for Chelsea Farms. Their strategy focused on four action steps: land and resource assessment, market opportunity analysis, farmer capacity evaluation, and enterprise shortlisting through feasibility studies.

They proposed integrated enterprise combinations such as maize with Robusta coffee, cassava with oil palm, and livestock systems combining cattle, pigs, and pasture. They also emphasized soil and water management through erosion control and drainage using vetiver grass.

Feedback from the faculty underscored the need for economic viability. Prof. Anthonia stressed profitability as key for long-term sustainability. Prof. Egwim criticized the presentation design and questioned the suitability of Robusta coffee for the local agro-climatic conditions, recommending clear justification for crop choices and the use of early-maturing oil palm and cassava varieties. He also suggested rice and aquaponics as alternatives due to the land's waterlogged nature. Mr. Emmanuel Okalany recommended consulting the International Institute of Tropical Agriculture (IITA) for accurate data, while Dr. Rebecca advised carrying out a Benefit-Cost Ratio analysis.

3.3.4.3 Group 3: ZeaBean

The third group, ZeaBean, addressed the challenge of enhancing the production and quality of maize and soybean for E. Colha Dopovo Company in Angonia. They identified major issues including uncontrolled cross-pollination in maize, untimely planting, low yields, premature harvesting of soybeans to avoid pests, and significant post-harvest losses due to poor storage.

Their solutions included mapping farmland, selecting suitable crop varieties, and providing farmers with inputs, training, and demonstrations covering pest management, soil fertility, irrigation, proper harvest timing, and post-harvest handling. They also proposed contracts with milling farmers, price incentives, and investment in modern storage facilities.

Feedback focused on refining the problem definition. Prof. Kristien recommended numbering slides for clarity. Mr. Okalany argued that cross-pollination was not a major issue and urged inclusion of quality assurance measures. He also noted that the slides were difficult to read due to small font size. Prof. Egwim suggested exploring aquaponics for efficiency, while Dr. Rebecca encouraged using a solution tree to link causes and interventions and proposed developing a mobile app for quality monitoring.

3.3.4.4 Group 4: Sustainable Feed Production

The final group presented on Sustainable Feed Production in Angonia, identifying challenges such as poor feed conservation, lack of knowledge on silage production, seasonal forage variability, limited access to tools, and weak farmer awareness.

Proposed solutions included cultivating drought-resistant fodder crops like brachiaria and lablab, training farmers on hay and silage production, establishing fodder banks, integrating crop-livestock systems, building farmer capacity, and creating demonstration farms. They also emphasized grazing management, farmer cooperatives, and policy advocacy.

Feedback was critical and constructive. Dr. Prossy noted that earlier questions remained unanswered and warned against attributing forage shortages solely to poor training. She also highlighted that policy recommendations were beyond the group's scope, urging a focus on actionable solutions. Prof. Egwim stressed the need to calculate actual fodder requirements during the dry season, while Prof. Anthonia sought clarification on the target farmer group. Dr. Assane clarified that the beneficiaries were local farmers supported through the university. The UNN coordinator thanked Dr. Assane for guiding the session, after which participants broke for tea and resumed in breakout rooms to revise their work.

3.3.4.5 ABC BlendEd Learning Discussion

Prof. Nuno addressed concerns on the ABC-Blended Learning Model and grading. He clarified that students would receive a certificate of participation to enhance employability but that it would not yet appear on academic transcripts. Eduardo Mondlane University and Universidade Zambeze raised concerns about incorporating the grading system into their structures.

On staff training materials, Prof. Nuno encouraged institutions to develop course guides for short training programs based on their two years of experience rather than relying on samples. Dr. Prossy requested a sample, but the consensus was to draw from institutional practice. Mr. Okalany proposed a framework for teacher training course development. The task of preparing course material was transferred to Mozambique.

3.3.4.6 Plenary Session

Participants reconvened for continued group work and feedback after lunch. Mr. Cletus Ebubedike of Chelsea Agric joined in person, engaging with students addressing his company's challenge. He expressed appreciation for their progress, pledged financial support for analyses, and invited them to conduct an on-site land assessment for the proposed pilot oil palm plantation.

Group updates followed. *Sweet Cashew* strengthened their work with literature reviews and economic analysis, earning commendation from Dr. Prossy. AgroFit received guidance from Mr. Cletus regarding land, equipment, and financial resources, and were tasked with land suitability assessments. ZeaBean refined their strategies by engaging farmers directly and planned further consultations. Sustainable Feed Production clarified that the real issue was feed management rather than shortage and were urged to investigate stocking rates, carrying capacity, biomass requirements, and grass quality.

Dr. Prossy suggested incorporating maize stovers as an additional feed resource, while Dr. Rebecca praised the group's structured approach. Prof. Egwim recommended adopting a uniform report structure for final presentations. Agreed Presentation Structure for Final Reports:

1. Title
2. Background
3. Problem/Challenge
4. Solution
   (a) What has been done
   (b) What is yet to be done
   (c) How it will be done
5. Organization and Management of the Team
   (a) Who is the team leader?
   (b) Who is the contact person?
   (c) Communication method to be used
   (d) Frequency of meetings
   (e) Role distribution within the team

Importantly, the designated contact person must be domiciled in the country where the challenge originates.

Announcements and Closing

Prof A. I. Achike announced a sightseeing activity for the following day to help participants appreciate the University of Nigeria, Nsukka environment. A reminder was also issued for student groups to submit their reports by the end of the day. Concerns were raised about delays in submissions and missed participation by some members, particularly affecting the group working with Chelsea Agric. The UNN coordinator closed the day by appreciating the dedication of participants, faculty, and guests.

3.3.5 Day 5 (23-5-2025): Final Pitching and Excursion

The final day of the ABC BlendeD Meeting commenced with opening remarks from the UNN coordinator. The four teams made their final pitches in the presence of the company representatives that posed the challenges that they are solving.

3.3.5.1 Final pitch: Sweet cashew - Prevention and Removal of Astringent Taste from Processed Cashew Nuts

Sweet cashew group presented their final pitch using the agreed format. They presented step-by-step methods for mitigating the astringent taste in cashew nuts. Their approach involved pre- and post-processing solutions.

Pre-processing

- **Chemical treatment using sodium bicarbonate**: Adding sodium bicarbonate to water (about 0.5%-1% of NaHC03)
- **Roasting:** Roasting helps to remove astringent taste by denaturing the tannin compounds which in turn remove astringent taste

Post-processing

- **Enzymatic treatment:** Enzymes break down tannin compound, which remove the astringent taste
- **Soaking in salt (sodium chloride) solution:** Soaking in a solution of about 2% to 5% salt.

Feedback and Discussion:

Mr. Daniel (Company Manager) expressed satisfaction with the presentation but indicated a preference for post-processing solutions. Other feedbacks were:

Inquiry about the process for reaching out to the company for cashew sample collection.

Need to assess the tannin content before implementing the treatment.

Concerns about the efficacy of soaking in a salt solution.

Recommendation on the need to use uniform referencing style across all citations.

3.3.5.2 Final Pitch: Team Zea-Beans – Enhancing Maize and Soybean Supply for Escolha do Povo

Team Zea-Beans presents a strategy to improve the quality and consistency of maize and soybeans supplied to Escolha do Povo, a feed processing company based in Angonia. The company currently faces challenges with unreliable supply chains and substandard raw materials, which limit feed production and affect livestock farmers across the region.

To address this, the team plan to implement a multi-step intervention focused on strengthening input access, improving post-harvest handling, and expanding farmer training. They recommended that improved seed varieties should be distributed to farmers, farmland should be mapped to maintain genetic purity, and contract farming agreements should be formalized to ensure predictable supply. The team also proposed training farmers on drying, sorting, and storage techniques, while digital platforms will be introduced to stabilize market access and pricing.

They also proposed a mobile application to support planting calendars and logistics coordination. A grading system will be introduced to standardize maize and soybean quality, and performance-based incentives should be offered to encourage best practices. Contract frameworks will be signed in the presence of local authorities to build trust and ensure accountability between farmers and the company.

To support implementation, the team will maintain structured communication through Zoom, Google Meet, Teams, email, and WhatsApp. Bi-weekly coordination meetings will be held to monitor progress and ensure alignment across technical and operational roles. The team will continue to operate with a multidisciplinary structure, covering ICT support, data analysis, literature review, and field liaison.

Feedback

The company manager expressed appreciation for the team's efforts. However, he highlighted challenges that may prevent the proposed solutions from working. He noted that previous attempts to provide improved planting materials to local farmers had incurred substantial costs, yet the farmers consistently reverted to using low-quality seeds stored from previous harvests,

showing little interest in adopting improved varieties. Consequently, the manager stated that the company could not justify further investment in the farmers. Hence, his unwillingness to invest in any solution being proposed by the students.

In response, Mr. Cletus advised the company to conduct a cost-benefit analysis to assess the opportunity cost of investing in versus not investing in improved planting materials. He further suggested deploying an agronomist to collaborate directly with the farmers, ensuring they produce the desired quality of produce.

3.3.5.3 Final Pitch: AgroFit Team – LandSmart Agro-Enterprise for Chelsea Farm

The AgroFit team presents a strategic plan for transforming Chelsea Farm's 5,000 hectares in Anambra State into a resilient and profitable agro-enterprise. The team recognizes the need for a context-specific approach that accounts for the site's biophysical complexity, including waterlogged areas and uneven terrain.

To address these challenges, the team proposes a multi-layered solution centered on a Land Suitability Analysis. This includes soil sampling, climate diagnostics, and geo-mapping to determine optimal crop placement. The analysis combines both qualitative and quantitative methods to classify land parcels based on their physical, chemical, and biological properties. Each parcel will be rated for its suitability, guiding informed decisions on crop zoning and investment.

In addition to the technical assessment, the team recommends a social analysis to verify land ownership, engage local communities, and identify potential conflicts. An economic analysis will project costs, returns on investment, and infrastructure needs, ensuring the enterprise is both viable and scalable.

The AgroFit team is structured for agile coordination, with clear roles in research, mobilization, documentation, and virtual collaboration. Communication will be maintained through WhatsApp and Gmail for daily updates, and Google Meet for scheduled meetings.

Feedback

The company manager, Mr. Cletus, expressed interest and assured the team of his cooperation. However, he did not accept the suggestion of engaging in intercropping due to the company's specific technical land preparation methods.

Mr. Emmanuel Okalany recommended that the team prioritize selecting key parameters for analysis, considering time constraints. The coordinator thanked the team for their presentation.

3.3.5.4 Final Pitch: Sustainable Feed Production Team – Stabilizing Livestock Productivity in Angonia

The Sustainable Feed Production team presents a targeted strategy to address the seasonal feed scarcity affecting livestock productivity in Angonia. Despite the region's expansive grasslands, farmers face a critical biomass gap during the dry season, leading to up to 20% weight loss in cattle and forcing animals to travel long distances in search of forage. This challenge undermines food security and limits the viability of small-scale livestock systems.

To resolve this, the team proposes a multi-pronged solution focused on feed conservation and improved grazing management. Key interventions include the establishment of fodder banks, promotion of forage conservation techniques, and strategic use of maize stovers. These approaches are complemented by enhanced extension services to support farmer adoption and knowledge transfer.

The team's analysis integrates ten core aspects of sustainable feed planning, including land use patterns, breed characteristics, stocking rates, carrying capacity, and biomass requirements. Further assessments will quantify biomass availability across seasons, identify drought-resistant forage types, and evaluate adoption rates based on economic and social factors. A situation analysis will guide the selection of the most practical and scalable solutions for local farmers.

Implementation will be supported by a structured communication plan using Zoom, Google Meet, Teams, email, and WhatsApp, with bi-weekly coordination meetings. The team is led by Ssekandi Bedan, with Justência Francisco serving as the in-country contact to facilitate engagement with local stakeholders. Roles span technical support, breed assessment, biomass planning, and agronomic analysis, ensuring a multidisciplinary approach.

Feedback

Dr. Paulino, the contact person for the farmer group, expressed satisfaction with the team's efforts and promised close collaboration during the problem-solving phase. He also promised to escalate the inventions proposed by the students to the offices that will implement them. Hence, there is willingness to invest in the solutions. The team was urged to actively engage the farmers in the development of the solutions to ensure easy adoption and implementation of the proposed solutions.

3.3.5.5 Testimonies from UNN participants in the first edition

ABC-BlendeD UNN alumni, Mr. Anthony C. Anigbogu and Ms. Goodness C. Onuchukwu were invited to share their experiences. They discussed the program's impact on their professional development and the challenges they faced, encouraging current students to fully utilize the opportunities provided. The ABC BlendEd program was designed to bridge academic learning with real-world applications, offering students a platform to collaborate across borders, tackle pressing challenges, and build professional competencies. For Anthony Chukwuka Anigbogu (Picture 5), the experience was transformative.



Picture 5. Mr. Anthony C. Anigbogu giving his testimony.

Anthony entered the program with modest expectations: to improve communication, broaden his research perspective, and build global networks. However, what he experienced was

beyond his expectations. As a member of the Waste Management team, he discovered the complexity of agricultural waste challenges, particularly in commercial poultry production—an area he had previously approached from a small-scale lens.

Before joining the program, Anthony grappled with stage fright, limited global exposure, and difficulty in public speaking. Through ABC BlendEd, he gained:

- Confidence in leadership and communication
- Exposure to international collaboration
- A reshaped global outlook
- Motivation to pursue impact-driven research.

He credits the program with instilling a sense of purpose and pride, and with shaping his career aspirations toward sustainability and cross-cultural engagement.

The experience enhanced his skills in data analysis, problem-solving, and research design. He learned to set academic goals with discipline and clarity, and to approach challenges with a collaborative mindset. He advocates for continued alumni engagement, publication of team research, and mentorship for future cohorts.

3.3.5.6 Vote of Thanks

Vote of thanks was received from both students' and teachers' representatives. The Vice chancellor through the UNN ABC coordinator, Prof A.I. Achike officially declared the session closed.

3.3.6 Excursion and Dinner

To conclude the ABC-BlendeD event, students from the Department of Theatre Arts, UNN provided a captivating entertainment session that added a lively and cultural touch to the occasion. Participants went on a site-seeing tour within the University of Nigeria that included the Faulty of Agriculture, 3D Innovative Electronics Prototyping Laboratory, Institute of African Studies, and etc (Picture 6 and Picture 7) offering them the opportunity to appreciate the local environment and unwind after a series of productive sessions. The event culminated in a cocktail party (Picture 8), fostering networking, celebration, and reflections on the week's achievements. It was a fitting end to a successful and impactful program.



Picture 6. Group visit to the Institute of African Studies at University of Nigeria, Nsukka



Picture 7. Group visit to the 3D Innovative Electronics Prototyping Laboratory at University of Nigeria, Nsukka



Picture 8. Farewell Dinner by the pool side

3.4 National Exhibition of Young Entrepreneurs (Mostra Nacional de Jovens Empreendedores)

The Mostra Nacional de Jovens Empreendedores is a Portuguese national showcase organized by Fundação da Juventude, in partnership with the City of Porto. The 2025 edition was held between 2nd and 4th June at the Centro de Congressos da Alfândega do Porto.

In this competition, the two teams from the ABC BlendEd first edition presented innovative solutions addressing agricultural and environmental challenges in Africa.

The Waste Management team introduced Farm Waste Management Using Biochar, a project designed to tackle severe odour and waste management issues at Zulinkx Agro & Vet Services in Nigeria, which manages over 10,000 poultry birds and 1,300 pigs. By converting agricultural residues into biochar, the team demonstrated a cost-effective, scalable, and eco-friendly approach that reduces odours by up to 30%, lowers greenhouse gas emissions, improves soil fertility, and fosters a circular economy by transforming waste into value. The project is backed by strong university partnerships, a sound business model, and promising financial projections, aligning closely with several UN Sustainable Development Goals (SDGs).

The Seed Bank team presented the Community Seed Bank Project, targeting the shortage and high cost of certified seeds in Tete Province, Mozambique. Their model introduces a sustainable shared harvest system where farmers receive seeds and return 50% of their yields to the seed bank, ensuring a continuous and affordable supply. Complemented by a prototype mobile/web app for yield prediction, record-keeping, and seed distribution tracking, as well as a project website for transparency, the initiative empowers smallholder farmers, boosts yield by up to 40% and strengthens food security. The project is scalable across Africa and contributes to SDGs on poverty reduction, zero hunger, innovation, and sustainable land use.

3.5 Steering committee online June meeting with the students

The monthly steering committee meeting was adjusted to allow to present their current standing and any barriers they might be facing in addressing the company challenges.

3.5.1 Students Presentations

3.5.1.1 Sweet Cashew Team

The Sweet Cashew Team made a progess report titled Prevention and Removal of Astringent Taste from Processed Cashew Nuts. The presentation is summarized as:

1. Summary of Past Activities

a. Team Coordination and Planning:

Established a meeting schedule to ensure consistent participation. The meeting time was 7 PM EAT through Google Meet and Google Docs. They meet three times a week (Monday, Wednesday, Friday)

b. Solution Analysis

Conducted literature reviews to evaluate the success rates of proposed solutions for removing astringency from cashew nuts.

c. Industrial Visit

Mr. Omale Jeremiah, the contact person, conducted a site visit to the cashew processing facility and collected cashew nut samples for laboratory testing. However, due the timing of the visit was unable to observe processing operations.

2. Current Activities

a. Technological Exploration

Investigating technological interventions to enhance the effectiveness of proposed solutions.

b. Laboratory Testing

Implementing practical tests using the samples acquired during the industrial visit. Each proposed solution is being trialed to assess its efficacy in removing astringency.

Closing Note

The team expresses gratitude for the support received and continues to work toward a viable solution for improving the taste quality of processed cashew nuts.

3.5.1.2 ZeaBean Team

Team Objective

The ZeaBean team aims to demonstrate how farmers can improve the quality and quantity of maize and soybean per hectare. Their specific objectives are:

- ❑ To increase maize and soybean production per hectare through use of certified seed varieties.
- ❑ To improve the supply chain of maize and soybean to Escolha Do Povo company in Angonia district, Tete province.
- ❑ To increase farmers' access to fertilizers and improved seeds.
- ❑ To bridge the market gap and coordination between Escolha Do Povo company and small holder farmers in Angonia.

Activities Carried Out

1. **Team Coordination**
    - Established a working rhythm across institutions, using digital platforms for documentation and communication.
    - Assigned roles to streamline research, stakeholder outreach, and reporting.
2. **Problem Scoping and Literature review**
    - Identified causes of low-quality yields key.
    - Reviewed existing literature and technologies related maize and soybean suitability study.
    - Recommended maize variety SC 727 and soyabean variety SC Saga for farmers in Angonia
    - Proposed seed acquisition route and seed amount for farmers

Activities to Be Carried Out

1. Cost benefit analysis
2. Farmer training on how to manage improved varieties.
3. Transportation and Logistics analysis
4. Risk Management plan.

Feedbacks

The team was asked to elaborate on what informed the choice of recommeded varities and if the varieties where tested in the location. Do they have contigency plan incase of crop loss due to disease? The main bottleneck experienced by the group was poor support from the company that possed the challenge. The group was advised to work directly with the farmers while the Unizambeze should take ownership of the chanllenge**.**

3.5.1.3 Agrofit

Summary of Past Activities

- **Literature review**: Conducted a literature review to identify existing approaches and frameworks for land suitability analysis, agronomic requirements of cassava and oil palm, and analysis tools.
- Zeroed down on the **FAO framework for** designing the methodology because it is standardized and globally recognized for its credibility.
- **Field visit**: Conducted a field visit to collect soil samples and their corresponding GPS coordinates and reconnaissance.
- **Qualitative land classification**: After the visit, qualitative land classification was conducted, and it was concluded that rice must be added to the suitability analysis in the waterlogged areas.
- Field visit included guidance from economic experts for budgeting and sensitivity analysis.

Current Activities

Data collection (85% complete)

This involves collecting datasets from open-source sites for different parameters i.e.

- Soil quality (pH, texture, organic carbon, phosphorus and nitrogen) from ISRIC at a resolution of 250m
- Climate data i.e. precipitation, temperature (minimum, maximum and average)) gathered from WorldClim and rainfall gathered from ClimateSERV
- Land cover dataset from Digital Earth Africa

Remaining data

- Topography (Altitude, Slope, Aspect, Drainage) to be obtained from Digital Elevation Models (DEM) from Digital Earth Africa with a 30m resolution
- We opted for open-source datasets because collecting all the data required is expensive and may not be funded by Chelsea Agric.

Data pre-processing and analysis tools.

ArcGIS, Q-GIS, PyLusat, Jupyter Notebook environment, Google Colab

Technical work

- Refining the literature review to include rice parameters and all the open-source data sources
- Soil testing of the samples obtained from Chelsea farm for data validation.
- Compilation of parameters necessary for each crop to survive to be used during data analysis and suitability assessment

Group management

- Developing the team's project website to document and share insights about the work done to achieve the project deliverables (85% complete)
- Requires appropriate images and hosting.

Future activities

- Data pre-processing (e.g., extraction and clipping) to get the raster data.
- Ranking and data analysis using the collected data sets
- Suitability assessments of different crops
- Recommendation of management practices for the different crop enterprises
- Cost benefit analysis (Profitability of the different land use types)

Challenges Experienced

- Limited time on-site due to long travel hours (10-hour round trip)
- Internet cost for regular meetings, which sometimes limits consistency in virtual collaboration and updates.
- Network stability fluctuations that hinder collaborations during Zoom meetings

- Limited time at Chelsea farm that limited a comprehensive survey and data collection hence opting for open-source data.

3.5.1.4 Sustainable Feed

Previous Activities

Discussion of the team's pitch

Designing a meeting schedule

Role reallocation

Questionnaire compilation

Literature search

Future Activties

Data collection from the farmers

Website development and design

Data analysis and aligning collected data to literature

Creating short videos demonstrating our solutions to the challenge

Website completion and presentation compilation

Challenges Experienced

- Failure to obtain data on time.
- We have not contacted the farmers.
- Funding to hold our website.
- The website is in English, but the target group of farmers speaks portuguese.

3.6 Closing meeting of the African ABC-BlendEd Project Edition 2024/25 held on 21 – 25 July 2025 at Angónia

From July 21 to 25, 2025, Zambeze University hosted the closing meeting of the ABC Project at the Faculty of Agricultural Sciences in Angónia. The Opening Ceremony, held on July 21 at 10:00 a.m. in Room 5, was led by Her Excellency Anabela Matangue Zacarias da Silva, Vice-Rector of Zambeze University, representing the Rector. The project meeting was attended by 14 participants from Mozambique, 10 from Nigeria, 12 from Uganda, 1 from Portugal, and 1 from Belgium, from the following institutions:

África

- Universidade Zambeze (08), Mozambique,
- Universidade Eduardo Mondlane (06), Mozambique,
- Makerere University (05), Uganda,
- Soroti University (06), Uganda,
- University of Nigeria, Nsukka, (06) Nigeria,
- Federal University of Technology, Minna, (04) Nigeria,
- RUFORUM (01), Uganda,

Europe

- Instituto Politécnico do Porto (01), IPP, Portugal
- Odisee University (01), Belgium
- University of Siegen, Germany, (virtual)
- Hellenic Mediterranean University, Greece, (virtual)

Some local partners of Zambeze University were also present, namely: District Service of Economic Activities (01), Institute of Agricultural Research of Mozambique (02) and the Center for Research and Technology Transfer (01), totalizing 42 participants. According to the work agenda, during the five days the meeting activities start at 09:00 and end at 17:00.

UNIZAMBEZE

No.	Name	Observation	Challenge
1	Paulino Bartolomeu Sandramo	Teacher	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
2	Inácio Mateus Assane	Teacher	Sustainable Feed Production In Angonia
3	Télis Adolfo Cumbe	Teacher	Sustainable Feed Production In Angonia
4	Quisito Chico Francisco Raiva	Teacher	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
5	Edmundo Isaquiel Silvestre Manjacapolo	Student	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
6	Maria Mário Santa Maria	Student	Sustainable Feed Production In Angonia
7	Justência António Francisco	Student	Sweet Cashew. Removing Astringency From Processed Cashew Nuts

8	Quenade António Ferro	Student	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric

UEM

No.	Name	Observation	
1	Arsénio Daniel Ndeve	Teacher	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
2	Arsénio Jorge	Teacher	Sustainable Feed Production In Angonia
3	Tarcília Agnaldo Marurele	Student	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
4	Chelsea Paulina Fernando	Student	Sweet Cashew. Removing Astringency From Processed Cashew Nuts
5	Graça José Macuácua	Student	Sustainable Feed Production In Angonia
6	Jorge António Langa	Student	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric

UNN

No.	Name	Observation	
1	Anthonia Ifeyinwa Achike	Teacher	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric
2	Uchechukwu Paschal Chukwudi	Teacher	Sweet Cashew. Removing Astringency From Processed Cashew Nuts
3	Felix Tamunominabo Owubokiri	Student	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
4	Christian Tochukwu Eyah	Student	Sweet Cashew. Removing Astringency From Processed Cashew Nuts
5	Ruth Chimuanya Okoro	Student	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric

6	Leticia Ozota	Student	Sustainable Feed Production In Angonia

FUTM

No.	Name	Observation	
1	Egwin Evans	Teacher	Sweet Cashew. Removing Astringency From Processed Cashew Nuts
2	Abigail Ebunoluwa Adegoke	Teacher	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric
3	Favour Ifeoluwa Obanro	Student	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric
4	Jeremiah John Omale	Student	Sustainable Feed Production In Angonia
5	Felicia Olayemi Amole	Student	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
6	Joseph Toluwani Peter	Student	Sweet Cashew. Removing Astringency From Processed Cashew Nuts

Makerere

No.	Name	Observation	
1	Prossy Isubikalu	Teacher	Sustainable Feed Production In Angonia
2	---	Teacher	
3	Akol Merab	Student	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric
4	Kagoya Jackline	Student	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
5	Ssekandi Bedan	Student	Sweet Cashew. Removing Astringency From Processed Cashew Nuts
6	Tagume Joab	Student	Sustainable Feed Production In Angonia

Soroti

No.	Name	Observation	
1	Hellen Aluku	Teacher	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric
2	Chemisto Satya Musa	Teacher	Sweet Cashew. Removing Astringency From Processed Cashew Nuts
3	Anirwoth Rachel	Student	Sustainable Feed Production In Angonia
4	Isabirye Simon Peter	Student	Improving The Productivity And Quality Of Maize And Soybean Produced By Farmers In Angonia
5	Kawuma Latiif	Student	Land Suitability Analysis For Oil Palm And Cassava For Chelsea Agric
6	Chelangat Specioza	Student	Sweet Cashew. Removing Astringency From Processed Cashew Nuts

RUFORUM

No.	Name	Observation
1	Becky Namubiru	Technician

IPP

No.	Name	Observation
1	Nuno Escudeiro	Teacher

Odisse

No.	Name	Observation
1	Kristien Van Assche	Teacher

On July 21st, due to the delay in the arrival of three delegations (approximately 18 participants), only the event's opening ceremony took place at 10:00 AM, after which the meeting was adjourned until the following day.

On July 22nd, the meeting began at 9:00 AM as scheduled, followed by presentations by all participants. The activities began with a presentation of Zambeze University, its location, areas of knowledge it teaches, and existing courses, led by Dr. Inácio Mateus Assane. The students then presented the progress of each of the four existing groups, which have six members each, totaling 24 students, 12 faculty members, and additional guests.

It is worth noting that for this 2025 edition, the following challenges are being studied:

1. Sustainable Feed Production in Angonia;

2. Improving the Productivity and Quality of Corn and Soybeans Produced by Farmers in Angonia;

3. Sweet Cashew. Removing Astringency from Processed Cashew Nuts;

4. Land Suitability Analysis for Oil Palm and Cassava for Chelsea Agric.

The 1st and 2nd themes were proposed by Zambeze University in Angonia, through the Calómuè Producers' Association, and the People's Choice Factory, respectively. The 3rd theme was proposed by the Federal University of Technology, Minna, and the 4th theme was proposed by the University of Nigeria, Nsukka.

Therefore, each group presented the progress of the themes, and as always, the faculty provided technical guidance for each group on how to improve the approach to concrete solutions for each challenge. In general, the ultimate goal is for each group to arrive at a concrete solution, which should be submitted to the proposing institution for implementation and respective improvement of the institution's activities, thus building student capacity to face the job market in their field of study.

On July 23rd, while students were assigned to specific group work rooms, faculty members met behind closed doors with the General Coordinator. Several topics were discussed, with emphasis on:

 Dissemination: He recommended that all local project coordinators conduct dissemination activities for the four themes with agricultural producers, private companies, and other relevant sectors to raise awareness of the University's work and thus share knowledge that improves the performance of these sectors. Therefore, any dissemination activities should be reported, sharing photos and short summary texts and uploading the information to Teams.

 Accreditation: He recommended that each university find an alternative way to credit student participation in this three-month internship. Zambeze University emphasized that the Faculty will inform its participating students to continue working on these topics and with the assigned faculty to prepare a concise report to be submitted for evaluation as a Final Course Project (TCC), which will be credited with approximately 25 credits once the workload is compatible. Ugandan universities already have this criterion of concluding the course with an internship equivalent to this activity.

 Quarterly reports: It recommended that all local coordinators submit quarterly reports to Teams according to existing and agreed-upon templates. Zambeze University has all quarterly reports submitted to Teams.

 Quality Assurance: It recommended that all participants ensure they have acquired meeting materials, although some have not yet acquired them. Zambeze University, in Angónia, has acquired all necessary meeting materials.

On July 24th, with the support of Zambeze University, approximately 15 producers from the Calómuè Producers' Association came to the Faculty and interacted with the other meeting participants, primarily to clarify the topic proposed by this association. During open discussions in the Faculty auditorium from 10:00 am to 1:00 pm, it became clear that this association faces the problem of a lack of pasture land in the region for cattle and goats. During the interaction with students, they were explained in detail that forage crops should be planted to ensure year-round pasture, and the IIAM present during the discussions offered to provide seeds for pasture production, provided all necessary precautions are followed.

Next, all participants and the association's producers visited the biochar production equipment developed by Maimuna Manuel, a 2024 Zambeze University student. The student has successfully produced biochar and has a demonstration field for lettuce production, still in the experimental phase. All participants asked questions and appreciated the initiative. The student was encouraged to submit the final report of this activity and explore the possibility of sharing this knowledge with local producers and improving vegetable production. The producers were then recalled. Another student from the 2024 edition, Osvaldo Pessuro, also shared a presentation highlighting the experiences of the previous edition.

From 4:00 PM to 5:00 PM, Zambeze University shared the topic of Entrepreneurship for 30 minutes, led by Dr. Paulino Bartolomeu Sandramo, and for the remaining 30 minutes, Soroti University shared the topic of Career Development, led by Dr. Hellen Aluku and Chemisto Musa. These were very interesting topics to discuss with those present.

3.6.1 FINAL PITCH (FINAL PRESENTATIONS)

On July 25th, each group of students presented their final solution.

3.6.1.1 Sustainable Feed Production in Angonia

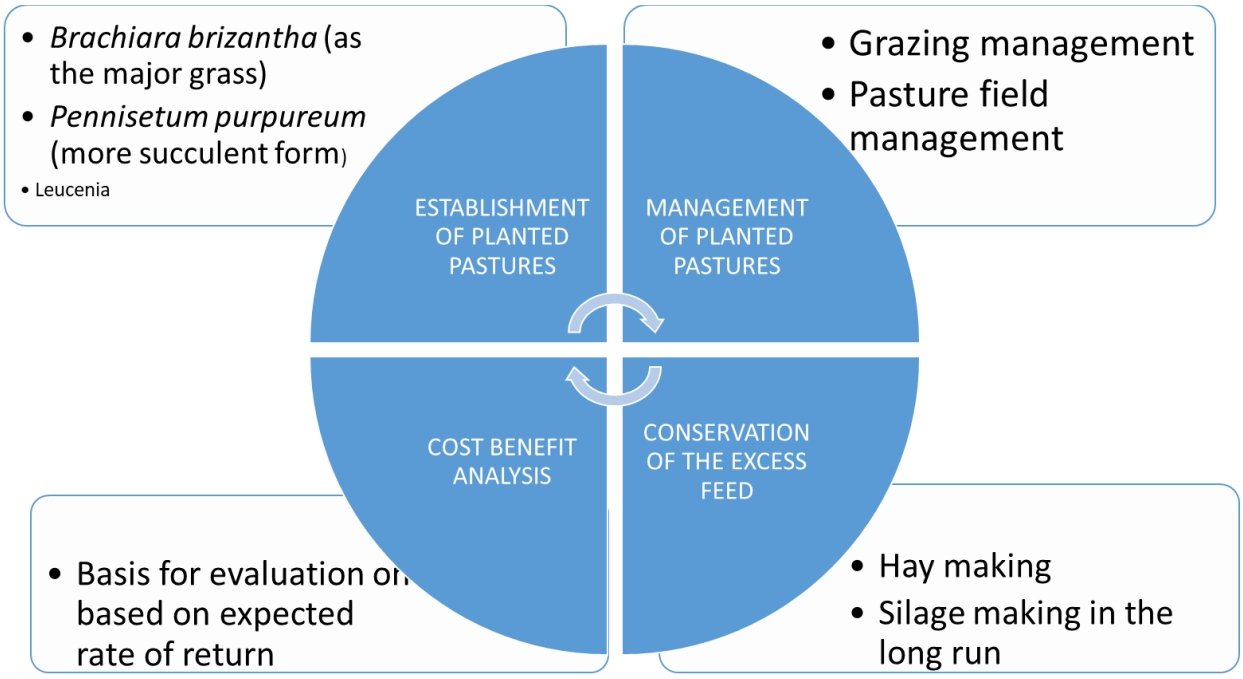
The Angonia District has a family-based livestock farming system, heavily dependent on free-range grazing in areas of natural vegetation. However, the climate, characterized by two distinct seasons—a rainy season and a dry season. During the dry season, natural pastures are scarce, and crop residues become scarce. This seriously compromises livestock nutrition, leading to weight loss, reduced meat production, and even death.

The main objective of this topic is to present practical and sustainable solutions to the problem of pasture scarcity in the District of Angonia, focusing on alternatives that can guarantee livestock feeding throughout the year, especially during the critical periods of the dry season. The specific objective was to identify and analyze the factors contributing to feed scarcity among farmers in Angonia.

To deepen understanding of pasture scarcity in Angonia District, as well as structured questionnaire was administered through face-to-face interviews. Data collection included information on the number of animals per producer, the size of pasture areas, willingness to invest in solutions, and the cooperative's degree of control over producers; producers' perceptions of changes in pasture availability over the past five years; interest in creating forage banks; and knowledge of forage conservation practices such as silage and haymaking. This approach allowed for a contextualized analysis of local practices and openness to adopting sustainable alternatives.

After collecting the data from the farmers, we proceeded to organize and clean the responses. Using Google Forms, we digitized the data into a simplified Excel worksheet. We carefully checked the data for completeness and accuracy

To further support our findings, we utilized QGIS software to perform geospatial analysis on the data collected. We plotted the GPS coordinates of the farms we visited, which helped us visualize the spatial distribution of the farmers involved in our study. All following all steps the group team came up with this proposed solution.



Use of *Brachiaria brizantha cv. marandu* as a potential pasture establishment species.

Use of elephant grass, which is being used in some areas of Tete province and the inclusion of legumes such as leucaena is important.

The seed is available at the Angonia Zoo Technical Station.

Elephant grass is propagated through cutting and Brachiaria through ratoons and seeds

There is High yield of forage, that is, 8-12 tones per harvest, per hectare year after input of 4kg of seed.

All year-round production of forage because of its high regrowth ability of 20-35 days;

Easily managed through controlled grazing, intrusion into pasture fields.

High nutrient content compared to the natural grasses.

Perennial forage grass

Disease tolerance

The impact to the community is as follows: Increased forage production, Increased Productivity (Meat and Milk), Reduction of Mortality and Morbidity, Family Income Stabilization

3.6.1.2 Improving the Productivity and Quality of Corn and Soybeans Produced by Farmers in Angonia;

Agriculture remains the backbone of the rural economy in Angonia district, Tete, Mozambique, where maize and soybean are among the most cultivated crops. However, productivity levels remain low due to several persistent challenges, including labor-intensive practices, limited access to certified seeds, fertilizers, and inoculants.

To address these constraints and unlock the agricultural potential of the region, this project aims to enhance the productivity and quality of maize and soybean production through a comprehensive and collaborative approach. By facilitating access to high-quality agricultural inputs via credit-based mechanisms, providing continuous extension support, and building strong market linkages. The initiative seeks to improve both yields and incomes for smallholder farmers.

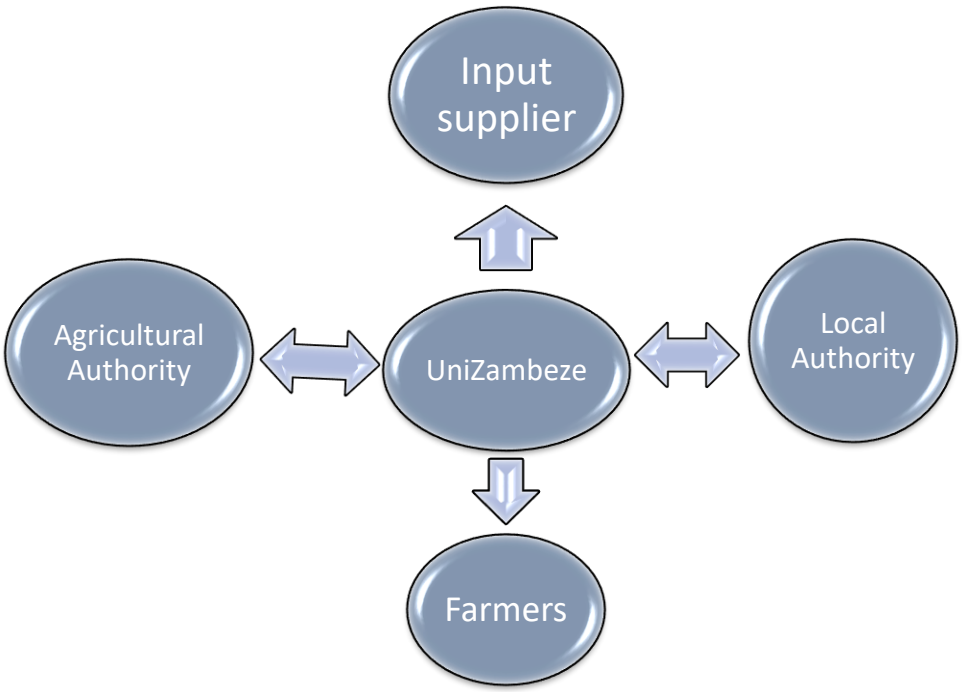
This project aligns with strategies for sustainable agriculture and regional food security, integrating the efforts of multiple stakeholders including farmers, input suppliers, local authorities, extension services (SDAE) and Zambeze University. Together, these partners aim to create a sustainable and scalable model for agricultural development in Angónia.

Main Objective:

- To enhance maize and soybean productivity and quality in Angonia through improved access to high-quality inputs, extension services, and market linkages, while aligning with sustainable agriculture.

Specific Objectives:

- To empower selected small holder farmers with access to inputs, improved farming methods to increase their own production.
- To create a sustainable value chain in the maize and soybean production where each of the stakeholder benefits from another.
- To bridge the gap between the farmers and the input suppliers through the agricultural authority.



Methodology

PHASE	TASK	RESPONSIBILITY	DELIVERABLE
Initiate Collaboration	Host meeting with input supplier to discuss partnership possibility and draft MoU(Memorandum of Understanding).	University of Zambeze	Draft MoU, stakeholder roles defined.
	Finalize and sign MoU with input supplier.	University, input supplier.	Signed MoU.

Engage Local Government Authority.	Meet local government authorities to secure oversight commitment.	University, Local authorities	Oversight plan,.
Coordinate with government agricultural authority (SDAE).	Meet SDAE to plan extension services (which include land analysis, farmer training) that will be provided by the extension agents on a periodic basis.	University, SDAE, administrators	Plan detailing the extension work plan.
Stakeholder Workshop	Organize workshop with all the stakeholders. Workshop will be hosted by UniZambeze.	University, Agricultural Authority, Input Supplier.	Registered farmer list, workshop report.
On-Site Assessments	Conduct land assessments to determine crop suitability and farmland sizes.	Extension Agents University students	Land assessment reports, crop allocation plan.
	Initiate baseline studies for unsuitable lands.	University, Students	Baseline study plan.
6. Research and Proposal	Collect field data on parameters like yield potential of different varieties and soil characteristics like pH.	Students, Extension agents	Field data reports.

	Compile data into a proposal for sustainable farming solutions.	University Students, University Professors	Funding proposal document.
Monitoring and Feedback	Conduct quarterly oversight reviews with local government.	University, Local Authorities	Oversight reports.
	Monitor farmer progress and repayment to input supplier.	SDAE Extension agents. Input Suppliers.	Repayment status report.

Deliverables

Functional stakeholder collaboration

- Effective coordination among the seed supplier, university, local authorities, extension agents and the farmers.

Supply of certified seeds to the farmers

- Farmers will receive high quality seeds through credit agreements.

Farmer training

- Practical training by extension agents on improved farming practices.

Increased crop yield.

- High productivity and better quality maize and soybean harvested.

Regular monitoring reports

- Ongoing monitoring and feedback reports from extension agents to track seed use, crop health, and farmer performance.

Roles and Responsibilities

UniZambeze

- **Project initialization**: this role involves getting each stakeholder to a round table discussion, explaining the roles, benefits and costs (where applicable) for each stakeholder
- **Serve as a link**: connect stakeholders like a bridge to ensure the process has no gaps.
- **On site assessment and monitoring:** collaborate with the extension agents by sending students to monitor and take period assessments reports from the farmers.
- **Engage local authorities:** secure oversight commitments from the local authorities.

Seed.co

- Supply high quality seeds to the farmers.
- Provide training models on the handling of the seeds.

Farmers

- Willing to improve their productivity and quantity of their produce.
- Willingness to learn and practice the correct methods of handling the improved varieties
- Willingness to sign a contract with Seed.co and abide by the contract terms.

Local Authority

- Acts as 'POLICE' to ensure strict adherence to contract terms by all stakeholders
- Stand as witnesses during contract signing.

Agricultural Authority

- Work hand in hand with seed.co and UniZambeze to ensure the seeds gets to the right farmers.
- Collect and store farmers data.
- Provide Extension services: such as training farmers on new farming techniques, helping farmers to harvesting, organizing timely planting, monitoring the crop cycle and providing instructing on when spraying is needed, recommending which seed variety to plant where and when.

Conclusion

Through clear following of the stakeholders' model, the productivity and quantity of maize and soybean will increase, improving the livelihood of the small holder farmers

3.6.1.3 Sweet Cashew. Removing Astringency from Processed Cashew Nuts;

The astringent taste present in cashew nuts is caused by **tannins,** naturally occurring polyphenolic compounds found in some plants.

In cashews, the specific tannins responsible are **condensed tannins** (also known as **proanthocyanidins**), which are made up of **catechins** and **epicatechins**.

When consumed, these tannins interact with saliva, producing a **dry, puckering sensation** in the mouth that affects the taste experience of the cashew nut. While this is a natural characteristic, it can be undesirable for consumers.

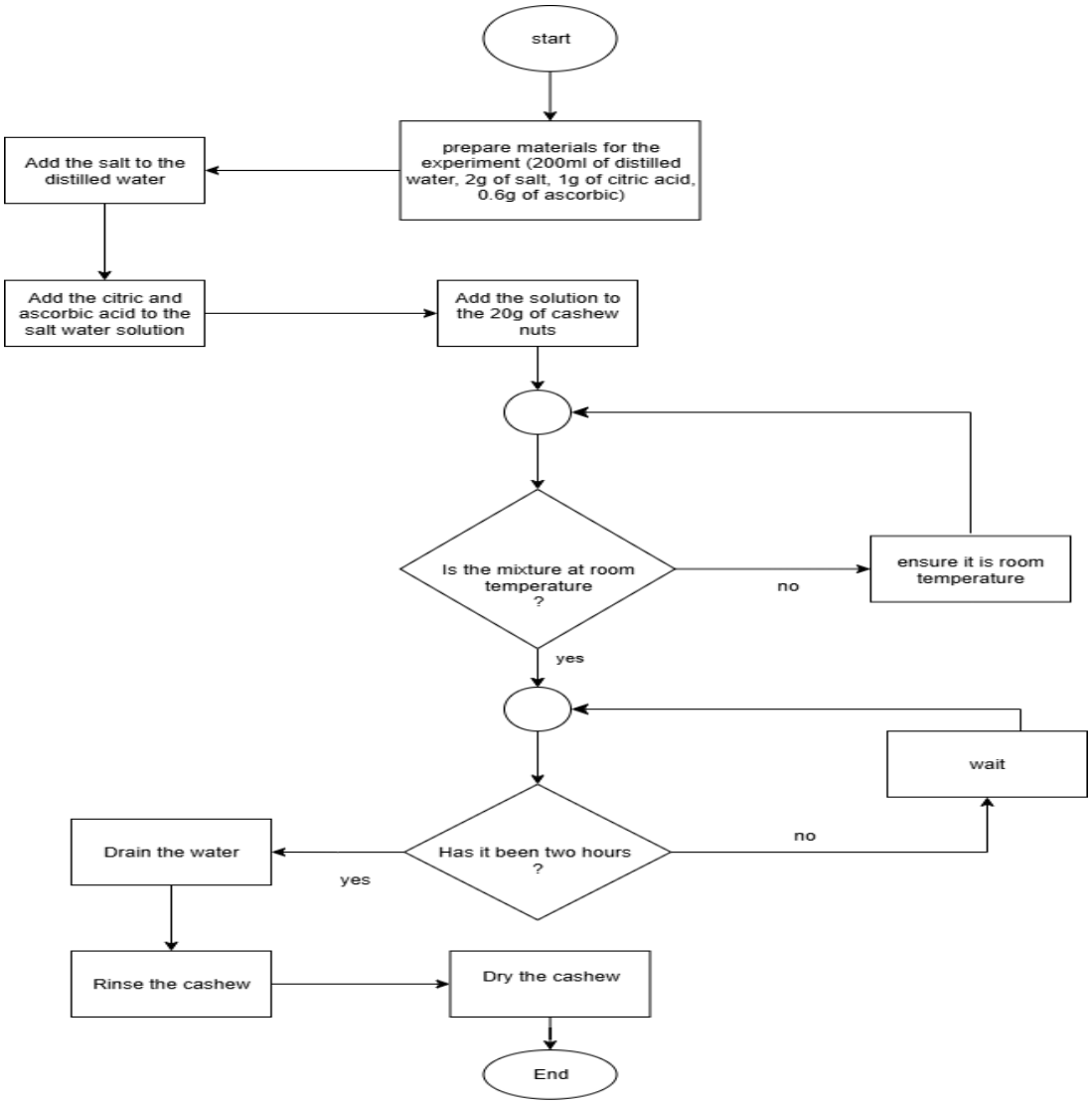
Despite undergoing processing (which is shell and kernel removal), cashew nuts continue to retain a noticeable astringent taste. Additionally, approximately 5% of the raw cashew yield is lost as waste during processing.

Vertex Agro Limited is seeking effective **post-processing solutions** to eliminate or reduce the astringent taste in the final product, thereby improving the palatability and market value of their processed cashew nuts.

We bring a simple and effective solution to the challenge of astringency in the cashew nuts, that is **salt treatment**. The solution uses 1% sodium chloride, 0.5% citric acid , 0.3% Ascorbic acid and a 2-hour soak.

The salt treatment results in a 98% tannin reduction in the cashew nuts.

The salt treatment has been tested and proven to work in the laboratory



The experiment of the salt treatment from the laboratory produced up to 98% reduction in tannins.

The quantity of materials used were 1% salt, 0.5% citric acid, 0.3% ascorbic acid in 200ml of water treating 20g of cashew nuts for 2 hours.

TIME	SALT CONCENTRATION (%)	BEFORE (T0)	AFTER (T1)	DIFFERENCES	REDUCTION IN PERCENTAGE (T0-T1)/T0 X 100/1
15mins	0.5	0.101	0.098	0.003	2.97%
15mins	1	0.101	0.091	0.010	9.90%
15mins	2	0.101	0.098	0.003	2.97%
15mins	3	0.101	0.099	0.002	1.98%

30mins	0.5	0.101	0.093	0.008	7.92%
30 mins	1	0.101	0.097	0.004	3.96%
30mins	2	0.101	0.067	0.034	33.66%
30 mins	3	0.101	0.082	0.019	18.81%
45mins	0.5	0.101	0.079	0.022	21.78%
45mins	1	0.101	0.092	0.009	8.91%
45mins	2	0.101	0.099	0.002	1.98%
45mins	3	0.101	0.098	0.003	2.97%
1hr	0.5	0.101	0.063	0.038	37.62%
1hr	1	0.101	0.081	0.02	19.80%
1hr	2	0.101	0.038	0.063	62.38%
1hr	3	0.101	0.057	0.044	43.56%

Finally, the cost benefit ratio is equal to

Cost : Benefit

71.5 : 926.1

1 : 12.95

The above ratio implies that for every **1 USD** invested in the solution, it benefits **12.95 USD** to the company**.**

Safe ways to reuse water from the salt treatment

Procedure to clean the water

1. Sedimentation to allow any solids to settle
2. The waste water is transferred into a large tank and lime added (calcium hydroxide, $Ca(OH)_2$) to enable tannins and fine solids clump (allow 4-6 hours to pass).
3. Filtration to remove any residues that are suspended in the water.
4. The water collected from the sedimentation step should be passed through a layered filter tank having gravel (stops large particles), coarse sand, fine sand (traps fine particles) and charcoal (has adsorption properties that will remove toxins, organic acids and odors) with charcoal being the top layer.

5. PH rebalance
6. Test for PH using strips and if too acidic (low PH) baking soda is added to neutralize the water.

Activities for which the water can be used

1. Flushing the toilets
2. Cleaning factory floors and equipment (non-food contact)
3. Watering non edible plants like flowers and lawns (only if diluted with more water to make PH 6-7.5 and watering should be done around the plant not on the plant and once in a while use fresh water)

Conclusion

Our salt treatment, 1% sodium chloride, 0.5% citric acid, 0.3% ascorbic acid delivers a 98% tannin reduction, improving cashew nuts at 71.5 USD per ton (excluding water, energy , machinery and labor). The solution has a cost benefit ratio of 1 : 12.95 USD

3.6.1.4 Land Suitability Analysis for Oil Palm and Cassava for Chelsea Agric

Background

- Chelsea Agric has a land of 10,000ha and plans to allocate 1,000ha for cassava and 4,000ha for oil palm as part of a large-scale agro-enterprise in Anambra state, Nigeria.
- The land has areas of waterlogging, lies at the bank of a river, and was previously forested.
- The core concern is whether cassava and oil palm can thrive under current land conditions.
- A targeted land suitability assessment is therefore critical to ensure productivity, long-term sustainability, and return on investment

Main Objective

To assess the suitability of Chelsea Agric's 10,000ha land in Anambra State for cassava and oil palm cultivation

Specific Objectives

1. To conduct a comprehensive land suitability assessment for cassava and oil palm cultivation based on key biophysical parameters
2. To identify site-specific limitations that may affect the establishment and yield potential of each enterprise
3. To recommend tailored land management and agronomic practices for each crop that address identified limitations and optimize crop performance

Methodology

1. Define the land utilisation types that Chelsea Agric is interested in
2. Determine the land use requirements for each land utilisation type
3. Determine the land quality corresponding to each land use requirement for each land utilisation type after determining the land characteristics in each tract of land
4. Compare to what extent each land quality satisfies the land use requirement of each land utilisation type
5. Deduce management interventions needed to make each land utilisation type on each tract of land more productive or less degradative
6. Deduce the physical and economic suitability classification of the tract land for a given land utilisation type
7. Make final recommendations of which tract of land should be used for which land utilisation type based on the physical and economic land suitability
8. Determination of Land Use Requirements for each land utilization type. Collected information on the biophysical, social, and economic characteristics of the land utilisation types from which a standard Land suitability class table was obtained.
9. Determined Suitability Ratings by Class for consideration during parameter classification

Class	Meaning
S1	Highly Suitable
S2	Moderately Suitable
S3	Marginally Suitable
N1	Conditionally Not Suitable
N2	Permanently Not Suitable

Land Use Requirements for Oil palm Cultivation

Parameter	S1	S2	S3	N1	N2
Slope (%)	0-4%	5-8%	9-15%	15-18%	>18%
Soil Texture	Loamy clay/ silty clay loam	Clay loam/ sandy clay	Sandy loam	Sand/clay pan	Sand/gravel/clay pan
CEC (cmolc/kg)	>16	12–16	8–11	7-8	<7
Nitrogen (cg/kg)	> 1000	800–1000	600–799	500-600	< 500
Phosphorus (cg/kg)	> 400	250 – 400	150 – 249	140-150	< 140
Potassium (g/kg)	>10	7–10	5–6.9	4-5	<4
Organic Carbon (%)	>2.0%	1.0–2.0%	0.5–1.0%	0.4-0.5%	<0.4%
pH	5.5–7	5–8	4.5–8.5	4.0-9	<4.0 or >9.5
Sodium(mg/kg)	≥300	150–299	50–149	40-50	<40
Rainfall (mm)	1,800–2,500	1,400–1,799	1,200–1,399	1000-1200	<1,000 or erratic
Mean max temp (C)	27–30	25–26 or 31	22–24 or 32	20-22	<20 or >32
Mean min temp (C)	22–24	20–21 or 25	18–19	17-18	<17 or >25
Land use /Land cover					

- **Land Use Requirements for cassava Cultivation**

Parameter	S1	S2	S3	N1	N2
Slope (%)	0-4%	5-8%	9-15%	15-16%	>16%
Soil Texture	Loamy clay/ silty clay loam	Clay loam/ sandy clay	Sandy loam	Sand/gravel/ clay pan	Sand/gravel/ clay pan
CEC (cmolc/kg)	>16	12–16	8–11	6-7	<7
Nitrogen (cg/kg)	> 1000	800–1000	600–799	500-600	< 500
Phosphorus (cg/kg)	> 400	250 – 400	150 – 249	140-150	< 140

Potassium (g/kg)	>10	7–10	5–6.9	4-5	<4
Organic Carbon (%)	>2.0%	1.0–2.0%	0.5–1.0%	0.4-0.5%	<0.4%
pH	5.5–7	5–8	4.5–8.5	4.0-9.0	<4 or >9
Sodium(mg/kg)	≥300	150–299	50–149	40-50	<40
Rainfall (mm)	1,800–2,500	1,400–1,799	1,200–1,399	1000-1200	<1,000 or erratic
Mean max temp (C)	27–30	25–26 or 31	22–24 or 32	21-22	<21 or >32
Mean min temp (C)	22–24	20–21 or 25	18–19	17-18	<17 or >25
Land use /Land cover					

Field Survey

Dr. Ben and Ruth led the team to the farm to carry out a reconnaissance survey and collect soil samples at strategic points within the 5,000-hectare expanse.

Observations from the Farm

1. Location & Landscape

- Chelsea Farm is located **adjacent to a river**, offering natural irrigation potential
- The land is expansive and **diverse in terrain**, with visible differentiation in soil types

2. Existing Agricultural Activity

- Ongoing cultivation of: **Cassava, Rice** (notably in waterlogged areas), **Maize**
- Some areas already **mapped out by the farmer** for future cassava and oil palm expansion

Assumptions made

- Opted for open-source data for classification because;
  - Not all the parameters could be got from the field e.g. Climate parameters
  - We couldn't have the soil test results in time
- We opted to use the soil test results for ground truthing (verification) of the selected areas for oil palm/cassava cultivation

Management Practices

Divided into 3 categories; topography, climate and soil quality

For Oil palm and Cassava

- Slope and Erosion Control
- Drainage and Waterlogging Prevention
- Irrigation and Water Conservation
- Temperature and Microclimate Management
- Soil pH Adjustment
- Organic Carbon Improvement
- Cation Exchange Capacity (CEC) Enhancement
- Basic Cations (Ca, Mg, K, Na, N, P) Management
- Soil Texture Improvement;
- Soil Depth Optimization

3.7 BlendEd Community of Practice (BlendEd CoP)

On this last day, the BlendEd CoP (BlendEd Community of Practice) was launched to broaden the project's visibility and reach, allowing the information produced by the project to be consumed globally and thus reach even more funders for future editions after this one closes.

The General Coordinator also urged us to continue working together to identify more funding opportunities to keep this group sustainable, healthy, and long-lasting. He guaranteed monthly meetings to foster this unwavering partnership between these six universities from three African regions.

3.8 Final remarks

Finally, the coordinator of each university was given the floor to address the event. It was noted that, overall, Zambeze University deserves congratulations for its excellent organization, comfortable meeting room, internet access, timely meals, productive dialogue, efficient communication, decent accommodations, excellent transportation, and airport transfers to and from Angónia. Therefore, Her Excellency, the Vice Rector, expressed appreciation for the excellent opening of the meeting.

Students during the five days meeting were given several questions to improve their work and in the final day, they presented their final pitch after including the recommendations give by teachers during

mid week presentations. Therefore they were also given 30 days to correct everything and submit the final work to their supervisors.

The final scores of the students in this edition are presented in the following table.

Final team scores Edition 2024/25 Closure at University of Zambezi (25th July 2025)					
		Feed Production	**Maize, Soybean**	**Sweet Cashew**	**AgroFit**
1 - Process	20	15	15	17	17
2 - Product, Solution	20	15	14	17	17
3 - Presentation	15	12	12	12	12
4 - Questions	15	11	11	12	11
5 - Dressing, self-presentation	10	8	8	9	9
6 - Time mngmt	10	8	7	7	8
7 - Team work	10	9	9	9	9
Total	**100**	**78**	**77**	**82**	**82**

The meeting concluded around 5:00 PM, and participants returned on Saturday and Sunday, July 26th and 27th, respectively.

4 Pilot course Year 3 (2026)

The third edition of the African BlendEd Course (ABC BlendEd) brought together 36 undergraduate students from six African universities, namely, Eduardo Mondlane University (EMU/UEM) and Zambezi University from Mozambique, Makerere and Soroti Universitines from Uganda and, The Federal University of Technology Minna (FUTMinna) and the University of Nigeria, Nsukka from Nigeria. Students worked in six cross-institutional teams with six members each, with each team addressing a real operational challenge submitted by an agricultural or agrifood business.

The kick-off meeting was scheduled for 25–29 May 2026 and the closing meeting for 27–31 July 2026. Because of funding limitations, the kick-off was implemented through a distributed blended arrangement rather than a single in-person meeting: the Eduardo Mondlane University and Instituto Politécnico do Porto participants met in Maputo, The Federal University of Technology Minna (FUTMinna) and the University of Nigeria, Nsukka from Nigeria worked together in Nsukka while the other three university groups worked from their respective institutions. Most inter-university collaboration took place online.

The six challenges concerned digital coffee traceability, farmer support and pre-financing, e-commerce for an avocado enterprise, temperature regulation of a solar dryer, affordable quality fish feed, and digital monitoring of ORUWERA seed out growers. The soluction to the challenges included digital platforms and prototypes, a solar-dryer automation system, a fish-feed production guide and digital formulation tool, and a KoboToolbox-based field monitoring system.

4.1 Challenges: Call for Companies, Proposals, Selection Criteria and Selected Challenges

4.1.1 Identification of business challenges

The internship programme under the ABC BlendEd project was aimed at student teams under guidance of the university lecturers/coaches coming up with workable and sustainable solutions to challenges that were identified among the communities. The development of the

solutions to the identified challenge was possible through collaboration with the community or company that presented the challenge and therefore desired to have a workable solution.

The identification of challenges to work with was a process that involved stages. In the first stage, the Eduardo Mondlane University in Mozambique and Soroti University in Uganda contacted potential partner companies and invited them to identify operational challenges for which practical solutions would be useful. In the second stage, the companies identified the challenges that they faced and needed solutions. A company or organization that picked interest and was willing to take part in working with the project was free to give more than one challenge for which they needed a solution. In the process of providing the challenge key information about the company or organization was requested which included the description of the company and description of the challenge proposed or desired solution to give the project an understanding of what the company actually did and the context of the challenge or problem. Understanding the context of the challenge was important for designing feasible proposals to solve or manage the challenge. Presentation of a challenge was no guarantee that it would be selected.

4.1.2 The challenges presented by companies

Following the process of invitation of companies to express interest in being part of the project and providing their challenges, eight (8) companies presented their challenges. The challenges submitted by companies were then presented to academic staff representing the six participating African universities and the European partners. Following the challenges presentation, six challenges were selected. The selection process was based on clarity of the operational context, the practicability of the problem to be solved, and the scope for a student teams working within the ABC BlendEd course period. Of the eight companies that presented the challenges, 4 companies were from Mozambique and 4 from Uganda. The companies and their challenges are presented below.

ORUWERA Seed Lda, Mozambique

ORUWERA Seed Lda is a seed company based in Nampula Province in Mozambique. The company was established in 2008, being one of the private seed companies operating within

Nampula Province. Its portfolio includes the production of seed for major food security crops including cowpea, soybean, maize, and groundnut.

Like many seed companies in Mozambique, ORUWERA operates within a complex and often inefficient seed value chain.

The challenges faced by ORUWERA include the following:

- Insufficient supply of first-generation seed.
- Low productivity of seed multiplication by subcontracted producers.
- Poor water efficiency in field irrigation systems (Inefficient water consumption).
- High costs associated with using different irrigation systems.
- Insufficient water retention for production.
- Low seed promotion at the community level.
- Management of seed supply to customers during peak distribution periods.
- Poor seed storage capacity in warehouses for more than two seasons.
- High logistics costs in seed distribution for sale at the community level.

JUDY Fish, Gaza Province in Mozambique

Mozambique's aquaculture sector holds strong potential to support food security, employment, and income generation, yet it remains underdeveloped and constrained by structural and operational challenges. The country benefits from abundant inland water resources and favorable climatic conditions, making it suitable for freshwater aquaculture, particularly tilapia production. However, production levels remain low and are largely dominated by small-scale, semi-intensive systems with limited access to modern technologies.

One of the key constraints in the sector is the limited and inconsistent production of fingerlings, especially during the winter months. Seasonal temperature fluctuations affect breeding cycles, resulting in unreliable supply and disrupted production planning for fish farmers. In addition, the high cost and limited availability of quality feed significantly increase production costs, reducing profitability and limiting growth.

The aquaculture value chain in Mozambique is also fragile and poorly coordinated. Weak linkages between hatcheries, feed suppliers, producers, and markets reduce efficiency and hinder sector development. Limited access to finance, technical support, and extension services further restricts the adoption of improved practices.

Infrastructure challenges, including inadequate cold storage, transportation, and market access, exacerbate these constraints. This context shapes the operational environment of companies such as Jude Fish, operating in Gaza Province, and highlights key areas for potential intervention.

- Limited production of fingerlings in winter;
- High acquisition costs and limited access to quality feed;
- fragility of the aquaculture value chain.

DADTCO Mozambique

DADTCO Mandioca Mozambique (DMM), established in 2011 by the Dutch company DADTCO, is the only industrial-scale producer of cassava-based products in Mozambique. The company operates in Inharrime District, Inhambane Province, an area with strong potential for cassava production. DMM uses innovative mobile processing units that allow cassava roots to be processed immediately after harvest, reducing post-harvest losses and enabling commercialization.

DMM produces cassava wet cake for local and South African food and beverage markets and works with approximately 2,500 smallholder farmers. This inclusive model provides farmers with a reliable market, contributing to improved livelihoods.

Despite its achievements, DMM faces several constraints. Logistics in the cassava supply chain are inefficient, with high transport costs and delays affecting raw material quality. Traceability and certification are also complex due to the large number of smallholder suppliers. In addition, the company's drying capacity is limited (450 kg/hour), restricting its ability to meet growing demand and highlighting the need for expansion.

Finally, by-product management, especially cassava peels and fiber is weak, resulting in underutilization of potential value-added opportunities. Addressing these challenges is key to improving DMM's efficiency, competitiveness, and long-term sustainability.

Current Challenges

- Poor cassava roots supply chain logistics, from farm to the processing site
- Traceability and certification of raw material (cassava roots) very difficult and complex
- DMM Low drying capacity 450 kg wet cake/hour. Would like to increase to 1500kg/hour
- Weak management of byproducts mainly peels and fiber (waste)

Josina Machel Cooperative, Mozambique

The Josina Machel Cooperative (COJOMA) was established on June 18, 2000, legalized as an association in 2003, and later transformed into a cooperative in 2019. It is located in Sisal, Nhanombe locality, Inharrime District, Inhambane Province. The cooperative has 5 members (2 women and 3 men) and employs over 15 workers, including youth and casual laborers.

COJOMA focuses on the processing and commercialization of cassava and its derivatives, contributing to local income generation and rural development. It operates under principles of voluntary and open membership, allowing inclusive participation. The cooperative plays an important role in linking smallholder cassava producers to markets, while promoting agro-processing at the local level.

Challenges

The challenges faced by COJOMA include:

- Limited transport capacity increases raw material costs and affects supply reliability.
- Insufficient and inefficient processing equipment reduces productivity.
- Dependence on specific cassava maturity periods limits raw material flexibility.
- Poor packaging quality reduces market competitiveness.

- Lack of proper storage facilities restricts market access and sales flexibility.
- Shortage of essential equipment affects hygiene, safety, and record-keeping.
- Unstable market access leads to unsold stock and financial instability.
- Weak management capacity limits effective coordination and growth.

Empire Agricultural Coffee Limited, Uganda

Empire profile Empire Agricultural Coffee Services Limited (EACS) is a coffee marketing, processing, and export firm based in Uganda that works with thousands of smallholder farmers and producer groups. Its mission is to raise farmer incomes by integrating farmers into higher-value coffee supply chains through value addition, improved production and quality practices, and access to remunerative markets. Core activities include procurement, processing, quality control, packaging, and export logistics, alongside services such as certification support and agronomic capacity building. Target markets include premium international buyers as well as local value-added channels. For student teams, Empire can provide business-unit mentorship, access to non-sensitive process and quality/traceability data, pilot sites through its hubs and partner cooperatives, and modest test funding for validation.

Challenge:

- Build a “buyer-ready” traceability and quality evidence pack (tech adoption + compliance). Design a lightweight traceability and quality-documentation system that links farmer/cooperative lots to processing batches and export shipments and generates a buyer-ready evidence pack (e.g., lot IDs, process steps, QC checkpoints, and chain-of-custody records).
- Build and test a working prototype with real or simulated workflows, then propose a pilot that defines data fields, SOPs/roles, and KPIs (accuracy, time-to-document, rejection/claims rate, and cost-to-run).

Deliverables:

- working prototype (app, spreadsheet+QR workflow, or dashboard);

- traceability data model + SOPs; requirements-to-evidence “mapping” brief;
- pilot plan (site, timeline, risks, KPIs).

Challenge:

- Produce a market-entry and buyer-readiness playbook for one priority export segment (business model improvement).
- Develop a practical playbook for one defined segment (choose one origin/grade and one target buyer type) covering buyer profiling, pricing logic, contract structure, and shipment terms, with a repeatable outreach pipeline.
- Validate the playbook through a fast discovery sprint (secondary research plus interviews where possible) and deliver a 90-day execution plan supported by a simple unit-economics model and risk register.

Deliverables:

- buyer profiling report + outreach pipeline;
- pricing and offer model (assumptions + sensitivity);
- contract term-sheet templates and negotiation checklist;
- 90-day execution plan (roles, milestones, KPIs) + risk register.

Challenge:

- Redesign branding, packaging, and export labeling for premium markets (innovation + sustainability).
- Create a packaging and labeling system for Empire’s value-added coffee that improves premium positioning while meeting export labeling compliance needs and reducing packaging waste and cost.
- Prototype label/packaging concepts and specify a pilot plan for one channel (export sample packs, local retail, or direct-to-consumer) including acceptance criteria and a simple test protocol.
-

Deliverables:

- brand and packaging concept deck;
- compliant label prototypes + labeling checklist;
- packaging sustainability assessment (materials, waste, cost drivers);
- pilot merchandising plan + test protocol (what to measure and how).

Challenge:

- Design a scalable farmer-support and pre-financing pilot that raises quality and incomes (social impact + sustainability).
- Design a farmer-centric support model that improves coffee quality/consistency and strengthens incomes by combining climate-smart agronomy coaching, input distribution, and a practical prefinancing/repayment mechanism suitable for cooperatives.
- Produce an implementable pilot (one cooperative or cluster) with governance rules, a monitoring framework, and a business case showing how the model sustains itself for Empire and farmers over time.

Deliverables:

- research brief (constraints, farmer/cooperative needs, root causes);
- pilot plan (process, eligibility, repayment rules, partner roles);
- monitoring & evaluation framework (2–6 metrics + collection plan);
- business case (unit economics + sustainability assumptions).

Atari Farms, Uganda

Atari Farms Limited is a social agribusiness based in Mbale City, Uganda, working with over 1500 smallholder farmers to reduce post-harvest losses, strengthen market access, and build circular agricultural value chains. Through its value-addition brand Avoglow, the company produces cold-pressed avocado oil and related natural products, while also operating Atari Fresh, a fresh-produce aggregation and supply business. Despite growing market demand and

strong field operations, Atari Farms currently lacks a centralized digital platform, limiting its ability to communicate its impact, expand customer reach, and scale product sales.

Problem Statement

The absence of a functional website and integrated e-commerce system presents three key challenges:

- Limited brand visibility and storytelling for partners, customers, and investors
- Lack of an online sales channel for Avoglow products
- Fragmented digital presence across multiple social media platforms without a unified ecosystem. Addressing this gap is critical for strengthening market competitiveness, improving revenue generation, and supporting long-term enterprise growth.

Proposed Student Project

Students will collaborate with Atari Farms to design and develop a user-centered website integrated with an e-commerce system, capable of showcasing the company's story, products, and impact while enabling online sales. The project will also include integration of social media platforms, communication and recommendations for a scalable digital growth strategy suitable for a growing African agribusiness.

Expected Outputs

- Functional website prototype for Atari Farms
- Integrated e-commerce structure for Avoglow products
- Brand storytelling and digital content framework
- Strategic recommendations for long-term digital visibility and online marketing

Empire Agricultural Coffee Services Ltd., Uganda

Monitoring and control of the full coffee supply chain.

Archtech Agro Uganda Limited, Uganda

Management of funding sources their applicability and its results.

4.1.3 Challenges selected and criteria for selecting the challenges

From the eight challenges presented, six challenges were selected. The selection was based on real operational problems for which students could develop practical, interdisciplinary solutions during the course. The six selected challenges are listed below.

No.	Company / location	Challenge	Reported solution / output
1	Empire Agricultural Coffee Limited, Uganda	Dependency on a manual, paper-based system to track the coffee value chain.	Digital coffee traceability platform, including farmer registration, GPS farm mapping, offline data collection, deforestation screening and due-diligence records.
2	Empire Agricultural Coffee Services Ltd., Uganda	Design a scalable farmer-support and pre-financing pilot that improves quality and incomes, with social impact and sustainability.	Web-based farmer-support and pre-financing system covering farmer verification, loan approvals, input inventory, harvest deliveries and loan recovery.
3	Atari Farms, Uganda	Creation of a digital platform and e-commerce system for the farm, which markets avocado products under the Avoglow brand.	User-centred website with company information, product promotion, sustainability information and e-commerce functions.

4	Archtech Agro Uganda Limited, Uganda	Develop a temperature regulation and control system for a solar dryer.	DrySmart prototype combining an ESP32 microcontroller, temperature and humidity sensors, ventilation fans, display, data logging and an Android application.
5	Judy Fish Center Company, Gaza Province, Mozambique	Improve access to quality fish feed at low cost.	Feed-production guide using locally available ingredients and the AquaGrow digital platform for ingredient management, nutrient calculations, formulation, stock and production monitoring.
6	ORUWERA Seed Lda., Nampula, Mozambique	Low seed productivity associated with a lack of a farmer-monitoring system.	Digital field-monitoring system using KoboToolbox to record outgrower details, GPS coordinates, field activities and photographs.

4.2 Call for application, selection and establishment of student teams

4.2.1 Advertisement of the internship opportunity

Each of the six African universities publicized the opportunity internally. The advertising methods included emails to students and staff, printed notices on faculty and school noticeboards and lecturers' office doors, announcements during lectures, direct communication with students, and sharing notices through student WhatsApp groups. The communication was intended to explain the ABC BlendEd opportunity, outline eligibility criteria and indicate how interested students could apply.

4.2.2 Selection criteria

Different criteria were used to select student to be part of the 3rd edition of the ABC BlendEd project. Overall, academic merit, assessed using grades in all courses completed by the time of selection was the first criterion used in all six African universities. At Eduardo Mondlane University, in addition to the merit, the other criteria used were the following:

- No outstanding or failed courses that remained to be completed;
- Being a fourth-year undergraduate student or completion of coursework while awaiting the final-project defense.
- Basic english proficiency (sufficient to listen, speak and write).
- Availability for the scheduled kick-off and closing meetings.
- Inclusiveness and equal opportunity, promoting participation from diverse backgrounds and, where possible, gender balance.

Through this process, a total of 36 students were selected from the six African Universities, being six from each university.

4.2.3 Establishment of student teams

Students were grouped according to the six selected challenges, with one team assigned to each challenge. The intended model brought together students from different institutions and disciplinary backgrounds to support cross-cultural collaboration and interdisciplinary problem-solving. The team allocations is indicated in the table below.

Team / challenge	Students recorded in the consortium report
1. Coffee traceability	Mugumya Anthony (Soroti University); Jurugo Santos Amale (Makerere University); Chelsia Amisse Manuel (Zambezi University); Joseph Victoria (FUTMinna); Célia Fernando Loforte (Eduardo Mondlane University); Eribe David (University of Nigeria, Nsukka).
2. Farmer support and pre-financing	Fáusia Francisco Miguel (Eduardo Mondlane University); Dien El-Shaddai King Dien (FUTMinna); Leonilda Francisco Alves (Zambezi University); Nakanyike Belinda (Soroti University); Nwuko Destiny Chekwubechukwu (University of Nigeria, Nsukka); Wantimba Sauda Kirabira (Makerere University).
3. Atari Farms digital platform and e-commerce	Arinda Judith (Makerere University); Edson Cau (Eduardo Mondlane University); Escolástica Luís Bizueque (Zambezi University); Iyi Onyenyonachukwu Samuel (University of Nigeria,

	Nsukka); Kawala Desire (Soroti University); Mayowa Oluwatoyoi Deborah (FUTMinna).
4. Solar-dryer temperature control	Taremwa Arthur (Makerere University); Mucunguzi Benjamin (Soroti University); Bialódia José Jonasse (Eduardo Mondlane University); Emmanuel Adakole Francis (FUTMinna); Agbedo Leo Kelechi (University of Nigeria, Nsukka); Virgílio de Armando Jorge Salato (Zambezi University).
5. Affordable quality fish feed	Célia Aurélio Zevo (Eduardo Mondlane University); Babirye Aisha (Soroti University); Emmanuel Oluwaseu Solomon (FUTMinna); Kiwuluka Arafat Waira (Makerere University); Chukwuemea Hope Ekpereamaka (University of Nigeria, Nsukka); José Elísio Chemane (Zambezi University).
6. Seed outgrower monitoring	Américo Dima (Eduardo Mondlane University); Baptista Arnaldo (Zambezi University); Arum Treasure (FUTMinna); Asadu Miracle (University of Nigeria, Nsukka); Mugerwa Patrick (Makerere University); Owori Charles (Soroti University).

4.3 Third Edition Kick-off Meeting

The third-edition kick-off meeting was scheduled for 25–29 May 2026, with Eduardo Mondlane University in Maputo, Mozambique, as host. The original plan envisaged a in-person meeting in Mozambique. Because of funding limitations, the meeting instead used a distributed blended format. The Eduardo Mondlane University participants and staff from Instituto Politécnico do Porto met physically in Maputo; the Zambezi University, Makerere University and Soroti University groups worked separately at their institutions while staff and students from FUTMinna and the University of Nigeria, Nsukka worked together in Nsukka. Interaction between student within a team was conducted online.

The meeting brought together students, academic staff and, during challenge discussions, the companies or stakeholder representatives. The main purpose of companies' attendance of the meetings was to clarify the challenges. The teachers' purpose was to organize student

teams, review progress, and agree on the work to be completed during the subsequent four-week engagement.

4.3.1 Objectives and programme

The objectives of the meeting were to:

- Introduce participants to the 3rd edition and strengthen coordination among partner institutions.
- Clarify the six company challenges and the expected practical outputs.
- Enable student teams to present their initial progress and receive feedback from academic staff and challenge owners.
- Agree on next steps for the four-week period following the kick-off meeting.
- Review project implementation deliverables, including reporting, dissemination, accreditation-related documentation, conference participation and training materials.

The detailed day-by-day programme and attendance list are presented in annex 1 and 2

4.3.2 Student presentations of progress

During the kick-off week, students made two presentations of progress on their assigned challenges to the fellow students, teachers and company representatives. The first presentation was made in the 3rd day of the kick-off meeting and the second presentation in the last day of the kick-off meeting. The purpose of presentation was to give opportunity for the companies to make clarification of the challenges faced and help shape the process of solution development by the students. The presentation enabled teachers to best guide students in the process of solution development. The presentation on the final day of the kick-off meeting also served to guide the students of the 4 weeks that would follow up to the closing meeting where students were expected to have the solution developed for the challenges presented.

4.3.3 Project implementation and reporting

In addition to student guidance, the teachers were involved in discussion and addressing of the pending issues of the project implementation. The ABC BlendEd Coordinator provided information on the pending project deliverables and implementation, including quarterly reports, accreditation reports, dissemination activities, conferences attendance and the development of training materials. Coordinators emphasized timely submission of reports.

4.3.4 Closing meeting planning

On the final day of the kick-off meeting of the third edition of the ABC BlendEd project, held in Maputo, participants discussed the arrangements for the closing meeting, which was initially scheduled to take place in Soroti, Uganda. During the discussion, the availability of funding to cover the costs of students' and academic staff's in-person participation in Soroti was identified as one of the main constraints to the in-person participation of African partner institutions.

In this context, the ABC BlendEd project coordinator raised the possibility of the Polytechnic Institute of Porto covering the costs of in-person participation. However, this option depended on confirmation from the institution's financial department regarding the availability of funds. The coordinator also raised the question of whether the Institute's internal regulations and procedures would permit this type of funding arrangement.

The meeting also considered the possibility of each participating institution advancing the funds required to cover the expenses of its representatives and subsequently requesting reimbursement or the applicable financial compensation. However, representatives of the African institutions indicated that this option would not be feasible, as their institutions faced significant financial constraints, including difficulties in covering their regular operating expenses.

The meeting concluded with the project coordinator awaiting a response from the Polytechnic Institute of Porto's financial department to confirm whether it would be possible

to advance the funds required to cover the in-person participation expenses of the African partner institutions.

4.4 Online Phase: Interim Student-Team Assessment and Progress Monitoring

Following the kick-off meeting, the six teams continued working on their challenges during a further four-week engagement period. With support from their teachers, the students developed a weekly meeting schedule of the online engagement. Student guidance and progress were also scheduled to take place in a weekly basis. The table below lists the coaching teachers per group of students.

During the 8 weeks of online meeting the students interacted with the companies which enabled then to address the challenges and develop solution which included prototypes development. Some solutions underwent functional testing or were tested with the client as a proof of concept.

Team / challenge	**Students and institution affiliation**	**Coaches and institution afilliation**
1. Coffee traceability	Mugumya Anthony (Soroti University); Jurugo Santos Amale (Makerere University); Chelsia Amisse Manuel (Zambezi University); Joseph Victoria (FUTMinna); Célia Fernando Loforte (Eduardo Mondlane University); Eribe David (University of Nigeria, Nsukka).	Prossy Isubikalu (MU)
2. Farmer support and pre-financing	Fáusia Francisco Miguel (Eduardo Mondlane University); Dien El-Shaddai King Dien (FUTMinna); Leonilda Francisco Alves (Zambezi University); Nakanyike Belinda (Soroti University); Nwuko Destiny Chekwubechukwu (University of Nigeria, Nsukka); Wantimba Sauda Kirabira (Makerere University).	1. Mukebezi Rebecca (SU) 2. Pascal Chukwudi (FUTMINNA)

3. Atari Farms digital platform and e-commerce	Arinda Judith (Makerere University); Edson Cau (Eduardo Mondlane University); Escolástica Luís Bizueque (Zambezi University); Iyi Onyenyonachukwu Samuel (University of Nigeria, Nsukka); Kawala Desire (Soroti University); Mayowa Oluwatoyoi Deborah (FUTMinna).	1. Achike Anthonia Ifenyinwa (Insukka) 2. Musa Chemisto Satya (MU)
4. Solar-dryer temperature control	Taremwa Arthur (Makerere University); Mucunguzi Benjamin (Soroti University); Bialódia José Jonasse (Eduardo Mondlane University); Emmanuel Adakole Francis (FUTMinna); Agbedo Leo Kelechi (University of Nigeria, Nsukka); Virgílio de Armando Jorge Salato (Zambezi University).	1. Hellen Aluku (SU) 2. Lucas D. Tivana (EMU)
5. Affordable quality fish feed	Célia Aurélio Zevo (Eduardo Mondlane University); Babirye Aisha (Soroti University); Emmanuel Oluwaseu Solomon (FUTMinna); Kiwuluka Arafat Waira (Makerere University); Chukwuemea Hope Ekpereamaka (University of Nigeria, Nsukka); José Elísio Chemane (Zambezi University).	1. Francisco Baloi (EMU)
6. Seed outgrower monitoring	Américo Dima (Eduardo Mondlane University); Baptista Arnaldo (Zambezi University); Arum Treasure (FUTMinna); Asadu Miracle (University of Nigeria, Nsukka); Mugerwa Patrick (Makerere University); Owori Charles (Soroti University)	1. Rogerio Chiulele (EMU) 2. Prof. Egwin Evan (FUTMINA) 3. Quisito Ravia (ZU)

4.5 Third Edition Closing Meeting

The third edition closing meeting was designed to take place in Soroti University in Uganda between 27 and 31 July 2026. The purpose of the closing phase was to review the students' work, present the developed solutions, consider their feasibility and potential for use, assess student performance and agree on follow-up actions. Due to financial limitations, the meeting was held in online format. The Eduardo Mondlane University participants met physically in Maputo; the Zambezi University, Makerere University and Soroti University groups worked separately at their institutions; and staff and students from FUTMinna and the University of Nigeria, Nsukka worked together in Nsukka.

Similarly to the kick-off meeting, students together with academic staff and the companies or stakeholder representatives got together to guide students, discuss the project implementation and next steps of ABC BlendEd after the 3rd edition.

The programme meeting and attendance list are presented as annexes 4 and 6.

4.5.1 Student progress presentations of the final products

Student presentations took place in the first, third and last day of the closing meeting. In the first day, students presented the solution achieved and got feedback from the teacher for improvement. In the 3rd day, the students presented the solution after the refinement and inclusion of the comments of the first day and in the last day they presented the final products.

4.5.2 Assessment and grading of students

For the third edition each institution was responsible for assessing its students independently of the group they were working on.

Final grade of the six teams of 2025/26 Edition

#	Team	Student name	Institution	Grade
1	CT	Mugumya Anthony	SU	
2	CT	Jurugo Santos Amale	MU	88

3	CT	Chelsia Amisse Manuel	ZU	80
4	CT	Joseph Victoria	FUTMinna	82
5	CT	Célia Fernando Loforte	EMU	85
6	CT	Eribe David	UNNsukka	81
7	FSPF	Fáusia Francisco Miguel	EMU	85
8	FSPF	Dien El-Shaddai King Dien	FUTMinna	84
9	FSPF	Leonilda Francisco Alves	ZU	88
10	FSPF	Nakanyike Belinda	SU	
11	FSPF	Nwuko Destiny Chekwubechukwu	UNNsukka)	86
12	FSPF	Wantimba Sauda Kirabira	MU	86
13	AFDPEC	Arinda Judith	MU	85
14	AFDPEC	Edson Cau	EMU	85
15	AFDPEC	Escolástica Luís Bizueque	ZU	78
16	AFDPEC	Lyi Onyenyonachukwu Samuel	UNNsukka)	80
17	AFDPEC	Kawala Desire	SU	
18	AFDPEC	Mayowa Oluwatoyoi Deborah	FUTMinna	78
19	SDTC	Taremwa Arthur	MU	84
20	SDTC	Mucunguzi Benjamin	SU	
21	SDTC	Bialódia José Jonasse	EMU	85
22	SDTC	Emmanuel Adakole Francis	FUTMinna	84
23	SDTC	Agbedo Leo Kelechi	UNNsukka)	89
24	SDTC	Virgílio de Armando Jorge Salato	ZU	92
25	AQFF	Célia Aurélio Zevo	EMU	85
26	AQFF	Babirye Aisha	SU	
27	AQFF	Solomon Emmanuel Oluwaseu	FUTMinna	87
28	AQFF	Kiwuluka Arafat Waira	MU	89
29	AQFF	Chukwuemea Hope Ekpereamaka	UNNsukka)	84
30	AQFF	José Elísio Chemane	ZU	85
31	SOGM	Américo Dima	EMU	85
32	SOGM	Baptista Arnaldo	ZU	85
33	SOGM	Arum Treasure	FUTMinna	65
34	SOGM	Asadu Miracle	UNNsukka)	83
35	SOGM	Mugerwa Patrick	MU	85
36	SOGM	Owori Charles	SU	

Note: CT= Cofee tracebility; FPF=Farmer support and pre-financing; AFDPEC= Atari Farms digital platform and e-commerce; SDTC= Solar-dryer temperature control; AQFF= Affordable quality fish feed; SOGM= Seed Out Grower Monitoring

4.5.3 Student Products/Deliverables

The solutions developed during the third edition included digital platforms and prototypes, a solar-dryer automation system, a fish-feed production guide and digital formulation tool, and a KoboToolbox-based field monitoring system. Details of each solution are provided in 6.1 to 6.6.

4.5.4 Solution for the challenge 1: Digital traceability for the coffee value chain

The team developed **Empire Roast**, a digital coffee traceability platform intended to address reliance on manual, paper-based records at Empire Agricultural Coffee Limited in Uganda. The platform supports farmer registration, GPS-based farm mapping, offline data collection, satellite-based deforestation screening, secure recordkeeping and automated generation of due-diligence statements. The consortium report states that testing demonstrated feasibility for improving transparency, data integrity and administrative efficiency.

Further development priorities include stronger security, multilingual support, artificial-intelligence features, advanced satellite monitoring, mobile applications and large-scale field validation. Transferability will depend on validating the platform under operational conditions, ensuring data quality and privacy, and training the company's staff and participating farmers. The source does not confirm full-scale deployment.

4.5.5 Solution for the challenge 2: Scalable farmer support and pre-financing

The team working on this challenge developed a web-based farmer-support and pre-financing system for Empire Agricultural Coffee Services Ltd. The system digitises farmer registration and verification, loan approvals, input inventory, harvest deliveries and automatic loan recovery. Role-based dashboards, audit trails, performance indicators and offline capabilities are intended to strengthen traceability, financial accountability and operational efficiency while reducing side-selling.

Recommended next steps include SMS/USSD notifications, collecting client feedback and piloting the system within a cooperative cluster. A controlled pilot should assess usability,

data accuracy, repayment performance and the effects on farmer access to inputs and markets. The consortium summary uses the name “Empire Roast” for both challenges 1 and 2; the precise name of the second product should be verified with the team before final publication.

4.5.6 Challenge 3: Digital platform and e-commerce for Atari Farms

The team working on this challenge developed a user-centred website with integrated e-commerce functions for Atari Farms, which markets avocado products under the Avoglow brand and reportedly serves more than 1,500 smallholder farmers. The website centralises company information, product promotion, sustainability activities and social-impact information, with shopping-cart, checkout and customer-account features. It was designed for multiple devices and tested with the company as a proof of concept.

Payment-gateway integration remained outstanding in the consortium report. Priorities for sustainability include completing secure online payments, maintaining product and inventory information, assigning responsibility for website updates, and monitoring traffic, enquiries and completed sales.

4.5.7 Challenge 4: Temperature regulation and control for a solar dryer

The team working on this challenge developed **DrySmart**, an affordable offline automation and monitoring prototype for the solar tunnel dryer at Archtech Agro Uganda Limited. It integrates an ESP32 microcontroller, temperature and humidity sensors, ventilation fans, a display and data logging, complemented by an Android application communicating via Bluetooth. Functional testing reportedly confirmed automatic ventilation, manual control and data recording.

The team recommended field installation and farmer training. Further improvements include product-moisture sensing, real-time-clock integration and optional remote connectivity. Before wider adoption, the system should be tested under real drying conditions and across relevant crops and weather conditions, with attention to reliability, maintenance, energy requirements and user support.

4.5.8 Challenge 5: Affordable quality fish feed in Gaza Province, Mozambique

The team developed a practical approach to improving access to affordable, quality Nile tilapia feed using locally available ingredients. The output combines a feed-production guide with the **AquaGrow** digital platform. The guide covers ingredient selection, feed formulation, manufacturing, quality control, storage and feeding management. AquaGrow supports ingredient management, automated nutrient calculations, feed formulation, stock control, production tracking and monitoring.

The reported next priorities are field testing, production reporting and iterative improvement based on user feedback and research findings. Before recommending adoption at scale, the feed should be evaluated for nutritional quality, fish growth performance, feed-conversion efficiency, production costs and safety. The consortium summary does not provide results from a completed field trial.

4.5.9 Challenge 6: Digital monitoring of seed outgrowers in Nampula, Mozambique

To address low seed productivity associated with inadequate farmer monitoring, the team developed a digital field-monitoring system using KoboToolbox. It enables technicians to collect out grower information, GPS coordinates, field activities and photographs. The system is intended to improve monitoring efficiency, accountability and evidence-based decisions in seed production and agricultural extension.

Potential improvements include GIS mapping, automated notifications, online dashboards and crop-performance analytics. Sustainable use will require clear data-collection protocols, staff training, regular synchronization and review of data quality, as well as an agreed institutional owner for the tool and its records.

4.5.10 Cross-cutting transferability and sustainability

Across the six challenges, the student teams produced digital tools, prototypes and practical guidance intended to respond to real business needs. These outputs have potential for adaptation to other enterprises and locations, but their long-term impact will depend on

testing in operational settings, company ownership, user training, maintenance arrangements, access to relevant data and resources for further development.

4.6 Conclusions, Recommendations and Next Steps

4.6.1 Conclusions

The third edition engaged 36 students from six African universities in six cross-institutional teams addressing practical challenges submitted by agrifood businesses and organisations in Uganda and Mozambique. The reported outputs covered coffee traceability, farmer pre-financing, e-commerce, solar-dryer control, fish-feed production and seed-outgrower monitoring.

The edition demonstrated the potential of blended, challenge-based learning to connect university learning with real operational needs. The teams developed software platforms, prototypes and practical guidance, and some outputs underwent functional or proof-of-concept testing. The distributed delivery model enabled participation despite funding constraints, but also increased reliance on online coordination.

4.6.2 Recommendations

- Secure adequate resources for student and staff mobility, internet access and prototype testing; where physical meetings are not possible, provide a clear hybrid plan and reliable meeting facilities.
- Identify and refine company challenges early, document the selection criteria, and ensure that each company assigns a focal person who can provide information and timely feedback.
- Agree on measurable milestones for each team, including problem definition, design, prototype development, testing, company feedback and final handover.
- Use a common assessment rubric across all institutions, covering teamwork and process, feasibility and usefulness of the product, presentation and communication, and evidence of engagement with the company.
- Collect structured feedback from students, teachers and company partners using common questionnaires and report response rates and key findings.

- Follow up on the specific technical gaps recorded by the teams, including field validation, payment integration, farmer feedback, system security, and improved analytics where relevant.

4.7 Annexes

4.7.1 Annex 1. Kick-off meeting programme (25–29 May 2026)

ABC – Edition 2025-2026 – Kick-off meeting – held in hybrid mode (in-person in Maputo and online with the remaining partners)
Venue: Eduardo Mondlane University, 3453 Avenida Julius Nyerere, Maputo, Moçambique
Online at ABC BlendEd 2025/26 Kick-Off | Meeting-Join | Microsoft Teams

Meeting agenda

Monday, 25th of May 2026

Time	Task	Leader	Target	Location
08:30-08:45	Registration – Attendance list			
08:45-09:00	Opening Agenda for the week briefing	Rogério Chiulele Nuno Escudeiro	Students, teachers	Plenary room + Teams
09:00-10:30	Project briefing by companies: • Project A – 09:00-09:30 • Project B – 09:30-10:00 • Project C – 10:00-10:30	Companies' representatives	All (students, teachers, companies)	Plenary room + Teams
10:30-11:00	Coffee break – Health break			
11:00-12:30	Project briefing by companies: • Project D – 10:30-11:00 • Project E – 11:00-11:30 • Project F – 09:00-09:00	Companies' representatives	All (students, teachers, companies)	Plenary room + Teams
12:30-13:30	Lunch break			
13:30-14:30	Multicultural awareness workshop (TBC)	Tatjana Welzer	Students	Plenary room + Teams
14:30-16:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams

	Documents missing: • In-person meeting attendance lists: Kampala, Minna, Nsukka, Angónia, Porto, Maputo • Partnership agreements	Nuno Escudeiro	Teachers	Teachers room + Teams
16:00-16:30	Wrap-up	Nuno Escudeiro	Students, teachers	Plenary room + Teams

Tuesday, 26th of May 2026

Time	Task	Leader	Target	Location
08:30-08:45	Registration – Attendance list			
08:45-09:30	Plenary stand-up meeting. What are you doing today: 5 minutes per team.	One student per team is nominated by the team per day	All (students, teachers)	Plenary room + Teams
09:30-11:00	Students' teamwork	Team leaders	Students	Students-rooms + Teams
	Status of Deliverables and plan to conclude: • D1.1 – Project Management Framework (IPP, M1) • D1.2 – Progress report (IPP, M20) • D1.3 – KPI dashboard executive summary, compilation of semestral monitoring reports (IPP, M6/M12/M18/M24/M30/M36) • D2.1 – ABC course syllabus (ODISEE, M5/M12/M24/M36) • D2.2 – ABC course guide (HMU, M5/M12/M24/M36) • D2.3 – ABC staff training course material (FUTMIN, M5/M12/M24/M36) • D3.1 – Hybrid-Problem Based Learning (H-PBL) cells (UEM, M6)	Nuno Escudeiro	Teachers	Plenary room + Teams

	• D3.2 – ABC BlendEd yearly pilot reports (MU, UNN, UEM, M12/M24/M36) • D3.3 – ABC BlendEd pilot accreditation certificate (MU, M12) • D3.4 – ABC BlendEd pilot accreditation certificate (UNN, M24) • D3.5 – ABC BlendEd pilot accreditation certificate (UEM, M36) • D4.1– ABC CoP online platform (SU, M12) • D4.2 – Strategic plan for sustainability (RUFORUM, M30) • D4.3 – Dissemination plan (RUFORUM, M4) • D4.4 – Dissemination report (SU, M36)			

11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Status of Events and plan to conclude: • Local workshops: which ones are done? Which ones are missing? Where are the reports of those already implemented?	Nuno Escudeiro	All (students, teachers, companies)	Plenary room + Teams
13:00-14:00	Lunch break			
14:00-16:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Management issues pending: • Quarterly reporting • KPI Dashboard • Dissemination reporting **Exploitation of project results:**	Hubert Roth Kostas Karampidis	Teachers	Teachers room + Teams

	• Community of Practice • Book: Transformative Education: From Islands of Success to Scale and Sustainability Across Africa and Europe • 2026/27 course edition	Emmanuel Okalany		
16:00-16:30	Wrap-up	Anthonia Achike	Students, teachers	Plenary room + Teams

Wednesday, 27th of May 2026

08:30-08:45	Registration			
08:45-09:30	Students present their plan and current standing: 5 minutes pitch + 5 minutes suggestions for improvement.	One student per team is nominated by the team per day	Students, teachers, company representatives	Plenary room + Teams
09:30-11:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Plenary room + Teams
11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Plenary room + Teams
	Status of project Events and plan to conclude: • Local workshops: which ones are done? Which ones are missing? Where are the	Teachers	Teachers	Plenary room + Teams

	reports of those already implemented?			
13:00-14:00	Lunch break			
14:00-16:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
16:00-16:30	Wrap-up	Egwim Evans	Students, teachers	Plenary room

Thursday, 28th of May 2026

08:30-08:45	Registration			
08:45-11:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
13:00-14:00	Lunch break			
08:45-11:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room

11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
16:00-16:30	Wrap-up	Prossy Isubikalu	Students, teachers	Plenary room

Friday, 29th of May 2024

08:45-09:00	Registration and final teams' arrangements			
09:00-10:30	Students' pitches (15 minutes pitch + 15 minutes discussion): • Project A – 09:00-09:30 • Project B – 09:30-10:00 • Project C – 10:00-10:30	Students	Students, teachers, companies	Plenary room + Teams
10:30-11:00	Coffee break – Health break and final teams' arrangements			
11:00-12:30	Students' pitches (15 minutes pitch + 15 minutes discussion): • Project D – 11:00-11:30 • Project E – 11:30-12:00 • Project F – 12:00-12:30	Students	Students, teachers, companies	Plenary room + Teams
12:30-13:00	Meeting closing	Closing remarks • Teachers • Students • Companies • Rogério Chiulele		Plenary room + Teams

4.7.2 Annex 2. Minutes of the kick off meeting at Eduardo Mondlane University (25–29 May 2026).

ABC – Edition 2025-2026 – Kick-off meeting – held in hybrid mode (in-person in Maputo and online with the remaining partners)
Venue: Eduardo Mondlane University, 3453 Avenida Julius Nyerere, Maputo, Moçambique
Online at ABC BlendEd 2025/26 Kick-Off | Meeting-Join | Microsoft Teams

Meeting agenda

Monday, 25th of May 2026

Time	Task	Leader	Target	Location
08:30-08:45	Registration – Attendance list			
08:45-09:00	Opening Agenda for the week briefing	Rogério Chiulele Nuno Escudeiro	Students, teachers	Plenary room + Teams
09:00-10:30	Project briefing by companies: • Project A – 09:00-09:30 John Bosco, Empire Agricultural Coffee Services Export, buying and trading Real time data is needed • Project B – 09:30-10:00 Atari Farms Integrated digital platform and e-commerce system Avoglow brand, adding value to avocado that are currently unused. They need marketing and IT to develop a marketing strategy and an online sales channel Oluka Geofrey, solar dryers, automação Develop an automated system to monitor solar drier temperature, humidity, …	Companies' representatives	All (students, teachers, companies)	Plenary room + Teams

	Air drier is approx. 100 m2 Many companies are asking for digitalization of their businesses. This is a great opportunity for joint teams meeting in hybrid mode involving BlendEd and ABC BlendEd, where the EU students work on IT and marketing and AU students work on agriculture knowledge and African reality. This can be funded by a mix of grants, Erasmus+ KA2 CBHE and other, Erasmus+ ICM, IntraAfrica Mobility. The implementation mode will be blended, if/when we raise funds and hybrid with national-wide in person and online internationally, as we are doing today. The kick-off in hybrid mode was a great testbed for the virtul classroom settings in all partners universities			
10:30-11:00	Coffee break – Health break			
11:00-12:30	Project briefing by companies: • Project D – 10:30-11:00 Bene, Jude Fish centre, aquaculture, fish food Difficulty in getting fingerlings to sell during winter, a solution can be to buy a greenhouse cover to keep temperature above 22 degrees, expensive circulation system, the cost of fish feed is very high Fragility of aquaculture value chain. Establish agreements between fingerling producers	Companies' representatives	All (students, teachers, companies)	Plenary room + Teams

	and fish growing farms, there is no interaction between family businesses and big producers companies: importam tudo, desde as gaiolas para o peixe, até …, outro problema é que as entregas de encomendas aos fornecedores demoram mais de 30 dias… Pode demerara até 2 meses para comprar ração e tê-la disonível What in concrete do you want to solve. Priority: accessibility to good quality fish feed; available and at fair cost Tilápia and Cat Fish (Peixe Preto) • Project E – 11:00-11:30 Eng Amilcar, Oruela, produção agrícola de sementes Querem passar a produção de semente para produtores contratados que possam garantir semente de qualidade equivalente à que eles conseguem. Precisam de aumentar o número de agricultores que produz semente de qualidade. Sistema de rega			
12:30-13:30	Lunch break			

13:30-14:30	Multicultural awareness workshop (TBC)	Tatjana Welzer	Students	Plenary room + Teams
14:30-16:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Documents missing: • In-person meeting attendance lists: Kampala, Minna, Nsukka, Angónia, Porto, Maputo • Partnership agreements	Nuno Escudeiro	Teachers	Teachers room + Teams
16:00-16:30	Wrap-up	Nuno Escudeiro	Students, teachers	Plenary room + Teams

Tuesday, 26th of May 2026

Time	Task	Leader	Target	Location
08:30-08:45	Registration – Attendance list			
08:45-09:30	Plenary stand-up meeting. What are you doing today: 5 minutes per team.	One student per team is nominated by the team per day	All (students, teachers)	Plenary room + Teams
09:30-11:00	Students' teamwork	Team leaders	Students	Students-rooms + Teams
	1. Assign team teacher coaches 2. Agree on one or two interim releases online. Book it 3. Mngmnt issues: missing docs, QA, Dissemination 4. Pending local workshops and other events, reports of those already held 5. Deliverables and milestones	Nuno Escudeiro	Teachers	Plenary room + Teams

	Status of Deliverables and plan to conclude: • D1.1 – Project Management Framework (IPP, M1) • D1.2 – Progress report (IPP, M20) • D1.3 – KPI dashboard executive summary, compilation of semestral monitoring reports (IPP, M6/M12/M18/M24/M30/M36) • D2.1 – ABC course syllabus (ODISEE, M5/M12/M24/M36) • D2.2 – ABC course guide (HMU, M5/M12/M24/M36) • D2.3 – ABC staff training course material (FUTMIN, M5/M12/M24/M36) • D3.1 – Hybrid-Problem Based Learning (H-PBL) cells (UEM, M6) • D3.2 – ABC BlendEd yearly pilot reports (MU, UNN, UEM, M12/M24/M36) • D3.3 – ABC BlendEd pilot accreditation certificate (MU, M12) • D3.4 – ABC BlendEd pilot accreditation certificate (UNN, M24) • D3.5 – ABC BlendEd pilot accreditation certificate (UEM, M36) • D4.1– ABC CoP online platform (SU, M12) • D4.2 – Strategic plan for sustainability (RUFORUM, M30) • D4.3 – Dissemination plan (RUFORUM, M4) • D4.4 – Dissemination report (SU, M36)			

11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Status of Events and plan to conclude: • Local workshops: which ones are done? Which ones are missing? Where are the reports of those already implemented?	Nuno Escudeiro	All (students, teachers, companies)	Plenary room + Teams
13:00-14:00	Lunch break			
14:00-16:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Management issues pending: • Quarterly reporting • KPI Dashboard • Dissemination reporting **Exploitation of project results:** • Community of Practice • Book: Transformative Education: From Islands of Success to Scale and Sustainability Across Africa and Europe • 2026/27 course edition	Hubert Roth Kostas Karampidis Emmanuel Okalany	Teachers	Teachers room + Teams
16:00-16:30	Wrap-up	Anthonia Achike	Students, teachers	Plenary room + Teams

Wednesday, 27th of May 2026

08:30-08:45	Registration			
08:45-09:30	Students present their plan and current standing: 5 minutes pitch + 5 minutes suggestions for improvement.	One student per team is nominated by the	Students, teachers, company representatives	Plenary room + Teams

	Team 2 Africa Coffee, Farmer-First – we need a volunteer; Prof. Paschal (UNN) cannot do it 1. Lack of pre-financing 2. They have no upfront capital available to buy input (fertilisers, pesticides and other) 3. Weak agronomy support 4. Unaware of techniques leads to highly variable quality which is not good for sell 5. This leads to a perpetual cycle of low income-poor quality 6. Agronomy coaching is missing → involve local university in promoting workshops with local farmers Team 1 Buyer ready trackability – Prof. Prossy (MAK) 1. Manual coffee supply chain operations 2. Improve buyer trust and transparency From all the component, which ones will you deliver in July? On Friday pitch, highlight those and give a draft plan for developing and delivering the rest Team 3 Atari GLOW – Prof. Anthonia (UNN), Prof Musa (US) 1. Nice name 2. Product catalogue 3. E-commerce 4. Distribution/delivey to client of products sold 5. Use case diagram 😉 wow 6.	team per day		

	Team 4 Solar dryers – Prof. Hellen (US) 1. Issues in the room with feedback 2. Keeping steady air flow at the proper temperature 3. Control humidity 4. Visual inspection → can this be replaced by AI? How long is the drying cycle? This will give the sampling frequency Team 5 AquaGrow Fish Feed Initiative Prof. Inácio (UZambeze) 1. Very good analysis of fish feed characteristics and properties 2. Local materials 3. Solution: provide a new feed using the local ingredients to assure the same composition as the current feed in use but at a lower cost Team 6 Oruwera Quality Seed, Improve Crop Productivity – Prof. Egwim (FUTMINNA) 1. Challengs are distinct dpednig on the seed/nut (groundnut, maize, cowpea) 2. Literature review – do it systematically, using PRISMA for instance			
09:30-11:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Plenary room + Teams
11:00-11:30	Coffee break – Health break			

	Students´ teamwork.	Team leaders	Students	Plenary room + Teams
11:30-13:00	**Status of project Events and plan to conclude:** • Local workshops: which ones are done? Which ones are missing? Where are the reports of those already implemented? 1. E4.1 - Workshop addressed to local stakeholders (farmers, companies, and universities), Kampala, Uganda, February 2024 2. E4.2 - Working meeting, promote interest in local observers from remote areas, Minna, Nigeria, June 2024 3. E4.3 - RUFORUM AGM 2024 workshop on the ABC BlendEd paradigm and results, December 2024, P10-Siegen and P11-Odisee, RUFORUM invites a stakeholder from Africa: **2nd Triennial Conference – Operationalising Higher Agricultural Education and Research Ecosystems for Innovation, Industrialisation and Economic Development in Africa: A Call for Action, 12/16th August 2024, Windhoek, Namibia**. 4. E4.4 - Workshop addressed to local stakeholders (farmers, companies, and universities), Nsukka, Nigeria, February 2025 5. E4.5 - Workshop with farmers, companies, and universities	Teachers	Teachers	Plenary room + Teams

	willing to join, Beira, Mozambique, June 2025 6. E4.6 - RUFORUM AGM 2025, workshop on the ABC BlendEd paradigm, December 2025, P1-IPP and P9-HMU, RUFORUM invites a stakeholder from Africa 7. E4.7 - EAIE 2026, communication/paper on ABC BlendEd and EU/Africa cooperation, March 2026, P11-Odisee 8. E4.8 - EDUCON 2026, communication/paper on ABC BlendEd and EU/Africa cooperation, September 2026, P1-IPP 9. E4.9 - Workshop with farmers, companies, and universities willing to join, Soroti, Uganda, June 2026 10. E4.10 - ERACON 2026, communication/paper on ABC and EU/Africa cooperation, June 2026, P10-Siegen 11. E4.11 - EAEEIE 2026, communication/paper on ABC and EU/Africa cooperation, September 2026, P9-HMU ***Section 3.2 Communication, dissemination and visibility, page 53, application Part B*.**			
13:00-14:00	Lunch break			
14:00-16:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
16:00-16:30	Wrap-up	Egwim Evans	Students, teachers	Plenary room

Thursday, 28th of May 2026

08:30-08:45	Registration			
08:45-11:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed • Quarterly reporting missing from some partners	Teacher leader per workgroup	Teachers	Teachers room
11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
13:00-14:00	Lunch break			
08:45-11:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
11:00-11:30	Coffee break – Health break			
11:30-13:00	Students´ teamwork.	Team leaders	Students	Students-rooms + Teams
	Working on the pending tasks previously agreed	Teacher leader per workgroup	Teachers	Teachers room
16:00-16:30	Wrap-up	Prossy Isubikalu	Students, teachers	Plenary room

Friday, 29th of May 2024

08:45-09:00	Registration and final teams' arrangements			
09:00-10:30	Students' pitches (15 minutes pitch + 15 minutes discussion): • Project 1 – 09:00-09:30 – Digital Coffee Traceability System a) Uganda coffee value chain runs on paper: it must be digitalized - **Johnbosco** b) This can be a business, apply for a EU grant to develop, test and deploy the system c) Product backlog d) System design what will it be? What is the output of this phase? When do you expect to present/discuss the first release with the client? • Project 2 – 09:30-10:00 a) Empire Agricultural Coffee Services – Farmer First b) Scalable farmer support and pre-financing pilot c) Solution 1 Climate smart agronomy coaching – capacity building d) Solution 2 Input distribution (fertilizer, tools, seeds), reimbursed at harvest e) Solution 3 website for pre-financing f) Barriers: lack of smartphones prevent access to digital tools; lack of pre-harvest cash to invest g) Pre-finance funds: where will they come from? What if the crop faces unexpected events and production is very low?	Students	Students, teachers, companies	Plenary room + Teams

	h) List of concrete initiatives: farmers training on which subjects, in which regions, by whom? Agronomy visits when, who, where? How to assure the sustainabilifty of these initiatives? Who will manage/maintain these initiatives? Which resources will be allocated to keep these initiatives running; who will assure them i) Nice to see the plan to work online during the two months j) To be deployed and explored by the company; great chance for students • Project 3 – 10:00-10:30 a) Atari GLOW – Mukasa, integrated digital platform and e-commerce b) 6 phases: how long each one? What is the deliverable from each phase? Deliverables per week – nice! c) Where are you going to develop and host the system? Webserver, web domain – foreseen! d) Who will setup the github repository? **e) User testing on week 8 only!!!! Do interim releases** f) Why Zoom and GoogleMeet and not always the same g) How will the catalogue be updated along time, once the team is no longer working on the project			
10:30-11:00	Coffee break – Health break and final teams' arrangements			

11:00-12:30	Students' pitches (15 minutes pitch + 15 minutes discussion): • Project 4 – 11:00-11:30 a) Smart solar dryer – Oluka Geofrey b) No real-time data, cant control temperature neither humidity c) How to keep 50ºC temperature during night time, with no sun shining? d) 2 weeks for hardware procurement is short, no? e) How will you control pay-per-use • Project 5 – 11:30-12:00 a) Jude Fish b) How to do the testing/validation c) How does the cost and quality of your formulae compares to the state of the art? d) Great work e) Output per week specified • Project 6 – 12:00-12:30 a) Oruwera Quality Seed Production b) Be aware of gdpr if you want to follow the location of the technicians in real time	Students	Students, teachers, companies	Plenary room + Teams
12:30-13:00	Meeting closing	Closing remarks • Teachers • Students • Companies • Rogério Chiulele		Plenary room + Teams

4.7.3 Annex 3. Attendance lists of participants to the kick off meeting (25–29 May 2026).

Team of the Eduardo Mondlane University participating in the kick off meeting (25-29 May 2026)

#	Name	Role
1	Rogerio Marcos Chiulele	Teacher
2	Lucas Daniel Tivana	Teacher
3	Teodora Kaba	Teacher
4	Francisco Baloi	Teacher
5	Americo Dima	Student
6	Bialodia Jose Jonasse	Student
7	Celia Zefo	Student
8	Celia Fernando Loforte	Student
9	Edson Cau	Student
10	Fauzia Francisco Miguel	Student

Universidade Zambeze

Faculdade de Ciências Agrárias

Participantes, Edição 2026

No.	Nome	Função
1	Inácio Mateus Assane	Teacher
2	Lucinda Verónica Cuamba Ferreira	Teacher
3	Virgílio de Armando Jorge Salato	Student
4	Baptista Arnaldo Sabonete	Student
5	José Elísio José Chemane	Student
6	Leonilda Francisco Alves	Student
7	Escolástica Luís Bizueque Otie	Student
8	Chelsia Amisse Manuel	Student

Makerere Team

	Name and Registration number	**Program**	**Role**	
1	Jurugo Amale Santos (24/U/04943/PS)	BARI II	Student	0770889511/0761141737
2	Taremwa Arthur (23/U/1450)	BAGR	Student	0765077722
3	Wantimba Sauda Kirabira (24/U/1427)	BARI	Student	0707318470
4	Arinda Judith (24/U/22692)	BARI	Student	0790704811/0709899095
5	Kiwuluka Arafat Waira (23/U/0626)	BAGR	Student	0756889364
6	Mugerwa John Patrick (23/U/26407/Ext)	BARI	student	0773441338/0705992830
7	Dr. Rebecca Mukebezi	MAK	Lecturer	
8	Dr. Prossy Isubikalu		Lecturer	

List of FUT Minna participants going for ABC Blended Mobility at Nsukka

SN	Name	Status
1	Prof Egwim Evans	Team Leader
2	Prof Alabi John	Coach
3	Joseph Avosuahi Victoria	Student
4	Mayowa Oluwatoyosi Deborah	Student
5	Arum Treasure Ezinne	Student
6	Dien El-shaddai King Dien	Student
7	Emmanuel oluwaseun Solomon	Student
8	Emmanuel Adakole Francis	Student

Soroti University Participants			
S/N	**Name**	**Dignation**	**Gender**
1	Babirye Aisha	Student	F
2	Nakanyike Belinda	Student	F
3	Kawala Desire	Student	F
4	Owori Charles	Student	M
5	Mugumya Anthony	Student	M
6	Mucunguzi Benjamin	Student	M

7	Dr. Musa Chemisto Satya	Coach	M
8	Dr. Hellen Aluku	Coach	F

4.7.4 Annex 4. Closing meeting programme (27–31 July 2026).

ABC – Edition 2025-2026 – Closure meeting – held in hybrid mode
Venue: Soroti University, Plot 50/51, Arapai Soroti, Moroto Rd, Uganda
Online at ABC 2026 pilot edition - closure | Meeting-Join | Microsoft Teams

Monday, 27th of July 2026

Time	Task	Leader	Target	Location
08:00-08:30 – WEST 09:00-09:30 – CET 10:00-10:30 – EAT	Opening Agenda for the week briefing	Hellen Aluku, Musa Chemisto Nuno Escudeiro	Students, teachers	Plenary room + Teams
08:30-10:00 – WEST 09:30-11:00 – CET 10:30-12:00 – EAT	Teams briefing (10 minutes per team): current standing point, plans for the week **Team 1 – Buyer ready traceability of coffee – Empire Roast. Prossy, Musa** Victoria Joseph Implementing client suggestions in the platform Demo by Mugumya Ali 15 minutes… Template for presentations Template for final reporting **Team 2 – Farmer support & Pre-financing system – Empire Agricultural Coffee Services. Paschal, Rebecca** Digital literacy training? Offline capabilities; the system can be used offline. Data is stored locally	Students' teams	All (students, teachers, companies)	Plenary room + Teams

	and then transferred to the server when there is internet connection **Team 3 – Avoglow e-commerce, natural beauty products – Atari Farms, Anthonia, ?** Still waiting for a decision on relation to the payments' provider **Team 4 – Smart Solar Dryer – Archtech Agro Uganda, Hellen, Lucas** Fan auto control to keep temperature and humidity stable in a sloar drier; communicates **Team 5 – Aquagrow Quality Fish Feed – Jude Fish Company, Gaza Provinc Mozambique, John Alabi, Egwim** Fish feed formulation 36.5% savings, from 2.50usd to 1.56 usd/kg Above 20% reduction in total production costs **Team 6 – improving Oruwera seed productivity, Nampula Mozambique** Reproductivy potential is not explored properly resulting in low seed productivity 2 solutions: develop a digitl tracing monitoring app, increase work force – technicians following up farmers			
10:00-11:00	Students: teamwork.	Kostas Karampidis,	Students in their teams	Breakout rooms

– WEST 11:00-12:00 – CET 12:00-13:00 – EAT	Teachers: **Dissemination**. Task list for the afternoon. As agreed in our meeting just concluded, please **reply to this email sharing your LinkedIn and Facebook accounts** to be added as Admin in the ABC LinkedIn and FB so you can upload your posts. We expect that each partner institution will **present tomorrow at 8 am the following posts** (one short text plus an image/video for each one): - 1 post about the project meeting hosted by your institution (Kampala, Minna, Nsukka, Angónia, Maputo, Soroti) - 12 posts about our students' projects (1 post for each one of the 12 projects we had over the past three years) - 1 post per student testimonial	Manos Garefalakis	Teachers	
	Lunch break			
12:00-14:00 – WEST 13:00-15:00 – CET 14:00-16:00 – EAT	Students: teamwork assisted by teachers. Teachers: Work on **Dissemination** following the task list agreed in the morning session.	Self-organized	Students Teachers	Offline/Online

Tuesday, 28th of July 2026

Time	Task	Leader	Target	Location
08:00-09:00 – WEST 09:00-10:00 – CET 10:00-11:00 – EAT	Students: teamwork. Teams want to meet companies Students asked for a repot TOC sample. Nuno informed it will be shared but as a starting pint and that students should then tailor it to their project specific needs. Teachers: Results from the previous day; 5 minutes per partner. New posts delivered by: Hubert-USiegen and Nuno-Porto. Other colleagues are on it. We will make another round at the beginning of the afternoon session.	Hellen Aluku, Musa Chemisto Partners' local coordinators	Students, teachers	Plenary room + Teams
09:00-11:00 – WEST 10:00-12:00 – CET 11:00-13:00 – EAT	Students: teamwork, assisted by teachers.	Students' teams	All (students, teachers, companies)	Offline/Online
	Lunch break			
12:00-14:00 – WEST 13:00-15:00 – CET	Students: teamwork. Teachers: **KPI Dashboard**, **Reporting**. Task list for the afternoon.	Students' teams Hubert Roth	All (students, teachers, companies)	Plenary room + Teams

14:00-16:00 – EAT	Dissemination: Manos was with all partners adding them to FB and LinkedIn. Since not all are connected, we will continue this process tomorrow morning. Hubert took the lead. See his email from last week with the current standing			

Wednesday, 29th of July 2026

Time	Task	Leader	Target	Location
08:00-09:00 – WEST 09:00-10:00 – CET 10:00-11:00 – EAT	Students: teamwork. Teachers: Results from the previous day; 5 minutes per partner.	Hellen Aluku, Musa Chemisto Partners' local coordinators	Students, teachers	Plenary room + Teams
09:00-11:00 – WEST 10:00-12:00 – CET 11:00-13:00 – EAT	Students: teamwork. Teachers: **Pending Deliverables**. Task list for the afternoon.	Students' teams WP leaders	All (students, teachers, companies)	Plenary room + Teams
	Lunch break			
12:00-14:00 – WEST	Students: teamwork assisted by teachers.	Self-organized	Students Teachers	Offline/Online

13:00-15:00 – CET 14:00-16:00 – EAT	Teachers: Work on **Pending Deliverables** following the task list agreed in the morning session.			

Thursday, 30th of July 2026

Time	Task	Leader	Target	Location
08:00-09:00 – WEST 09:00-10:00 – CET 10:00-11:00 – EAT	Students: teamwork. Teachers: Results from the previous day; 5 minutes per partner.	Hellen Aluku, Musa Chemisto Partners' local coordinators	Students, teachers	Plenary room + Teams
09:00-11:00 – WEST 10:00-12:00 – CET 11:00-13:00 – EAT	Students: teamwork. Teachers: **Project Sustainability, Final Report**. Task list for the afternoon.	Students' teams Emmanuel Okalany, Nuno Escudeiro	All (students, teachers, companies)	Plenary room + Teams
	Lunch break			
12:00-14:00 – WEST 13:00-15:00 – CET	Students: teamwork assisted by teachers. Teachers: Work on **Project Sustainability, Final Report** following the task list agreed in the morning session.	Self-organized	Students Teachers	Offline/Online

14:00-16:00 – EAT				

Friday, 31st of July 2026

Time	Task	Leader	Target	Location
08:00-09:30 – WEST 09:00-10:30 – CET 10:00-11:30 – EAT	Final pitches. Teams 1 to 3. 15+10 minutes each team.	Hellen Aluku, Musa Chemisto	Students, teachers, companies	Plenary room + Teams
	Health break			
10:00-11:30 – WEST 11:00-12:30 – CET 12:00-13:30 – EAT	Final pitches. Teams 4 to 6. 15+10 minutes each team.	Hellen Aluku, Musa Chemisto	Students, teachers, companies	Plenary room + Teams
11:30-12:00 – WEST 12:30-13:00 – CET 13:30-14:00 – EAT	Students: program evaluation, testimonials (20 minutes). Teachers: reflection (20 minutes) Teachers & Students: Wrap-up. Farewell (10 minutes)	Hellen Aluku, Musa Chemisto Anyone, final brief comments	Students Teachers Companies	Plenary room + Teams

4.7.5 Annex 5. Minutes of the closing meeting (27–31 July 2026) in Soroti

Monday, 27th of July 2026

• Time	• Task	• Leader	• Target	• Location
• 08:00 - 08:30 – WEST • 09:00 - 09:30 – CET • 10:00 - 10:30 – EAT •	• Opening • Agenda for the week briefing	• Hellen Aluku, Musa Chemisto • Nuno Escudeiro	• Students, teachers	• Plenary room + Teams
• 08:30 - 10:00 – WEST • 09:30 - 11:00 – CET • 10:30 - 12:00 – EAT	• Teams briefing (10 minutes per team): current standing point, plans for the week • • **Team 1 – Buyer ready traceability of coffee – Empire Roast. Prossy, Musa** • Victoria Joseph • Implementing client suggestions in the platform • Demo by Mugumya Ali • 15 minutes… • Template for presentations • Template for final reporting •	• Students' teams	• All (students, teachers, companies)	• Plenary room + Teams

	• **Team 2 – Farmer support & Pre-financing system – Empire Agricultural Coffee Services. Paschal, Rebecca** • Digital literacy training? • Offline capabilities; the system can be used offline. Data is stored locally and then transferred to the server when there is internet connection • • **Team 3 – Avoglow e-commerce, natural beauty products – Atari Farms, Anthonia, ?** • Still waiting for a decision on relation to the payments' provider • • **Team 4 – Smart Solar Dryer – Archtech Agro Uganda, Hellen, Lucas** • Fan auto control to keep temperature			

	and humidity stable in a sloar drier; communicates • • **Team 5 – Aquagrow Quality Fish Feed – Jude Fish Company, Gaza Provinc Mozambique, John Alabi, Egwim** • Fish feed formulation • 36.5% savings, from 2.50usd to 1.56 usd/kg • Above 20% reduction in total production costs • • **Team 6 – improving Oruwera seed productivity, Nampula Mozambique** • Reproductivy potential is not explored properly resulting in low seed productivity • 2 solutions: develop a digitl tracing monitoring app, increase work force – technicians following up farmers •			

	•			
• 10:00 - 11:00 – WEST • 11:00 - 12:00 – CET • 12:00 - 13:00 – EAT	• Students: teamwork. • • Teachers: **Dissemination**. Task list for the afternoon. • As agreed in our meeting just concluded, please **reply to this email sharing your LinkedIn and Facebook accounts** to be added as Admin in the ABC LinkedIn and FB so you can upload your posts. • We expect that each partner institution will **present tomorrow at 8 am the following posts** (one short text plus an image/video for each one): - 1 post about the project meeting hosted by your institution (Kampala, Minna, Nsukka, Angónia, Maputo, Soroti)	• Kostas Karampidis, Manos Garefalakis	• Students in their teams • • Teachers	• Breakout rooms

	- 12 posts about our students' projects (1 post for each one of the 12 projects we had over the past three years) - 1 post per student testimonial •			
•	• Lunch break			
• 12:00 - 14:00 – WEST • 13:00 - 15:00 – CET • 14:00 - 16:00 – EAT	• Students: teamwork assisted by teachers. • • Teachers: Work on **Dissemination** following the task list agreed in the morning session.	• Self-organized	• Students • • Teachers	• Offline/Online

Tuesday, 28th of July 2026

• Time	• Task	• Leader	• Target	• Location
• 08:00 - 09:00 – WEST • 09:00 - 10:00 – CET	• Students: teamwork. • • Teachers: Results from the previous day; 5 minutes per partner.	• Hellen Aluku, Musa Chemisto • Partners' local coordinators	• Students, teachers	• Plenary room + Teams

• 10:00 - 11:00 – EAT •				
• 09:00 - 11:00 – WEST • 10:00 - 12:00 – CET • 11:00 - 13:00 – EAT	• Students: teamwork, assisted by teachers.	• Students' teams	• All (students, teachers, companies)	• Offline/Online
•	• Lunch break			
• 12:00 - 14:00 – WEST • 13:00 - 15:00 – CET • 14:00 - 16:00 – EAT	• Students: teamwork. • • Teachers: **KPI Dashboard**, **Reporting**. Task list for the afternoon. • • Copy Hubert communication, emails, here •	• Students' teams • • Hubert Roth	• All (students, teachers, companies)	• Plenary room + Teams

Wednesday, 29th of July 2026

• Time	• Task	• Leader	• Target	• Location
• 08:00-09:00 –	• Students: teamwork. •	• Hellen Aluku, Musa Chemisto	• Students, teachers	• Plenary room + Teams

WEST • 09:00-10:00 – CET • 10:00-11:00 – EAT •	• Teachers: Results from the previous day; 5 minutes per partner.	• Partners' local coordinators		
• 09:00-11:00 – WEST • 10:00-12:00 – CET • 11:00-13:00 – EAT	• Students: teamwork. • • Teachers: **Pending Deliverables**. Task list for the afternoon. • • 1st edition, 2nd edition certification in Minna. ABC is a part of another longer (6 months) course •	• Students' teams • • WP leaders	• All (students, teachers, companies)	• Plenary room + Teams
•	• Lunch break			
• 12:00-14:00 – WEST • 13:00-15:00 – CET • 14:00-16:00 – EAT	• Students: teamwork assisted by teachers. • • Teachers: Work on **Pending Deliverables** following the task list agreed in the morning session.	• Self-organized	• Students • • Teachers	• Offline/Online

Thursday, 30th of July 2026

• Time	• Task	• Leader	• Target	• Location
• 08:00 - 09:00 – WEST • 09:00 - 10:00 – CET • 10:00 - 11:00 – EAT •	• Students: teamwork. • • Teachers: Results from the previous day; 5 minutes per partner.	• Hellen Aluku, Musa Chemisto • Partners' local coordinators	• Students, teachers	• Plenary room + Teams
• 09:00 - 11:00 – WEST • 10:00 - 12:00 – CET • 11:00 - 13:00 – EAT	• Students: teamwork. • • Teachers: **Project Sustainability, Final Report**. Task list for the afternoon. • • Emmanuel presented the sustainability plan • • Egwim: we need to organise • a webinar to promote the continuation and showcase what we have developed over the 3 years, how can BlendEd develop and	• Students' teams • • Emmanuel Okalany, Nuno Escudeiro	• All (students, teachers, companies)	• Plenary room + Teams

	contribute to the development of internal universities labs? Whats in it for them?; students will not do the ABC BlendEd course and then go, thsy should be requested to continue their work in the lab • prepare a document/video showing what we have done. Ask the communication office of each ones' university to prepare a video of their view, organize a general script and go from there • • •			
•	• Lunch break			
• 12:00 - 14:00 – WEST • 13:00 - 15:00	• Students: teamwork assisted by teachers. • • Teachers: Work on **Project Sustainability, Final Report** following the task	• Self-organized	• Students • • Teachers	• Offline/Online

– CET • 14:00 - 16:00 – EAT	list agreed in the morning session.			

Friday, 31st of July 2026

• Time	• Task	• Leader	• Target	• Location
• 08:00- 09:30 – WEST • 09:00- 10:30 – CET • 10:00- 11:30 – EAT •	• Final pitches. Teams 1 to 3. 15+10 minutes each team. • **Team 1 – Buyer ready traceability of coffee – Empire Roast. Prossy, Musa** • What can you trace; how much of the distribution chin is covered? • How does the input from farmers is validated? • What else can be built on top your app? • Did you perform any field validation? • What happens when reject and flag a submitted document? • How long (hours per week/day) will the admin need to keep the system running? • Have you considered using blockchain to assure the thrustworthy of the pdf generated by the app • Training: what is planned? • John Bosco, the promoter farmer, is in the team	• Hellen Aluku, Musa Chemisto	• Students, teachers, companies	• Plenary room + Teams

	• Creating a spin-off to explore the system at the continental • • **Team 2 – Farmer support & Pre-financing system – Empire Agricultural Coffee Services. Paschal, Rebecca** • What happens if the farmer does not fill in data every 6 months? • Do you have any arrangements/contact with finances players/commercial banks as sponsors? • Which warnings are settled? For the company? For the farmers? Are audit trails available per individual loan? Or Farmer? • Incredible how students managed to pitch in 15 min!!! • • **Team 3 – Avoglow e-commerce, natural beauty products – Atari Farms, Anthonia, Musa** • When considering sales out of Africa, what would you need to upgrade? • Dates of status of each order? • • Students manage to pitch in the time given!!! If we had given them 10 min, or 1 min, they would be able to do it and focus on the critical aspects! • •			
•	• Health break			

• 10:00-11:30 – WEST • 11:00-12:30 – CET • 12:00-13:30 – EAT	• Final pitches. Teams 4 to 6. 15+10 minutes each team. • **Team 4 – Smart Solar Dryer – Archtech Agro Uganda, Hellen, Lucas** • Demo of the prototype • What happens if a fan that is ON crashes? Do you monitor that? • Limited to 5 zones; to increase need to upgrade hw and sw • • **Team 5 – Aquagrow Quality Fish Feed – Jude Fish Company, Gaza Provinc Mozambique, John Alabi, Egwim** • How do you compute the cost of your feed? What if you have parts of the stock acquired at price 1 and another part acquired at a different price? • What about the fluctuation of the feed? Is this also configurable? • • **Team 6 – improving Oruwera seed productivity, Nampula Mozambique** • Nice solution for a problem that was tough to understand; after a hard kick-start we managed to perform and deliver. Good job! • Is Oruwera using this? Have you trained them? Do you have plans to do it?	• Hellen Aluku, Musa Chemisto	• Students, teachers, companies	• Plenary room + Teams

	• Can you configure the start and end time of the window of use? • Wo will analyse all the inputs/videos/reports uploaded to the platform? Can genAI be explored to help? •			
• 11:30-12:00 – WEST • 12:30-13:00 – CET • 13:30-14:00 – EAT	• Students: program evaluation, testimonials (20 minutes). • Teachers: reflection (20 minutes) • Workshops about leadership and other topics would be useful • Teamwork was very good for its international/multidisciplinary flavour • Impact on rural communities was very good to realise • In-person meetings are key, we would have liked to benefit from them if they could have been ran • The time given for the program is short, it should be extended • Alumni • Forever friends • Teaching English to the Portuguese students • English programme should be included in students pre-training • • Teachers & Students: Wrap-up. Farewell (10 minutes) • Discussion of students marks.	• Hellen Aluku, Musa Chemisto • • Anyone, final brief comments	• Students • Teachers • Companies	• Plenary room + Teams

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4.8 Annex 6. Attendance list for the closing meeting (27–31 July 2026)

Team of the Eduardo Mondlane University participating in the closing meeting (27-31 July 2026)

#	Name	Role
1	Rogerio Marcos Chiulele	Teacher
2	Lucas Daniel Tivana	Teacher
3	Teodora Kaba	Teacher
4	Francisco Baloi	Teacher
5	Americo Dima	Student
6	Bialodia Jose Jonasse	Student
7	Celia Zefo	Student
8	Celia Fernando Loforte	Student
9	Edson Cau	Student
10	Fauzia Francisco Miguel	Student

Universidade Zambeze

Faculdade de Ciências Agrárias

Participantes, Edição 2026

No.	Nome	Função
1	Inácio Mateus Assane	Teacher

2	Lucinda Verónica Cuamba Ferreira	Teacher
3	Virgílio de Armando Jorge Salato	Student
4	Baptista Arnaldo Sabonete	Student
5	José Elísio José Chemane	Student
6	Leonilda Francisco Alves	Student
7	Escolástica Luís Bizueque Otie	Student
8	Chelsia Amisse Manuel	Student

Angónia, 22 de Abril de 2026

Makerere Team

	Name and Registration number	**Program**	**Role**	
1	Jurugo Amale Santos (24/U/04943/PS)	BARI II	Student	0770889511/0761141737
2	Taremwa Arthur (23/U/1450)	BAGR	Student	0765077722
3	Wantimba Sauda Kirabira (24/U/1427)	BARI	Student	0707318470
4	Arinda Judith (24/U/22692)	BARI	Student	0790704811/0709899095
5	Kiwuluka Arafat Waira (23/U/0626)	BAGR	Student	0756889364
6	Mugerwa John Patrick (23/U/26407/Ext)	BARI	student	0773441338/0705992830
7	Dr. Rebecca Mukebezi	MAK	Lecturer	
8	Dr. Prossy Isubikalu		Lecturer	

List of FUT Minna participants going for ABC Blended Mobility at Nsukka

SN	Name	Status
1	Prof Egwim Evans	Team Leader
2	Prof Alabi John	Coach
3	Joseph Avosuahi Victoria	Student
4	Mayowa Oluwatoyosi Deborah	Student
5	Arum Treasure Ezinne	Student

6	Dien El-shaddai King Dien	Student
7	Emmanuel oluwaseun Solomon	Student
8	Emmanuel Adakole Francis	Student

Soroti University Participants			
S/N	**Name**	**Dignation**	**Gender**
1	Babirye Aisha	Student	F
2	Nakanyike Belinda	Student	F
3	Kawala Desire	Student	F
4	Owori Charles	Student	M
5	Mugumya Anthony	Student	M
6	Mucunguzi Benjamin	Student	M
7	Dr. Musa Chemisto Satya	Coach	M
8	Dr. Hellen Aluku	Coach	F