



UNIVERSITY ACTIVITIES AND DEVELOPMENT COOPERATION IN THE AGRI-FOOD FIELD: KITEGA CC CASE

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ABSTRACT

The connection between the activities carried out by universities and cooperation projects for development is of great interest in achieving the Sustainable Development Goals and the 2030 Agenda.

This work shows the activities developed by the Universitat Politècnica de València (UPV) in terms of human development and international cooperation in the agri-food field. It starts from a description of the experiences and internships by the research staff, students, and technical staff of the UPV in a rural community of Uganda (Kitega), where it has been possible to connect two projects. The first one is related to improving agricultural systems, and the second one is on food conservation and processing techniques. Both intend to develop sustainable agri-food and are always based on actions that affect the needs of the most vulnerable groups.

Agricultural production in rural areas allows food to be obtained for self-consumption, while surplus production is offered for sale without any conservation or transformation system during its useful life. Poverty and lack of technical knowledge are essentially causing food unsafety and malnutrition. In addition, the narrow variety and low quality of the products sometimes do not allow to cover the nutritional needs of the families.

The conclusions obtained point to the importance of students, researchers, and staff from universities' participation in development cooperation projects to achieve a transition towards fairer societies in a sustainable and lasting environment.

1. INTRODUCTION

1.1. Cooperation for development and Research

Main world challenges (e.g., environmental protection, energy security, natural disaster mitigation, preventing and curing infectious diseases, ensuring food security) are increasingly the subject of policy-level deliberations, both nationally and internationally. It is recognized that international cooperation in science and technology is needed to deal with these issues. Cooperation between developed countries and developing countries is of special importance, because the first ones are often the ones most severely affected by global threats, and because they possess much of the expertise, data, and resources that are needed for finding effective solutions. [1].

In this context, universities play an important role as a source of knowledge and resources.

1.2. Cooperation Department at UPV

The Cooperation Department of UPV aims to support and encourage the participation of the university community in university cooperation activities for development.

Some of the programs offered and related to this paper are:



The Adsideo-Cooperation research program aims to promote the development of R&D projects in Development Studies, International Cooperation, and the application of Technology for Human Development.

The Meridies cooperation scholarships are intended for UPV students to carry out internships or Final Degree Projects in development cooperation programs and projects through universities, non-governmental development organizations, social entities, and any other international development cooperation system organization.

The staff Meridies cooperation program allows non-professors staff to stay in a short internship in an organization.

The development of one project or the participation of individuals from the university already positively impacts the community. Undoubtedly, when it is possible to connect more than one project and have more people involved, the results have even more impact. The university facilitates this connection through forums, expositions, meetings, and seminars in collaboration with NGOs.

In this paper, we will show an example of the participation of different people and the connection between two projects in the agri-food field.

1.3. Context

Uganda is a landlocked country in Eastern Africa located at the Equator. It has an area of over 240.00 km², and according to the latest Human Development Index Ranking from the United Nations Development dated 2019 [2], Uganda's data were:

- Position 159 (from a total of 189)
- HDI (value): 0.544
- Life expectancy at birth (years) 63.4
- Expected years of schooling (years) 11.4
- Gross national income (GNI) per capita: 2.123 \$

1.4. Agriculture in Uganda

Agriculture accounts for 70% of employment, overwhelmingly on small farms; it occupies half of all land area and provides half of all exports and one-quarter of GDP in Uganda. It is considered a leading sector for future economic growth and economic inclusion in the current National Development Plan. Yet despite having excellent natural resources and climate conditions for the production of a wide variety of crops and livestock, the difference between aggregate output growth and the growth of all inputs and factors of production that produced it--in Ugandan agriculture has been negative for the last two decades [3].

The effects of climate change have not gone unnoticed, and the influence of foreign crops without knowledgeable technicians has resulted in an impoverishment of the soil. Dependence on seeds and uncontrolled use of plant protection products to combat pests and diseases have not helped its development.



1.5. Kitega Community Center (KCC)

Kitega Community Centre is located in Kitega, a rural village where the local economy is mainly agriculture-based. However, most of the population is unemployed, and the standard of living is low.

Kitega Community Centre Uganda is an NGO in Uganda founded in March 1999, to support children with disabilities, as a result of the stereotypes surrounding disability, the children were rejected and marginalised in the community.

In a bid to foster an inclusive community in which everyone is respected as valuable and contributing to the development of the community, the organisation launched a community development model to build capacity of local communities to address their own development challenges in Partnership with the Organisation. The community development model includes; Women empowerment, Legal Aid, Mobilising local farmers and training them, support to marginalised schools among others. Today, the centre is partnering with over 15 communities in Central Uganda.

Kitega has received international volunteers since 2009, and some have developed specific projects. Some of them have been under the frame of the Universitat Politècnica de València.

Kitega has an NGO partner in Spain who facilitates the connection with people and institutions.

1.6. Agri-business cooperation projects

The two Adsideo projects that successfully connected are: "Diagnosis of local production system in rural areas of Uganda. Proposals for a sustainable agriculture", which started in 2020, and "Evaluation of techniques for the conservation, transformation, and reuse of food in the community of Kitega (Uganda)" started in 2022.

The first project was proposed with an agroecological approach, characterized by minimal alteration of the ecosystem, by the nutrition of plants from organic sources and inorganic, the use of natural biodiversity, and oriented to the production of food, raw materials, and other ecosystem services, following the recommendations of the FAO in the Guide for those responsible for policies of sustainable intensification of production (FAO, 2014).

The approach for the second project has to do with the situation of farmers in Africa incurring the enormous loss of fresh horticultural agro-produces attributed to limitations in accessing modern food conservation technologies such as the use of electric dryers, freezing, canning, refrigeration, and cold-chain facilities [4]. Faced with this problem, several investigations highlight that the design of equipment for solar food drying is a practical and economical method that allows for the conservation of fresh horticultural products for extended periods [5, 6].

The local NGO, Kitega CC, has a relevant role in gathering farmers and local leaders, facilitating the network of contacts and the translation necessary to make communication possible.

2. METHODOLOGY

2.1. Diagnosis of local production system in rural areas of Uganda. Proposals for a sustainable agriculture

This project included the diagnosis of family farms to improve crop production from an agroecological point of view.

A group of farmers is involved with the help of Kitega staff, sharing their native knowledge, being part of the improvement process and decision making, and connected through the staff from KCC with the researchers from the university to discuss farming techniques.

The methodology used has been the field survey of farmers and interviews to study agronomic models, know the techniques they use, and the main difficulties they face.

The people who have contributed to the project through the Cooperation Department's support are:

- A staff person (Agronomy Engineer) specialized in training, who carried out an initial diagnosis on the knowledge of agriculture in farmers.
- A group of research professors (Agronomy Engineers and Biologists) to monitor crops and provide advice on crop pests and diseases.
- A group of students enrolled in the Master of Plant Health collaborated with the diagnosis from the university.



Fig. 1. Interview to the farmers for the initial diagnosis



Fig. 2. Farmers involved in the project and staff from KCC.

2.2. Evaluation of techniques for conservation, transformation, and reuse of food in the community of Kitega

As one of its objectives, this project has the design, construction, and commissioning of a solar drying system for the use of the community. The prototype is based on the design of a drying system successfully implemented in other countries such as Burkina Faso [8]. The choice of construction materials is adapted to the environment's limitations, and available materials have been sought with good resistance to climatic conditions.



Drying tests have been carried out by direct exposure to the sun and inside the dryer chamber to get drying curves and study dehydration kinetics for different local fruits and vegetables.

The fruits and vegetables are selected from surplus for consumption, extending the shelf life of these foods and avoiding the generation of waste. The process includes recommendations for good practices in food hygiene to obtain a safe food processing diagram.

The roles participating in this project are:

- A group of research professors (Agronomy Engineers and Ph.D. in Food Science and Technology).
- A student (Master in Food Processing) with a Meridies internship who has been in charge of the solar drying construction and first food measurement for three months.

Furthermore, it is planned for the following months:

- A student with a Meridies internship who will be in charge of exploring other ways of conservation.
- A person with a Meridies staff specialized in cooperative and entrepreneurship to encourage and motivate the community to commercialize the products.

3.3. RESULTS

3.1. Diagnosis of local production system in rural areas of Uganda. Proposals for a sustainable agriculture

A total of 20 farmers were interviewed to study their production systems, know the typology, understand their relationship with the environment, and find an approach that allowed improving agriculture from an agroecological perspective.

The answers showed that none of the farmers had specialized in agriculture training; they had learned only through practice. Extension services in the country are scarce, reaching a maximum of one visit a year when it happens. Some of them have heard of organic farming, which they associate with not using chemicals, but cannot explain more about it.

There is a low level of knowledge about the products they are using. None of them can identify labels or understand the scope of concentrations or solutions they are applying. That situation leaves the application of products entirely at the mercy of companies and sellers.

All farmers depend interviewed on rainwater for irrigation. In the context of climate change uncertainty, it is complicating traditional harvests as they have been doing until now when they were able to manage the seasonality. Their traditional agriculture labours, such as soil preparation, fallow, and sowing, have no dates anymore.

However, the way these family farms cultivate is more respectful and less invasive to nature than intensive agriculture. Nevertheless, that is mainly due to the lack of resources as a goal for sustainability.

During the project, several crops were monitored in an exhibition garden available at the KCC compound and in the family gardens; tomato, onion, pumpkin, pepper, eggplant, beet, and broccoli were cultivated with different results. A corn trial has also been carried out, with the varieties available in the area to determine its efficiency.

It can be pointed out that the most relevant result obtained in this project has been the built team of farmers, previously cultivating in isolation and now sharing knowledge and experiences. They have also shown great interest in food preservation techniques, aware of new business opportunities.

3.2. Evaluation of techniques for conservation, transformation, and reuse of food in the community of Kitega

The construction of the drying equipment was carried out in collaboration with local carpenters. The wooden structure was bought and built locally while the plastics were purchased in Spain.

Compared to the drying by direct sun exposure, the drying tests in the chamber of the built equipment offered dehydrated products with better characteristics and in more acceptable hygienic conditions than traditional drying.

The drying inside the equipment chamber was carried out at a temperature between 40 and 55 °C without direct sun exposure, while in air-drying and by direct exposure the temperatures suffer a greater oscillation. Direct exposure to the sun also produced a greater deterioration in the products to be dried, in addition to the greater risk of suffering contamination and attack by insects.

Workshops were held mainly for women and young people, who showed great interest in this type of processing. It was insisted on establishing a clean working procedure, which includes the pre-treatment of the fruits and vegetables to be dehydrated, all of which allows for more stable and safe products.



Fig 3. Drying carrot testing



Fig 4. Drying banana testing



Fig 5. Drying banana testing

These results showed the importance of solar drying to promote food availability and security. Since the project seeks human development in the region, the

actions impact the most vulnerable people and groups, especially young people and women who usually carry out daily agriculture and food preparation tasks.

The channels already established in terms of communication by KCC facilitated the development of face-to-face training talks, promoting the exchange of knowledge between local farmers and researchers.



Fig 6. Solar drying on construction



Fig 7. Workshop

4. SUMMARY AND ACKNOWLEDGMENTS

In Uganda, as in many African countries, food insecurity amongst poor households remains a severe problem, contributing to poor health, problems with learning in school, and lack of socio-economic development. Family agriculture is in better conditions to optimize the better use of land. Besides, it has the most significant potential for increasing the overall base growth and creating sustainable wealth. Thus, all effort to improve them is not enough for the considerable benefit they offer. Encouraging these families to move to agroecological models would improve their lives.

The processing of agricultural surplus offers new business opportunities, which can be approached at family or community levels.

The support of the Universitat Politècnica de València in the two projects, grants, and internships given to the people who are participating, have made it possible to pass through the different phases of diagnosis, creation of teamwork, crop monitoring, surplus drying monitoring, workshops, meetings, and business opportunities analysis.

The researchers provide the knowledge and work methodology; the students contribute with time, data collection, knowledge, reports, and enthusiasm. The staff contributes with a professional approach. The excellent relationship and significant involvement of the KCC staff, together all around above, contribute to the project's success.



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