Research Application Summary pp: 635 - 647

University student-centered outreach for rural innovations and community transformation in northern Uganda

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Abstract

In Uganda, while Universities are considered centers of knowledge creation and dissemination, their explicit role in economic development is largely less developed. Gulu University, at its inception sought to respond to this concern and positioned itself for community engagement as summarized in its motto of "For Community Transformation". As such, at its Faculty of Agriculture and Environment, curricular designs have been emphatic of Student-Centered Outreach services. In one of the existing programs, the Bachelor of Agriculture, the curriculum provides for attachment of students to smallholder farmers in the radius of 10 km from the University campus to which they regularly visit and interact for the whole of their final year of study. Recently, the faculty sought to restructure the management of student field attachment and in the new design supported by Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), field attachment will be starting right from year one of study. However, little is known on the design of Gulu University's Student-Centered Outreach model and how it is impacting on the farming community, the students and other university stakeholders. Therefore, this study set out to shed light on the design of this outreach model, provide a description of the institutional environment in which Gulu University attaches students. Preliminary findings from a synthesis of case studies reveal that the approach used in the model is not only attractive to farmers as evidenced by a growing demand for student attachment, but also enables the students to get real world experience in agriculture. It is recommended that Universities integrate ICT for extension in their community engagement efforts to enhance the efficiency in the student practical training and community transformation processes.

Key words: Community transformation, Gulu University, Uganda

Résumé

En Ouganda, alors que les universités sont considérées comme des centres de création et de diffusion des connaissances, leur rôle explicite dans le développement économique est largement moins développé. L'Université de Gulu, à sa création, a cherché à répondre à cette préoccupation et se positionne pour l'engagement communautaire tel que résumé dans sa devise «Pour la transformation communautaire ». En tant que tel, à la Faculté de l'Agriculture et de l'Environnement, des conceptions pédagogiques ont été emphatique de services d'approche centrée sur l'étudiant. Dans l'un des programmes existants, le la licence de l'Agriculture, le programme prévoit l'attachement des élèves aux petits agriculteurs dans

le rayon de 10 km du campus de l'Université à laquelle ils visitent régulièrement et interagissent pour l'ensemble de leur dernière année d'études. Récemment, la faculté a cherché à restructurer la gestion de l'attachement de terrain de l'étudiant et de la nouvelle conception soutenue par le Forum des Universités Régionales pour le Renforcement des Capacités en Agriculture (RUFORUM), l'attachement de terrain commencera dès la première année d'étude. Cependant, on sait peu sur la conception du modèle de sensibilisation centrée sur l'étudiant de l'Université de Gulu et comment cela se répercute sur la communauté agricole, les étudiants et les autres parties prenantes de l'université. Par conséquent, cette étude visait à faire la lumière sur la conception de ce modèle de sensibilisation, fournir une description de l'environnement institutionnel dans laquelle l'Université de Gulu attache ses étudiants. Les résultats préliminaires d'une synthèse des études de cas révèlent que l'approche utilisée dans le modèle est non seulement attrayante pour les agriculteurs, comme en témoigne la demande croissante pour la fixation de l'étudiant, mais aussi permet aux étudiants d'acquérir de l'expérience du monde réel dans l'agriculture. Il est recommandé que les universités intègrent les TIC pour l'extension dans leurs efforts de mobilisation communautaire visant à améliorer l'efficacité dans les processus de formation des étudiants et de transformation pratique de la communauté.

Mots clés: transformation communautaire, Université de Gulu, Ouganda

Background

University community partnerships designed to promote sustainable development have increasingly emerged worldwide (Stephens *et al.*, 2009). Universities as institutions of higher learning are also increasingly recognized as engines of economic development in many countries, providing avenues for innovation and technology transfer. Koven and Lyons (2003) observe that university researchers offer technical knowledge, always non-partisan and scientifically robust. These institutions facilitate access to talented and inexpensive labour pool, providing an educated workforce and may also offer customized training for local employers and communities. A key area of relevance of University outreach in the economic development process is the provision of agricultural education, extension and advisory services. Christoplos and Kidd (2000) explained that such services are critical means of addressing rural poverty because of the their embedded mandate of technology transfer, support learning, assisting farmers in problem solving and making them actively involved in the agricultural knowledge and information system.

In Uganda, although universities are certainly centers for knowledge creation and dissemination, their explicit role in economic development through extension is largely less developed. Extension in this case referring to the interaction and responsiveness of the University to the demands of society, most particularly in the agricultural sector. It is clearly known that in Uganda just like in the rest of Sub-Saharan Africa, a lot of knowledge, technologies and other research products are generated at Universities, but they are hardly available to the end-users to facilitate the development process (Davis, 2008). Therefore, Gulu University, at its inception recognized this concern and identified its niche summarized in its motto of "*For Community Transformation*". Enshrined in this motto is its core mandate

which is threefold namely: 1) provision of training to transfer knowledge, skills and attitude competences to the students; 2) undertaking both basic and applied research; and 3) provision of outreach services to the community, civil society and the productive sector.

The Faculty of Agriculture and Environment (FAE) at Gulu University undertakes the outreach program at both students and academic staff levels purposely to facilitate the transfer and diffusion of innovative and user-friendly technologies intended to yield improved agricultural productivity and socio-economic progress. This is not only aligned to the University motto of "*For Community Transformation*" but also addresses Uganda's national priorities enshrined in the Agricultural Sector Development Strategy and Investment Plan (DSIP). In particular, the FAE's outreach services focus on transforming smallholder farming systems from subsistence orientation to commercially inclined agriculture which rhymes well with objective (vii) of the production and productivity component of the DSIP, and the one that emphasizes efforts for improved agricultural livelihoods in Northern Uganda (MAAIF, 2010). The student outreach involves field attachment to smallholder farming households around the University campus. Recently, the FAE internally assessed its student-farmer attachment program and thus, it has refocused its strategy with more robust approach.

The momentum created by new developments in the management of the student-farmer field attachment presents interest to examine its previous implementation mode to inform the processes for improvement. For a deeper understanding of its operation, it requires a detailed unpacking of the issues concerned with the use of the approach for practical training but also addressing the social responsibility expected of the University. Little is known on how the Gulu University's "Student-Centered Outreach" Model is impacting on the smallholder farming households in Northern Uganda. In addition, its effect on the students, academics as well as the processes of development and review of training curricular is scantly documented. On the part of the smallholder farmers, real transformation assessment requires understanding their living and production conditions as well which, are very critical in the designing of the student field attachment program. One such appropriate qualitative approach to studying all these complexities is using the technique of Institutional Analysis and Development (IAD) Framework.

Polski and Ostrom (1999) pointed out that the IAD framework is useful to analysts in comprehending complex social situations and breaking them down into manageable sets of practical activities. The authors further noted that when applied rigorously to policy analysis and design, analysts and other interested participants have a better chance of avoiding the oversights and simplifications that lead to policy failures. The purpose of this paper therefore, is to shed light on the designing of "Student-centered outreach" model at Gulu University and its preliminary impacts. It also uses the IAD framework to provide a description of institutional environment of the smallholder farmers in which Gulu University attaches students for practical training, and finally examines lessons in the available case studies. Such knowledge is important for future planning of the student field attachment and informing the agricultural innovations systems that are bound to benefit from the efficient information flow catalyzed by smart-phone data collection, processing and dissemination.

Student-centered outreach and new community engagement developments in FAE

The growing demand for more community connected universities (as opposed to "ivory tower universities") is increasingly changing public attention to how university outreach services are formed and organized, examining how they operate, and what they accomplish. In this regard, the strengths of outreach services in FAE lie in the innovativeness of the "Student-Centered Outreach" model, which is largely implemented in the program of Bachelor of Agriculture. Students are attached to smallholder farmers in the radius of 10 km from the University campus. This kind of short distance operation enables students to reach the farmers by riding bicycles. The unique features of this approach are that the students: i) interact with the farmers on knowledge, skills and experiences exchange; ii) identify farmer problems and respond appropriately with technical backstopping from academic staff; and iii) collect agricultural enterprise specific problems requiring research attention, which upon research are packaged as technologies for agricultural development and disseminated back to the farmers through the same students.

Important aspects handled by students include: advice on seedbed preparation and crop production, postharvest handling, pest and disease identification. Others are: identification and costing of farm enterprises, evaluation of performance of farm enterprises, designing and guiding farmers in book keeping and records management. Students using knowledge and skills acquired from University training and interaction with farmers and other agricultural industrial players are required to develop fundable agri-enterprises business plans. While the intention of the approach is practical training of students, it has spill over benefits to other stakeholders. Farmers benefit from the technical support provided by academic staff. On the other hand, the academic staff use the opportunity of outreach to collect real world case studies and specimens for classroom learning but also community evidence for designing fundable projects. The University itself gains more visibility in the community and reputation in the general public.

Gulu University's FAE will be implementing a project titled "*Strengthening University Outreach and Agri-entrepreneurship Training for Community Transformation in Northern Uganda*[1]". This project has three thrust areas i.e. 1) development of a B.Sc. curriculum in Agri-entrepreneurship and Communication Management[2]; 2) operationalization of the Student Enterprise Scheme (SES)[3]; 3) enhancing the capacity of the faculty for community engagement using the student-centered outreach model. In the original design of

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[1] The new community engagement action is funded by RUFORUM under grant number: RU 2014 NG 15 and will run for a period of three years in Northern Uganda.

[2] The proposal for a new B.Sc. Curriculum follows a realization that in the current Bachelor of Agriculture with strong focus on science training, students can only have time for farmer attachment in their final of year of study. In the proposed curriculum, student field attachment will commence with year one of study taking good lessons from a similar model implemented by EARTH University in Costa Rica.

[3] The design of the Bachelor of Agriculture at Gulu University provided for supervised student enterprise scheme. However, this innovative approach to training has hardlybeen implemented owing mainly to resource constraints. In the proposed project, this has been brought forward with strong focus on document of lesson learnt and sharing in innovations platforms and other University in the wider RUFORUM network.

the community engagement program, students were meant to be attached to shorter distances from the University campus for which they would reach farmers by riding bicycles. In the new design supported by RUFORUM grant, the coverage has been extended to two districts in Northern Uganda namely: Gulu and Amuru. Therefore, the bicycle mode of student mobility to reach farmers will continue for shorter distances whereas for long distances, the students will be transported using the newly acquired faculty bus. In the view of ensuring efficiency, institutionalized and harmonized efforts in the implementation of the student-farmer field attachment, the FAE is enlisting two recently produced documents for management of outreach services. The documents developed under the Project titled "Enhancing Capacity for Agricultural Research and Training at Gulu University (ECART)[4]" are the Student-Farmer Attachment Manual and the Faculty Outreach Policy (still in draft form).

Although documented lessons from the Bachelor of Agriculture program's field attachment are scanty, their collection has been very crucial in the development of two labor-responsive Master of Science (M.Sc.) curricula at Gulu University. The programs having field attachment strongly embedded are: M.Sc. Agri-Enterprises Development[5] and M.Sc. Food Security and Community Nutrition. The two programs are very cognizant of the growing pedagogical shift in higher education training from teaching to problem-solving learning facilitation, making use of learning techniques such as Problem-Based Learning (PBL). The M.Sc. Agri-Enterprises Development curriculum, in addition to the field attachment, it has a component on business development services consulting training and will benefit from synergies created with another project[6] titled "Strengthening University Capacity to enhance Competitiveness of Agribusiness in East and West Africa" in funding Student Enterprise Scheme. For capacity development purposes, the M.Sc. students will not only participate in field attachment but also supervise student-farmer attachment activities of undergraduate students. Also to enhance their business development consulting skills, they will deeply be involved in coaching undergraduate students in preparation of business plans.

The new intervention on student field attachment has a strong bearing on capturing, documentation and sharing lessons learnt during the implementation of the action. In particular, it emphasizes documentation of transformation processes and the impact of field attachment on the farming households in Northern Uganda. As such, a baseline survey will be conducted in the two districts targeted for the intervention for purposes of generation of bench-marks for gauging the impacts. Other important activities in the action include: community/ stakeholder mobilization and sensitization; staff exchange with EARTH University; skilling faculty staff through mentoring by experienced EARTH University faculty and graduate students action research. It will still facilitate students to use lessons learnt during field attachment to develop bankable business plans for funding and arising lessons shared not

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[4] The project is funded by Netherlands Government through the Netherlands Organization for International cooperation in Higher Education and implemented jointly by Gulu University and a consortium of European Organizations namely: International Center for Development Oriented Research in Agriculture (ICRA), the Royal Dutch Institute (KIT) and University of Greenwich.

[5] Developed collaboratively with Egerton University, Kenya under the overall umbrella of RUFORUM and with the funding from FORD Foundation.

[6] The project is funded by ACP-EU EDULINK under grant number: FED/ 2013/335-687.

only in the innovations platforms including financial service providers but also in the wider RUFORUM network of Universities.

The project will also fund action-research for three graduate students including: one PhD candidate pursuing studies in Agricultural and Rural Innovations to study and document the transformation of farming households attributable to the proposed intervention. It is of interest to understand whether the interaction of University students with smallholder farmers significantly enhances availability of technologies, information and knowledge resulting into a shift in technical change, an increase in farm productivity and the expansion of the production frontier. World Bank (2008) qualifies the importance of improved productivity for smallholder farming households by asserting that along with profitability and sustainable incomes, it is the main pathway for getting out of poverty. The information availability also improves accessibility to markets, enhances commercialization and therefore rural transformation. There will also be two master students, one pursuing agricultural economics to examine the competitiveness of one of the farm enterprises in the intervention area. The second Master student will pursue agricultural extension and will study perceptions and responses of farming households to information and knowledge flows from university student outreach activities.

Institutional analysis

Institutional analysis and development conceptual framework. Ostrom *et al.* (1994) while explaining the basic structure of the IAD approach highlighted its components as follows: (a) an exogenous set of variables, (b) situations of actors and (c) the behavior of the actors leading to outcomes. The framework has been widely applied in political theory and public choice analysis (Polski and Ostrom, 1999). Its application has also been extended to studying natural resource management, exchange of goods and services and most recently the use of Information Communication Technology (ICT) for development. The IAD framework is both a problem diagnostic and solution prescriptive tool. As a problem diagnostic tool, it enables identification of issues requiring research attention and on the other hand, it is used for development planning.

Structurally, the IAD framework (Fig. 1) has the institutional environment comprising of three components i.e. physical or material conditions (techno-economic factors), socio-economic environment and the policy and governance environment. The techno-economic factors include: the soil quality levels, climate and its changes and variability, pests and diseases, drought and irrigation facilities, transport, telecommunication, production technologies and other factors that influence the actors' production choices. Socio-economic factors include: gender relations, demographic factors, cultural norms e.g. social reciprocity for labor supply, and the distribution of human, physical and social assets which shape the behavioral patterns. The policy and governance environment refers to the set of fundamental political, social and legal ground rules that establish the basis for production, exchange and distribution of goods and services. The focus is largely on property rights and how they influence access and control of productive resources.

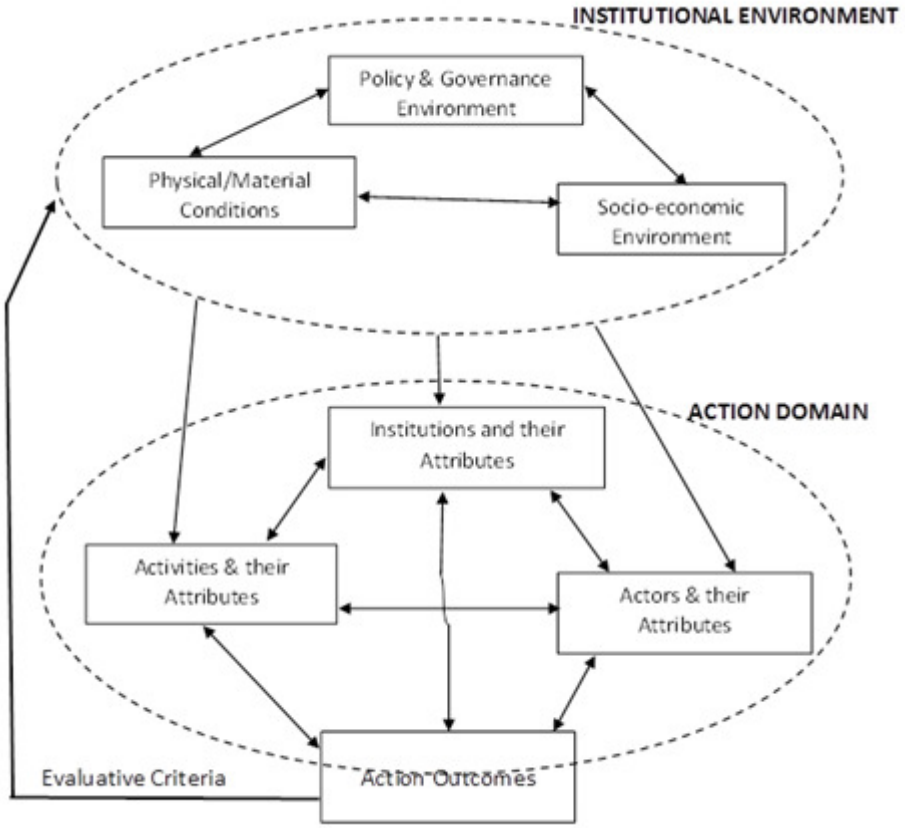

Figure 1. Institutional Analysis and Development (IAD) Framework. Adapted from Kirsten and Vink (2006).

The action domain also known as the action arena has institutions which Ostrom (2005) define as the rules, norms and strategies used by humans in repetitive situations. When such institutions interact with the organizations and actors, they shape the institutional evolution of an economy and the pace of community transformation. These institutions perform a variety of social and economic functions, and connect and affect the different sets of actors. In an agricultural situation, the institutions include: property rights, standards, local regulations, constitutional choice rules and collective choice rules. While examining the action arena, it is important to address questions such as what kind of institutions exist, why do they exist, who do they connect and affect, and how do they work (Kirsten and Vink, 2006).

Other sub-components in the action include: the actors who are involved in the production and exchange of goods and services. It also has the activities and their attributes and these are the production and exchange processes, resources and goods and the services. The interaction between the institutions, actors and activities provides feedback to each of these sub-components which eventually result into the action outcomes. Kirsten and Vink (2006) explain that action outcomes may be the actions of the actors themselves or changes in the states of the action domain, for example, supply of goods, product quality, demand, prices

etc. Outcomes may also be considered in form of outcome measures of the action domain for instance, its efficiency, equity and sustainability; and in terms of the welfare of interest groups such the poor, the landless, the youths and women. The presence of support services (e.g. the financial, extension/advisory and information services) lubricates the action domain and may determine the extent and quality of the outcomes. The outcomes give a feedback to the institutional environment and to determine the impact of this feedback requires an evaluative criteria.

Smallholder farmers' institutional environment in northern Uganda. Applying the conceptual framework to the situation of Northern Uganda and particularly in the operational area for Gulu University's student-farmer attachment, it can be observed that the agricultural production system is generally subsistence in nature. Agricultural output is mostly for home consumption and with a big number of households only selling farm outputs when a surplus is realized in a season. Common crops for farming households include: sweet potatoes, cassava, maize, rice, pigeon peas, beans, ground nut, and sesame. For livestock, a typical household keeps chickens ranging from 2 -10 and goats ranging from 2-5.

The socio-economic environment of the production system has smallholder farmers with average individual land holding (land accessed and controlled by a household in a communal setting) ranging between 1-5 acres. These households are recently resettled following an armed conflict that lasted for 20 years in Northern Uganda. Thus, many of these rural inhabitants never had a chance of practicing agricultural production during the insurgency when they lived in Internally Displaced Persons (IDP) camps. Production is dominated by women farmers who barely have control over productive resources. Young men are rarely involved in agricultural production just like in many other parts of Uganda (FAC, 2011) because a considerable number of these youths have migrated to towns in search of jobs with quick returns irrespective of the magnitudes of the returns. The exodus of youths from agriculture is annually estimated at 9% (Ahaibwe *et al.,* 2013). Yet again research has shown that countries that depend heavily on agriculture, Uganda inclusive, may not readily create sufficient jobs for the youth in non-agricultural sectors in the medium term (Brooks *et al.*, 2012). The exodus rate means that development practioners should strategize for incentives attractive to the youths so as to reduce the rate of loss of energetic labor. Possibly, the University students' involvement (especially with Student Enterprise Scheme) in the community could be a good response in terms of peer interaction and learning that is likely to attract youths to stay in agriculture.

The material conditions of these farmers show low investment in farm inputs due to lack of capital, itself exacerbated by low household incomes and savings. As such, production is heavily dependent on rainfall and the use of fertilizers, herbicides, pesticides and improved seeds are very rare. The soils are fairly fertile capable of earning farmers moderate yields. A major tool for production is the hand hoe, although a few of these farmers are now adapting to use of draught animals for land opening and ploughing. The policy and governance environment has the district and sub county local governments whose legislative responsibility is the enactment of the ordinances and bye-laws to regulate activities of actors. They also enforcement property rights relating land matters including resolving disputes. At much high

levels, the policy and governance environment prescribes standards for actors to facilitate exchange of goods and services. With the emergency of a regional market and the increasing integration with the international markets, a set of new standards have come into play. The chain of actors now have to grapple with traceability issues, product testing and conformity assessment, certification and phyto-sanitary requirements which, ideally result into a more remunerative market than the domestic one but highly unaffordable to the ordinary smallholder farmers. Worse still, all these exist in the face of absence of adequate flow of information among the actors.

In the action arena, smallholder farmers interact mostly with middlemen who move to the country-side for assembling the produce but also to a small extent to the urban traders, processors and exporters, especially when the farmers are organized in producer organizations. What is evident in the interaction is that there are hardly any recognizable standards developed between the actors themselves to enable efficient exchange locally. There are also no innovations platforms to facilitate the actors meet periodically and discuss issues that jointly affect them. In effect, traders experience inadequate produce volumes because the producers are unable to synchronize their production and market demand. Besides, the traders often complain about product quality defects namely; the presence of debris, rotten grains, inappropriate drying etc. On the other hand, farmers complain about cheating from traders and unsupportive for agro-technologies that would increase farm yields. Therefore, the student field attachment is seen as an opportunity to not only provide agro-technology knowledge and advice to the farmers but also facilitate information flow amongst participants.

One notable observation about smallholder farmers in Northern Uganda, is their keen interest in formation of producer groups whose average number is around 30 members. These groups are generally cohesive and stable. Key among the group activities especially those involving women is the collective provision of farm labor to members on rotational basis. The groups also establish and management Village Savings and Loan Associations (VSLA) to which each member is required to save a small amount of money ranging from Uganda shilling (UGX) 2,000 – 5,000 per week (average exchange rate is 1 US Dollar = UGX 2,600). Groups with significant numbers of men are also beginning to collectively market their produce. These have club norms which are used to control any form of free riding. The implication of this scenario is that these groups could have crafted enforceable institutions and therefore connecting for more production and credit access. The features of these institutions could be relevant in enhancing the flow of information and knowledge from the University to the farmers.

Synthesis and discussion

Three case studies have been selected to demonstrate how the Student-Centered Outreach program in FAE is generating lessons on which to build more involvement in the community and learning. They also show how it is creating a lot of excitement and arousing interest amongst the students, farmers, academics and other stakeholders, as evidenced by their reaction. Thus, the foregoing analysis is used to describe how this outreach program is

impacting on the university and the wider community. The cases include one drawn from the original student-farmer attachment program and two from the ongoing testing of new approach to student filed attachment.

In the case study from the original design (described in the Bachelor of Agriculture program), two students were attached to two farmers' groups in Unyama Sub County, Gulu District for a period of one year. The group comprised of mainly young women and men. Key areas of focus for the attachment were: advising and demonstrating timely and row planting of maize, rice and ground nuts, postharvest management including advice on farm structures for storage, enterprise costing, record keeping, and pest and disease identification and control. After two years, the group reported technical, managerial and economic benefits as outcomes of their interaction with students. For the crops, farmers noted significant increase in farm yields upon harvesting, reduced postharvest losses and improved incomes. The group further reported that arising out of increased group savings, a collective effort mushroom enterprise was started to supplement household incomes. It sounds apparent that students could have contributed to helping farmers to bridge the technology and management gaps. Anderson and Feder (2003) explained that the two gaps are responsible for productivity differential and when the differential is addressed, farmers achieve productivity improvements, a precursor to improved farm incomes.

Gulu University's FAE interested Concordia University of Canada in terms of its practical training approach of student-farmer attachment. Consequently, in a partnership initiation process, three undergraduate students from Concordia University visited the FAE in June 2014 and sought to work alongside students of FAE in building the capacity of smallholder farmers. Working under the supervision of the lecturer concerned with outreach, the visiting students teamed with four students of Gulu University and visited a producer group in Pece village, Koro Sub County, Gulu District. On day-one, the combined student team began with identification of knowledge needs of farmers in the piggery and dairy cattle. Students retreated to the University, developed work plans and workshop sessions for training farmers. Using the knowledge acquired from the University and lecture notes, students also developed hand out as manuals with content on record keeping, disease identification and control as well as other management practices, as reference for their routine management activities. Although, no results are available on this student-farmer interaction, it generated excitement among the members of the producer group to the extent of informing students that these local farmers would bring their children to study at Gulu University. Three learning points can be drawn from this kind of case study. Firstly, it is not the bringing of children to Gulu University that is important but rather the appreciation of student services on the part of the farmers that such services can transform their production. Secondly, on the part of the students, they demonstrated a learnt skill of contact with the farmers, community entry and creation of a rapport for acceptance of their services. Thirdly, the cross-University student exchange visit sounds a plausible approach to peer learning and sharing amongst students of different universities and could be a good strategy for diversifying exposure to practical situations and knowledge exchange.

In pilot-testing of technologies for extensions, research and training in June 2014, for the proof of concept (in which Gulu University is partnering with the INSEAD Business School, Asia Campus) under consideration by Bill and Melinda Gates, students were taken for fieldwork to test smart-phone enabled applications for extension guides, plant doctor and credit scoring. Two producer groups engaged in commercial rice production and managed as Farmer Field Schools (FFS) under Food and Agriculture Organization (FAO) programs were met in Patiko Sub County, Gulu District. In a preparation meeting, members of the producer groups pointed out the activities undertaken by the groups which included: agricultural production, collection of weekly savings into the Village Savings and Loans Association from all members and diversification with other off-farm income generating activities. The farmers also expressed priority needs as follows: accessing farm inputs especially agro-chemicals, linkage with reliable output markets, training in agronomic practices and provision of marketing information including information on traders and prices of inputs and outputs.

Students interacted with farmers (majority of whom were women) who were working in groups and weeding rice and used smart-phone applications for agronomic advice, pest and disease diagnosis and general recommendations on a range of issues. They also rated farmer creditworthiness and provided response financial advice. Interestingly, farmers were excited by the engagement with students who were advising them using the smart-phone applications especially on weather, pests and diseases symptoms and requested for more regular visits. Farmers were also informed that information collected on the smart-phones would be posted and processed at the farmer call center which will be used to respond to farmers and traders' knowledge and information needs. Such ICT technologies could improve the speed of technology transfer by increasing farmers' knowledge and assisting them in improving farm management practices, which conditions, Feder *et al.* (2004), explain that are critical in increasing farm productivity differential.

Conclusion and recommendations

Universities' role in the community transformation and economic development through outreach services cannot be underestimated. However, how this can be achieved efficiently and sustainably requires a lot of innovative thinking and planning. The student-farmer field attachment seems to be a plausible approach meeting the objectives of community engagement and transformation of smallholder farming households. It is a good practical approach for training agricultural students and if used alongside other practical methods can be critical in producing a new breed of agricultural graduates well-endowed with innovative skills and mindsets relevant to the agricultural sector.

In order to realize sustainable results and attractiveness to smallholder farmers, ICT technologies should be integrated and embedded in all outreach activities. The recent introduction of smartphone for agricultural extension in Africa can go a long way in addressing this need. Equally important, managers of outreach services need to be retooled in new approaches to community engagement especially in how to cost-effectively use the ICT. Importantly, universities need to have in place guiding frameworks for management of outreach services and student field attachment.

Acknowledgement

The authors thankfully acknowledge the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) for funding to facilitate the revitalization of the student-farmer attachment in Gulu University and supporting documentation of lessons. ACP-EU EDULINK II Project grant number: FED/2013/335-687 funding enabled the compilation of information used to develop this papers. The Bill and Melinda Gates Foundation for supporting the proof of concept of Smart-phone enabled applications in agricultural extension, research, credit scoring, among others. The team from ISEAD Business school Singapore lead by Prof. Phillip Parker for making sure the smart-phones and call center are up and running, and lastly, Netherlands Government for funding ECART project under which Student-Farmer Attachment Manual, Faculty Outreach Policy and Outreach transport equipment (newly acquired bus and double cabin vehicle) have been realized.

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