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Entrepreneurship education in agriculture: The EARTH University approach

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ABSTRACT
Entrepreneurship is an essential component of agricultural development and is receiving increasing interest, especially in the developing world. However, until very recently, entrepreneurship has not been a theme included in programs of higher education in agriculture. This paper highlights the importance of entrepreneurship in agricultural development and describes in some detail the entrepreneurial capacity building program at EARTH University in Costa Rica. The paper concludes with a discussion of the challenges and possibilities for developing agribusiness entrepreneurial education programs in the African context.

Key words: Agricultural development, Costa Rica, EARTH University, entrepreneurial education

RÉSUMÉ
L'entrepreneuriat est une composante essentielle du développement agricole et reçoit un intérêt croissant, en particulier dans le monde en voie de développement. Toutefois, jusqu'à très récemment, l'esprit d'entreprise n'a pas été un thème inclus dans les programmes d'enseignement supérieur agricole. Ce document souligne l'importance de l'entrepreneuriat dans le développement agricole et décrit en détails le programme de renforcement des capacités entrepreneuriales de l'Université EARTH au Costa Rica. Le document se termine par une discussion sur les défis et les possibilités de développer des programmes d'éducation entrepreneuriale en agro-industrie dans le contexte Africain.

Mots clés: Développement agricole, Costa Rica, l'Université EARTH, enseignement entrepreneurial

INTRODUCTION

Throughout the world, but particularly in developing countries, entrepreneurship, and rural entrepreneurship in particular, is increasingly being recognized as a key element for economic development and poverty alleviation. The transformation of agricultural producers into entrepreneurs is of critical importance in efforts to enhance rural economic and social development. However, doing so requires capacity building. Unfortunately, most higher education programs in agriculture remain highly theoretical, disciplinary and focused on the technical and scientific aspects of production, failing to provide their graduates with the tools to become entrepreneurs and to promote rural entrepreneurship (Jordaan *et al.,* 2014; Mabaya *et al.,* 2014; Sherrard, 2014).

EARTH University in Costa Rica has developed an undergraduate program that integrates entrepreneurship into the agricultural curriculum and that links five essential aspects: technical and scientific knowledge, entrepreneurship, social and environmental awareness, experiential education and values and ethics. This paper briefly introduces the principle approaches to entrepreneurial education, locate EARTH University's methodology within that spectrum and present in some detail the University's approach to integrating entrepreneurial education in an agricultural oriented curriculum.

Importance of Entrepreneurship in Agriculture in the Developing World. While the last decade has seen an increasing interest in agricultural development on the part of governments in the developing world as well as national, regional and international development organizations (OECD, 2012), until recently relatively less attention has been paid to the role of agribusiness and entrepreneurship as a driving force of development (World Bank, 2013; Agriculture for Impact, 2014). In fact, as Lingelbach *et al.* (2005) suggested: "Yet, entrepreneurship in developing countries is arguably the least studied significant economic and social phenomenon in the world today."

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The role of agribusiness and agricultural entrepreneurship is critical in the overall economy of many developing countries. Agribusiness represents perhaps half of the gross domestic product (GDP) in many countries and over 2.5 billion people in these countries depend on agriculture for their survival (World Bank, 2013). It is precisely agribusinesses, many of which are the result of the efforts of small entrepreneurs, who link these smallholders to markets and value chains and who provide seeds, fertilizers and other inputs yet not only is there a lack of understanding of the role of entrepreneurship in development, and particularly agricultural entrepreneurship, there is also little being done to equip young people with the skills, competencies and attitudes required to become successful entrepreneurs.

Entrepreneurial Education and Training. Entrepreneurial education and training (EET) is a relatively recent phenomena. While there is evidence that efforts to train entrepreneurs existed since at least the 1800's in the U.S. it was not until the 1970's that entrepreneurship education came into its own in business schools (Katz, 2003). Other regions of the world have followed a similar pattern. Entrepreneurial Education and Training includes both formal academic education and training programs. While both ultimately seek to develop entrepreneurs and entrepreneurial activity, they differ in the specific objectives. In general, formal academic entrepreneurial education at the secondary and post-secondary levels tend to focus on knowledge acquisition about entrepreneurship, while training programs, which are typically found outside the formal educational sector, are oriented to providing the skills needed for actually launching a business. The audiences for entrepreneurial training programs vary widely, from unemployed, at-risk youth and rural women with minimal education to highly skilled individuals seeking new opportunities (Robb *et al.,* 2014).

At the post-secondary level, entrepreneurship education is not limited to schools of business, and programs have emerged in colleges of arts and sciences, engineering, education, social work, etc. Schools of agriculture are not the exception, with many institutions offering majors, minors, concentrations as well as specific courses in entrepreneurship and agribusiness. At the secondary level, there is also increasing interest in providing students with knowledge and skills related to business and entrepreneurship. Technical and Vocational Education Training (TVET) programs are also beginning to incorporate entrepreneurial education components.

In general at the post-secondary level, two pedagogical approaches to entrepreneurial education can be identified: a small business management model and an entrepreneurial venture focus (Winslow *et al.,* 1999; Rideout and Gray, 2013). In the first approach the focus is on management "know-how", goal setting, planning, organizing and controlling in the framework of a small firm. In contrast, entrepreneurial venture education focuses on actually developing a business plan. The content of many programs of course mix the two general approaches and the field of entrepreneurial education is quite diverse and eclectic (Rideout and Gray, 2013).

Teaching entrepreneurship to non-business students. Currently, the majority of entrepreneurship programs offered by institutions of higher education are in faculties of business administration and economics, which limits the opportunities for non-business students to receive this type of education. Since non-business students are the majority of the student population at the University level it is highly desirable that this group also be exposed to entrepreneurial opportunities. In the developing world, it is particularly important that entrepreneurial education be included in colleges and faculties of agriculture as the creation of entrepreneurial activity in rural areas, home to the majority of the world's poor (IFAD, 2011), is a critical factor in development.

Entrepreneurship Education in Agriculture: The EARTH University Approach. EARTH University is an international institution, located in Costa Rica and dedicated to education in the agricultural sciences and natural resource management to contribute to the sustainable development of the tropics. The University's highly experiential and student-centred educational model seeks to balance technical and scientific knowledge, entrepreneurship, social and environmental awareness, experiential education and values and ethics. The University, with a small student population of 420 originating from approximately 43 countries, offers a single, holistic undergraduate program in agricultural sciences.

A founding tenant of EARTH University is that agricultural and rural development is highly dependent on the propagation of successful rural enterprises. Agricultural professionals who are capable of integrating technical agricultural knowledge, entrepreneurial competencies and ethics are key to creating successful agricultural value chains that result in concrete development outcomes.

The Entrepreneurial Project course. The Entrepreneurial Project course is a fundamental component of EARTH University's educational model. It is a long-term course that begins in the first trimester of the 1st year and concludes in the second trimester of the 3rd year. Throughout the three years of the course, students are actively engaged in developing a viable business venture, while at the same time enrolled in learning modules in which they study the elements instrumental for the formation and implementation of a successful business project. The modules provide the theoretical and practical knowledge and skills that support the work the student is carrying out in his/her entrepreneurial project. The modules seek to integrate the technical, financial, environmental, and social aspects of business management. During the process the students engage in the creation and development of an agricultural related business. A critical feature of the Entrepreneurial Project course is that an effort is made to schedule the modules so that the topic of each is relevant to the particular stage of the development of the student's business project. Thus when a student is organizing his or her enterprise, together with 5 or 6 colleagues, the module will address the different forms of business organization. The theoretical support is made up of six modules, each of which lasts one trimester. The course consists of practical experience in forming and operating an enterprise as well as the learning modules. Figure 1 depicts the organization of the course over the three years. The applied and "practical" portion of the course consists of laboratories dedicated to formulation of business plans and evaluation, as well as "Entrepreneurial Experience" in which the business plan is actually implemented. During their fourth and final year, students are enrolled in a course, *Food Systems and the World Economy,* that seeks to contextualize their entrepreneurial experience. The organization of the Entrepreneurial Project course reflects the University's approach to curricular design. EARTH's plan of study can be characterized

<table>
<tr><td></td><td colspan="3">Trimester</td></tr>
<tr><td>Year</td><td>I</td><td>II</td><td>III</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Introductory Seminar</td><td>Module #1: Introduction to Entrepreneurship</td><td>Module #2: Planning and Business Organization</td></tr>
<tr><td>Lab: Formulation of business plans I</td><td>Lab: Formulation of business plans II</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Entrepreneurial Experience</td><td>Module #3: Accounting and Agri-business Information Systems</td><td>Module #4: Agri-business Finance</td></tr>
<tr><td>Entrepreneurial Experience</td><td>Entrepreneurial Experience</td></tr>
<tr><td rowspan="2">3</td><td>Module #5: Social and Environmental Economics</td><td>Module #6: Evaluation</td><td rowspan="2">INTERNSHIP</td></tr>
<tr><td>Entrepreneurial Experience</td><td>Lab: Business evaluation</td></tr>
<tr><td>4</td><td>Food Systems and World Economy</td><td></td><td></td></tr>
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Figure 1. Organization of EARTH's entrepreneurial program

as an "upside down" approach. Unlike most plans of study that are based on a reductionist vision in which students begin their studies concentrating on the components that comprise the system (biology, chemistry, physics, etc.), at EARTH the process begins by focusing on the system and emphasizes a holistic vision of agricultural production and natural resource management. From their first days at the University, students are confronted with the complexity of the agricultural production system and the role of humans in that system. Later, as they advance in their studies, they increasingly concentrate on the parts of the system, but without losing sight of the whole. The strength of this "upside down" approach is that students live and experiment the social, technical, environmental and entrepreneurial realities of agricultural production from the very beginning of their studies, thus providing a context for the construction of knowledge as they advance. This focus provides students with a meaningful formation that is closely linked to the reality of the field in which they will work. This approach is reflected in the entrepreneurial area in which students, just initiating their studies at EARTH, are expected to form a company and select an enterprise before being introduced to the basics of business administration.

Other critical features of the Entrepreneurial Project course include:

- The students themselves are entirely responsible for the development of their project. While the development of the projects is monitored by members of the faculty, the success or failure of the venture is in the hands of the students.
- The Entrepreneurial Project course sequence is required for all EARTH students.
- Student teams must be composed of students from different countries and must include both men and women.
- After repaying their interest bearing loan and costs of production, the net profits are divided among the members of the team (the University reserves a portion of the proceeds in a revolving fund to finance those projects that lose money).

Following is a detailed description of the course, divided into three phases: The pre-operational phase; The operational phase; and The evaluation phase.

The pre-operational phase: Creation and Organization. This phase occurs over the first three trimesters of the student's first year (the academic year at EARTH University is 11 months long and consists of three, 15 week "trimesters" each of which is equivalent to a semester in other systems), and involves forming the team, researching and deciding on the project to be implemented, developing a feasibility study and defending the project proposal to obtain financing.

Planning and organization begin in the first trimester, when students form entrepreneurial teams of 4-6 members. The teams must be composed of no more than two members from the same country, have representation from the different regions represented in the student population (Central America, South America, Africa), and both male and female students. These requirements are very much in line with the University's commitment to promoting multicultural understanding and global perspective.

Once the team is established, they must develop their administrative structure, assign individual responsibilities, define their long-term goals, develop a mission statement, and write the bylaws under which the enterprise will operate, including internal policies, a business code of ethics and others. At a minimum, each project must name a General Manager, who will be the legal representative of the enterprise. The group also sets up a system for follow-up and evaluation of each member's individual performance. In consultation with the course professor, other faculty members and students, the team conducts a preliminary evaluation of potential initiatives. Each student must actively research the options. The resulting information is studied and compared in detail in order to identify the most appropriate project. Using comparative analysis of budgets, marketing opportunities and personal considerations, the team selects an activity to pursue.

A feasibility study is then conducted of the selected idea. In the modules that accompany the development of the team, students learn about the theoretical basis for determining feasibility. The feasibility study covers seven specific components providing the students with an overview of the activities involved. The seven components are: Business organization, marketing study, technical study, environmental impact, social impact, economic study and financial study.

At the end of the third trimester, the students defend, in front of a panel, their agri-business feasibility study where they must demonstrate that they have the necessary knowledge, skills, determination and commitment to pursue their idea. The panel typically includes farmers or producers involved in the selected activity, the course professor, an advanced student and the project's technical advisor.

The operational phase: Implementing the Proposal. Beginning in their second year, students actually develop and implement their enterprise, creating a project that integrates and applies the theoretical and practical knowledge acquired during their first year. The heart of the Entrepreneurial Project course is the creation and implementation of an actual enterprise. Once the panel approves the feasibility study, the Entrepreneurial Projects Office (EPO) grants the finances requested. This process is formalized through a contract between the EPO and the student enterprise. The panel of evaluators approves the level of credit available for the enterprise, with a maximum of US $5000 available for each project. The financing provided does not include salaries for the team members as the project is considered a part of the curriculum, however, the student's hourly labour is paid at the conclusion of the project from the revenues generated. Team member's labour is compensated at the Costa Rican minimum wage rate, and are paid out of the project's gross profits.

The operational phase is focused on project implementation and is an unparalleled opportunity for integrating theoretical knowledge with applied skills and critical "soft skills" that are so often lacking in graduates of programs of higher education. In the case of theoretical knowledge, students learn and apply many of the principles of accounting, administration and agri-marketing, in a "real world" context. With respect to applied skills students gain practical experience in everything from machinery operation to managing an animal production operation, depending on the nature of the project they develop. However, perhaps the greatest contribution of the Entrepreneurial Project course to a student's development lies in area of "soft skills", or personal attributes. The course affords multiple opportunities for future professionals to strengthen their competencies in areas such as decision making, teamwork, conflict resolution and time management. Finally, the course also provides numerous opportunities for analysing ethical considerations in business decision making and interpersonal relations.

While the execution of their project is the responsibility of the team, the EPO conducts periodic site visits. Projects are monitored and are allowed to deviate up to a maximum of 30% of the parameters established in their feasibility study. In the case of larger variations, the team members, the EPO, course professor and the technical advisor meet to attempt to correct the execution of the project. Each enterprise pays interest on their loans with the rate established as an average of the interest charged by the Costa Rican National Banking system.

All projects must evaluate their environmental impact, taking into consideration the relevant externalities, including CO_2 emissions, water and nitrogen footprints. Externalities either have to be compensated for through mitigation or, alternatively, pay an environmental "tax". As part of the course, the team must present their progress on a monthly basis. Internal financial audits are conducted through the EPO and external audits by the University Accounting Department. It is important to stress that ultimately the purpose of this course is to provide students with an opportunity to make decisions, develop teamwork skills, experience the successes and challenges involved in developing any complex project, as well as developing leadership skills.

Closure phase: Financial and environmental evaluation and closing the Project. The operation of the project is concluded after a minimum of a one calendar year or, depending on the production cycle of the particular enterprise, at the conclusion of the production cycle. This usually occurs during the first or second trimester of the third year (Fig. 2). In order to evaluate the project and assign a grade, the team must present a detailed report describing the operation, technical issues encountered, costs incurred and suggested changes for future projects, as well as financial statements. This is presented to the course professor, the team advisor, and all first year students. This is a critical step as it provides an additional opportunity for the team to prepare and present a professional report on their project, and importantly provides first year students a portfolio of ideas and insights for their own projects.

In the event that a project fails, with failure defined as not breaking even (after covering costs and paying back the loan plus interest) an evaluation is conducted to identify the causes. If the team is found to be at fault due to negligence, a failing grade is issued. A student receiving a failing grade must develop a new project, including a complete feasibility study and carry out the project during their fourth and final year. If, based on a careful analysis carried out by the course professor, project advisor and the team it is determined that the failure is attributed to force majeure (for example flooding of a crop), the EPO assumes the financial loss, and a negotiated grade is assigned.

Project results. Since inception, there have been 489 agricultural related projects developed as part of the entrepreneurial project course, of these, 51% were crop production projects, 25% food processing projects, 17% animal production projects, and 7% service related projects. With respect to the financial results of the projects, Figure 2 presents the percentages of projects that lost money, repaid the loan, repaid the loan plus interest, repaid the loan plus interest as well as the team member's labour and finally, those projects that repaid the loan, interest, labour and realized a net profit during the 16 year period between 1996-2015. It should be noted that the years with a relatively higher proportion of projects with negative financial correspond to years with adverse climatic conditions or difficult external economic conditions.

However, the program (or individual projects) should not be evaluated based solely on financial results. The objective of the course is to expose students to the world of entrepreneurship, to working in a team, to resolving the inevitable conflicts that arise in any complex human interaction and to provide an opportunity to apply the knowledge, skills and competencies they are acquiring as students in the university. It is safe to say that most students, upon entering the university have little intention of becoming independent entrepreneurs. Over the years many graduates have commented that participation in the entrepreneurial project served to open their minds to the possibility of engaging in entrepreneurial ventures after graduation.

While more detailed research is clearly needed, anecdotal information indicates that the program actively promotes and reinforces a number of subjective characteristics that are considered important in the development of future entrepreneurs including risk taking, decision making and leadership skills, among others. Annual follow-up surveys of EARTH University graduates indicate that approximately 20% have developed successful agricultural related business ventures (or

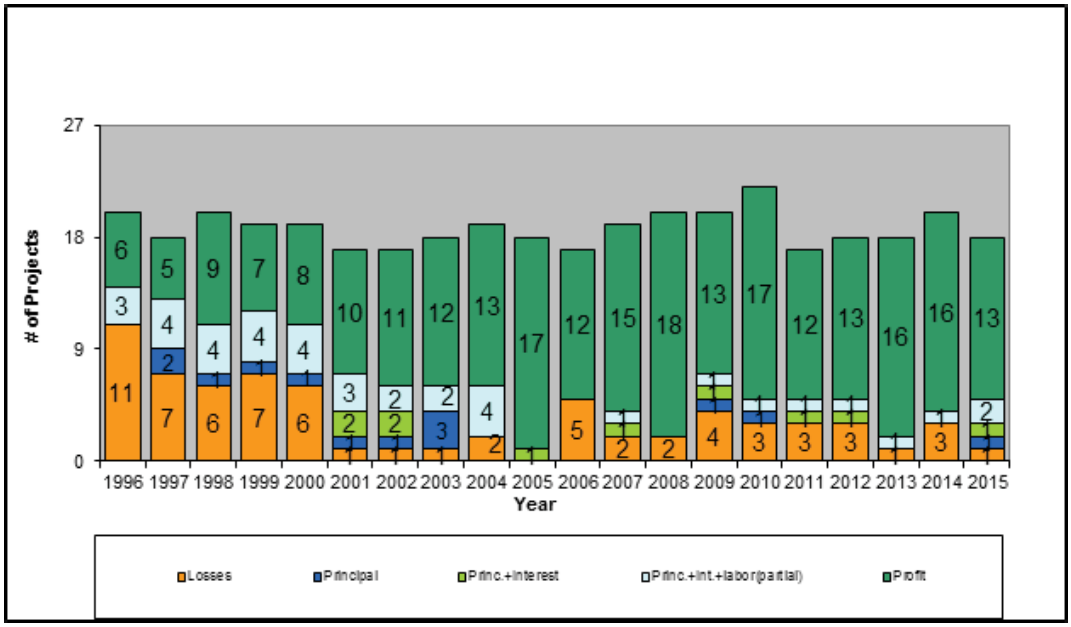

Figure 2. EARTH University's entrepreneurial program 16 years of financial results, 2016

have assumed responsibility for family businesses)

DISCUSSION

The theme of agribusiness and entrepreneurship as it relates to agricultural education is of great interest, particularly in the developing world. While it is beyond the scope of this paper to assess the extent to which programs in agribusiness entrepreneurship are being implemented at the university level, or their relative quality, it seems fair to say that, in the case of Africa, relatively few universities have incorporated effective programs to prepare agricultural students with the knowledge, skills and competencies to prepare them for careers as entrepreneurs.

It is important to highlight that the program described in this paper has been developed and implemented under relatively favourable conditions. EARTH University has a low enrolment (420 students), a high student/faculty ratio, full-time professors and support staff dedicated exclusively to the University's academic program, an institutional ethos of academic excellence, a strong emphasis on teaching/learning, and an educational program that stresses the development of entrepreneurship. It is relevant to question to what extent the experience of EARTH University in developing this program is relevant in other contexts characterized by exploding enrolments, faculty who, to make ends meet, only dedicate part of their time to their duties at the university, institutional cultures that often emphasize research over teaching and universities with serious financial limitations.

Nevertheless, after 25 years implementing this model, and sharing experiences widely across the developing world, it is the authors' opinion that the single most important factor in developing an effective program is not as a much a question of material resources as it is a shared conviction by university decision makers and academics that graduating agricultural professionals with a solid formation as entrepreneurs is a top priority. If the focus on agricultural entrepreneurship is manifested as simply one more course (and often not a required one at that), it is unlikely that the impact will be significant. Graduating future leaders with the skills to become successful entrepreneurs and who, at the same time, possess the motivation to actually seek such a path is no simple task. It requires a change in mind-set on the part of administrators and faculty members. Admissions criteria may need to be altered, faculty reward structures and promotion criteria need to be adjusted, and curricula need to change.

Changing mind-set is without a doubt the single greatest challenge to implementing a program like the one pioneered at EARTH University in agribusiness and entrepreneurship. It involves changing the way academics (and students) view the educational enterprise. It recognizes the tremendous potential of experiential learning and the value of hands-on, practical experience at the farm level. It recognizes the importance of a generalist formation, rather than a focus on individual disciplines and an appreciation that while the preparation of some students for careers as researchers and academics is essential, the majority of the opportunities for graduates of faculties of agriculture will be found in the private sector and outside of academia.

Building a successful program in entrepreneurship also requires a commitment to active engagement beyond the university. Building relationships at the community level with farmers, with business groups and others is essential for understanding the challenges of developing the agricultural sector. The authors believe that to build successful programs in agribusiness entrepreneurship requires a transdisciplinary approach, involving close collaboration between academics from the agricultural sciences, business and economics as well as those who can help students develop "soft skills" including communication, problem solving, teamwork, conflict resolution and leadership. Whether graduates eventually develop their own enterprises or work for already established businesses, the knowledge, attitudes, skills and competencies that such a holistic formation provide is essential.

Taking into account the difficulty of achieving these kinds of changes across the university or even a single faculty for that matter, a potential strategy for developing successful programs may be to implement them on a small scale as special programs that students specifically apply for, or house the program within specific programs in the university that have the flexibility that allows for innovation. Many faculties of agriculture have programs in general agriculture (in addition to those in specific agricultural disciplines) that might be appropriate venues for such a venture.

A unique feature and a critical factor of success in the EARTH University model of entrepreneurial education is the fact that the program is designed for students in a general agricultural program, not students specifically studying entrepreneurship or agricultural economics students. Recognizing the resistance to change in existing institutions and programs, a second strategy to consider in implementing innovative programs in agribusiness entrepreneurship would be to develop new institutions. While such a strategy implies significant challenges in terms of resource mobilization, political considerations and others, "freed of the constraints of tradition, new institutions are able to establish a new learning paradigm, to recruit faculty, staff and students willing to experiment and to implement an administrative structure supportive of innovation." (Sherrard, 2001).

Developing agribusiness entrepreneurs is a priority in developing the agricultural sector and the overall economy in the developing world. EARTH University has developed an innovative approach to preparing promising young people with the knowledge, skills, attitudes and most importantly the motivation to work and create opportunities in the rural areas of their countries. This approach, as well as other models being implemented across Africa and around the world, deserve to be studied and adapted across the continent to provide the leadership necessary for Africa's future development.

STATEMENT OF NO CONFLICT OF INTEREST

We the authors of this paper hereby declare that there are no competing interests in this publication.

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