

SUSTAINABLE SOCIAL BUSINESS INCUBATOR IN WEST AFRICA

Kurt M. DeGoede^{1,3}, Duc T. Dam¹, Danni Qiao¹, Matthew R. Ascah¹ and Momodou Jain²

¹ Elizabethtown College, USA

² The University of The Gambia, The Gambia

³ degoedek@etown.edu

Abstract: Through a partnership between students and faculty in the US and in The Gambia, we seek to establish a vibrant sustainable social business incubator to address problems in West Africa. Elizabethtown College (Elizabethtown, PA) has partnered with The University of The Gambia (UTG). The goal is to establish an incubator framework, which will in turn launch small scale self-sustaining cottage-style social enterprises. These small enterprises (non-profit businesses) will provide fair wage employment at all skill levels. Projects originate through locally generated problem identification at UTG. We seek to instill an entrepreneurial problem solving spirit among participating students on both sides of the Atlantic. We have leveraged Elizabethtown undergraduate capstone projects as the vehicle for developing the technologies and business models for this effort. Since the start of the project in 2011, 20 Elizabethtown College students from 4 different majors, including 6 non-engineering students, have participated. A similar number of UTG physics students have worked alongside these students during site visits and on parallel community service projects. UTG student participation will increase dramatically with the first social enterprise roll out (a PV phone charger). The business plan for our social enterprise calls for Gambian management. All employees will be fairly paid Gambians. All costs must be recovered with each unit sold, while remaining affordable for the end user. Margins will be minimized and applied toward future projects. To achieve economic self-propagation we must meet real social needs with locally appropriate solutions. UTG enrollment in physics has increased sharply, with the major viewed as a pathway to practical careers. The UTG students have completed several community based service projects impacting their local communities since a service learning sustainable engineering course was introduced to that curriculum in 2011. The participating students have gone on to become Fulbright scholars, graduate students and practicing professionals with new perspectives on making a positive impact in their own and the global community.

1 GOALS AND OBJECTIVES

1.1 Overall Objective

A student based collaborative partnership between Elizabethtown College (EC) and the University of The Gambia (UTG) has been established to develop and support a series of sustainable cottage enterprises in The Gambia. The enterprises will be built on a social business model, designed to affordable solutions addressing the effects of poverty and other social justice issues.

1.2 Specific Objectives

1.2.1 Collaborate Across Social and Professional Barriers

The project has built a network of student collaborators spanning the diverse socio-economic and cultural barriers that separate EC and UTG. The structure also fosters interdisciplinary collaboration between engineering, physics, business and other students from both institutions. These collaborations extend to the alumni of the program. Many alumni remain connected to and supportive of the incubator and have a strong interest in serving on eventual enterprise advisory boards.

1.2.2 Solve Community Based Problems

We aim to support locally generated initiatives. The program is attached to the community and population group of UTG, rather than a particular project or technology. Our projects are identified by listening directly to communities and individuals in The Gambia. Further, each social enterprise launched will be completely Gambian owned, managed and staffed. In this way, the project also addresses the challenge of underemployment across a wide range of skills.

This initiative will continue to address new challenges faced by this population identified by or filtered through our local partners. We have developed our model around the social enterprise concept to avoid producing and distributing “SEDOW – ‘stuff we don’t want’” (Olopade, 2014). End users in the community will only purchase a product from one of our social enterprises if they want and can afford the device or system.

1.2.3 Enable Participants to Solve Other Problems

The ultimate success will only be fully realized if EC participation becomes optional. We seek to instill an entrepreneurial problem solving spirit among participating students on both sides of the Atlantic. Our greatest success will come when individuals utilize the skills and perspectives they gained in the program to solve novel problems outside the academic structure.

2 BACKGROUND

2.1 History of EC-UTG Collaboration

Kurt DeGoede spent the 2010-11 academic year serving as a visiting professor at UTG. Dr. DeGoede taught both the traditional physics-engineering course classical mechanics (engineering dynamics) and a course in the design of photovoltaic (PV) Systems. Seven UTG Physics students completed the PV course in the fall of 2010. Dr. DeGoede’s expertise is in biomechanics, but UTG’s administration, faculty and students wanted to focus on renewable energy systems. With no previous expertise in photovoltaic systems, Professor DeGoede’s approached the course with a spirit of adapting to the local need and teaching with an attitude of “let’s figure this out together.”

Dr. DeGoede did bring experience with developing an engineering program from a foundation in a physics curriculum and community based learning design projects. Throughout the 2010-11 academic year Dr. DeGoede and Dr. Momodou Jain worked to reshape the physics curriculum to include a greater emphasis on applied problem based learning (DeGoede and Jain 2012). The seven students from the PV course were joined by another 4 UTG students and one EC study abroad student in a spring project based learning engineering design course. The students applied principles of design and project management while serving as engineering consultants to two underperforming PV installations (DeGoede et al. 2012). Two groups worked on a non-operating PV lighting system at a health center in Gunjur. The PV lighting system had been donated by western tourists and failed a couple of years after installation. The teams of students inventoried and tested functionality of all components of the non-functional systems and ended the semester with a full technical report recommending a course of action to rehab the systems to meet center needs within available resources at the center. The third team did a similar analysis for a NGO community center in another village.

In January 2012, four EC engineering students began work on their capstone project to collaborate with the UTG students on a sustainable energy project. The collaborative team settled on a PV phone charger for rural Gambians. Since that time, over 20 EC students have collaborated with a similar number of UTG students on this and other projects. The UTG students have also continued to participate in community based learning projects in the physics curriculum in parallel with the collaborative projects.

2.2 The Gambia

The Gambia, bordered on three sides by Senegal in West Africa, is the smallest nation on the African mainland. The nearly 2 million citizens have a median age of 20 years and life expectancy is 64 years. Ninety percent of the population practices Islam (CIA 2015). The vast majority (90%) of the population has access to improved water sources. Only half the population is literate. Per capita GDP Purchasing Power Parity is estimated at \$2000, 195th of 228 nations. The service sector (68%) and agriculture (20%) dominate the economy. 75% depend on agriculture for their livelihood (Forbes 2015). Nearly half (48%) of the population live below the poverty line. The service sector of the economy is based in tourism, with 40% of the nation's economic output generated through tourism (CIA 2015). Specific rates of underemployment are not well known, but it is clear that many Gambians do not work in jobs with taxable income and underemployment is always reported as "high." Electricity production stood at 230 million kWh in 2010, essentially 100% from fossil fuels. In 2010, 3434 bbl/day of refined petroleum products were imported. Most (80%) of its 2300 miles of roadways are unpaved (CIA 2015).

3 METHODS

3.1 Local Participation

Inspired by a model focused on genuine local participation (deNegri, et al 1998), our program has employed a model of cooperation and co-learning to solve problems local to our West African partners. The cited model defines cooperation as "Local people work together with outsiders to determine priorities; responsibility remains with outsiders for directing the process." Co-learning is defined as "Local people and outsiders share their knowledge to create new understanding and work together, to form action [plans] with outsider facilitation. This group indicates that much development work fails to improve conditions due to much lower levels of local participation: "co-option," "compliance" and "consultation" (deNegri, et al 1998). We've certainly seen numerous examples of such misguided projects throughout The Gambia. The PV system at the health center in Gunjur is just one example among hundreds.

At the highest level participation is at the level of Collective action: "Local people set their own agenda and mobilize to carry it out in the absence of outside initiators and facilitators" (deNegri, et al 1998). Our model also reflects the principles of effective development transforming communities:

- Focus on place (village) and human relationships
- Build on existing local resources
- Work toward economic sustainability
- Invest with the poor rather than provide charitable gifts
- Develop indigenous leaders
- Don't get ahead of people in the community (Lupton 2011).

In a community development approach we must address questions of enabling residents to solve their own problems, creating solutions that generate economic resources for the community, transferring ownership to community members (Lupton 2011). This echoes the earlier claims that "if joint working is to survive, the professionals will need to increase their valuation of the indigenous proficiencies inherent in their community partners...[and] consciously incorporate in their design and implementation, capacity building, skills transfer and empowerment strategies" (El Ansari 2002).

3.2 Academic Structure

The two institutions involved will support the startup cottage enterprises with ongoing technology and business research and development. The program has expanded existing courses to include this international/multidisciplinary collaboration centered on developing appropriate technologies in the sustainable energy sector. The specific courses modified and introduced at UTG are described above. At EC, engineering students have participated in the project through our three semester capstone design experience. Since 2012, EC has allowed non-engineering majors to enroll in the senior year capstone sequence to collaborate side by side with the engineering students. This collaboration has significantly increased the potential for a social enterprise launch. Business Administration, International Business and Political Science students have enrolled in the engineering capstone courses as part of this project. These student teams have been responsible for developing the technology and the business plan for a proposed social enterprise.

3.3 Relationship Based

To make possible the type of local participation described above, we insist upon regular person to person interactions. Without a doubt, the most productive sessions in the collaboration have been those of face to face meetings between groups of students. Without these sessions, the work of the EC students drift away from the real issues of the particular design challenge. The UTG students look to the EC students to leverage their greater access to academic and physical resources and assume leadership on developing the technology and business structures. To date, the relationship building has occurred through the initial year-long visiting faculty position by Dr. DeGoede at UTG, semester long EC study abroad experiences, and student team site visits to The Gambia and UTG in January 2013 and 2014. Skype conferences between the student groups has been used between visits. This close interaction has been essential for breaking down the typical “experts from the west” mentality. Through close interaction and mutual trust, we are able to work interactively as true peers. That direct peer to peer partnership helps us avoid a mismatch between the cultural map of development projects and the maps for cultures in Africa which often leads to project failures (Olopade 2014).

3.4 Site Fixed – Local Germination of Projects

The successful community based learning program from our engineering curriculum at EC served as a model for taking the theory heavy, often rote memory based, UTG physics curriculum and injecting a practical problem solving element. The program at EC has been based in the first two years of the curriculum. All engineering students complete a design project with a local non-profit. Working with the EC Center for Community and Civic Engagement (CCCE) a collection of potential projects are identified. Students then select projects of interest and are assigned to teams of 3-5 students. These teams then work with the community based clients to solve the problem. The projects are all problems identified by not for profit agencies in the Elizabethtown community (McBride et al. 2005). In a parallel structure, at UTG we sought to create a new course in the curriculum to take the skills the UTG students were developing and apply them toward problems facing their own communities. Since before 2010, UTG had a strong interest in developing programs around sustainable development and sustainable energy systems. The design course described above coupled with the PV theory course provides a vehicle for meeting real needs in the local community while also developing practical problem solving skills among the students. As with the EC community based learning course, the UTG students apply their developing skills to solve a wide assortment of problems in their community.

The social business incubator project grew out of this community based learning course at UTG. Accordingly, the program is designed to meet a wide variety of local needs. Rather than a program to develop a particular technology and then seek out a market. This program is site fixed in The Gambia and is designed to provide a framework to meet the needs of individuals and groups living in The Gambia. Social enterprises will be piloted in communities of The Gambia. Successful programs will then be disseminated to entrepreneurs in other areas.

3.5 Long Term Partnership

Both institutions view the collaboration as permanent, developing sustainable solutions to a wide variety of problems as they emerge indefinitely. EC and UTG value the ongoing practical student training through solving problems and work toward issues of social justice. The strong interpersonal relationships supporting the collaboration ensure continuation.

3.6 Social Enterprise Example

The original PV phone charger device will soon be ready for a gradual rollout as a first social enterprise: Recharging The Gambia (RTG). This social business is designed to combat energy access limitations within the rural communities of The Gambia. This organization works to combat social issues through the development of social business. This organization functions as a responsible citizen, making a difference by helping to build and support sustainable communities in a socially and environmentally friendly manner. All employees are provided equal rights with reasonable wages and benefits, above standards of the given nation. Organizational management encourages inspiration, motivation, and enthusiasm of all employees.

The organization must be financially stable, considering all costs, investments, and revenue. All products must be affordable to the targeted communities within The Gambia. Operations must include ideals of profit maximization in order to reinvest revenue into the business while compensating for accrued costs.

Labor costs, production costs, and fixed costs such as rent will all be considered in determining the price of the product. However, some of the start-up costs would be considered sunk costs and should not be considered in the price of the product. Because we cannot we cannot recover the cost of research and development at this point, these costs should not affect our future decisions or pricing.

Employees will manufacture the product within the community setting with local materials. It will be necessary to provide educational tools and training so these individuals may develop an understanding of the product's design and functionality. UTG students will be in charge of training the local employees. This will ultimately strengthen the products sustainability by simultaneously creating manufacturing services as well as future repair services.

In the first stage of the production, UTG students will be the main employers for production. In the second stage, employment will come from the local community in this area. Employee recruitment within the Gambia will be formed through contacts with the Peace Corps, UTG Faculty and UTG students. UTG graduates will likely provide leadership for second stage social enterprises, creating domestic employment opportunities for skilled university graduates. A successful second stage social enterprise will provide modest inroads into the high levels of underemployment across all skill levels: labor for assembly, distribution, management and technology development.

Students will utilize the academic expertise from various disciplines in order to create the student management team. This interdisciplinary program should explore how aspects of all participating majors may be of benefit within the business and product development.

Some of the most significant competitors for this first social enterprise are the market vendors that provide charging services to Gambians at a low cost. However, these competitors can be viewed as potential consumers, as well. These vendors rely on grid power to charge their customers' cell phones. Therefore, they would benefit from being able to provide these services off-grid.

The main product would be a one-time purchase, but customers can also choose to purchase other phone jacks as needed. We also provide refurbishing plans for broken chargers. Our customers are very price-sensitive but are also willing to spend money on useful and durable products. Therefore, the demand is expected to be elastic but not to an extreme degree. As long as they perceive the product worth the price, they will be willing to purchase.

The Board of Directors will supervise the overall operations of the enterprise. The organization will leverage legal service provided by University of The Gambia's to ensure all endeavors are working in accordance within all applicable regulations and constraints. Additional governmental support may be found within established contacts at the Ministry of Education, Justice and Energy as well as within institutions such as the University of the Gambia and Peace Corps.

4 FINDINGS AND DISCUSSION

4.1 Local Collaboration Necessary

Our experience echoes that reported by others (Seay and Lumkes 2014). Strong local collaboration is essential for a successful service learning project in a developing nation. In our case that collaboration has developed through direct person to person partnerships over 5 years. Foremost, the collaboration with UTG provides the ideal structure for developing the local leadership needed to launch the social enterprises. The long-term personal connection has led to a complete trust between the team and the partners, built understanding the values and personal commitment of the team. Such trust would be hard to duplicate by other means. Navigating the local legal environment and regulations regarding non-profit start-ups would not have been possible without collaborating with UTG and working under their umbrella. A network of well-connected local leaders opens the doors for us to obtain the blessing of government ministries. The Ministry of Higher Education, Research, Science and Technology has endorsed novel approach of a non for profit business structure as a method for ensuring (1) solving the right problems, (2) providing skill development for Gambians, (3) creating employment opportunities and modest economic gains. By keeping these agencies aware of our projects and gaining their strong support ensures smooth entry at customs, including bringing in substantial equipment and supplies, ensures our projects complement the efforts of the ministry of energy working from a top down model in parallel with our ground up approach. A Gambian US Peace Corps placement coordinator has provided access to field test sites and potential social enterprise partners.

4.2 UTG Students Enabled to Solve Problems in their Communities

Physics enrollment has increased sharply at UTG since we have introduced the community based service learning projects into the Physics curriculum: class of 2016 cohort, 12 students – class of 2018 cohort, 23 students. In addition to collaboration with the EC social enterprise project the UTG students have completed the following community based learning projects.

- In the spring of 2011, students provided analysis and recommendations for rehabilitation of 2 PV installations (described above).
- Community leaders of a Gambian village received word of the 2011 PV projects and requested that a group of UTG students design and install a PV system in their mosque. The students successfully completed this project.
- They designed and constructed a kitchen facility for a private primary school, utilizing principles of heat transfer to provide natural ventilation reducing smoke levels in the kitchen.
- Students performed a load analysis and PV system design for a NGO dental clinic.
- UTG students partnered with students from Rowan University in developing a cooking fuel briquette from biomass waste (grass and peanut shells).
- The students are currently collaborating with a local PV system engineering company to use damaged PV cells to fabricate low cost modules for community garden water pumps.

4.3 Student/Graduate Professional Perspectives Shaped

As with other international service learning experiences the professional perspective of the EC student participants was shaped by participation in this project (Johnson 2009). The students identify increased interest in seeking employment or graduate school programs focused on improving quality of life for others, and scrutinizing the social ethics of potential employers. The process of acting across cultures changed how they approach problems and understand the world, helping them understand how to define the real problem in a difficult situation. The following quotes are from participating EC students.

- “This project really solidified my decision/want to work in international based companies that will better the life of someone else.”
- “The strength of this program lies in connecting cultures and experiences to work towards a common goal.” “It has changed how I approach problems and how I view the world as a whole.”
- “Working directly with a customer is an eye opening experience. It gives context to problems and helps to establish what is truly needed in a solution.”
- “Participating in the solar phone charger project reinforced the idea of working in a field where I may be able to have a larger impact on communities and people's lives.”
- “I am hoping to go to graduate school to continue research in methods to help improve quality of life for individuals all over the world. Also, I look into companies business practices, and a major quality I look for in a company is its business ethics. I see the much bigger role that engineering has on individual people, families, and entire communities.”

Unlike most similar projects we have also been able to observe the impact of this collaboration on the professional development of peer students in the developing nation. The UTG students speak of improved career opportunities, praising the practical training in the community based projects. Alumni of the program identified specific skill development that led to their employment: PV system design, determining the root cause of a problem and systematically formulating a solution to that problem. Through the program they came to understand the connection between engineering and business to develop an economically successful enterprise. The following quotes are from participating UTG students.

- “I have had the opportunity to choose a career that is related to renewable energy and Physics in general. I was able to make such a decision through my participation in the projects which subsequently enhanced my capacity in career decision making.”
- “I was able to decide without ambiguity or doubt that I want a career in Renewable Energy technology after completing the courses experimental physics I & II (which involved mainly the design and or sizing for solar PV systems)”
- “I better understood engineering as an area which deals with solving real life problems and a tool that can be used to turn businesses into success.”
- “It has enabled me view engineering and Physics as a fruitful and problem solving oriented career than just an academic discipline. It helped greatly in rendering service to the community, particularly those of pressing concern to the people.”
- “I for example used the skills and knowledge acquired from this program to get a job at a private solar firm as my first job after graduation.”

These students also paralleled the EC students in experiencing an awakening of a humanitarian spirit: “[...] having been a part of the community based projects that emerged from the Photovoltaic course at UTG (the pioneering badge) had helped me harness my zeal to serve others. I had always perceived Physics to be self-involved field [...] Those few months of my Photovoltaic project was an eye opener for me as it was what helped me aware that I had always had a dormant quality in me that was never awakened, a quality of being a humanitarian and using my love for science for the greater good. It was a moment that I wouldn't change for anything.”

4.4 Conclusions

Our program started as an initiative to collaborate across the physics and engineering curriculum to foster applied learning for the UTG students and a potential study abroad site for EC students. Following the lead of UTG and the needs of the communities in The Gambia, that initiative evolved into an effort to establish a long-term social enterprise incubator in West Africa. The project is quickly moving beyond the technical work of the engineering and physics students to encompass the work of business students and other disciplines such as political science.

This incubator has been developed identify locally generated problems, solve those problems through the work of cross cultural student teams across a variety of technologies. The social business framework will ensure economically sustainable solutions, moving us out of charity modes for development. While other programs maintain on-going relationships with a specific site (Oakes 2009, Duffy 2008), we know of few

examples of programs designed to facilitate peer to peer learning among students across the developed-developing world divide.

Moving forward, we are actively pursuing the creation of an umbrella benefit corporation based at EC to facilitate the process of moving problems identified by Gambian communities to local social enterprise cottage industries. The structure will be built on a system of student to student training and development to develop the technology and business structures. The PV phone charger project will be the first enterprise launch for this umbrella agency. This expansion will also bring in further collaborators from both institutions strengthening the long term viability of the collaboration.

Acknowledgements

BCA, the UTG Office of Relations, and the Elizabethtown College Faculty grants program have sponsored this work. Additionally, several individuals have help offset site visit expenses through the Sponsor Etown program.

References

- El Ansari, W., Phillips, C.J., and Zwi, A.B. 2002. Narrowing the gap between academic professional wisdom and community lay knowledge: perceptions from partnerships. *Public Health*, **116**(3), 151-159.
- "CIA World Factbook," accessed 9 January 2015, <https://www.cia.gov/library/publications/the-world-factbook/geos/ga.html>.
- DeGoede, K. and Jain, M. 2012. Developing an engineering curriculum at a developing University in a developing country. *Annual Meeting of the ASEE*, San Antonio, TX, USA.
- DeGoede, K. Jain, M. and Kadlowec, J. 2012 Developing Model for Cross-Cultural Service Learning in Developing Countries. *Annual Meeting of the ASEE*, San Antonio, TX, USA.
- de Negri, B., Thomas, E., Ilinigumugabo, A., Muvandi, I., and Lewis, G. 1998. Empowering Communities: Participatory Techniques for Community-Based Programme Development. Volume 1(2): Trainer's Manual (Participant's Handbook). The Centre for African Family Studies (CAFS), in collaboration with the Johns Hopkins University Center for Communication Programs and the Academy for Educational Development. Nairobi, Kenya.
- Duffy, J. 2008. Village Empowerment: Service-Learning with Continuity. *International Journal for Service Learning in Engineering*. **3**(2), 1-17.
- "Forbes Places," accessed 9 January 2015, <http://www.forbes.com/places/gambia/>.
- Johnson, P.E. 2009 Direct and Indirect Benefits of an International Service-Learning Design Project. *International Journal for Service Learning in Engineering*. **4**(1), 15-30.
- Lupton, R.D. 2011. *Toxic Charity*, HarperOne, New York, NY, USA.
- McBride, T., Fullerton, J., Bergel, V. 2005. Community Based Projects by First Year Engineering Students. *Annual Meeting of the ASEE*, Portland, OR, USA.
- Oakes, W. 2009. Creating Effective and Efficient Learning Experiences While Addressing The Needs Of The Poor. *Annual Meeting of the ASEE*, Austin, TX, USA.
- Olopade, D, 2014. *The Bright Continent*. Houghton Mifflin Harcourt, New York, NY, USA.
- Seay, J., Lumkes, J. 2014. Multi-University Partnership for Global Service Learning in Sub-Saharan Africa. *International Journal for Service Learning in Engineering*, **9**(3), 367-380.