Project Management Techniques for Student Base of the Pyramid Enterprise Projects:
Running Water International – Clean Water for the Poor in Kenya

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Abstract
A specific example from Colorado State University’s Global Social Sustainable Enterprises Program demonstrates the creation and execution of student projects targeting Base of the Pyramid customers with triple bottom line business enterprises. This paper provides an overview of project process and discusses one particular project in depth. The Running Water International team created a successful enterprise selling Biosand water filtration systems in Kenya. The RWI team found 4 key factors to their success: 1) Multiple dimensions of diversity among team members; 2) Strong motivation of team members to create measurable impact; 3) Team value of choosing people over project; 4) Active project partner in-country.

Introduction
The Global, Social, and Sustainable Enterprises (GSSE) Masters degree program in the College of Business at Colorado State University provides an international, cohort-based, experiential learning opportunity for students interested in creating businesses emphasizing triple bottom line results. The student admission process ensures a diverse, experienced cohort consisting of working professionals, with at least 50% of the students coming from outside the USA. Students are actively recruited from around the world and the small cohort size of twenty-five students ensures a competitive admission process. Students are generally older, with an average age of thirty, and have extensive experience.

The GSSE program comprises three academic semesters – Fall, Spring, and Fall – with an intervening summer experiential session focused on researching or launching a business enterprise. The core of the program is a three-course sequence in Entrepreneurship. Students self-select into teams of three to five around a triple bottom line project in the first semester and complete an opportunity assessment. Projects should match a student’s passion and have measurable impact. Projects may be based on a student’s idea, a University project, or a Partner project. In the second semester, students draft a business plan.

1 “Triple bottom line” refers to the perspective that a business enterprise can return a profit while still providing social value and improving environmental impact – usually referred to as “profit, people, planet.” It is not an issue of trading one measure off for the other. Instead, it is possible to create returns in all three categories (Elkington 2004).
and identify the key issues that must be resolved. During the summer practicum, students may research and validate the business model. In some cases, students use the practicum to launch their enterprise. In the final academic semester, students complete the business plan and secure launch funding. The core Entrepreneurship courses are supported by traditional business courses in Marketing, Accounting, Finance, Information Technology, etc.

Traditional business and engineering curricula approach product and enterprise design with the objective of generating or enhancing profits. An article by Simanis and Hart (2008) describes a fundamental approach to developing business models for addressing the needs of customers at the “base of the pyramid. (BOP)” The paper emphasizes the need to shift from “selling to the poor” to “business co-venturing.” The authors emphasize the need to view the BOP customer as a business partner who should be involved in the co-creation of any new business models. The experience with GSSE projects supports many of the points made in the Simanis and Hart paper. Other educational programs exist to address this perspective. For example, the Social Innovation and Entrepreneurship Program at Stanford,3 the Social Enterprise Initiative at Harvard Business School,4 and the Social Enterprise Program at Columbia Business School.5 The GSSE program is unique in that it is a dedicated MS degree in Business Administration that requires an extensive field project focused on enterprise creation. Projects involving the first two GSSE cohorts have included:

- Exploring the use of low horsepower diesel engines for irrigation in Bangladesh and Ethiopia.
- Establishing a robust business model for the distribution and sale of clean-burning wood stoves and solar powered appliances in South America.
- Developing local manufacturers of home Biosand water filtration systems in Kenya.
- Creation of environmentally compatible housing designs in Mexico.

This paper reports on a specific project example from GSSE that illustrates many of the observations from other GSSE student-created social enterprises.

Solutions for the BOP

C. K. Prahalad is a leading author promoting the concept that substantial profits are available for any enterprise that successfully addresses the needs of the so-called “Bottom of the Pyramid” (2006). Some four billion people live on an income of less than $3 per day and represent an enormous market opportunity. Prahalad’s argument is that there are tremendous rewards available to those businesses that choose to address the needs of this “latent market.”

Prahalad offers “Twelve Principles of Innovation for BOP Markets” (2006, 23-46). These principles include an emphasis on:

- Low initial cost solutions that provide substantial value and may combine value traditionally captured by multiple products.

2 The “Base of the Pyramid” (BoP) refers to the approximately 4 billion people in the world whose purchasing power parity (PPP) is less than $1500 US. These customers are typically not served or underserved by products and services from the developed countries (Simanis and Hart 2008, 1).
3 http://sie.stanford.edu/overview.html
4 http://www.hbs.edu/socialenterprise/
5 http://www4.gsb.columbia.edu/socialenterprise
• Deep understanding of customer needs and functionality across various countries, cultures, and languages.

• The key role of distribution to reach customers in remote areas.

Those businesses which creatively and effectively address key customer requirements in these markets may reap substantial economic benefit from addressing these needs.

Businesses are often reluctant to pursue such markets. Beyond the normal concern regarding market opportunity and credit risks, companies face additional challenges when addressing these markets:

• Language and cultural differences prevent them from clearly understanding the customer needs.

• Geographic remoteness and widespread distribution of the customers makes supplying products and services difficult.

• Typical corporate thinking regarding product needs imposes an incorrect and unnecessary burden of previous expectation on product design.

Businesses must address all of these challenges to serve BOP markets.

**Issues in Sustainable Design and Appropriate Technology**

Paul Polak does an excellent job of describing his own experiences as an entrepreneur addressing the needs of the BOP market (2008). Polak describes a few essential attributes of a successful triple bottom line product and solution in his “Principles of Design for the Other 90 Percent” (2008, 75-77):

• Think of impoverished people as customers who have needs to be met, rather than as helpless people who need to be told what they need.

• Use a co-creation process to design solutions that genuinely meet the requirements of the target market.

• Don’t bother to launch your product or program if:
  * you haven’t spoken with at least twenty-five potential customers,
  * your product won’t pay for itself in the first year through savings or additional income potential for your customer, and
  * you do not think you can sell at least a million units at an unsubsidized price.

Based on these insights and substantial help from partners, the Running Water International GSSE student team embarked on a project designed to meet clearly articulated customer needs.

**Running Water International (RWI)**

As an enterprise team formed within the GSSE program, Running Water International manufactures, sells, and maintains household water treatment technologies for rural developing world communities without access to an improved water source.6 RWI began production of the Biosand Filter in Kenya during their GSSE practicum in the summer of 2009. The main element of the program is that the students are to complete their practicum or social enterprise project in self-selected teams. The program incorporates team-building opportunities for the entire cohort, including classes about management style and temperament as well as opportunities for the students to get to know each other. From the interactions

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6 An improved drinking water source is one in which community members are less than 1 km from the source. A safe drinking water source is one that meets WHO microbial, chemical, and physical guidelines and standards. By these definitions, an improved drinking water source may not be safe in all cases, indicating that more people than estimated may be drinking unsafe water (UNICEF/WHO 2008).
provided through the program, the students must select their teammates in relationship to project proposals for the GSSE program.

RWI was one of seven teams formed in the fall of 2008 for the second cohort of the GSSE program. The social enterprise projects spanned from developing fair trade organic tea products from Ethiopia to implementing aquaponic systems in urban/peri-urban regions in Peru. Although GSSE can boast multiple success stories in respect to its students making positive impacts globally, four things set RWI apart from their cohort, and we believe, are instrumental in the success of this team:

- Multiple dimensions of diversity among team members.
- Strong motivation of team members to create measurable impact.
- Team value of choosing people over project.
- An active project partner in-country.

The members of RWI are all hard workers as well as high-achieving students. The personalities represented on this team span a spectrum of temperaments. The team dynamic has provided space for each individual to explore her own personality. Each of the four women represents one of four major personality types according to the Merrill-Reid method of categorizing personalities. The major types include (Merrill and Reid 1991):

- Driver: Objective-focused, brash, not afraid of conflict.
- Expressive: Storytellers, competitive, motivators.
- Amiable: Quiet, kind-hearted, supportive.
- Analytical: Detail-oriented, perceptive, highly critical.

With the diversity of personality types, the students learned how to manage themselves as well as how to overcome obstacles they might face. In addition, the team is also diverse in cultural and professional backgrounds. The team consists of four women 28-31 years of age representing the US, Iraq, and India. Each member has much to offer from her varied background:

- Student 1, from Iraq, speaks four languages, and has over five years experience working in microfinance offering technical assistance and training in northern-Iraq. She fit the Driver personality type and took responsibility for the accounting and financial worksheets.
- Student 2 is from India, is fluent in three languages, and worked in Delhi as a human resources consultant for multinational consulting firm Amrop Hever Group. She is “Amiable,” and was the Human Resources manager on the team.
- Student 3, from the US, is a water resource and design engineer and has worked for international civil and environmental engineering firm Montgomery Watson Harza (MWH). She took the lead on product development and has an Analytical personality type.
- Student 4 is also from the US, and has worked in East Asia and the US in various roles in educational capacities ranging from instructor to administration and support. She was able to take the responsibilities of marketing and communications and was the “Expressive” personality on the team.

The RWI team members were each motivated by the social aspect of the project. Running Water International’s project was to establish a business model for household water treatment technologies by leveraging the research conducted by their project partner in Kenya, a USAID funded research collaborative. According to the World Health Organization, approximately 884 million people lack access to
an improved water source (UNICEF/WHO 2008). These conditions cause waterborne diseases that kill one child every 15 seconds, resulting in nearly 2 million deaths each year (Water Health International 2008). With that in mind, each member of the team felt that they had the capacity to make a significant positive impact to bring access to clean water, thus lowering instances of waterborne disease and potentially improving the quality of life in rural developing-world communities.

Moreover, one year ago, these four women did not know each other, nor did they know what they would be able to accomplish as a team. Within the GSSE program, the members of RWI were able to follow author Jim Collins’ advice, by maintaining selection criteria for classmates for this project. Collins describes the importance of management choosing the right people: “We found instead that they first got the right people on the bus, the wrong people off the bus, and the right people in the right seats – and then they figured out where to drive it” (2001, 13). The project team placed a higher emphasis on the selection of team members than on the selection of their project.

RWI was fortunate enough to have an active project partner for their in-country practicum in Kenya. There are two ways a project could be identified for student groups within the GSSE program, but in either case, the student teams choose the projects and project partners. First, an outside organization can approach the program and submit a proposal for the student review. Alternatively, students can utilize their own social or professional networks to bring a project into the program. RWI’s project came from the latter strategy via one team member’s professional contact in water resources and civil engineering.

RWI’s project partner, SUMAWA (Sustainable Management of Watersheds) was a USAID-funded academic research collaborative based at Egerton University in Njoro, Kenya in partnership with the University of California-Davis and the University of Wyoming. SUMAWA received a 5-year grant from USAID, commencing in 2003 and terminating in the summer of 2009. SUMAWA’s main objectives were to conduct research and development to protect the biodiversity and human health in the Njoro Watershed region surrounding Egerton University in the Central Rift Valley Province of Kenya.

SUMAWA’s research within the Njoro Watershed proved that 55% of rural households take water for drinking and domestic use from highly polluted watering points along the Njoro River (2006). Consequently, SUMAWA’s investigations revealed frequent outbreaks of typhoid, childhood diarrhea, and other waterborne illness within the region. SUMAWA selected the Biosand filter as the appropriate low-cost point-of-use (POU) water treatment solution to improve drinking and domestic water quality for households using polluted surface water sources such as the Njoro River.

As the project funding for SUMAWA was coming to a close (expiring June 30, 2009), one of the Principal Investigators of the project was looking for someone to take the research and analysis in respect to the Biosand filter into an enterprise to make a sustainable impact in the Njoro Watershed. Through her previous employer, one RWI team member was able to get in touch with the project contact and discuss the opportunities to collaborate with a GSSE team to assess the feasibility of building an enterprise model for Biosand filter production in the Njoro region.

Having a strong project partner has been a boon for the RWI team. The project partnership with SUMAWA has provided financial support, prevention of scope creep, and credibility in the region on the ground in Kenya. The support of a strong project partner has been a key factor in the success of the team.

As a part of the GSSE program, each team must capture their learning from the classroom by taking steps to create a business enterprise in the field. In RWI’s case, the field was in rural Kenya where SUMAWA had conducted their research. As the team prepared to head to Kenya, the students expected to conduct
extensive analysis, including market research, studying the existing supply chain, and developing an outreach, education, and social marketing plan. While in country, the prescribed course of action changed to include the registration of a business entity, receiving an order of 200 filters from an NGO (HIV Nutrition Project), and finding a partnership for manufacturing the filters. The RWI team did not anticipate these outcomes, but was able to establish a social venture in Kenya as a result of their work.

With clear objectives at the start of the project, RWI was able to maneuver through their project as they hit the ground in Njoro, Kenya. The need for point-of-use water treatment interventions became evident as the students learned about the issues of the Njoro Watershed. One main issue was that the watershed is geographically located in a hotspot of political and environmental controversy in western Kenya. The Njoro Watershed is located within the Mau Forest Complex, which is considered “the single most important source of water for direct human consumption in the Rift Valley and Western Kenya” (UNEP 2009). According to the United Nations Environment Program (UNEP), the Mau Forest has lost approximately 107,000 hectares, equaling about 25% of its forest cover (2009). This destruction will certainly lead to a national water crisis that could extend beyond the borders of Kenya. Because of this deterioration, the rivers in the Mau Forest catchment are increasingly seasonal, causing unpredictable wet seasons, distressing water supply, and meanwhile affecting the pollution levels in the local rivers and tributaries. In light of this environment, the people in the Njoro Watershed were progressively more aware of their water quality and supply. Environmental issues, especially the availability of clean drinking water, were on the forefront of conversations in the area, making it a ripe time for RWI to launch a business enterprise.

Within three weeks of working in the Njoro Watershed, RWI had visited over thirty households currently using the Biosand filter from the original SUMAWA studies. In addition, the team was able to visit multiple stakeholders throughout the region, including schools, churches, community-based organizations, and local community leaders. These meetings confirmed that there was a substantial unmet demand for the Biosand filter after SUMAWA had created significant awareness and demand for Biosand filters as a byproduct of their research. As a result of their activities, the team recognized that there was clearly an opportunity to create a viable social business selling Biosand filters in the Njoro Watershed region.

The team developed the business model to include the production, distribution, and support of Biosand water filters. As a result, the team was forced to narrow the scope of their project by eliminating some of the original objectives. They identified four critical success factors necessary in order to create a sustainable enterprise for the Biosand filter in the region:

1) Using the grant funding appropriately provided through SUMAWA before the project ended on June 30, 2009. This included paying fees for registration and legitimizing the business.

2) Finding a central location for a Biosand filter manufacturing facility.

3) Understanding and building supply-chain and procurement protocols for all raw materials for the Biosand filters.

4) Identifying local talent to help with all the above.

By prioritizing these issues, the team focused their project plan and worked hard to accomplish these goals within the last six weeks of their time in Kenya.

The first task, to use the SUMAWA funding appropriately prior to June 30, was the main time constraint that influenced the urgency to legitimize and register the business. During the fourth week in country, the RWI team learned that they had the opportunity to fill an order of 200 filters for another project in Eldoret
(west of Njoro) conducting research on nutrition and its impact on the health of individuals infected with HIV. This HIV project was funded by the same source as SUMAWA; for that very reason, the HIV project would need an invoice from RWI by June 30th. The HIV project needed to have evidence that they had allocated and “used” the funds by that date – because that particular grant-funding source for both projects was ending.

To fill this order, RWI had to register a business, find a manufacturing facility, and create an invoice agreement, signed and delivered by June 30 to the group in Eldoret. This task was monumental and the team was not confident they could get all these things accomplished in ten days. With the guidance of their project partner, RWI decided to look for existing institutions that could provide space for manufacturing in exchange for additional income generation, instead of buying or leasing land.

After three or four days of searching for potential partners, RWI stumbled upon a valuable tip from the project partner as she was preparing to leave Kenya. The team went to visit the Nakuru Youth Polytechnic Institute (NYP) in Nakuru town, which is the main commercial hub in the Central Rift Valley. During initial introductions, the RWI team met a man on staff called “The Engineer,” tasked with finding income-generating activities to revitalize the polytechnic. The institute trains local teens in various vocations such as carpentry, masonry, welding, hairdressing, and automotive mechanics. “The Engineer” was eager to create a partnership. Noticing his enthusiasm, the RWI team became optimistic that they might have found the partnership that they were looking for.

After learning more and meeting the staff at the NYP a few more times, RWI wrote and signed a Memorandum of Understanding (MOU) agreement with the Nakuru Youth Polytechnic Institute within a week of their first meeting. RWI would be able to use NYP’s facilities, including water and student labor, to manufacture the Biosand filters, and in exchange RWI would contribute 30% of their profits to the NYP. The 30% of profits going back to the NYP would then be used to create a small account for the students involved in the project, as well as to cover the overhead costs at the institute. Four to six students have been identified at the NYP to manufacture the Biosand filters as a part of the required practicum for their coursework.

With the partnership established at the Nakuru Youth Polytechnic, the RWI team went on to develop relationships with various supply chain members, such as hardware and sand/gravel wholesalers. In order to start production of the Biosand filters, RWI would need all the right raw materials in the correct quantities. RWI utilized many of the same suppliers that SUMAWA had used during initial study, and the team conducted further analysis for strategic purchases such as hardware and concrete.

Finally, the team was able to register the business as RWI – Maji Salama. “Maji Salama” means “safe water” in Swahili. RWI – Maji Salama was registered in Kenya as a partnership between two of the students and a new member of the team: a Kenyan. This new member had been with RWI since their arrival in Njoro early in the summer, but his role grew increasingly more important as the team completed all the above activities. The presence of their new teammate was invaluable as the team of four women traversed through multiple cross-cultural situations when conducting business in Kenya. In addition to their new teammate, RWI was also able to hire another local resident who had previously worked with the SUMAWA project to manufacture the Biosand filters for their original study.

With such a diverse team, RWI was able to accomplish a lot in 8-9 weeks. However, the team was not free from conflict. One major source of contention on the team was the registration of the business. Two team members were pushing to register the business, but meanwhile the other two were reluctant to sign their names on the registration. As a result, two team members were hurt when their “commitment” was
questioned when they decided not to sign the registration paperwork. The conflict centered on varying expectations for commitment to the project. This was a watershed moment; the students were tense about the idea that their “school project” was developing into a bona fide business. The team was not prepared to tackle the important question of “Who will be staying on this venture beyond our school project?”

In order to overcome such a divisive argument, RWI had to take time out of their tight schedule while working on the ground in Nakuru. This meant taking almost half a day to communicate and work through the conflict. As mentioned previously, RWI was formed with the priority of its members, the team had to sit down and one by one to confront the issue as it affected them personally. In addition, each team member had to be honest in communicating her level of involvement for the future of the project versus the business venture. RWI was also able to come to a conclusion that the members who refrained from signing the registration would still contribute equally to the project, but would probably be unlikely to return to Kenya in the future. This was more difficult for some team members than others, but proved to be a valuable exercise for the well-being of the team.

The RWI team was able to accomplish more than they anticipated through the course of their summer practicum, and two team members intend to return to Kenya in January 2010 to support ground operations and assess the future of RWI – Maji Salama in Nakuru.

RWI’s accomplishments from their summer 2009 fieldwork include:

- Managed approximately $20,000 dollars in outside grant funding from two different sources for travel, team, and project expenses.
- Gained an understanding of the sustainability, impact, and additional ways for improving the Biosand filter by visiting approximately thirty households who had purchased filters from the initial SUMAWA study in 2006.
- Sold and installed three Biosand filters in a new community outside the initial SUMAWA study.
- Mobilized relationships with various stakeholders including members of local water users associations, volunteers with NGOs such as the Red Cross, and student groups to promote the benefits of the Biosand filters.
- Developed rapport with local microfinance institutions such as the Kenya Women’s Finance Trust and Jinue Investment. The latter institution has expressed interest in a group lending model for Biosand filter customers.
- Developed daily operations workflow, protocols, financial worksheets, and procedures for production and sale of Biosand filters.
- Identified and hired two local employees for daily operations and manufacturing of filters.
- Established partnership with the Nakuru Youth Polytechnic Institute for a manufacturing facility and labor.
- Took ownership of SUMAWA assets for Biosand filter production such as Biosand Filter steel molds, etc.
- Sent invoice for the first order of 200 filters for the USAID funded HIV Nutrition Project in Eldoret, to be completed by November 2009.
- Registered RWI – Maji Salama as a legal business in Kenya.
- Set up financial infrastructure for RWI – Maji Salama including banking, salary payment, and financial reporting.
Although RWI has already accomplished a lot, this is just the beginning and more needs to be done. Currently, RWI is remotely managing their staff of two men in Kenya. The team at the NYP is making great progress on the order for 200 Biosand filters. RWI has been able to develop an extensive network in the US and Kenya with people working in the water and sanitation sector and has the opportunity to partner with some of these existing organizations to leverage their work and make a meaningful impact. RWI is also looking for new regions and alternative technologies for product extension. In addition, the team needs to start moving in the direction of developing a board of directors and building a management structure. Finally, RWI is currently looking for financial support to ensure the sustainability of RWI – Maji Salama in Kenya.

Upon their successful arrival back to Colorado at the start of the fall semester, the team members of RWI felt that somehow they had gotten lucky with the right formula of diversity, passion, value of relationships, and active project partners. Here are some thoughts from the team members themselves reflecting upon their success:

“I think one of the things that allowed our group to succeed is that we are all professionals and have worked in the real world before so we know what it takes to get the job done...we may not have always agreed with each other or enjoyed working together during certain moments but we saw the task in front of us and pushed through any difficulty to finish what we set out to do.”
—RWI Team Member

“Despite some disagreement among team members, we never lost respect and care. We also showed commitment to the team and the project and respected each other’s time and were punctual for meetings.”
—RWI Team Member

“Changes happened on a daily, even hourly basis due to the fact that we were operating in a developing country. Bureaucracy, corruption, culture, team dynamics, all played a role in our daily decision-making and decision-changing. Every day was quite different and our team was only accountable to ourselves to complete and accomplish our goals— it was equally as rewarding as it was challenging.”
—RWI Team Member

Conclusion
The experience of the Running Water International (RWI) team reinforced the key success factors identified earlier.

Multiple dimensions of diversity among team members
RWI took great advantage of the personality style and cultural diversity of the team members. Repeatedly during the project, the team was called upon to react quickly to unanticipated circumstance – such as the need to immediately ramp up production to meet the customer need for 200 Biosand filters in Eldoret. The breadth of skills and temperaments proved to be essential to the team’s success under rapidly emerging opportunities.
Note that this diversity proved to be a double-edged sword. As the project progressed and the pressure mounted, the cultural differences, particularly as related to communication styles, led to substantial issues in team dynamics that needed to be resolved.

**Strong motivation of team members to create measurable impact**

Each RWI team member was driven by a personal desire to create a measurable impact in the world. This strong motivation allowed the students to persevere when the project obstacles appeared to be especially daunting.

**Team value of choosing people over project**

The RWI team took to heart the adage of “who first, then what” in selecting their team members. They felt it was crucial to recruit a high-performing, diverse, and motivated team first, and to select the target enterprise project later. This appears to have been a very successful strategy for the team.

**Active project partner in-country**

As documented previously, (Turley 2009) student projects are far more likely to be successful if a strong in-country partner is available to provide support for logistics, contacts, credibility, and cultural adaptation. RWI certainly benefited from strong partner support, including SUMAWA and the Nakuru Youth Polytechnic Institute.

As more projects are initiated and completed in the GSSE program, more specific best practices will emerge.

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**References**


