

Gabriel Jones  
The Academy of Science and Entrepreneurship  
Bloomington, IN  
Kenya, Factor 15

## **Kenya: Agriculture Success School**

In Kenya, there are approximately nine million people who are malnourished out of a population of over forty million (“CIA World Fact Book Kenya” and “Prevalence of Malnutrition in Kenya”). Most people cannot afford basic human needs such as food and health care because of the low per capita income of approximately 808 U.S. dollars (*World Bank*). The low income and high malnourishment rates are brought on primarily by agricultural inefficiencies. There are several reasons for these inefficiencies, but the main problems include the arid climate and lack of arable land, weed and mole infestation in crops, food spoilage, insufficient transportation, and inadequate agricultural education. Kenya is far behind on meeting the Millennium Development Goals (MDGs), and these barriers must be removed to ensure positive progress can be made for the general welfare of Kenyan citizens (“Kenya National Agriculture Research Project”). The key to removing these barriers and improving Kenya's current economic turmoil is best illustrated by the words of Bill Gates, "Agricultural science has enormous potential to increase the yields of small farmers and lift them out of hunger and poverty" (*Brainyquote*).

The average rural Kenyan family, consisting of four people, owns a farm of approximately two and a half hectares or six acres (Adams, Mburugu, and Keaton). “Natural resources form the foundation of much of the Kenyan economy today. Agriculture in particular is a cornerstone of the country's economy employing over 80% of the population. In fact, more than 50% of export earnings are attributed to agricultural products with cash crops of coffee, tea, tobacco, cotton, sisal, pyrethrum, and cashew nuts leading the way” (“Agriculture”). Typical food crops grown include various fruits and vegetables, rice, beans, peanuts, spices, corn, sorghum, sweet potatoes, and wheat (Mazuri). Because the vast majority of the economy is agriculture dependant, it is essential that farmers be well equipped to deal with the arid climate they face.

Current trends are improving in terms of agricultural practices. One practice in particular, crop rotation, has significantly increased over the past few years. However, there is still an inherent problem with both the lack of agricultural education and the lack of appropriate technology uses (“Kenya-Agriculture”). "Information from the Kenya Agricultural Research Institute indicates that many viable technologies that have been developed are currently not being applied by the farmers. This has led to farmers achieving as low as 6% of what is potentially possible. For instance, in Kakamega district, while the potential yield of maize was 50-60 bags per hectare by research station standards, the average yield on farms was a meager 3 bags per hectare" (Ariga, Kyalo, Okeyo, Oluoch-Kosura, and Waithaka). This particular study, and many more like it, show clear evidence that a major cause of the agriculture industries inefficiencies is the lack of education on many available technologies and innovations. To change this, agricultural education must be the target of large scale investments.

One of the reasons for the low crop yields is the arid climate in Kenya. Only 16% of Kenyan soil is considered arable (“Kenya-Agriculture”). Vast water shortages result in low crop yields. This also in part compounds the problem of armed conflict, for people will often fight to gain control of the land that receives the most rain water (Derman, Rie, and Espen). Cultivating the dry land is an inevitable challenge that properly applied solutions can make possible.

Agricultural inefficiencies are further exacerbated by massive weed outbreaks, especially from the striga weed, as well as mole infestation. Most farmers do not have improved plant varieties, due in part to

genetically modified organisms (GMOs) being illegal. However, the government often ignores when foreign aid programs provide GMOs, so the main problem is not the illegality, but rather the difficulties in producing enough resources to be spread around to all those in need (“Kenya-Agriculture” and World Food Prize). To compound the problem, many refuse these enhancements because of a severe distrust of them. In the past, completely untested GMOs were pumped into the hands of many farmers leading to harsh soil degradation. A large part of battling weeds and moles simply lies within gaining trust through showing reliable efforts of support. The building of this trust is of urgent matter, because weeds and moles are responsible for the loss of over 60% of produce (“Kenya-Agriculture”).

Food spoilage provides immense problems in food insecurity for many nations, including Kenya. In fact, nearly one third of all food grown worldwide is lost to spoilage or waste. Literally one third of the world's food supply never gets eaten (Cederberg, Gustavsson, Meybeck, Stonesson, and van Otterdijk). To compound the problem of spoilage, few adequate roads exist in rural areas (“CIA World Fact Book Kenya”). Additionally, the farmers who populate the area can rarely afford motor vehicles (Adams and Mburugu). Because of this, the crops take an extended period of time to reach the markets where they are needed, and often spoil along the way. Spoilage accounts for largely unacceptable food losses (“CIA World Fact Book Kenya”).

The severe droughts, weed and mole infestations, food spoilage, and inadequate transportation combine to create another issue: rising food prices. Food and alcohol prices have risen over 20% just from 2010 to 2011. Even the staple of the Kenyan diet, maize flour, is increasing in overall price, resulting in widespread food insecurity (*IRIN News*). It is essential that agricultural productivity be increased in order to create a stable market and reduce food insecurity.

There are no doubt several barriers to agricultural productivity in Kenya; however, on a positive note; education is relatively high. Approximately 83.5% of Kenyans attend primary school (“Kenya Statistics”). Over 85% of all Kenyans 15 years and older can read and write in Kiswahili, English, and one of the many indigenous languages (“Kenya Demographics Profile 2012”). The multiple languages help to break the language barrier and make communication with foreigners much less difficult. There are also currently thousands of schools within Kenya, ranking it high among other sub-Saharan African nations (“Kenya Demographics Profile 2012”). This takes away the burden of having to construct hundreds of schools that many nongovernmental organizations (NGOs) face with other majority nations. Additionally, unlike many other nations, women are not particularly being disadvantaged in their schooling. Although the literacy rate among women is approximately 10% less than in men, cultural practices and recent Christian missionary movements provide women with equal opportunities in rural communities. The trends are certainly improving for women as well as for overall education (“Kenya Demographics Profile 2012,” Kiriti and Tisdell).

The solution being proposed, titled *Agriculture Success School*, will dramatically improve economic trends through enhancing agricultural education. The logic behind this new proposal is best defined by the words of Moses Maimonides "Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime" (*Brainyquote*). The truth is that much of the foreign aid and mismanaged private projects that have been directed toward Kenya have done little to actually solve the problem of food insecurity (Fengler). The proof is in the numbers, as nine million people are still malnourished (“Prevalence of Malnutrition in Kenya”). What Kenya needs, and what the focus of foreign aid funds should be is to help farmers increase their productivity. The goal of this project is to expand upon others that have already proven their worth and bring what they have to offer to the entire nation of Kenya. *Agriculture Success School* is modeled off other highly successful education related foreign aid programs, such as the *Alliance for a Green Revolution in Africa*. (“Smart Aid Success Stories”). *Agriculture Success School* will take lessons learned from other foreign aid programs to ensure its own success. Specific details of the project are elucidated as follows.

The content taught in this program will be based on The Future Farmers of America Organization (FFA) standards. The FFA has recently introduced a new curriculum to help high school students become successful farmers. The curriculum is based on hands on experience with limited intervention from instructors and is supplemented with in class lectures to help students gain sufficient content knowledge. For instance, students spend time learning various plant types including GMOs designed to improve plant productivity and weed resistance. They are then given ample opportunity to plant and harvest their crops, all while inspecting for diseases such as crop rust. In addition, students are able to learn how to be successful in marketing their crops in the complex global economy. By getting practice in implementing what has been learned, students are able to become effective farmers in the real world environment (*FFA*).

The *Agriculture Success School* will implement a curriculum based on similar ideas proposed in the FFA standards for secondary schools all across Kenya. This will capitalize on the fact that over half of the nation's youths attend secondary school, making it easy to reach a large portion of the population ("Kenya Statistics"). Youths who cannot afford secondary school will also be given opportunities to participate. Students will have the option to stay on campus, after finishing their regular classes, and participate in an extracurricular opportunity to learn farming techniques, such as drip irrigation, push pull technology, sack gardening, and crop rotation through hands on experience with guidance from instructors. This method does, however, create a problem because the dry climate in Kenya makes it nearly impossible to find sufficient land that is not already under use. To counter this, *Agriculture Success School* will use the multi-storey garden farming technique whenever farmland is unavailable. Multi-storey gardening, also known as sack farming, plants crops in any available container, such as a jug or a bag. This technique is particularly ideal for the success of this program because it uses locally available materials ("Nutrition Information and Recipe Book for People Living with HIV").

Each different technology the students will learn provides its own benefit and has its own limitations. For instance, the implementation of GMOs vastly increases plant productivity, but the illegality of them makes it impossible to collaborate with the government on any long-term plans to supply farmers with the crops. There is also no guarantee that farmers will be trusting enough to accept them ("Kenya Agriculture"). Drip irrigation reduces water usage by over 30 percent, but it also requires a complicated network of pipes that cost time and money ("Drip Technology Inspires Farming in Arid Areas"). Push pull farming take out weeds at the source, but it takes more time and resources to plant additional seeds. The plants needed for push pull also use up some of the farmland. Each agricultural practice can benefit based on its own specialties, which is important for the success of *Agriculture Success School*, because students will have the knowledge to make a decision that will best benefit their own personal crop yields ("A Novel Farming System for Ending Hunger in sub-Saharan Africa").

Despite all of these positive ideas, there is still one problem that could potentially bankrupt the entire program. There are thousands of schools within Kenya making the process of finding and hiring adequate teachers very difficult ("Kenya Statistics"). Fortunately, *Agriculture Success School* proposes a solution to this problem. Colleges, such as the Purdue College of Agronomy, provide plenty of opportunities for students to study abroad. Any university, such as Purdue, will be free to set up their own programs for students to study abroad in Kenya and supplement their learning by helping teach the *Agriculture Success School*. There is a very finite number of professors who can go abroad with the students; but the students themselves, after completing ample prerequisite courses proving that they are adept in their field of study, will have the opportunity to help run the multitude of classes. Their tuition costs, along with any available grants, will generate the capital necessary to fund this program. The colleges will also play an active role in the continuation of *Agriculture Success School*. They will provide annual progress reports on the successes, shortcomings, and points of

improvement for the program. This will play a key role in ensuring this program is able to reach its full potential.

In order to have strong base of students, the price of this program must be kept at a reasonable price. To prevent tuition costs from being too expensive, the responsibility of maintaining a steady supply of crops will be delegated to NGOs, such as the Canadian Foodgrains Bank (CFB). The CFB and other similar organizations are able to gather up donations from farmers and dispense them to countries in need (*Food Security Aid Map*). For *Agriculture Success School*, colleges will place orders for whatever crops are needed to use in the classrooms, and the NGOs will fill their orders and deliver all necessary seed grains. Not only will this decrease tuition, but it will also streamline the process of funding because NGOs will be given specific details as to what needs to be provided for, and will have ample opportunity to do so without interference. Also, by having the burden of cost be shared, millions of dollars will be saved. If this were solely a NGO program, then it would be difficult to secure enough funds to maintain a consistently strong program. On the other hand, a strictly collegiate program would be taxing on the students themselves which would severely limit the number of willing participants. One thing that will make this program both efficient and economical is effective collaboration in a joint effort.

There are five keys behind this project's success; one is that students will learn all of the farming techniques. Obviously not every agricultural practice is feasible in every situation, but the students will be able to choose based on their knowledge what they need to do to improve their own situations. The second point is that farmers will be able to spread their knowledge to friends and family. Not all Kenyans can afford to attend secondary school, but the ones that do not can still be positively affected by this. Students will also be able to keep left over materials such as notes or handbooks to help ensure what is learned is neither wasted nor forgotten. Thirdly, the students will be sheltered from violence because schools are located in non-conflict zones. Fourthly, because secondary school students will be taking the classes, it will take some of the burden off of their parents. It is much easier to reach students who are already on school grounds than to reach out to their individual homes. Additionally, by the time students reach secondary school, they are well versed in both of their national languages. This makes it easier and more culturally acceptable to have teachers that can only speak English. Unlike some other programs, it will not require too much effort on the part of local Kenyans to ensure the project's success. It is a completely optional extracurricular program, so people who refuse to participate will not be forced to do so. The fifth key is the simple fact that investing in the students is investing in the future. The agricultural techniques learned by the youths in Kenya will continue to benefit the nation for many years to come, long after the MDGs deadline of 2015.

No true progress can be made without full collaboration on the part of citizens as well as the government (Fengler). In order to secure governmental support, the *Agriculture Success School* will be presented using the standard curriculum proposal method. First, a list of committed donors and organizations will be compiled with details as to what they plan to contribute. For instance, the Bill and Melinda Gates foundation will pledge two million dollars toward transportation of all necessary materials, while the World Food Prize Foundation pledges one million toward purchasing crops. Secondly, a hardcopy manuscript of curriculum guidelines will be drafted for review by government officials. Once the manuscript has been edited and finalized, all necessary materials including various crops, handbooks, and other essentials will be purchased and delivered to Kenya where the program will be implemented (Ryan). Vast amounts of research exist on the topic of agriculture, so the key is to make sure that this research reaches the people who need it the most (World Food Prize).

Of course no solution is perfect. Everything must be evaluated on a cost-benefit analysis. The main con against *Agriculture Success School* is simply the magnitude of the project. It will require the support of several

worldwide organizations and is likely to cost many millions of dollars. Fortunately, what makes this program useful is the fact that it can be scaled up or down. It can be scaled up and implemented not only in Kenya, but in various countries all over the world, or it can be scaled down to affect a specific area such as one particular school or school district. A smaller project will make securing funds much less difficult, while still having the same positive effect, while a larger project will have the possibility of showing dramatic improvement on a grander scale. This sort of flexibility is essential to the project's success.

In the words of Her Royal Highness Princess Haya Bint Al Hussein, "Global hunger is the number one threat to international security" (World Food Prize). The United States is the leading nation in foreign aid expenditures, and yet we spend more on pet care than on world human care (Hill). We cannot become complacent while knowing that 222 billion tons of food is wasted annually among industrialized nations. This number is just short of the entire net food production in all of sub-Saharan Africa (Cederberg, Gustavsson, Meybeck, Stonesson, and van Otterdijk). As stated by HRH, "This is not a roadmap for peace" (World Food Prize). There are still nearly one billion people starving worldwide, and it is the duty of every able bodied person to contribute all that they can to nations, such as Kenya, which suffer from a plethora of problems including the lack of adequate transportation, an arid climate, weed and mole infestation, spoilage, and inadequate agricultural education ("CIA World Fact Book Kenya" and "Kenya National Agriculture Research Project"). In the words of Nelson Mandela, "Education is the most powerful weapon which you can use to change the world" (*Brainyquote*). *Agriculture Success School* will use the power of education not only to lift those in need out of poverty, but also to help Kenya's economy stay completely self-sufficient. No one solution could make an impact rapidly enough to make Kenya meet all of the MDGs by 2015, but the foundation must be laid for a stronger economy and a better overall standard of living starting today.

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