Youth Enviropreneurs of Tomorrow

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Executive Summary

Introduction:
Youth Enviropreneurs of Tomorrow (YEoT) is a farm concept that will produce plants to assist in the preservation of Rwanda’s environment, while providing a space for the youth to gain agricultural-based entrepreneurial skills. The primary objective will to be set up a cost effective solution to help the people of Rwanda to reduce employment and preserve the environment for future generations.

Once the project has begun it is expected that we will need to continue to grow to keep up with demand. By year three, additional infrastructure will needed to manage the increase in plants being sold.

Context:
Agriculture employs 87% of the population in Rwanda with it accounting for 80% of exports and 45% of the nation GDP so it’s important to the success of the economy. However issues like erosion and pollution are having major impacts on the industry and that is where we are looking to help. Erosion in Rwanda is estimated to cause the loss of 15 million tonnes of soil each year; equal to the amount used to feed up to 40,000 people per year. Rwanda’s government are looking to expand the manufacturing and industrial sectors. This potentially will have a negative flow-on effect increasing pollution of nearby water bodies, air and soil.

Rwanda has a major under employment problem, with 23% of youth being under employed (not working or studying full time). To combat these problems, the concept of YEoT Farm has been created. YEoT Farm will specialise in growing to sell plants & seedlings specific to reduce erosion and pollution. Target markets are different for each specialty plant; erosion plants to be sold to local farmers, and specialty pollution-reduction plants will be sold to government bodies and local manufacturers for use in phytoremediation of the water bodies and soil.

Employment will predominately be aimed at youth of Rwanda. This will not only help reduce under-employment issues but create a social cohesion through encompassing village elders to initially teach, and later oversee the traditional knowledge and skills of land husbandry. A secondary key component of the Farm is to provide a place for the youth to unleash their innovation and creativity, bringing together their newly learned traditional agricultural skills with their own new and innovative ideas.

Market Opportunities:
As outlined earlier, with 87% of the population being employed in agriculture, we see a massive market for our product especially with the local farmers to help combat erosion. Building terraces can be a long, costly and labour intensive job however we will be offering a cost effective solution to these farmers, which has been proven to work. In terms of the pollution, with the government looking for such massive growth in the industrial sector, there is going to be increased demand for eco-friendly pollution reduction solutions such as ours.

Financials:
Our initial start-up cost is 8,270,000 RFW (USD$10,670), which includes initial deposit of land, infrastructure construction and labour. Fixed costs, including wages of 900 RWF (USD$1.15) per day add up to a cost of 900,000 RWF (USD$116.00) per week on wages. Sourcing plants is relatively inexpensive, due to the Farm becoming responsible for producing their own seeds and cuttings within the first two years. Sale price is to be between 200 RWF (USD$0.22) and 400 RWF (USD$0.45) dependent on the plant. An estimated 100% overall margin is expected once fixed costs other than land have been paid for. An anticipated increase in sales within three years, the Farm proposes a need to expand to incorporate solar energy and a secondary water source to cement our environmental and financial sustainability.
Our Concept

The Problem:

Project ‘Youth Enviropreneurs of Tomorrow’ (YEoT) Farm is a concept to provide a centre for Rwanda’s youth to contribute to conserving Rwanda’s environment. YEoT identifies key issues for Rwanda and brings them together in a cohesive solution: youth under-employment; environmental issues of erosion and pollution; and lost knowledge through the generations.

Rwanda’s Youth - Under-employment
Under-employment, particularly of youth, is an issue for Rwanda’s government. Over 12 million people inhabit Rwanda (Index Mundi, 2014), of which 18% are youth aged between 14-24 years of age. Almost one quarter, 23% of these youth are under-employed and don’t work or study full time (EDPRS2, 2016). These figures may not appear unusual now, but when over 40% of the population are aged between 0 and 14 years old (Index Mundi, 2014), this potentially represents large problems for the future.

Industry in Rwanda - Pollution
Rwanda’s government are seeking to increase industry and manufacturing to contribute to over 20% to Rwanda’s GDP (Rwanda Development Board, 2016) by 2020. Industries including sheet iron, textiles, paint factories and sugar refinery have been established along low-lying areas of Kigali, immediately next to highly populated residential areas. This poor planning and improper infrastructure has resulted in chemical discharges leaking toxic pollutants into the waterways and soil near to these residents (REMA, 2016).

Loss of Traditional Knowledge
With a mere 6.5% of the population aged over 55 years (Index Mundi, 2014), it can be suggested that Rwanda has a young population. Traditional knowledge is knowledge gained through life experiences. Given Rwanda’s economic dependency on agriculture, sharing of traditional knowledge surrounding agriculture management and care of natural resources will be an important benefit to its success.

Agriculture in Rwanda - Erosion
Agriculture within Rwanda is an important contributor to the economy. Employing 87% of the population, contributing to 80% of total exports and 45% of National GDP (UNDP, 2007), agriculture is a key resource needing protection. Affectionately named “land of a thousand hills” (Help a Child, 2016), Rwanda’s undulating landscape has been affected by deforestation over the centuries and is heavily cropped. Attempts to reduce the effects of erosion through terracing is not enough; when erosion causes 15 million tonnes of soil loss each year, equal to losing the capacity to feed 40,000 people annually (UNDP, 2007), the situation is serious and more efforts must be taken.

Our Solution:

The YEoT project is a farm concept that will produce and sell plants and seedlings promoting environmental and wellbeing benefits. Plants and seedlings will specifically target the abatement of environmental pollution, prevention of erosion and human well-being by focusing on traditional plant and natural properties.

YEoT Farm will have a twofold effect. First, the youth; YEoT Farm will be a place for youth to be taught by local elders the traditional skills of planting, propagation, retaining seeds, plant properties and benefits. Particularly to minimize hazardous substances discharged in water bodies, air, and soil. The youth will learn about land husbandry; the result of fertilisation and land management. YEoT Farm will also provide the space to encourage creativity and innovation, promoting ideas in water
Youth Enviropreneurs of Tomorrow – Team 97

conservation, irrigation and use of solar energy to benefit the Farm. The youth will also be responsible for the financial management of YEoT Farm; from sourcing cuttings and seeds through to promotion and selling of the final product. Skills learned will not only give youth the principles to running their own business, but also the knowledge to pass on to the youth of tomorrow.

Second, YEoT Farm will be an exemplar farm, setting and teaching standards to improve sustainability of Rwanda’s agricultural and industrial environments, though a social cohesion of Rwanda’s youth and elders. Rwanda’s government’s objectives are to ensure that environment and natural resources are utilised and managed productively in support of equitable and sustained national development and poverty reduction. This ensures that development in Rwanda is undertaken in a manner that inflicts minimal damage to the environment, meanwhile building resilience to threats posed by climate change for the sustained support to economic, social and cultural development. YEoT Farm will therefore support the Rwandan government priorities through an environmental based project and employment of youth for sustainable development and poverty reduction.

Our Strategy

Marketing Strategy:

YEoT Farm has two main target markets and as a result need to have two very different approaches when it comes to marketing. Successful marketing is going to be very important for the future of our business as its main function will be generating interest in the project.

YEoT Farm’s first market will be the local farmers. As explained earlier, erosion is a major issue for farmers in Rwanda, with a cost effective solution being planting of trees. YEoT’s strategy for the locals is to attend markets within the villages as this is most likely going to be the place in which their goods are sold. This scene provides us the opportunity to not only sell our seedlings, but to interact with the farmers on a one to one basis to explain how YEoT Farm can help them. Special consideration has been taken within product pricing to this market, ensuring that all produce is able to be purchased on an ordinary farmer’s income.

The next target market will be the industry sector in Rwanda that is potentially causing some of the pollution. This will require us sending our emails to the companies and trying to set up meetings to discuss the potential of them buying some of YEoT Farm’s plants. Erosion isn’t going to be as big of a concern for these companies and as a result we will want to put more emphasis on the damage that they could be doing to the environment and how YEoT’s trees can help alleviate this.

Operational Strategy:

Our philosophy is that YEoT Farm is a place of learning. It is where traditional skills and knowledge are passed on to those who want to learn. It is a place where innovation and creativity is encouraged to incorporate YEoT’s objectives of sustainability while empowering youth through achievement and a safe place to experiment being their own entrepreneurs.

Our students/employees

YEoT Farm will follow an environmental farm plan to reduce its own impact on the environment.

- Positions include: instructors, gardeners, harvesters, packaging, sales, building & maintenance and administration.
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- Instructors are initially local elders, passing on their tacit knowledge about the agriculture and the local environment. After the first season, youth leaders will continue the teaching to fellow youth, under the guidance of the elders.
- Roles within YEOt Farm are rotated regularly to train individuals in all facets of running an agricultural business.
- All employees will earn the average agricultural wage. An added bonus will be the availability to produce fruit and vegetables for their own consumption.

Self-sustainability
YEOt Farm is a place encouraging self-sustainability, not only to return a profit for the sale of goods, but also to empower youth employees through combining their innovation and creativity with YEOt’s values of traditional farming.

Organic Status
Continuing the traditional form of agriculture, YEOt Farm will remain herbicide and pesticide free. All nutrition will be organically created through use of composting and specific planting. For example, to increase nitrogen in soil YEOt Farm can plant legumes and spread coffee grounds collected from local restaurants on the soil. Crop rotation to rejuvenate the soils natural properties is an important element of farming at YEOt Farm.

The Shade-House
Propagation of plants through cuttings and seeds is best undertaken out of direct sunlight. Construction of a large shade-house to operate under will reduce the likelihood of seedling death, increasing Farm productivity.

Pollution Reduction – Phytoremediation Strategies
Planting specific trees can help reduce pollution in the air, soil and waterways through a process called phytoremediation. Phytoremediation is used as it is often cheaper (US$25-100/tonne of soil, or USD$0.20-$2.00/1000 litres of water), and offers a more permanent solution (Ramesh Kumar, Arumugam, Anandakumar, Balakrishnan, Rajavel, 2012). Planting at the farm will specifically be aimed towards two phytoremediation strategies of phytoextraction and rhizofiltration.

Irrigation
Rwanda has a dry season from mid-May through till October. Rwanda’s average annual rainfall of over 1000mm can be collected through during the wet season to ensure water is sufficient to continue growing during the dry season.

Solar power
By investing in solar power panels, YEOt Farm will be able to power irrigation pumps and Farm machinery. Although an expensive initial outlay, solar power is completing YEOt’s value chain of sustainability.

Product Samples

Pollution Reduction – Phytoremediation Strategies
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Trees like poplars, with deep a root system are particularly good for phytoextraction; using plants to remove pollutants from soils (Ramesh Kumar et al, 2012). Waterways can have contaminants reduced through a system of rhizofiltration where contaminants again are absorbed by the tree roots, but plants are harvested once the roots are saturated with the contaminants. An example of this is at Chernobyl where sunflowers were used to reduce radioactivity (Ramesh Kumar et al, 2012).

Improve Well-Being
For thousands of years, plants have been used for their natural medicinal properties. Developed countries today have markets for natural health and well-being products. Using knowledge passed down from elders, YEOt Farm will be producing specific plants with special natural properties to help local residents. An example is the Piper Betle plant. It contains chemical properties that produce antimicrobial agents that can be used as a disinfectant (Dwivedi & Tripathi, 2014). It is a natural solution to kill bacteria in water, and a natural remedy for health problems such as burns, eczema and healing wounds. It is a perennial herb and grown
through propagation from cuttings and will be ready to harvest within 4-6 months (Balcony Garden Web, 2016) of planting.

Reduce the Effects of Erosion
Soil loss and leaching of nutrients from wind or rain causes long term damage to farmland particularly on hilly topography commonly found in Rwanda. Although many farms are terraced to help combat the soil loss, more education and provision of plants to complement this method of land husbandry will be provided from the farm. Three specific methods used will be strip grazing grasses between rows of crops, planting of eucalyptus and cassia trees whose roots provide support to the land, and crop planning and rotation education to further reduce losses (Clay & Lewis, 1996).

Selling our products
- Income will be earned through sale of seedlings.
- Erosion and well-being plants, whose target market is farmers and local villagers will be sold for 200RWF (USD$0.22) per plant.
- Pollution plants will be marketed towards government bodies and corporations, and will be sold at 400RWF (USD$0.45) per plant.
- Miscellaneous seedlings including vegetables will be sold to farmers and local villagers for 100RWF each.
- Volume of sales are based on two plantings per year.

YEoT Farm’s Risks and Barriers:
The success around YEoT Farm is based upon growing plants, therefore it is important that we have ideal conditions in which we can effectively produce them. YEoT Farm is based in Rwanda; a small mountainous country located in central Africa with a high population density and a heavy reliance on agriculture to keep the economy running.

The terrain in Rwanda presents the first risk for YEoT Farm due to the possibility of erosion. “About 77 per cent of all cultivated land in Rwanda is on slopes classified as having ‘moderate to high erosion risk soils’, according to the 2004 Strategic Plan for Transformation of Agriculture in Rwanda (Rural Poverty Portal, 2016).” This has the potential to ruin any crops or plants that YEoT produce; therefore sourcing a suitable location is critical. The slopes can also have other implications for YEoT Farm. “The steep slopes and acidic soils of Rwanda’s highland areas make them unsuitable for growing food crops (Our Africa, 2016).” While the slopes are great for growing plants like tea, it may not be suitable for the purpose of producing plants to help with reducing pollution and soil erosion. Selecting the right location will help YEoT Farm return the required nurturance to produce healthy plants.

A potential barrier that YEoT Farm may encounter is reluctance of participation or acceptance from the local farmers. Careful planning to potential crops must be considered. For example, if Banana’s are a chosen option, due to their flexibility in use from eating to rope making, YEoT could come up against resistance from local Banana farmers. Bananas are popular in Rwanda with them covering around one third of cultivated land. However they can account for at least two-thirds of a small farmer’s earnings (Our Africa, 2016). This could become an issue for YEoT Farm, because production of Banana’s or other crops could take away the earnings of local farmers. It’s important that YEoT Farm creates positive relationships with the local farmers, as ultimately they are potentially YEoT’s customers.

Maintaining of crops and plants will be crucial to the success of YEoT Farm. A risk that comes with this is the possibility of disease or plants getting eaten by insects. This will need to be monitored regularly to ensure that the plants are healthy to keep the farm open.
Pricing has been based in Rwandan Francs. To provide relative view of pricing, an exchange rate of USD$1 = 775RWF is used.

**Farm set up costs:**
Five hectares of land will be purchased for 21,428,500 RWF (Lamudi, 2016) with a 20 year loan, charged at 7% interest annually. A small dam, connected to an irrigation system will be built to water plants year-round. By year three, it is anticipated that a second dam or well will need to be built to account for the increased turnover of plants. A shade-house is required for planting and propagation of seedlings needing to be grown out of direct sunlight. Solar power will be introduced in year three to reduce overhead costs of electricity and as a further testament of YEoT’s goal to be self-sustainable.

**Operational Costs:**
Operational costs day to day running of the farm, additional maintenance of the irrigator, dam and solar panels. Plants will be propagated or grown from seed. By year three the farm will provide enough seed and cuttings to produce seedlings for within its standard products. New seed will be purchased for trialling new plants.

**Wages:**
The farm offers a range of positions, all paid the same equal rate of 900RWF (USD$1.15) per day, for a 5 day working week. To begin with, 25 staff will be required to assist in the building of dams, shade-house and installation of irrigation. In the second year, staff numbers will reduce to 15 to maintain a status-quo and implement processes to improve efficiencies. By year three, sales will expand and staff numbers will increase to 20.

**Anticipated Income and Expenses:**

<table>
<thead>
<tr>
<th>Volume Sales (Estimated -000's)</th>
<th>Yr 1</th>
<th>Yr 2</th>
<th>Yr 3</th>
<th>Yr 4</th>
<th>Yr 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion plants sold (yfr)</td>
<td>15,000</td>
<td>30,000</td>
<td>40,000</td>
<td>50,000</td>
<td>70,000</td>
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<td>Well-Being plants sold (yfr)</td>
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<td>10,000</td>
<td>15,000</td>
<td>20,000</td>
<td>25,000</td>
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<tr>
<td>Pollination plants sold (yfr)</td>
<td>8,000</td>
<td>15,000</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Miscellaneous seedlings sold (yfr)</td>
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<td>15,000</td>
<td>20,000</td>
<td>30,000</td>
<td>40,000</td>
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<tr>
<td><strong>TOTAL REVENUE</strong></td>
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<td>6,400</td>
<td>8,600</td>
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<td><strong>Net cash flow $1000</strong></td>
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<td><strong>Discounted net cash flow</strong></td>
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<td>-5,350</td>
<td>-6,366</td>
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<td>-6,922</td>
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<tr>
<td><strong>Internal rate of return %</strong></td>
<td>73%</td>
<td>73%</td>
<td>73%</td>
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