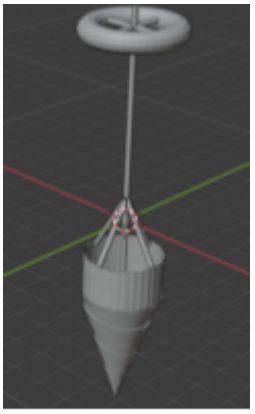
Zaïral
Mystery Inc., 39

Background

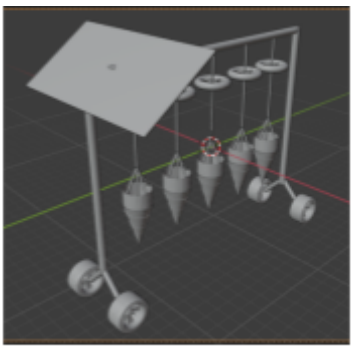
Currently, improper farming techniques, soil erosion, and groundwater depletion have caused once arable lands to rapidly undergo desertification, the process by which fertile land deteriorates into unusable desert. In the 1980s, a farmer in Burkina Faso[1] first implemented the practice of using small holes to restore soil damaged by desertification. The holes are filled with both a seed and a manure/nutrient solution which attracts insects to break up arid soil and provide necessary nutrients to the surrounding area. Additionally, the holes serve as basins to collect water which would otherwise fail to penetrate the soil, thereby mitigating runoff and erosion. Since its inception, the Zaï system has consistently been effective in reversing desertification and has improved crop yields of once degraded lands in Ghana by 500%[2]. However, as the practice is extremely labor-intensive, it is not practical as a large-scale solution to the problem of desertification. Zaïral is an innovative product that significantly reduces the labor input required to utilize the Zaï system. Thus, it serves as a large-scale, long-term, climate friendly solution to combat the effects of desertification on soil quality.

Product Description

In its most basic form (see Figure 1), the Zaïral is a mechanical instrument containing a unique compost solution and a seed of the farmer's choice, allowing Zaï holes to be dug and filled with compost in significantly less time than the original method. The instrument consists of a handle, attached to a smooth cylindrical midsection by a diverging metal bar, through which users can manipulate a cone lined with helical grooves. This cone serves as a screw, penetrating the soil and enabling the body of the instrument to enter into it. Once the instrument has reached a suitable depth, the user then twists the handle in a counterclockwise direction, partially lifting the instrument out of the hole. Then, the user pushes a button on top of the instrument's handle, opening the cone and allowing the compost solution, previously situated within the cone, to fall into the hole. The solution is encased in a biodegradable frame that allows it to maintain its shape throughout the process. In this form, individual farmers can easily produce Zaï holes. However, the instrument can also be situated within a larger system (see Figure 2), allowing for multiple Zaï holes to be produced simultaneously without the use of manual labor. This system utilizes solar power to electrically lower five instruments, screw the holes, and distribute the compost. Although the latter situation's efficiency is preferable in most environments, it may not appeal to some subsistence farmers, and may not be possible in some countries due to infrastructural limitations. The Zaïral can be therefore utilized in any environment to reverse the effects of desertification, and the freedom of choice in seeds ensures that cultural and environmental differences across the world are accounted for.



Zaïral, Figure 1



Electric Roller, Figure 2

Market Research

The primary target market for Zaïral consists of governments, NGOs, and other charitable organizations seeking to reverse the effects of desertification. Although targeting individual farmers is currently not a viable marketing strategy due to a lack of disposable income, this may change in the future and is therefore kept as a consideration. According to the United Nations Convention to Combat Desertification (UNCCD), desertification affects 168 countries worldwide and costs 490 billion US dollars[3] per year. Additionally, all member nations of the UN signed the United Nations Convention to Combat Desertification[3], committing themselves to implement National Action Programmes to reverse desertification. Therefore, one can reasonably assume that nearly every nation on earth is open to purchasing affordable solutions to desertification, such as Zaïral. The secondary target market consists of wealthier commercial farmers in places such as farms in Europe, the US, and Canada. Desertification is a problem in developed countries as well as developing. Nearly 1 billion tons of soil is lost every year in Europe due to desertification[4]. Farmers in these countries can purchase and utilize the electric version of the Zaïral to reverse desertification in their countries and increase the availability of arable land.

1. Nuraddeen Danjuma, Muhammad & Mohammed, Salisu. (2015). Zai Pits System: A Catalyst for Restoration in the Drylands. 8. 2319-2372. 10.9790/2380-08210104.
2. FarmingAfrica, et al. "Zai System Overcomes Desertification." Farming Africa, 1 Oct. 2014, farmingafrica.net/2014/09/zai-system-overcomes-desertifacation/?lang=en.
3. King, Ed. "Desertification Crisis Affecting 168 Countries Worldwide, Study Shows." Our World, 2013, ourworld.unu.edu/en/desertification-crisis-affecting-168-countries-worldwide-study-shows.
4. Panos Panagos, Pasquale Borrelli, Jean Poesen, Cristiano Ballabio, Emanuele Lugato, Katrin Meusburger, Luca Montanarella, Christine Alewell, The new assessment of soil loss by water erosion in Europe, Environmental Science & Policy, Volume 54, 2015, Pages 438-447, ISSN 1462-9011, https://doi.org/10.1016/j.envsci.2015.08.012. (https://www.sciencedirect.com/science/article/pii/S1462901115300654)

Marketing Plan

As of now, Zaïral has no competition. However, if a product were to emerge in the market, Zaïral would have a competitive advantage against other products due to the Zaïral having two different models: an individual unit and an electrical roller. Through these models, the product can be marketed towards a larger population, with more traditional farmers using the individual units and more advanced farmers using the electrical roller to combat desertification on a larger scale.

In order to effectively market to the various target audiences, we will sponsor international conferences that focus on climate change and desertification. At these conferences, the target audiences will view product demos and be informed of the detrimental effects of desertification. At future conferences, such as the International Conference on Environment Pollution and Prevention and the Arid Environments and Land Degradation Conference, we will set up booths that inform about desertification and show product demonstrations of Zaïral. We will also fund research on the use of our product to reverse the effects of desertification, proving its viability. Strategic relationships involving free product demos with major international organizations and companies will also aid in the marketing of our product.

Financial Plan & Estimated Costs

By utilizing mass production for both the compost solution and instruments, variable costs are fairly low for both the individual units and electric rollers. For the individual units, the cost per unit is $65.35 and for the electric roller, the cost per unit is $315. Given a selling price of $99.99 for the individual units and $599 for the electric rollers, this results in a substantial contribution per unit of $34.64 and $284 respectively. Ultimately, the break-even point (using average monthly fixed costs) for the individual units is 849 units and the break-even point for the electric rollers is 103 units. Due to the small size of these numbers relative to market demand, one can reasonably assume there will be a large margin of safety. Notably, individual units come with 10 compost capsules and electric rollers come with 50 compost capsules. However, additional capsules can be purchased at a price of $30 per 10 capsules, providing an additional revenue stream whose break-even point is not considered here. This revenue stream, however, is accounted for in the projected income statement.

Year	2021	2022	2023	2024
Sales Revenue	$ (US dollar) 349,000	$599,000	$747,5000	$1,315,300
Cost of Goods Sold	($190,175)	($378,350)	($413,025)	($731,550)
Gross Income	$158,825	$220650	$334475	$583,750
Marketing	($60,000)	($60,000)	($70,000)	($100,000)
Factory Rent	($66,000)	($66,000)	($66,000)	($66,000)
Salaries	($71,750)	($71,750)	($88,070)	($104,390)
Administration	($12,000)	($12,000)	($12,000)	($15,000)
Expenses	($209,750)	($209,750)	($236,070)	($321,390)
Net Income	($50,925)	$10,900	$98,405	$262,360

As seen in the forecasted income statement, we expect to make a profit by 2022. Given the previously stated prices and costs per unit, we expect revenue to steadily increase each year. Initially, a substantial marketing budget and costs related to renting a manufacturing plant suppress profits. However, as our product becomes more established and revenue increases, net income becomes positive only 1 year after founding. Although forecasted cash flow was not analyzed, by purchasing supplies on credit when possible and responsibility managing accounts receivable, we can reasonably expect to remain cash positive. For startup costs, we will need approximately $400,000. In order to raise these funds, we will first seek grants from environmental and developmental organizations. Further funds will be raised through equity financing from venture capital firms and impact investors and crowdfunding from sites such as GoFundMe. If any additional funds are required, we will utilize debt financing. Startup costs will be associated with initial manufacturing, marketing, and administration.

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