



Phoenix Ceramic Filters - Business Plan

Ceramic Clay water filters for rural Nepal.

Global Enterprise Experience 2015, Team 52. This document outlines our business plan for the construction and distribution of ceramic water filters to those who have limited access to clean drinking water in rural Nepal.

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Executive Summary

Water-borne diseases have been found to be primary reason behind high child mortality rate in least developed countries such as Nepal. Every year Nepal loses 75 children per day in average due to water related epidemics. This is because, most of the population in rural area of Nepal lack access to clean drinking water. They rely on its open sources which are easily polluted in monsoon and also due to lack of sanitation and hygiene in such areas. Our project proposes a simple, easy to use and cost-effective product that utilizes local resources to combat this problem- Silver coated Ceramic water filters.

The main objectives of our business would be to provide a cost effective water treatment system that fits the budget of rural population who have low income source, to significantly decrease the incidence water-borne epidemic among families of Jajarkot and thereby aid to reduce child mortality rate. In long term we envision healthy children and youths in rural Nepal who can contribute to the development of their region, after all, as the saying goes a healthy body leads to healthy mind.

Although our consumers are rural population of Nepal, we have divided our target group into two: the rural families and international donors working in the fields of health and sanitation who are looking for similar products to distribute to rural parts of Nepal. So our business model is both B2C and B2B. To gain competitive advantage through economies of scale and ensure consistency in our product we are importing the production moulds from USA. We have adopted a sales rep method in which teenagers and youths of Jajarkot will be employed to distribute and promote our product. This venture will be a private company and is promising because the financial projections show a profit of \$2756 within the first year of its operation.

Business Overview:

About 40000 children below five in Nepal die due to water-borne epidemics most of which are concentrated in Mid and Far Western Region of Nepal (Water in Crisis - Nepal (1)). In addition to this these regions lack proper infrastructure such as transportation system and people residing here have less income compared to other regions. Therefore, to combat child mortality and provide safe drinking water to rural villages of Nepal which lack basic amenities and below average income source, we propose cost effective water treatment system- an inexpensive ceramic water filtration unit for every household. Clay ceramic filters with silver coatings have been used as an effective filtration system in many African countries. In Cambodia it has been known to reduce incidence of diarrhoea by 46%. It reduces bacterial contamination by up to 99.9% accurately. These filters can also be modified to treat arsenic in water. By producing such affordable and easy to use filters using local resources we can also act as means of employment for the unemployed youths or teenagers of rural villages.



Strengths	Weakness
<p>Easy and low cost manufacturing</p> <p>Locally available resources (Clay, hydraulic machine and manpower)</p> <p>Potential to remove more than 99% of indicator organisms and reduce turbidity to below WHO guideline values</p>	<p>Heavily dependent of user, which results non-technical social issues</p> <p>Slow filtration rate</p> <p>Fragile and requires regular cleaning</p>

Our style of operation would be utilizing a **sales rep method** in order to travel to the vulnerable areas to show how our product could help them since the communication infrastructure has not fully developed there. Our sales representatives will be local teenagers and youths from target villages themselves. We would like to use youths and teenagers to develop a culture of self-dependence in them from early stages of their life.

Company registration: The business will be a registered private company based in Bhaktapur, Nepal. Production of ceramic water filtration units will be done in house or facility and then distributed to individual markets.

Business goals and Value Creation:

Our foremost business goal is to provide a clean and affordable drinking water to the people of Nepal, especially targeting the vulnerable rural population. By doing so we would like to bring significant reduction in child mortality rate and water-borne epidemics incidences. We also want to make a positive difference in the lifestyle of the people by employing young teenagers/youths through using them as sales reps so that they learn importance of health and sanitation and also learn to be self-dependent. Our initial focus is on the Jajarkot District as it has been the epicenter of recent Epidemics' in Nepal for few consecutive years. However after the initial phase of one year we plan to branch out into other remote communities.

Market Overview

Clean Drinking water problems in rural area:

About 700,000 households in Nepal, most of which lie in far western region do not have access to safe drinking water. According to Millennium Development Goal report the situation is speculated to continue at the same level till 2017(1). Nepalese in rural region drink water directly from its open sources such as rivers and alike which are easily polluted and contaminated. In fact, only half of the

population of the country has access to tap water. Due to this, the families in rural part of Nepal are prone to water-borne diseases such as diarrhea, cholera, typhoid, hepatitis A and dysentery every year. Every year 16000 Nepalese lose their life due to such hazards(2). United Nations Development Assistance Framework has identified lack of access to clean drinking water as one of the major contributing factors to high child mortality in the country.

Jajarkot District- Initial Target market

Jajarkot is one of the most vulnerable districts in the country. Almost every year it is hit by some kind of epidemic causing highest number of deaths in the country. The timeline of major ones have been given below:

Year	2009-2010	2011-2012	2014-2015
Epidemic	Cholera Outbreak	Diarrhea outbreak	Swine flu

Demographic details:

Total households	30,468 (Total population: 171,304)
Households with no access to tap water	13,411

Table 1: National Population and Housing Census 2011- Jajarkot

Competitor's Analysis

Due to high transportation cost associated, less number of substitutes or competitors focused towards rural areas and high bargaining power of suppliers of machinery the industry is moderately competitive. In addition to it, since the focus is not in rural areas we have an edge over the competition.

Competitors	Strength	Weakness
<ul style="list-style-type: none"> Traditional Copper and Steel Filters 'Piyush'- purifying drops and Potassium Tablets 	Conventional product, considered trustworthy Low cost	Expensive (USD 15-20) Lack of marketing in rural area People are hesitant to use chemicals directly

*As of now, advanced purifying system not included as competitors because they are very expensive for rural household and work with electricity.

Operations Overview:

Production:

The production of ceramic water filtration units neither requires expensive, rare resources nor high-tech machines. Local terra-cotta clay of Bhaktapur and a milled, combustible material like milled rice, millet or coffee husks are the only raw materials needed. The ingredients are mixed in a mortar mixer and then filled into a special mold. By using a hydraulic press, the clay gets formed into bucket shape. After that, the buckets are heated in an oven or over open fire. The combustible material burns out and leaves little holes. These little holes serve as the filter. In addition, the insides of the buckets are coated with bactericidal colloidal silver (Wagoner, 2015).

Staff:

According to Potters for Peace, which has set up dozens of water filtration facilities all over the world, 4 employees are needed to produce around 50 units per day (Wagoner, 2015). It is recommended to employ local potters, since they know how to work with terra-cotta clay. The average salary of an employee working in a related sector (construction/building/installation) is 16000 NPR per month which is around 160 USD (Salary Explorer 2014).

Resources:

The clay as well as the combustible materials is abundant natural resources in Bhaktapur. Therefore, the price is low and the availability high. Colloidal silver will be imported from India.

Equipment:

The acquisition of the machines account for the largest proportion of costs. To manufacture the ceramic water filters, the following machines are needed:

Aluminium Moulds:

The aluminium moulds are produced and shipped by a US-based company (Potters for Peace). Potters for Peace has supplied numerous organizations all over the world with the moulds shown in the picture. They are exclusively used for the production of ceramic water filtration units. The price for a set of molds is 850 USD + shipping costs. (*Recommended Equipment for Ceramic Pot Water Filter Production, 2015*)



Figure 1: Aluminum mould

Hydraulic press:

To press the ceramic filter units into shape, a 15-20 tons hydraulic press is needed. A second-hand press can be bought locally at around 200 USD (*Gregsmithequipment.com, 2015*).



Figure 2: Hydraulic press

Hammer mill / Mortar mixer

As their names suggest, these machines are used to mix and prepare the raw materials for the next step. Both machines are used all over the world in the construction and building sector. Therefore, they are available in Nepal. Prices rank, depending on the quality, from around 500 to thousands of USD per machine (*Recommended Equipment, Supplies and Materials for Ceramic Filter Production, 2015*).

Others:

The above listed equipment is the basis to produce the filters. To control the production and to measure the efficiency of the filters, measuring equipment can be bought additionally.

Facility:

According to Potters for Peace, a facility with around 50 sq m. is needed to produce the filters. The rental prices in Nepal are rather low. For example, the rent for a small office/factory in Kathmandu is 15,000 to 40,000 Rs. (150-400 USD) per month depending on the size. To run the factory, reconstruction work has to be done. An oven (kiln) has to be built and the machines installed proper. Kiln's are usually built by using local bricks and are therefore not expensive. It is also recommended to build a small warehouse where the filters can be stored. (*Recommended Equipment, Supplies and Materials for Ceramic Filter Production, 2015*)



Figure 3: Kiln

Marketing Overview

Our consumers are the people of Nepal without access to clean drinking water; almost half of the population. Although we have one consumer market we have two target markets:

Target Market Group 1	Families of rural Nepal (70000 households without access to clean drinking water) Average Salary- USD 195 Initial target market: Jajarkot
Target Market Group 2	INGOs as well as individual volunteers working in health and sanitation area willing to provide water filtration unit to affected districts Individuals with income USD 35,000 or more

Marketing Objective: Highlight and educate the importance of clean water and the lack of it in Nepal, how ceramic pots are better solution in terms of microbial and turbidity filtration fitting their budget and Direct selling of the product utilizing teenagers and youth of the target area.

Marketing Communications Plan

	Group 1 (Consumer market)	Group 2 (Business Market)
Communication Objective	Educate importance of clean drinking water to rural population	Highlight lack of clean drinking water in Nepal and its effects.
Promotional means	<p>Direct Marketing: Educate school children and provide short educational sessions</p> <p>Paper advertisements: Newspaper, Magazine and pamphlets</p> <p>Radio advertisements- the most common means of entertainment in rural area</p>	<p>Direct Marketing with INGOs</p> <p>Website: Clearly outlining the negative effects of unclean water and the progress being made by the business to mitigate it. It would also give information on where a water filtration unit would be most needed and have an easy link to donating a water filtration unit to a village in need.</p> <p>Word-of-mouth and Buzz marketing- Facebook</p>

Requirements and Financial overview

The tables below provide an overview about the financial situation of the company. All figures are based on current prices.

Acquisition costs:

Acquisition	Aluminium moulds	Hydraulic press	Hammer mill	Mortar mixer	Others	Total
Cost in USD	1000	200	1500	1500	5000	9200

Running Expenses:

Expenses	Factory rent	Materials	G/W/E	Salaries	Others	Total
Per month (USD)	300	700	150	640	200	1990

The costs for the molds, the hydraulic press, the hammer mill and the mortar mixer are based on the part "operations overview". The field "Others" includes tools, low-price production equipment, replacement parts and also the installation of an oven. Since it is hard to predict the exact costs, a higher value was used.

The stated price for "Factory rent" is rather too high since it is based on data about Kathmandu (*INDUSTRIAL FACTOR COSTS*, 2015). Since old Bhaktapur city lies in the outskirts of the valley, the rent will be considerably low. Each filter vessel of 18 litres volume requires 30 lbs of clay. The price of clay in average is USD 200 for 1 truck load of it. We will require 2 such loads for 1000 units. The silver coating material will cost USD 300 for 1000 units. For Gas, Water and Electricity, data from the Federation of Nepalese Chambers of Commerce & Industry was used as well. Prices for GWE are rather low in Nepal. The salaries are based on the findings in the "Operations overview". Same as for the Acquisition costs, the field "others" serves as a cushion for unexpected costs.

Legal Requirements and Costs

Legal Approval	Ministry responsible	Fees (USD)
FDI Approval	Department of Industries	\$40
Company Registration	Company Registrar's Office	\$95
Cottage and Small Industry Registration	Department of Cottage and Small Industries	\$20

Therefore, the total start-up capital required for the business will be:

Capital Requirements	USD
Fixed costs	9200
Working capital requirement for 3 months (1540*3)	4620
Pre-operating legal expenses	155
Total startup capital required	\$13975

Source of Capital

Since we are registering our company as a private company, our team members will act as shareholders each contributing \$2000 for the company. That way each shareholder will own 2000 shares each at \$1 par value per share.

Sales price:

To calculate the sales price the running costs per month as well as the acquisition costs were taken into consideration. It is vital to cover the running costs per month and to amortize the acquisition costs as fast as possible. This is especially important since the machines are used on a daily bases and therefore will need to be replaced after a certain time. Therefore, the calculation aims to amortize the costs for the equipment within 1 year. The following calculations are based on a production level of 1000 units per month. The sales price for 1 unit is **3.5 USD**.

Costs in USD	per month	per year	per unit	Sales	per month	per year	per unit
Running	1990	23880	1.99	Revenues	3500	42000	3.5
Acquisition	766.67	9200	0.77	Sales tax (13%)	455	5460	0.455
				after Tax	3045	36540	3.045
				Costs	2756.67	33080	2.76
Total	2756.67	33080	2.76	Profit	288.33	3460	0.285

Taxes:

The sales tax is paid by the buyer of a good. Nepal has a sales tax rate of 13%. It is raised by the seller and then paid to the tax office. The income tax depends on the income, the type of industry and the

location of a company. Companies operating in rural areas can get a reduction in taxes. The tax rates are staggered as followed (Outlines Research and Development P.Ltd.):

Income (in USD)	0-1600	1600.01-2600	above 2600
Tax rate	0%	15%	25% + 15000 Rs.

Forecast:

The table below shows the forecast for 5 year. The revenues were calculated to increase by 10 percent each year as the company gets more and more customers over time. The running costs will also increase due to the hiring of new staff. The acquisition / equipment costs are hard to calculate since the live expectancy of the machines is not clear. Therefore, the costs were set to 8000 USD from the second year on.

Year	2016	2017	2018	2019	2020
Revenues	42000	46200	50820	55902	61492
Sales Tax (13%)	5460	6006	6606.6	7267.26	7993.99
Sales after tax	36540	40194	44213	48635	53498
Costs					
Running	23880	26268	28894.8	31784.3	34962.7
Equipment	9200	8000	8000	8000	8000
Transportation	150	165	190	210	240
Income before tax	3310	5761	7128.6	8640.46	10295.51
Tax	827.5	1440.25	1782.15	2160.115	2573.877
Income after tax	2482.5	4320.8	5346.5	6480.3	7721.6

Future Outlook

Our initial target market Jajarkot will also be a learning experience and initial research work for us. We will have ample information on consumer behavior, need analysis of similar other districts, the appropriateness of our marketing approach and feedbacks on whether or not we have achieved our goals of bringing positive impact on reducing water-related epidemics. From Jajarkot we plan on to moving to other districts of Western region of Nepal where the incidence of diarrhoea in crosses 300,000 every year and within 6 years cater to drinking water needs of around 100,000 households.

Immediately after Jajarkot we would like to focus on two other districts who also suffer from similar problems like that of Jajarkot- Humla and Myagdi where drinking water is not fit as per WHO standard and is contaminated by E.coli. Our approach towards these districts will largely depend on our research analysis of data gathered from Jajarkot.

As of now, our business will be producing similar type of ceramic filters but we also plan to differentiate our products in later stages of our business by modifying our filters based on the need of different geographic region such as:

1. Large Arsenic filters (or ceramic disks to be used in water tanks) for Terai region where the water has high level of arsenic and is causing different types of skin diseases.
2. Cooking vessels with use of curved solar panels that also reduce the use of firewoods, etc.

Our business will continue empowering children, teenagers and youths of rural Nepal developing a community of responsible and independent youths for the nation in long run.

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