Report on

Case Study Research Segment
Topic assigned
Entrepreneurship Development at a village level by Proposing Business Plan for Treadle Pump to Rural Technology Action Group (RuTAG) IIT Delhi

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Abstract

Promotion of income generating activity by proposing business model for two of the most successful technologies provided by Rural Technology Action Group (RuTAG) at Indian Institute of Technology Delhi for development of India's rural masses. The proposed business model were developed as a part of Case Study Research Segment by the author. This report talks about the various methodologies and tools used for developing the business model. This reports also states the observations of the author during the field visits he had to do. And finally the conclusion to this report is included at last.

Acknowledgement

I would like to express our deep gratitude to our host organization Indian Institute of Technology for setting a good platform and a good environment to work on. I would also like to express my gratitude towards the **Office of the Principal Scientific Advisor** for giving me this opportunity to work with them. RuTAG an initiative of the PSA Office I have immense pleasure in expressing my deep senses of gratitude and sincere thanks to my esteemed **REPORTING OFFICER Mr. Raj Kumar Gupta, Senior Project Assistant RuTAG,** IIT Delhi, for helping throughout my **Case Study Research Segment**. I am grateful for the quality guide and immense help from **Prof. S.K. SAHA, Professor Mechanical Department IIT Delhi**, **and Mr. Davinder Pal Singh, Senior Project Assistant RuTAG,** IIT Delhi.

I would like to express our deep sense of gratitude to my **faculty guide and Co-ordinator Prof. Sumita Sindhi** for her valuable inputs, support and encouragement throughout our Case Study Research Segment

I would like to express my gratitude to Lupin Human Welfare and Research Foundation, Bharatpur, Rajasthan, Gramodaya Rachnatmak Vikash Sansthan, Chariawaha Khas, Deoria, Uttar Pradesh, and the International Development Enterprise in India, Dwarka, New Delhi for their supports and feedback associated to their technology upbringing.

Date……2014 **Arindam Mondal (14201006)**

Certificate

Date:

To whom it may concern

Certified that, **Mr. Arindam Mondal (14201006)**, a student of KIIT School of Rural Management (KSRM), Bhubaneswar, was attached here from 6th March, 2015 to 23rd May, 2015 at RuTAG IIT Delhi, Delhi under the Case Study Segment (MBA-RM 2014-16) programme as a part of his Master of Business Administration in Rural Management. Title of his project work was " Entrepreneurship Development at a village level by promoting the Proposed Business Plan to Rural Technology Action Group (RuTAG) IIT Delhi". Place of his visit were Deoria in Uttar Pradesh, Bhubaneswar in Odisha and Bharatpur in Rajasthan. He worked under Dr. Subir Kumar Saha, Professor, Mechanical Department, Indian Institute of Technology, Delhi.

He has completed the work assigned to him. He was friendly.

Wish him all the success in life.

Dr. Subir Kumar Saha

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1. Executive Summary of the proposed Business Model

Treadle pump is a foot operated device which uses the human power to generate the reciprocating motion of the piston by the use of slider crank mechanism to suck water out of the ground. It is a twin-cylinder reciprocating water pump presently being used by thousands of small/marginal farmers in various parts of eastern U.P, Bihar, Orissa and other places. These are particularly popular in areas where water level is not too low (around 10m). Treadle Pump was first developed and used for irrigation in Bangladesh. In the 1980s, International Development Enterprises (IDE) initiated a campaign to market the pump to the smallholder farmers. Over the years several million treadle pumps have been purchased by the farmers. However, the problem of drudgery in its operation was pointed out by an NGO (Gramodaya Rachnatmak Vikash Sansthan) in Uttar Pradesh who approached RuTAG IIT Delhi to rectify the problem.

The treadle pump which is used to pump out water from ground by using human power has a great potential in the rural market especially in the region of Odisha, Bihar and Eastern Uttar Pradesh. The treadle pump has been designed in such a way that its paddles are made adjustable to three points, and a support is also provided while in operation. The treadle pump was invented in 1980 by Gunnar Barnes, Agriculture Co-ordinator for Rangpur Dinajpur Rural Service (RDRS) in Bangladesh (then a program of Lutheran World Federation\World Service in northern Bangladesh), with input from Dan Jenkins, USAID engineer. RDRS had begun the search for efficient, low-cost irrigation technology using local materials from 1975, experimenting with many varieties. RDRS set up four local workshops producing 3000 per month between 1980-81. Several years later, after International Development Enterprises (IDE) established in Bangladesh, they expanded the marketing of the concept. From the figure 1 the problems identified are

Figure 1 Old Treadle Pump

1. The device was not scientifically tested and analysed keeping the engineering aspects in view.
2. The design used was not standardized.
3. Washers were wearing out unevenly due to the absence of guiding mechanism for the piston rod.

4. The inner surfaces of the cylinders were not smooth due to which friction between the washer and inner surfaces of the cylinders increased resulting in wearing of the washers frequently and making the operator apply more effort.
5. The lever length of the pedal was short, further causing the operator to put more effort in operation.
6. The suction valves placed at the bottom of each cylinder were not in the centre of cylinders due to which the stroke load increased which raised effort for operation.
7. There was no proper holding arrangement for comfortable operation of the treadle pump.

1.1 The Market of Treadle Pump

Farmer in Deoria district are using diesel pump as well as treadle pump for irrigation, the market is quite old . Many farmers are using only the bamboo treadle pump for irrigation. Therefore there is a demand for the improved device to eliminate drudgery and increasing the production of crop. Business model for generating entrepreneurship at village level was required for disseminating the improved technology for poverty alleviation. Deoria district is the market where the need for improved Treadle Pump is observed.

1.2 Growth Potential for the Business Plan

As India is a developing country it needs to become more financially stable. The rural area needs to be uplifted for making the people in the rural area financially sound. So there is a potential of exploring the market and enhance the economic conditions. As the rural sector is least explored market so there is a nice opportunity to excel in this area.

1.3 Sales and Profit forecast

The sales for first year is forecasted as 50 treadle pumps from which about 375,000/- can be earned. The improved device has a discharge rate of 3500 to 4000 litres of water per hour.

1.4 Financial Requirements

To start the business, the entrepreneur will need 297,000/- to meet the assumed demand, the capital can be provided by the implementing agency or the VLE[1] can go for loan. The author also recommends to get a loan from the bank for smooth operation of the business. The repayment will be made after setting up the business properly.

1.6 Utilisation of Finances

Capital will be utilised for procuring the raw materials required for manufacturing the device and other equipments, cost of renting out the plot/area, and payment of the staffs.

1.7 Repayment of loans

The loan will be required as the investment is much high for an standalone entrepreneur. If the VLE opt for taking loan then the entrepreneur can pay out the loan on monthly basis, as the VLE will start the business and can start paying once the entrepreneur reaches the break-even, just to be in the safe zone.

[1] Village Level Entrepreneur

2. Introduction

Ever since the independence of India in 1947, a sustained effort has been made to develop the country's science and technology capabilities. Government of India's Scientific Policy Resolution (SPR) dated March 4, 1958 clearly stated that the key to national prosperity, apart from the spirit of the people, lies in the effective coordination of three factors, technology, raw materials, and capital. The aim of SPR 1958 was to foster, promote and sustain the cultivation of science and scientific research in the country and to secure for the people all the benefits that can accrue from the acquisition and application of scientific knowledge. Various policy pronouncements of the Government have emphasised the role of mounting a direct and sustained effort on alleviation of poverty, enhancing livelihood security, removal of hunger and malnutrition, reduction of drudgery and regional imbalances, both rural and urban. The generation of employment was also emphasized using scientific and technological capabilities along with our traditional knowledge pool. A number of ministries, departments, R&D laboratories and other institutions and agencies have been established in India specifically to meet the aforesaid objectives. The effort of our Government through the last couple of decades has resulted in a broad-based and extensive science and technology (S&T) network, besides the development of a substantial number of trained and competent S&T manpower and S&T infrastructure.

Across the world there have been interventions by the governments to resolve the issues of technology up gradation in the micro and small enterprises. It is important to develop links between the industries, enterprises on one hand and research & development laboratories/academia on the other. Those countries which have successfully implemented this strategy have succeeded in improving the productivity of their micro and small enterprises and ensured adequate supply of credit at a reasonable cost to both the technical institutions and the entrepreneurs. Productivity of an enterprise, whether organised or unorganised, is primarily a function of technology. Similarly, the sustainability of an enterprise is a function of competitiveness. Increasing productivity is thus essential for the promotion of competitiveness. In this report, one such link is highlighted, Rural Technology Action Group (RuTAG), an initiative by the Principal Scientific Advisor to the Government of India.

2.1 Concept of RuTAG

As mentioned above, Rural Technology Action Groups (RuTAG) is an initiative by the office of PSA. RuTAG is a synergizing and catalysing mechanism and not a major funding mechanism. RuTAG was conceived to provide a higher level of S&T intervention and support by the IIT's and others technical institutes / R&D organizations. This intervention, which essentially is demand-driven, is to reduce technology gaps, technology up-gradation, technology training and demonstration through any innovative method. RuTAG attempts to bring about a successful interface between the rural majority and an institution of excellence through a field-level S&T organization. In summary, RuTAG activities are directed towards the following:

- Addressing defused rural economy through S&T Platform.
- Dissemination of refined/up-graded technologies to rural areas.
- Technology delivery primarily for non-farm sectors.
- Benefiting rural groups through network of NGOs.
- Adding value to the produce and enhancing quality of rural life.

3. Enterprise Details

Rural Market comprises of FMCG, Durables, Agri-inputs, Two/Four wheelers

Table 1 Rural Market Shares

FMCG	□65000 crore
Durables	□5000 crore
Agri-inputs	□45000 crore
Two/Four Wheelers	□8000 crore
Total	**□123000 crore**

Source: (Francis Kanoi, 2002)

This sector of business has been identified as the market of "agri-inputs" which is old in the rural areas and has a future in semi-urban area. The product is aimed at creating new entrepreneurs at the village level. Treadle Pump is going to save a lot of investment as compared to diesel pumps. Hence the cost of irrigation will be reduced by saving the investment towards the fuel of the other pumps. The need for an improved treadle pump was raised by an agency called "Gramodaya Rachnatmak Vikash Sansthan".

A team from RuTAG IIT Delhi visited Deoria and observed the need for improvement. After observing all the parameters a CAD model (Fig. 7) of the proposed improved device was made using Autodesk Inventor 2012.

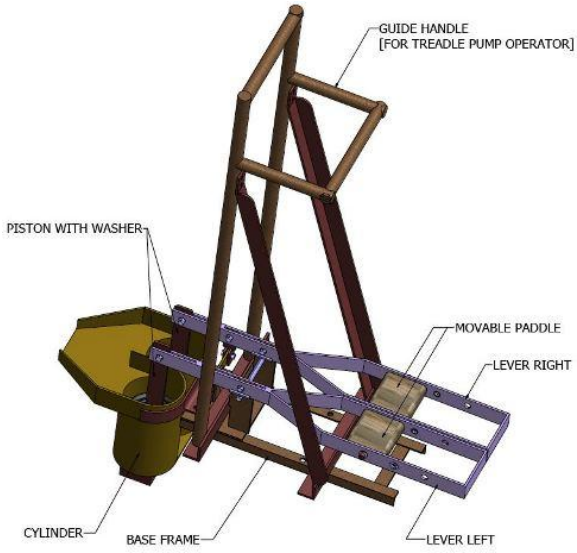

Figure 2 Existing treadle tump

The changes porposed for easy operation are as follows:

- A handle made up of MS pipes was fixed to the base of the treadle pump to support the operator during operation.
- After design analysis the appropriate lever length was decided. For easy operation, three holes were made at certain intervals for adjusting the position of the pedal in the lever.

- Fixed pedals were replaced with movable and adjustable pedals for smooth reciprocating of the treadle pump. The adjustable feature of the pedals was added to adjust with the body weight of the operators as the force changes with weight.
- The earlier cylinders, made up of mild steel sheet were not uniformly round, and were replaced with seamless pipes. The inner surface of each cylinder was machined for better finishing. Suction valves were fixed in the centre of the cylinder for smooth operation.
- Piston rod and the washer guide ring were welded together and were causing difficulty in replacing washer from piston. Changes were made by modifying the washer guide ring which is replaceable with the help of nut and bolt.
- Due to absence of bush and pin arrangement in all the movable links holes with nuts and bolts were wearing out frequently and were adding to the repair cost. Therefore all the movable links were provided with brass bush and pin arrangements, thus increasing the operation life of the pump.
- The washer were redesigned and casted with tougher /stronger/more resilient rubber (NBR) which has lesser wearing component and a longer life.

The business model has been developed for income generation activity in Deoria and elevate the standard of living of the rural people. The business model has been developed for village level entrepreneurs. The business model has been proposed for the existing fabricators in the village. The potential area in which the product has its need has been identified as Deoria, and Odisha.

RuTAG, IIT Delhi has identified this area for entrepreneurship development. To start the business, the entrepreneurs will need 296300/- which can be provided by the implementing agency as the recommended model for capital investment is the cost sharing model. It will reduce the capital investment burden from the VLE[2]. For the proposed business model, an existing fabricator is recommended. The cost of capital investment will be less as the fabricator will have the required tools for fabrication.

4. Product Description:

As mentioned above the product has been improved to reduce the drudgery in operation. The this business plan is being proposed to disseminate the technology provided by RuTAG for rural entrepreneurs and marginal farmers. The business deals with selling of that improved treadle pump (i.e. □7500/-), this will be a one-time investment for the farmers and for the entrepreneurs it will be profitable enough for the seller also as it will yield a profit of Rs.300/-. To deliver this technology to the maximum number of farmers keeping the budget in mind, the author suggests that the seller can also sell other pumps which are in demand in the area the different models will have a price range starting from □1000/- and will go up-to □7500/- depending on the need and want, a farmer can afford treadle pump at their own convenience. They are made in many different forms from very primitive to high tech. The high tech ones are usually made of steel and mild steel for the construction.

[2] Village Level Entrepreneur

Advantage is that the entrepreneur will sell the improved model of the treadle pump, along with the basic models which are already in demand. So the entrepreneur will be one step ahead of our competitors. According to one of the official of the IDE(I) the entrepreneur will have to do good marketing of the product in a very well defined manner.

One key success factor is that our treadle has a movable as well adjustable paddle, which can be easily changed as per the operator's weight, which gives our product an advantage over our competitor. The credit for this innovation goes to the team of RuTAG IIT Delhi.

Three unique selling propositions about our product they would be:

1. Low cost at which marginal farmers can afford to buy the product. (i.e. segmented market according to the type of farmers)
2. Design the product in a way that it will reduce drudgery while in operation. (i.e. a proper support handle providing support to the operator)
3. The product is rust free. (i.e. the product is made of MS Steel)

The product will satisfy the needs of the farmers who uses various other method to fetch water and the labour he had to put in to. The product can fetch water from 10m deep below the ground and has discharge capacity of 3500-4000 litres/hour.

5. Industry Analysis

Currently there 84 manufacturers of treadle pump in the whole world, in India there are around 6-7 manufacturers of treadle pump working in and around the target market area (Deoria). So there is a really good competition in the market and according to IDE(I) official it would be difficult for us to market the product. The product can be used in the area where there is abundance of rain-fed crops. In rain-fed area there is only one time crop harvesting is done. So for two time harvesting treadle pump can be used. Thus, the farmers will not have to wait for monsoon to arrive. So this can be counted as an opportunity to exploit the market.

So for that purpose the entrepreneur have to conduct a market research and analyse the data for the business purpose.

This is done to assess the external factors which may affect the business in a positive/negative way. So these factors play an integral part while setting up a business. These factors give the business either opportunity or pose a threat to the business. The more positive, the more is the chance to grow and develop that business in that particular area. This will give us an idea about the area where the business can run smoothly.

The sector which the entrepreneur will chose to operate in is not very wide sector for operation. This sector needs to be explored so the entrepreneur will can explore the market by rigorous market research. The entrepreneur will need to grab the opportunity and turn the tables around us. This sector has a very good potential and future is really good.

There are 6-7 companies operating in this sector, one being sold by IDE(I) (International Development Enterprise India) under the brand name of Krishak Bandhu in the village itself. So it the entrepreneur will have to get recommendations from the IDE(I) itself and get there help in marketing our product in the village. IDE(I) along with the implementing agency *"Gramodaya Rachnatmak Vikash Sansthan"* is selling treadle pumps in the village.

5.1 PEST Analysis

The basic PEST analysis includes four factors:

5.1.1 Political factors are basically to what degree the government intervenes in the economy. Specifically, political factors include areas such as tax policy, labour law, environmental law, trade restrictions, tariffs, and political stability. Political factors may also include goods and services which the government wants to provide or be provided (merit goods) and those that the government does not want to be provided (demerit good or merit bad). Furthermore, governments have great influence on the health, education, and infrastructure of a nation.

5.1.2 Economic factors include economic growth, interest rates, exchange rates and the inflation rate. These factors have major impacts on how businesses operate and make decisions. For example, interest rates affect a firm's cost of capital and therefore to what extent a business grows and expands. Exchange rates affect the costs of exporting goods and the supply and price of imported goods in an economy.

5.1.3 Social factors include the cultural aspects and include health consciousness, population growth rate, age distribution, career attitudes and emphasis on safety. Trends in social factors affect the demand for a company's products and how that company operates. For example, an aging population may imply a smaller and less-willing workforce (thus increasing the cost of labour). Furthermore, companies may change various management strategies to adapt to these social trends (such as recruiting older workers).

5.1.4 Technological factors include technological aspects such as R&D activity, automation, technology incentives and the rate of technological change. They can determine barriers to entry, minimum efficient production level and influence outsourcing decisions. Furthermore, technological shifts can affect costs, quality, and lead to innovation.

6. Competition Analysis

To understand the competition in the market the author have designed a research methodology and have designed a questionnaire to understand the current market situation and need of the customer. The author have asked the customer to rate the current entrepreneur Mr. C.P. Kushwaha and the competitor on a likert scale. It will give a clear idea how the customer perceive the brand *"Krishak Bandhu"*. So that the entrepreneur can strategize the entry move.

Entrepreneur / Competition

_____ /_____ Price

_____ /_____ Quality

_____ /_____ Durability

_____ /_____ Value

_____ /_____ Name Recognition

_____ /_____ Location

_____ /_____ Convenience

The competitor's main strength is pricing, they are selling their pumps at a very low cost at around □1200-□1300. They just provide their customer with the pump set only and the operator fixes bamboo poles around that pump as a support. This is a drawback and it creates a lot of drudgery to the operator while operating the treadle pump. But the people manage, the target customers are poor so they are easily taken advantage of their misery. And the major drawback is the lifetime of the machine. Krishak Bandhu claims that their machine has a lifetime of 8 years but it does not last even two years because the iron gets rusty after a monsoon and the farmers had to replace the pump. So this is a major drawback of our competitor and we can salvage this opportunity to our advantage.

The improved treadle pump has a lifetime of almost 5-6 years, and the machine is made up of mild steel (MS) pipe and sheet of steel which makes the product rust resistant and for the parts which are made of iron will be coated with CRC. The product will be superior from the competitors'.

Treadle pumps cost between US$20 and US$32 **(□1,000 and □1,600)** each. The total cost for installation of one treadle pump which includes the labour charges is around US$10 (□**520**). Most farmers buy the pumps directly from an IDE(I) dealer. Some dealers offer three to four months' credit, which allows the farmer to sell crops from their first harvest to repay the loan. Around 20% of farmers receive their pumps on credit. No subsidies are offered to users. So the total cost comes around □**1520** to □**2120**. The author states that the entrepreneur can bear the cost of installation at the first year to gain customers. This can perceived as incentive towards the customers. The entrepreneur need to follow the same exact strategy for the product as the competitors are following. So that the entrepreneur can stay in competition.

7. SWOT Analysis

SWOT is the acronym for Strength, Weakness, Opportunity and Threat. This is a very powerful tool for analysing the internal as well as external factors which affect the business either in positive way or in negative way. The Strength and Weakness are the internal factor or the factor which are inside the business organisation and Opportunity and Threat are the external factors which the organisation does not have any hold on it. So the picture below shows the SWOT Analysis done by the author.

Figure 2 SWOT Analysis

7.1 Strength:

- Robust Design
- Maximum Depth : upto 10 metres
- Discharge Capacity : 3500 to 4000 litres per hour
- Eight hours customer support

7.2 Weakness:

- Workforce as the business is start-up so the workforce is less

7.3 Opportunity :

- Target customers can be medium farmers

7.4 Threat :

- Krishak Bandhu and other new entrants.
- Any natural calamity which can have adverse effect on the business

8. Marketing Plan

As the business will be operating in the rural area, the entrepreneur need to think of good plan marketing very nicely. And to do that the author suggests to use Ansoff Matrix for analysing the marketing plan. According to the author's analysis the product falls under Market Penetration category.

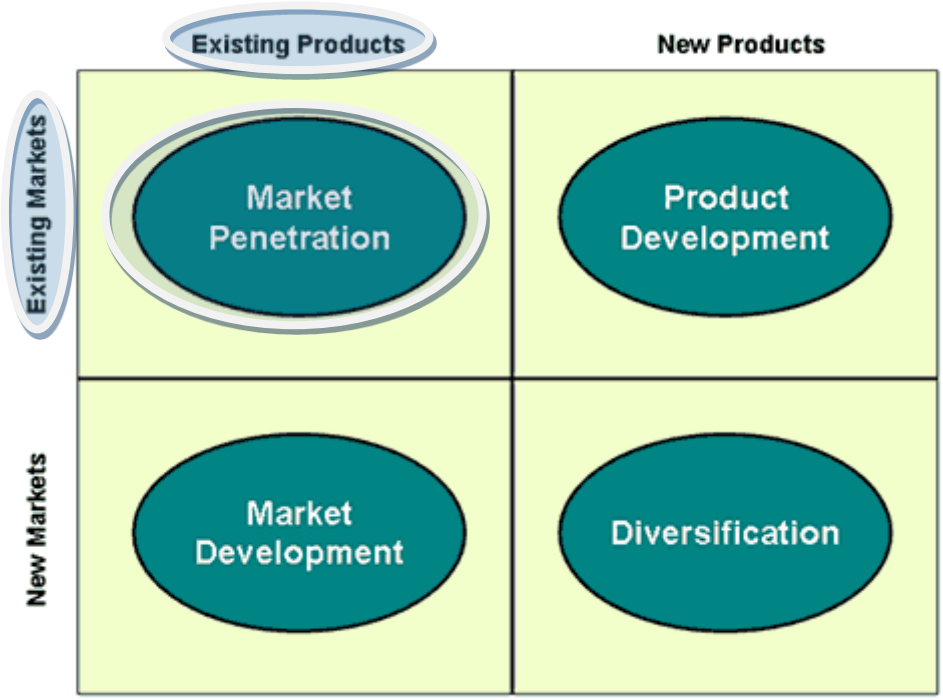

Figure 3 Ansoff Matrix

8.1 About the Ansoff Matrix

The Ansoff Matrix also known as the Ansoff product and market growth matrix is a marketing planning tool which usually aids a business in determining its product and market growth. This is usually determined by focusing on whether the products are new or existing and whether the market is new or existing. The model was invented by H. Igor Ansoff. Ansoff was primarily a mathematician with an expert insight into business management. It is believed that the concept of strategic management is widely attributed to the great man. The Ansoff Matrix has four alternatives of marketing strategies; Market Penetration, product development, market development and diversification.

8.1.1 Market Penetration

When we look at market penetration, it usually covers products that are existence and that are also existent in an existing market. In this strategy, there can be further exploitation of the products without necessarily changing the product or the outlook of the product. This will be possible through the use of promotional methods, putting various pricing policies that may attract more clientele, or one can make the distribution more extensive.
In Market Penetration, the risk involved in its marketing strategies is usually the least since the products are already familiar to the consumers and so is the established market. Another way in which market penetration can be increased is by coming up with various initiatives that will encourage increased usage of the product. A good example is the usage of toothpaste. Research has shown that the toothbrush head influences the amount of toothpaste that one will use. Thus if the head of the toothbrush is bigger it will mean that more toothpaste will

be used thus promoting the usage of the toothpaste and eventually leading to more purchase of the toothpaste.

8.1.2 Product Development

In product development growth strategy, new products are introduced into existing markets. Product development can differ from the introduction of a new product in an existing market or it can involve the modification of an existing product. By modifying the product one would probably change its outlook or presentation, increase the products performance or quality. By doing so, it can appeal more to the already existing market. A good example is car manufacturers who offer a range of car parts so as to target the car owners in purchasing a replica of the models, clothing and pens.

8.1.3 Market Development

The third marketing strategy is Market Development. It may also be known as Market Extension. In this strategy, the business sells its existing products to new markets. This can be made possible through further market segmentation to aid in identifying a new clientele base. This strategy assumes that the existing markets have been fully exploited thus the need to venture into new markets. There are various approaches to this strategy, which include: New geographical markets, new distribution channels, new product packaging, and different pricing policies. In New geographical markets, the business can expound by exporting their products to other new countries. It would also mean setting up other branches of the business in other areas that the business had not ventured yet. Various businesses have adopted the franchise method as a way of setting up other branches in new markets.

8.1.4 Diversification

The last strategy is Diversification. This growth strategy involves an organization marketing or selling new products to new markets at the same time. It is the most risky strategy among the others as it involves two unknowns, new products being created and the business does not know the development problems that may occur in the process. There is also the fact that there is a new market being targeted, which will bring the problem of having unknown characteristics. For a business to take a step into diversification, they need to have their facts right regarding what it expects to gain from the strategy and have a clear assessment of the risks involved. There are two types of diversification. There is related diversification and unrelated diversification. In related diversification, this means that the business remains in the same industry in which it is familiar with. For example, a cake manufacturer diversifies into a fresh juice manufacturer. This diversification is in the same industry which is the food industry. In unrelated diversification, there are usually no previous industry relations or market experiences. One can diversify from a food industry to a mechanical industry for instance.

8.2 The Product (i.e. Treadle Pump)

As the product is an existing product which has a market already, so the author suggest that the entrepreneur should to use the Ansoff Matrix (shown in the above figure) to strategically place the product and observe the current market for our growth in the future, and thus how to market

the product. The author suggests that the product from a workshop or from a e-commerce website which can be provided by any domain server or we can start up with blog-spot which is free. The workshop has to be big enough to produce the treadle pumps and a room in a back which can be used as inventory. Customers can easily access the website, and for the people who want to become the seller of this product or customer can buy the product directly from the showroom which will be opened in Deoria/Bhubaneswar. And about the plans to add more product to our product portfolio, the author suggests addition of the solar powered treadle pump also which has been in the light for quite some time now. The working model has not been fully functioning till now, and once it is in working condition the entrepreneur need to start manufacturing and selling it, thus it will increase the product portfolio of the entrepreneur.

8.3 The Customers (i.e. Customers of the Treadle Pump)

The target customers will be small/marginal farmers who have very less income and which is around 60% all over India. Hence the customer base is big enough. The majority of the customer base will be from marginal farmers. The author suggests of having a feedback by customer support or the customers can directly talk to the sales person for the feedback. To get a better feedback from customer the entrepreneur can make a register for them and can collect the complaints or feedbacks. The author also suggests that if` the entrepreneur opts for online sales the website should contain a feedback column there at the bottom of the website. It will have the customer name and her/his address and phone number and if possible the customer can give their email address also (if they have it)

8.4 The Place (i.e. Location where the business plan is to be implemented)

The geographical area/location is Deoria/ Bhubaneswar, these places have the required water level thus our product will be in demand, and also for the transportation, it will be easy for the entrepreneur to transfer the pumps to the nearby areas.

8.5 The Method (i.e. The marketing strategy to be followed for product promotion)

The author suggests of advertising the product on the newspaper as it can be an effective medium from rural perspective. As the people of rural area mostly depend and believe in the newspaper. So we need to give advertisement in the newspaper. Apart from that the author also focuses on positive "Word of Mouth" which will help the entrepreneur in gaining more customers. As new entrants to the market the entrepreneur needs to carefully enter the market. The author has done an extensive research and the results show that most of the competitors use the internet as a medium to advertise their products. So the entrepreneur will also have to go for internet marketing. As mentioned earlier that we can go for E-commerce/BlogSpot for that we will have to register ourselves on a domain which can cost around 800/- per month. The author is not suggesting to go for internet marketing as of now. But the internet is a very powerful tool to advertise for mass reach, so it is up-to the entrepreneur whether he/she will go for internet marketing or not. As the author is not recommending the use internet as medium for advertisements, so the best and most effective medium for advertising is newspapers, which the suggests and states that it has a reach to every home in a village.

Table 2 : PEST Analysis

	Factor	Opportunity	Threat
Political	Make in India	We can leverage on this	
Economical	Inflation		Shift of customer from higher model to lower model
Socio-Cultural	No Socio-Cultural barrier	We can sell our product to any caste/creed	
Technological	Solar-operated treadle pump	Early Mover advantage	

9. Operational Strategy

The author suggests for opening a store/showroom in Deoria/Bhubaneswar itself. This will be the strategy for the entrepreneur for the target customers to provide them with a better environment to buy the product at their doorstep. The author suggest for leasing/renting a land in Bhubaneswar/Deoria. The store has to be near the marketplace from where all customers in the vicinity will be able to buy the product. As the author has said earlier to have our store at the village itself so that he/she can reach as much customer as possible. The author also suggests to have three suppliers to provide the machine at our will without any delay. The entrepreneur needs to go on a contract with the suppliers in such a manner that till the entrepreneur achieves breakeven by selling the pumps which were acquired by us earlier. The entrepreneur can take those machines on certain credit term.

The structure for VLE's will be like:

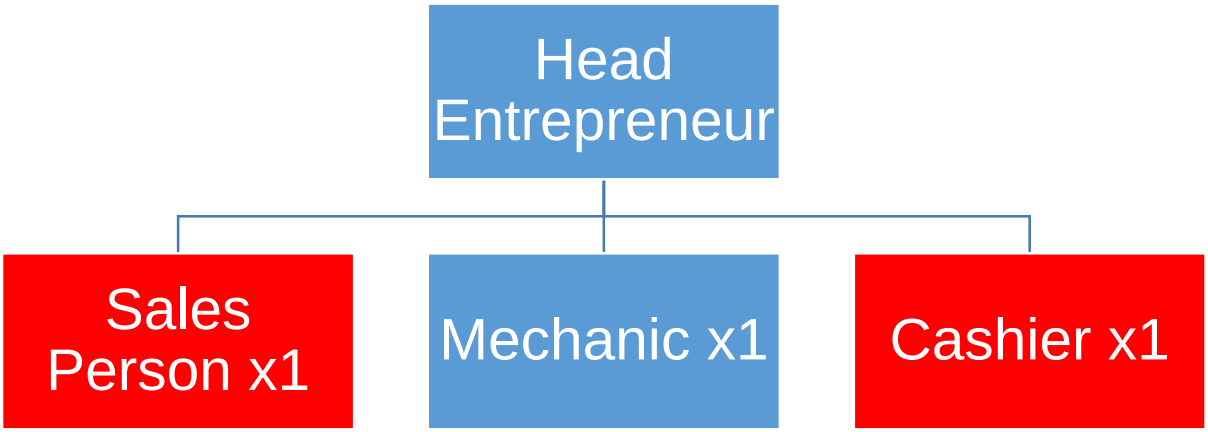

Figure 4 Organizational Structure of VLE

There will be the Head Entrepreneur who will be at the top of the hierarchy, followed by 1 sales person, 1 mechanic and 1 cashier. Here the head entrepreneur can act as a cashier and will have to take care of the financials. The VLE have to be capable enough to run this business. Or he can hire more person to look after the financials. The cashier and the Sales person here are marked in red to depict that they're optional. If the VLE can manage to take care of the financials then he might not need the cashier. And also he can only sale his product himself.

10. The Budget

As the entrepreneur will be starting the business the author suggests the funding should be done by the implementing agency. If not possible to fund our whole operations, then the entrepreneur will then have to arrange for some loan, which can be arranged easily I guess. Here is the budget plan for the 1st year only.

The cash flow diagram is given below..

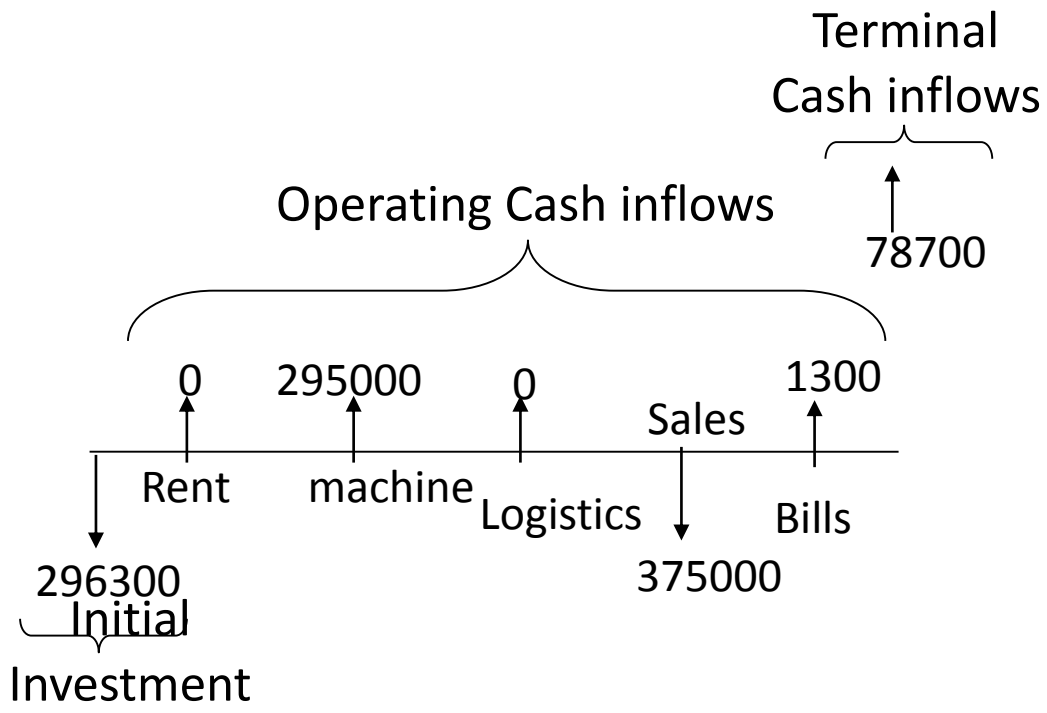

Figure 5 Cash Flow Diagram

The initial investment will be of INR 296,300 which will be used for manufacturing machines, paying out the salary for the first year and so on.

"If banks are tightening up their credit, use it to borrow what you need as collateral, and have it in capital investments you need to grow the business. Having it in cash is useless unless you have disbursements on an ongoing basis," (Osgood).

10.1 Breakeven Analysis

Table 3 Break Even Analysis

Fixed Cost	Variable Cost	Total Revenue	Selling Price Per Unit	Break Even Unit
15600	295000	296300	7500	42

From the above table it is clear that the total annual expenditure is 296300, where the fixed cost is 15600 and variable cost for making 50 machines is 29500/-. Fixed cost includes telephone bills and electricity charges. Variable cost includes the charges for making the devices. Logistics and repair charges are neglected. Rent of the room/place has also been neglected.

10.2 Return on Investment

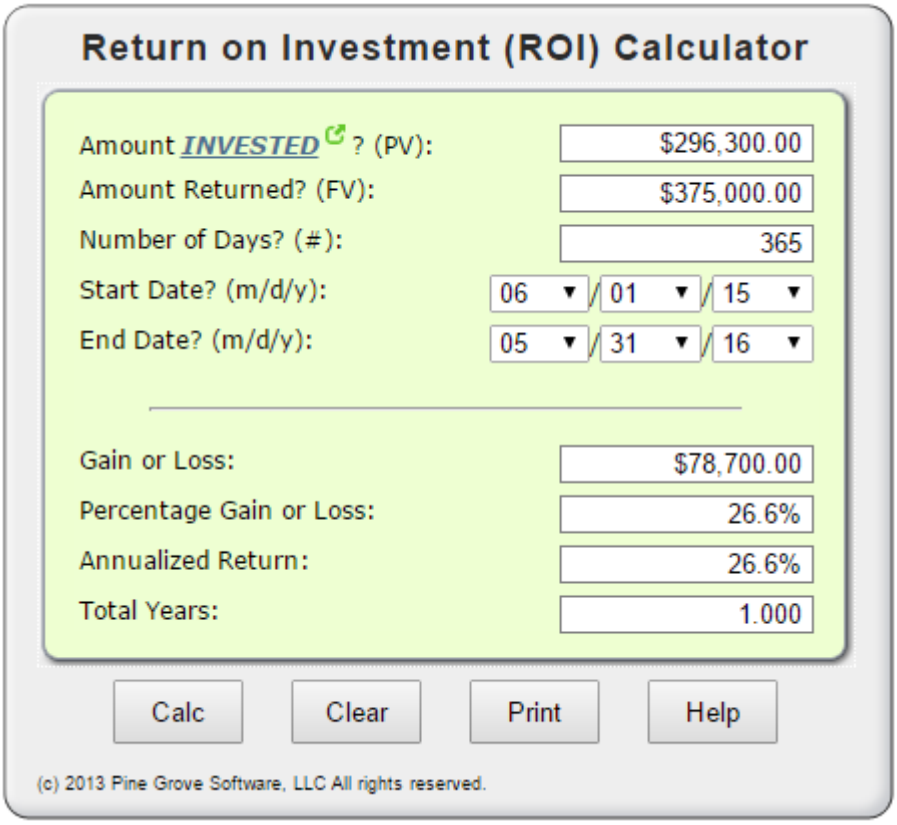

Figure 6 Return on Investment

The Return on Investment is calculated as per the investment. Here the calculations are done in dollars but the values are same. As per the calculations done by the author in INR it was coming as 26.6%, it is same for both dollar and INR. The tool used does not account for the exchange rate.

11. Financial Plan

As we are developing this business plan for Social Entrepreneurs as well as Village Level Entrepreneurs. We would like to propose the following financial models to the VLE's. They are as follows :

11.1 Pure play model

11.2 Cost sharing model

11.3 Quasi village entrepreneur model

11.4 Joint Venture Model

These four models are very much inter-linked to each other, as we will discuss about these models later you'll will come to know about the differences between these models.

Firstly,

Pure play model, in this model the Entrepreneur makes all the investment by himself/herself including the operating cost. The VLE is responsible for all the capital expenditure and working capital expenses.

Secondly,

Cost sharing model- Costs are shared between the VLE and the implementing agency. Here the VLE and the implementing organization (may be a NGO) will share the cost in setting up the business and the profit will be shared between the two bodies.

Thirdly,

Quasi village entrepreneur model- Implementing agency makes all the capital investments in setting up the model and has operating control over the operations. The implementing body will bear all the cost in setting up the business and they will take some portion of the profit and they will be in-charge of all the business transactions.

And last but not the least,

Joint Venture- A business arrangement in which two or more parties agree to pool their resources for the purpose of accomplishing a specific task. This task can be a new project or any other business activity. In a joint venture (JV), each of the participants is responsible for profits, losses and costs associated with it. However, the venture is its own entity, separate and apart from the participants' other business interests.

12 Conclusion

Annexure I

List of Figures

Annexure II
Questionnaire to assess the effect of Treadle Pump

RuTAG IIT Delhi

Treadle Pump Business Plan Questionnaire

IIT Delhi RuTAG

1. Name of the Respondent:

   ……..

2. Age: …….. Gender: male ☐ female ☐

3. Address: a) Village: …… c) Gram Panchayat: ……

   b) Block: ……. d) District: …….

4. What is cost of the treadle pump?

   ……..

5. How do you sell the machine?

   ……..

6. How do you advertise for the machine?

   ……
   ……....

7. Who are your potential customer?

   ……
   ……

8. Are they willing to buy the machine at your set price? How do you price the machine?

   ……
   ……

9. How do you foresee the changes in the market? Are there any potential competitors?

   ……..

10. How do they market their product? What are their pricing, advertising methods? And what are yours?

    ……
    ……
    ……

11. Is there really a need for this product in the market?

……....

12. What can you do to cut down the price of the product?

……

13. Where can you sell your product?

……..

14. Are you selling the improved treadle pump?

Yes ☐ No ☐

15. How many models are you selling currently? How each model is priced?

……
……

16. Can you provide the cost of manufacturing a unit of this machine?

……
……..

17. How do you hire people for your purpose?

……
……

18. Do you look for any special skill in that person?

Yes ☐ No ☐

19. What skills do you look for before hiring the person?

……..

20. What is the structure of the organization?

……

21. What is the investment required for becoming an entrepreneur?

……

22. Can a Village Level Entrepreneur bear this amount alone?

Yes ☐ No ☐

23. From where will the VLE arrange the capital for the business?

……

24. Will you charge for installing the treadle pump?

Yes ☐ No ☐

Annexure III

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