

2009 Ashden Awards case study

International Development Enterprises India (IDEI)

Finalist's work: Treadle pumps increase income and quality of life for poor farmers

Organisation: NGO, turnover US\$5 million and 185 employees (2009)

Location: India

Summary

About 98 million farmers in India are smallholders. Many grow only a single crop each year, watered by the monsoon. If the land is irrigated two or even three crops can be grown, providing food and income and reducing the need to migrate to cities for jobs. IDEI was set up to provide cheap treadle (foot-operated) pumps, so that poor farmers can afford to irrigate their land. IDEI won an Ashden Award in 2006, for setting up the supply chain to provide these pumps in the rural areas of Eastern India, and its work has now gone much further.

- Pump has two treadles which operate metal pump-cylinders and lift water through a rigid plastic tube-well from a shallow aquifer, or surface pond.
- Independent manufacturers, retailers and installers are trained, licensed, supported and quality-checked by IDEI.
- Innovative marketing under the 'Krishak Bandhu' (or 'farmer's friend') brand, using Bollywood-style films.
- Pump costs US\$20 to US\$32, with additional US\$11 for tube well and installation.
- Most farmers pay full cost outright, but some dealers offer part credit.
- 750,000 treadle pumps and 295,000 drip irrigation systems have been manufactured and sold (February 2009).
- Working a pump for two to eight hours per day provides water to irrigate a smallholding and grow one or sometimes two additional crops each year.
- Farming families have a better diet with more vegetables and milk, and plenty of surplus produce to sell. TERI survey showed that farm incomes double or treble as a result of using a treadle pump.
- Acumen Fund survey showed that helping with pumping did not add to chores of children or prevent them attending school, and that all had more vegetables and milk.
- TUV Nord has verified greenhouse gas savings from avoided diesel as 0.477 tonnes/year CO₂ per pump.
- Over the past four years, 177 thousand tonnes CO₂ savings verified, of which 52 thousand tonnes validated. Estimated total saving of 1.45 million tonnes to date.
- Huge potential in other parts of India and elsewhere. IDEI are currently working with other organisations to replicate in nine other countries in Asia and Africa.
- Since 2006 Ashden Award, IDEI has increased its range of pumps and provide 125,000 more, expanded into new states, and diversified into technologies like drip irrigation.

IDEI

Amitabha Sadangi

amitabha@ide-india.org

www.ide-india.org

Document last updated May 2009

Context

About 98 million farmers in India are smallholders, farming two hectares of land or less. A large proportion, about 76 million, have only one hectare. Often they can grow only a single crop each year, watered by the monsoon. Some farmers buy or hire a diesel pump for irrigation, but this adds to their costs. Incomes are low, and 7,000 Indian farmers committed suicide during 2008 because they were unable to repay their debts. Entire farming families may have to migrate to the cities in search of temporary employment in the dry season. However, if the land is irrigated, one or even two further crops can be grown, providing food and income, and reducing the need to migrate.

The NGO IDEI was set up to provide cheap treadle (foot-operated) pumps, so that poor farmers can afford to irrigate their land. IDEI won an Ashden Award in 2006, for its achievement in setting up the supply chain to provide treadle pumps in rural areas of Eastern India. IDEI has now expanded to new areas, provided more pumps, and diversified into other efficient irrigation technologies.

Statistical information, India	
Population (2005) million	1134
Urban Population % of total	29%
GDP per capita US\$ (2005)	US\$736
- at purchasing power parity	US\$3452
Population living on less than \$1 a day (2005)	34%
Population living on less than \$2 a day (2005)	80%
Population with access to grid electricity (2005)	56%
Annual electricity consumption per person (2004)	618 kWh
Annual CO ₂ emissions per person (2004)	1.2 tonnes
Population % undernourished (2002 -2004)	20%
Population with access to improved water supply (2004)	86%

Source: *UNDP Human Development Report, 2007/08*

How the programme works

IDEI has brought cheap treadle pumps to farmers by setting up local supply chains to manufacture, distribute, sell and install the pumps. The pumps are marketed under the 'Krishak Bandhu' (or 'farmer's friend') brand. The manufacturers, dealers and installation mechanics are all trained by IDEI and operate under licence. IDEI business associates work on commission to promote the pumps to farmers. IDEI is responsible for product development, and for quality control along the supply chain.

IDEI has developed a range of interesting materials to market the pumps and other technologies, and puts considerable emphasis on marketing. One innovative approach is the use of full-length Bollywood films, made using famous actors and directors. Each film tells a story with a happy ending brought about by using a treadle pump or drip irrigation. Films are screened from the back of vans, to large crowds, in the villages where IDEI dealers operate.

Technology and use

Treadle pumps

A treadle pump can be used by all members of a farming family to irrigate crops. The user stands on two treadles, usually made of bamboo, and pedals them. This light exercise, similar to using a step machine, operates two metal pump-cylinders which are connected to a tube-well, or to a surface level pond. The tube-well consists of robust, flexible plastic, sunk into the ground until it reaches an aquifer. Before first use, water is poured into the cylinders to 'prime' the pump. When the user pedals, water is lifted up onto the field, or into a pond or irrigation canal. The pedalling action is easily mastered and not strenuous, so that anyone in the family can take a turn at irrigating the fields. Typically the household will operate a pump for between two and eight hours per day, often in the early morning or evening when the weather is cool.

IDEI has developed different models of pumps for commercial production, to suit different water conditions and different incomes. The pumps are designed to pump water through a maximum vertical distance (head) of either 7m or 8m, and with maximum flow rates of up to 4,000 or 5,000 litres per hour.

Since winning the 2006 Ashden Award, IDEI has developed several new versions of the pump. For coastal areas, there is a model with anti-corroding parts. For places where there is ample surface water, there is now a pump designed to transfer water horizontally to different fields. Another version can provide higher flow rates where the water table is shallow. IDEI also discovered that some 80-year old pumps from Assam used bamboo filters at the bottom of tube wells to stop debris from being drawn up into the pump. These filters do not rust or corrode and can be made for less than a quarter of the price of the metal equivalent. They are now being used for the IDEI tube wells.

Other technologies

More recently, IDEI has also developed low-cost drip-irrigation systems. These use perforated, flexible tubing to distribute water efficiently to crops, and thus reduce the amount of water needed. They can be used with water pumped from treadle pumps, but also with other types of pump. Several different versions have been developed. Other products which IDEI has developed are efficient water-sprinklers, and water-storage bags.

How users pay

£1 = Rs 73 (Indian Rupees). US\$1 = Rs 50 (April 2009)

Treadle pumps cost between Rs 1,000 and 1,600 (US\$20 and 32) each, depending on the model. The other components, including the tube well, and labour for installation cost about Rs 520 (US\$11). Most farmers buy the pumps directly from an IDEI dealer. Some dealers offer three to four months credit to the farmers for the metal parts, which cost about Rs 510. This allows the farmer to sell crops from their first harvest to repay the loan. Currently around 20% of farmers receive their pumps on credit.

No direct subsidies are provided to the entrepreneurs involved in the supply chain (manufacturers, dealer and installers) or to end users. IDEI pays for product development, quality management, marketing and training, which averages about US\$6 per pump once the supply chain is established.

Training, support and quality control

There were some quality problems in initial designs of IDEI treadle pumps in the early 1990s. Learning from these, IDEI has established a highly structured training and quality control programme, for all stages of the supply chain.

The research and development department of IDEI is responsible for the design of the pumps. It creates the templates and specifications for pump manufacture, and trains the manufacturers. Every pump has a unique serial number, which identifies the year of production, the state where it was produced, the manufacturer, and the type of pump. The quality manager in the IDEI regional office checks the quality of pumps produced by each manufacturer in the region, and issues each with an annual license and serial number.

Installation mechanics are initially trained for two days by IDEI, followed by on-the-job experience assisting an experienced mechanic. A three-day refresher course is provided by the IDEI area manager, an experienced mechanic and a business associate. Mechanics meet colleagues in the area office annually to learn about product developments. The IDEI mechanic who installs a pump offers the farmer training on how to use it, for between two and four hours. Usually five or six farmers are trained together. Mechanics live in all of the areas where IDEI operates, and are able to repair and maintain the pumps in their area. Every treadle pump is sold with a one-year guarantee, after which the farmer has to pay for servicing. The valve and washers need to be replaced annually. The pumps are expected to last for about eight years, although a study by The Energy Research Institute (TERI) highlighted some that are still working well after eleven years of service.

IDEI business associates are initially trained for seven to fifteen days by their IDEI line manager. They meet for two to five days each year for refresher training and updates. The initial training for treadle pump dealers lasts three days. IDEI organise a two-day annual meeting for all dealers and business associates to review progress and receive information on updates.

Benefits

Since 2006, two important external reviews have also been made of the impacts of the work of IDEI. These include a 'Socio-economic-techno-environmental assessment of IDEI products: Treadle Pumps' undertaken in July 2007 by TERI, and 'A fairy tale for all?', an assessment of the impact of treadle pumps on the welfare of children, undertaken in June 2007 by the Acumen Fund.

Numbers

Since the 2006 Award, IDEI has expanded its work into other part of India, and diversified into different technologies. Treadle pumps are now available in 15 Indian states, and 125,000 more have been sold, bringing to 750,000 the total sales to date. With typically 5.2 people per family, the benefits of treadle pumps have been brought to around 3.9 million people. Sales of treadle pumps are currently about 50,000 per year. 295,000 drip irrigation units have also been sold.

The pumps are designed to last for about eight years, so some early ones will have been replaced. However, the TERI study shows some are still working well after eleven years of service, and random checks by IDEI staff confirm this.

Environmental benefits

The TERI study found that between 50 and 60% of treadle pumps replace diesel pumps for irrigating the same crops, and therefore directly avoid the use of diesel and the associated production of CO₂. When a treadle pump supplies irrigation for the first time, and increases

crop production, it can be regarded as indirectly avoiding the CO₂ which would have been produced in growing the same amount of produce elsewhere.

On this basis TUV Nord has verified the direct and indirect greenhouse gas savings associated with the use of treadle pumps as 0.477 tonnes/year CO₂ per pump. The verified savings over the past four years amount to 177,000 tonnes CO₂, of which 52,000 tonnes have been validated. IDEI estimates that the total greenhouse gas saving to date is about 1.45 million tonnes of CO₂.

Treadle pumps bring other environmental benefits too. Diesel pumps tend to wash away the top soil in patches, leading to a greater need for fertiliser. The flow from a treadle pump maintains the soil structure better, because it is slow enough to irrigate without causing erosion. One IDEI dealer noted that treadle pumps also reduce the need for pesticides, because diesel pumps leave a larger volume of water on the surface of the ground, which encourages pests. Diesel pumps also produce unpleasant fumes, and there is the risk of diesel spillages causing environmental damage.

Social benefits

Having a treadle pump can transform the life of a farming family. Families with access to pumped water for the first time are able to grow a second and sometimes a third crop each year, increasing both the quantity and variety of production. The new crops include papaya, onions, mustard, coriander, garlic, cauliflower, cabbage, arum, cucumber, sweet potatoes and tomatoes. Additional land has also been brought under cultivation because it can now be irrigated. This means that the family is able to eat a better diet with a greater variety of vegetables.

The study of 30 families by the Acumen fund, to find the impact of treadle pumps on the lives of children, showed significant benefits. Children have to help with pumping, along with other agricultural tasks, but on average they operated the treadle pumps for only half an hour each day, and this did not increase their overall chores. Because treadle pumps can be operated at any time of the day, they did not prevent children from attending school. The study also noted the particular benefits of better food for children: all the children from families with treadle pumps were now eating vegetables, and 83% also had milk. Half the families bought school books with their extra income, and some bought a bicycle to help their children get to school.

Treadle pumps are more convenient for farmers, because they are available to be used whenever they are needed, and do not have to be hired and transported like a diesel pump. One IDEI dealer commented: "It is like the difference between public transport and having your own bicycle. You can choose when you want to use it and not be dependent on anyone else."

Economic and employment benefits

Many farmers have bought a treadle pump as a result of seeing the effect of a pump on the income and life of a neighbour. The TERI survey, which studied three regions where IDEI works, confirms that the increase in income is significant. In Balangir, Orissa, average household income went from about Rs 9,500/year to Rs 25,500/year (US\$190 to US\$510) as a result of having a treadle pump, an increase of 167%. In other regions, the increase was as much as 232%.

The additional income earned by selling produce has enabled farmers to buy more land, extend their houses, send children to college, and buy school equipment. The income also allows low-income farming families to remain on their land all year, rather than drift into poor urban areas to find casual work outside the growing season. This means that the children stay in school longer, since previously the whole family would move to the city.

As well as increasing income for farmers, IDEI generates significant employment in the supply chain. IDEI itself employs 185 salaried staff, 25 at head office and the remainder in regional offices. The 300 IDEI business associates receive a small annual payment (about Rs 4,000) and earn commission of Rs 70 for every customer they recruit, who goes on to buy a pump. Significant employment has been generated for manufacturers, dealers and mechanics in the supply chain.

Potential for growth and replication

Treadle pumps can help farmers wherever the water table is no more than 8.8m below ground level. Each pump can irrigate about one acre (0.4 hectares) in a manner that is suitable for rice, wheat, maize, vegetables and fruit trees. India has an estimated 98 million smallholder farmers. About seven million of them farm land where the water table is sufficiently high that treadle pumps could be used.

IDEI expands its operation on a regional basis, so that the complete local supply chain is set up in a new State. By 2020, IDEI hopes to have provided one million more farmers with treadle pumps and three million more with drip irrigation systems. One barrier to expansion is the capital needed to start up the entire supply chain in a new state, which is around US\$400k. At the end of the supply chain, more farmers would be able to buy pumps if there was short-term credit to cover the period of about 120 days until the income is received from the first additional harvest. IDEI is considering setting up a private company to provide credit to farmers.

There is also huge potential for treadle pumps in other developing countries, because many smallholder farmers work land with a high water table. IDEI is currently in discussion with organisations in Pakistan, Sri Lanka, Laos, Tajikistan, Egypt and several countries in Africa, about replication of the treadle pump and drip irrigation work

Management, finance and partnerships

Amitabha Sadangi is the founder and Chief Executive Officer of IDEI. He manages the external promotion of IDEI, including speaking at conferences and fundraising, and creates the ideas for promotional films. He also monitors the research and development, and new products. Day-to-day operations are managed by the Chief Operating Officer, Suresh Subramanian, supported by Vice Presidents of Finance and Administration, Monitoring and Evaluation, Programme, Marketing and R&D.

Regular meetings of IDEI staff and associates are held at regional, state and national level, to set and review targets and report progress. Senior staff, including regional and branch managers, meet annually for five days with donors and partners to review progress and discuss future developments.

IDEI is funded by grants and carbon finance: as an Indian NGO, it is not allowed to earn income from sales of products. Recent funding includes a US\$27.1 million grant from the Bill and Melinda Gates Foundation for technology dissemination. The Acumen Fund has invested US\$1 million in Global EasyWater Products Pvt. Ltd. (GEWP), a commercial venture set up by IDEI Employees Trust, to sell and distribute the KB micro-irrigation products internationally. In 2009, IDEI received \$300k of carbon finance from selling verified emission reductions (VERs) for the treadle pumps.

Use of the 2006 Ashden Award

IDEI used its 2006 Ashden Award to expand its programme, primarily in the new state of Chhattisgarh. It built a supply chain of distributors and dealers and ran a promotional

campaign for the treadle pumps, which were bought by over 2,416 smallholder families in the state. The Award also contributed to expansion into new districts in West Bengal, Uttar Pradesh, Bihar and Orissa, resulting in 51,800 new customers. Winning the Ashden Award greatly raised the profile of IDEI, and helped lead to a number of significant developments including the grant from the Bill and Melinda Gates Foundation, an agreement with Climate Care for the purchase of carbon credits, and the assessments of the IDEI work by the Acumen fund and TERI.

Contact details

Amitabha Sadangi
Chief Executive Officer
International Development Enterprises India (IDEI)
C5/43
Safdurjung Development Area
New Delhi – 110016
India
amitabha@ide-india.org
www.ide-india.org

This report is based on information provided to the Ashden Awards judges by IDEI, and findings from a visit by one of the judging team to see its work in India.

Dr Anne Wheldon, Technical Director, Ashden Awards
Jeremy Rawlings, the National energy Foundation, Consultant
April 2009

The Ashden Awards have taken all reasonable care to ensure that the information contained in this report is full and accurate. However, no warranty or representation is given by The Ashden Awards that the information contained in this report is free from errors or inaccuracies. To the extent permitted by applicable laws, The Ashden Awards accept no liability for any direct, indirect or consequential damages however caused resulting from reliance on the information contained in this report.