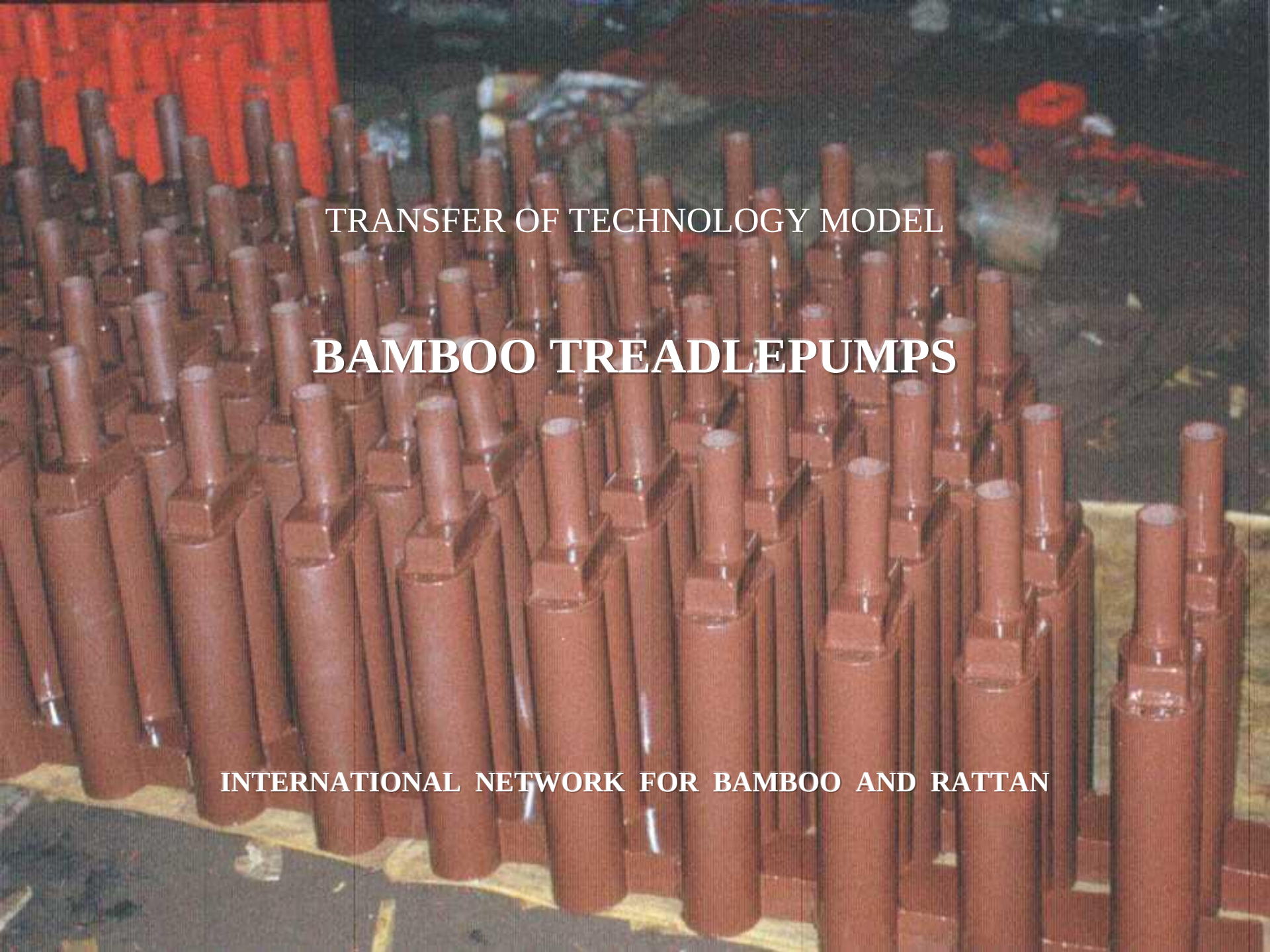


TRANSFER OF TECHNOLOGY MODEL

BAMBOO TREADLEPUMPS

INTERNATIONAL NETWORK FOR BAMBOO AND RATTAN

Why bamboo?

- **Bamboos** grow more rapidly than trees and start to yield within three or four years of planting.
- **Plantation** establishment requires minimal capital investment and builds upon the inherent plant-cultivation skills of local farmers and foresters.
- **Bamboos** can be harvested annually and non-destructively.
- **Bamboos** are excellent for rejuvenating degraded lands and protecting against soil erosion.
- **Bamboos** may easily be intercropped with shallow-rooted crops.
- As well as the culms, all other parts of the bamboo plant can be used in rural livelihoods - shoots for food, leaves for fodder, and branches for items such as brooms and for firewood.

What are bamboo treadle pumps?

- **Bamboo treadle pumps** are usually made of steel and have two barrels. The pumping mechanism is constructed of bamboo and the pump is operated by alternately depressing the bamboo pedals with ones feet.

- **Bamboo treadle pumps** can pump water from depths of up to 7-8 metres. They can pump from boreholes and open bodies of water but they cannot produce a pressurised flow and so cannot individually be used to raise water higher than the body of the pump. This can be achieved by locating pumps in vertical series.

- **Bamboo treadle pumps** can be produced by anyone with standard metalworking skills and simple metalworking tools such as welding equipment and a barrel roller.

How are treadle pumps produced?

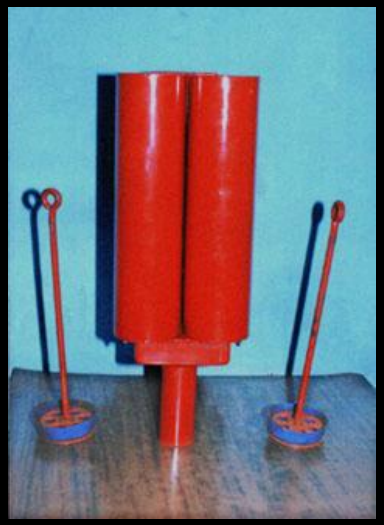
1. Metal components are cut from sheet steel

2. Barrels are rolled.

3. The cylinder sub-assembly is welded together

4. The plunger and valve sub-assemblies are welded together.

5. The cylinder and plunger sub-assemblies are painted and the cylinders tested for leaks



6. The pump is assembled and packed for sale

Why are treadle pumps better than other pumping devices?

- Treadle pumps are cheap and affordable. In India they sell for less than US $10 each.
- They are easy to operate, require no fuel, and can be used by any able-bodied person.
- They are light and portable. The pump weighs only 7 - 9 kg and can be carried around on a bicycle.
- They are easy to install. A basic level of practical engineering skill and a little common sense are all that are required.
- They are sturdy and durable. Their construction is simple and they are easy to repair. In areas of saline water steel pumps deteriorate rapidly, and concrete pumps are available.

Photo: Testing for leaks

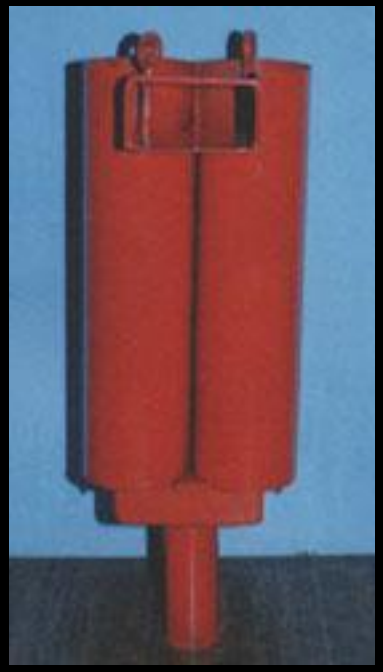
Main development attributes of bamboo treadle pumps

- Permit rehabilitation of degraded lands through increased areas of bamboo plantations.
- Promote efficient use of agricultural land, with better management practices.
- Enhance subsistence and income generation capacities of the user.
- Reduce the water-collection workload of male and female farmers.
- Create employment opportunities for pump producers, retailers and installers.
- Increase community welfare and improve local rural economies if manufacturing units are established as community enterprises.

Above: Plunger rod assembly

Some salient facts

- Treadle pumps are usually used to irrigate selected fields of higher value crops such as vegetables.
- In practice, farmers pay more attention to the fields they are irrigating with treadle pumps. They become more market aware and are able to manage their holdings more effectively.
- In India and Bangladesh incomes of farmers using treadle pumps have at least doubled as a result of their use.
- The cost of investing in a treadle pump can usually be recouped after one cropping season.
- The initial adopters of the technology are the better-off farmers who can afford to take a risk with the pumps. The poorest farmers usually adopt them one or two years later, when the benefits of the technology have become evident within the community.



Input costs for treadle pump manufacture in India

	Approximate cost per pump	
	Indian Rupees	US Dollars
• Raw materials	165.55	3.60
• Labour	30.00	0.65
• Power and electricity	10.00	0.22
• Direct costs	205.55	4.47
• Overheads	20.55	0.45
• Total manufacturing costs	266.10	4.92
• Margin	33.90	0.74
• **TOTAL**	**260.00**	**5.66**

Financial aspects of a treadle pump manufacturing unit

(based on a productivity of 500 pumps per month)

	US Dollars
Working capital requirement	870
Investment on machines	1, 783
TOTAL	2, 653

Estimated net present value after 5 years	$15, 485

Break-even Point	1578 units per year.
Break-even Period	0.394 years (4.73 months)
Benefit Cost Ratio	6.84

Note: Further details of the financial aspects of establishing and running a treadle pump manufacturing unit are given in the treadle pump TOTEM.

For further information

See

TOTEM

Bamboo treadle pumps TOTEM

Websites

www.ide-india.org.
www.ideorg.org/

Publication

Shah *et al.* 1999 Pedaling out of poverty: Social impact of a Manual Irrigation Technology in South Asia. Available at:

www.cgiar.org/iwmi/pubs/Pub045/Pub045.htm

Contact

- **IDE**, C5 / 43 Safdarjung Development Area, New Delhi, 110 016, India
- **IDE**, Post Office Box 5055, Govt. New Market, Dhaka 1205, Bangladesh
- **INBAR**, Beijing 100101-80, China