

Role of Private Sector in the Promotion of Sustainable Energy Technologies (SETs)

(Based on Experience of Water Mill Improvement Program in Nepal)

1. Background

Nepal is a mountainous country with rugged terrain and several perennial streams, rivulets and rivers. In the mid and high hills of the country, Traditional Water Mills (TWM) or *Ghattas*, are located on the banks of these water sources that –for centuries- have been part of rural communities and are used as an important energy source for grinding cereals. A comprehensive inventory of the number of traditional water mills is lacking, but estimates range from 25,000 to 30,000 operational mills in the country, one mill typically servicing 20 - 50 households. For traditional water mills, with their low efficiency, it is hard to cope with the increasing food-processing needs of the local communities. As a consequence, diesels powered mills –and to a lesser extent micro hydro mills- are increasingly taking over processing tasks. These modern mills do not only disturb the self-reliant set up of the rural villages, but also increase the dependency on imported machinery and –in the case of Diesel mills- fuel which also increases global warming and pollutes the environment through emitting CO₂ and other harmful particles. .

2. Improved Water Mill (IWM) Technology

An Improved Water Mill (IWM) is a piece of intermediate technology *par excellence* that almost doubles the efficiency of the traditional water mills and also improves performance as well as reliability of the traditional mill without changing the traditional management system. The improved water mill technology is a modified version of the traditional water mills designed on the principals of Impulse Turbine. Table below provides a comparison between the two.

Traditional Ghatta (Water Mill)	Improved Ghatta (Water Mill)
Wooden runners	Metallic runners
The wooden blades need replacement every year or two, as the flowing water wears them out	Metal runners, are designed to optimise the efficiency of the runner as well as to gain maximum power from the available hydro- power

The water hits the runner blades and the shaft coupled with the runner begins to rotate. When the runner rotates, the grinding stone also rotates at the same speed. The feed to the grinding stone should be controlled from the hopper itself. For its operation, fill the hopper with grinding materials. Divert water to enter the penstock pipe, which is tilted at 30⁰ with the horizontal. In case of additional end use connect it to the shaft coupled a pulley using flat belts.

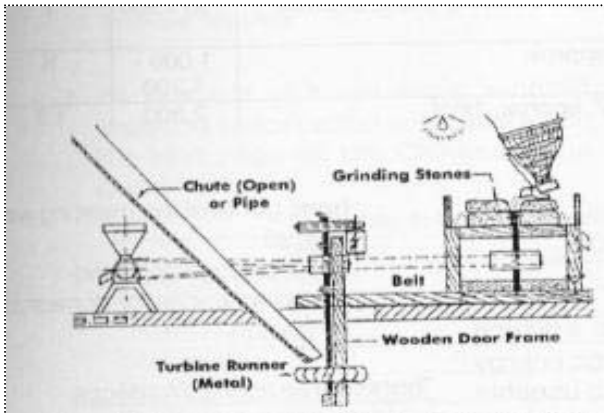


Figure: Improved Water Mill for Multiple Application (Sketch on the left and photo of Operation for Grinding on the right)

The technology has a direct impact that is tangible and felt quickly that increases both efficiency and demand. The immediate effect is that mills can be used for a longer period into dry season and - through their increased energy output- the quality of the milling services offered to the local community improves. The improved service quality is translated into a higher agro processing capacity (milling capacity often doubles) and/or diversified range of services (hulling, oil expelling, saw milling etc). An IWM also generates electricity for remote villages contributing to the quality of their livelihood.

3. Improvement of Water Mills

The history of IWM development in Nepal dates back to 1984, when the German Appropriate Technology Exchange of the German Technical Cooperation (GTZ/GATE) initiated a programme aiming for dissemination of IWM. From 1990 onwards the Centre for Rural Technology, Nepal (CRT/N), with the assistance of GTZ and other development organisations, has actively involved in the promotion and dissemination of IWM through supporting traditional Ghatta (Water Mill) owners for improvement.

The momentum of the improvement activities geared up with the initiation of the Improved Water Mill (IWM) Program in 2003 with CRT/N as implementing organization as part of SNV/N's Programme Support to His Majesty's Government of Nepal's Renewable Energy Sector Support (RESS). The programme aims to improve the living condition of rural households in hill and remote hill districts of Nepal, taking advantage of the significant development potential of efficient use of hydro power through IWM.

The overall objective of the program is to develop and disseminate Improved Water Mills as a sustainable energy source in the mid and high hill districts of Nepal to provide rural energy services to the village communities. The programme aims particularly to improve the sustainability of the sector as a

whole, planning activities at macro-(institutional strengthening), meso-(private sector company) and micro-(support to miller association) level. Because of the program support, it has been possible to install more than 1000 IWMs within a short period of 2 years whereas it took about 20 years to do the same numbers in the earlier promotional phases.

4. Approaches Adopted by IWM Program and Institutional Linkages

IWM Program has adopted approaches that lead towards making the program sustainable. It has emphasized for active collaboration and participation of private-public sector partnership on the basis of their comparative advantage regarding different aspects of the program. Focus has been given for the effective institutional linkages among the program partners such as Centre for Rural Technology, Nepal (CRT/N) as implementing agency, Alternative Energy Promotion Centre (AEPC), the government's wing for the promotion of alternative energy and executing agency of IWM program, SNV/Nepal representing the donor, development organizations involved in the promotion of the technology, Service Providers, Water Mill Owners and its Users.

To promote supply driven approach, the programme has adopted the demand driven approach for IWM promotion based on local needs identified through area level surveys. For mass awareness, a number of orientation/demonstrations on the technology were held at various centrally located sites of the program areas. Focus has also been given for the active participation of the local millers from the inception of the program itself. For building local capability a number of training activities have been organized for stakeholders such as service providers, millers and private workshops etc. for effective delivery of quality services.

5. Involvement of Private Sector for Effective and Quality Services

Role of private - NGO sector organizations has been very much instrumental in the effective delivery of quality services for the promotion and dissemination of the technology within the program in Nepal. The major private organizations involved for the delivery of various services in the program are as follows.

5.1 The Centre for Rural Technology, Nepal (CRT/N)

CRT/N is the lead organization responsible for the implementation of the whole program. Within the framework of the program, CRT/N has worked closely with government agencies, donors, development organizations, I/NGOs, private sector organizations, Service Providers etc. for its smooth implementation.

5.2 IWM Service Centres

IWM Service Centres are private sector entity, pre-qualified by the program to work at the local level, are the key actors in delivering socio-technical services required by the mill owners. Presently 16 IWM Service

Centres are working in 16 districts, one in each district. They are responsible for inventory of water mills in program districts, social mobilization, Water Mill Owners' Group/ Association formation, Orientation/Demonstration organization, feasibility survey, procurement of IWM components from manufacturers, linking with micro-financing institutions to facilitate credit support to interested mill owners, installation of IWMs, providing after sale services etc.

5.3 Private Manufacturers / Workshops

Private workshops and manufacturers are responsible to produce standard kits suitable for various end use purposes as per required by the mill owners. Presently 8 manufacturers are pre-qualified by the program for ensuring the supply of quality products. The quality of the products is checked and controlled by CRT/N.

4.4. Micro-finance Institutions (MFIs)

MFIs are also key players responsible basically to administer credit support to interested mill owners in coordination with IWM Service Centres. Although MFIs were expected to deliver required credit to the millers, they seem still weak in the program. Presently, IWM installation is mostly done through self-financing by the millers themselves with some subsidy support for the installation activities.

4.5 Water Mill Owners' Association

It works basically as pressure group for the rights of the mill owners and for awareness campaign among the millers and users not only for IWM promotion but also for social and income generating activities linking with other renewable energy. Some associations are also working as IWM Service Centers and MFIs

5.6 Local Blacksmiths

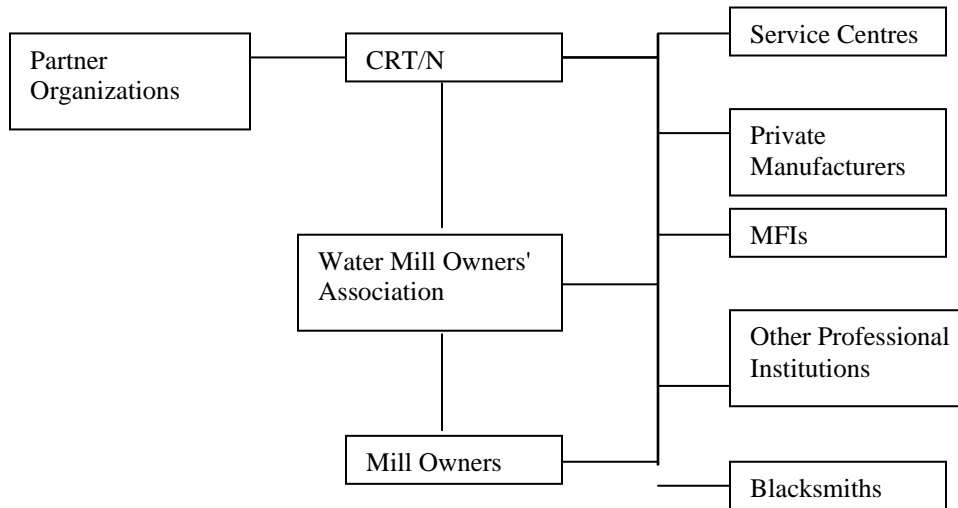
They are available at the local level for the supply of spare parts required for regular repair and maintenance of the technology.

5.7 Other Professional Institutions

They are institutions that undertake various program related important activities such as trainings, studies and assessments, publication related works etc. Their role has been quite useful, mainly in local capability development through skill and entrepreneurship development and potential end use diversification.

All the private partners have played their important role in a very effective way to make the program a success. But the role played by them was not an independent one. One is crucially dependent on other. The institutional linkages

highlighting private - public sector collaboration can be viewed from the sketch below:



6. Key Lessons Learned for Programme Success and Sustainability

Public - Private Partnership: The programme has many stakeholders. Each stakeholder has its own role and cannot be replaced by other. For the success of the IWM programme, private stakeholders have played very important role, however, with proper guidance and support of the public sector partners that mainly government and donor organizations.

Local Participation: Mill owners have effectively participated in the programme since the inception of the programme. Their participation started right from the contact with them while undertaking the inventory of the mills in the programme districts. Not only the mill owners, participation of the Service Providers also been quite instrumental in effective implementation of the programme. This has helped in smooth carrying of the activities in a sustainable way in future.

Institutionalisation: The nature of the partners varied in different programme districts and their institutional capabilities were also different. This has been one of the most challenging activities for the programme to build them up on self-sustainable basis. However, with their institutionalisation in a coordinated way the programme progressed ahead smoothly. The formation and functioning of established Mill Owners' Association in each programme district ensures the continued support to the mill owners in the future. .

Local Capability Development: A number of local capability development activities, mainly the training, were carried out within the framework of the programme. This has helped in building the confidence of the local stakeholders

involved in the programme. This has significantly helped to have productive outcome of the programme activities undertaken. This eventually will also be useful to widely replicate the program ideas in other areas in due course of time.

Integration of Activities: IWM Service Centres and Mill Owners' Association are actively involved to identify and develop complementary measures to integrate other renewable energy as well as socio-economic activities around IWM rather than focusing only on IWM activities. This has also helped in sustenance of the program around IWM on one hand and creation of more jobs for the Service Providers on the other.

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