

Problems Associated with Private/ Decentralised MMHP Plants and Possible Redressal

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Introduction

Considerable progress has been made in China, Nepal, and Pakistan in developing and implementing mini-and micro-hydropower (MMHP). In spite of this progress, a number of serious problems related to MMHP still exist. These problems and, to some extent, their causes and remedies are discussed below.

Problems of Private Plants

Funding

In Nepal, the funding available for MMHP projects has been rather low and inconsistent. The inconsistency and the recent decline in funds compelled some manufacturers to quit the MMHP business and divert their production capacities to other items. This seems to have increased the MMHP costs. The financing of MMHP through the Agricultural Development Bank of Nepal (ADB/N) has been vital for the success of the MMHP programme in Nepal. The lack of compatible financial arrangements in some other countries has proved to be a serious handicap. Poor repayment of bank loans for MMHP has also become a serious concern in Nepal. The fluctuation of interest rates in Nepal, within a range of from 15 to 19 per cent, is said to have had negative impacts on the confidence of entrepreneurs. The underlying reason for the fluctuating funds seems to be the low priority accorded to renewable resources in the region.

Policies and Implementation Procedures

The main problem in the planning and installation of MMHP plants is the lack of coordination between the various agencies concerned. The 1992 Hydropower Development Policy of Nepal requires the Nepal Electricity Authority (NEA) to buy those Micro-hydropower Plants (MHP) which are affected by its grid extension. However, in practice, problems have emerged in the implementation of this policy. This may discourage investors from investing in MHP.

The ADB/N has a policy of not financing turbine mills within a four-mile radius of an existing turbine mill, because of possible financial difficulties for the plants. But this policy does not seem to have been strictly adhered to. A number of plants failed due to

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poor screening of entrepreneurs in terms of their managerial and technical abilities. Over-estimation of harnessable power and revenues has also been reported as one of the causes of MMHP failure. The current situation is partly due to the heavy reliance on manufacturers of MHP in all aspects of MHP development. There is no system for evaluating plant performance after the plant is commissioned. Such a system could help the owners to improve plant performance. Water rights' regulations are detailed in Nepal. However, there are still some ambiguities related to water rights' guarantees for MHP. At present, there is no integration of MMHP, private or government, with other development endeavours in any of the countries of the region, except for China, and the government agencies responsible for rural electrification are yet to realise the importance of private MMHP installations.

Costs

The costs of the indigenously-developed electrification MMHP plants have been rising in Nepal at a much higher rate than could be explained by inflation alone. At present, the plant costs (below 25kW) are approaching US\$ 2,000 /kW. The capital costs of MMHP plants are also 10 times higher than those of diesel engine systems (prime movers only).

The costs of indigenous MHP plants are much lower than those of equipment imported from developed countries. The rising costs of MHP plants may partly be explained by the increasing costs of raw materials, fluctuation in the volume of business, and improvements in technology, including introduction of new components such as electronic load controllers and lightning arresters.

Profitability

Many MHP plants have reported inadequate profits. The reasons for the poor performance of MHP are severe competition; abject poverty of the people in some areas; frequent plant breakdowns; low plant factors, especially for electrification schemes; less water available than expected; poor management; and difficulties in repair and maintenance due to the remoteness of plants.

In general MHP plants used for agro-processing operations are commercially viable (more than 20 per cent profit on the original investment), whereas MHP plants used for electricity generation are much less viable.

Technology

Both in Pakistan and Nepal, there have been many reports of plant failures and other technological breakdowns. Similar failures were reported from earlier Chinese installations. The common problems reported are :

- damage to power channels and other civil structures;
- damage to turbine bearings as well as shafts;
- water leakages from joints and so on;
- damage to turbine runners;

- frequent damage to the water regulating vanes or valves;
- frequent damage to generators and control equipment;
- excessive voltage fluctuations causing bulb damage; and
- frequent damage to transmission lines.

Overall, the quality, performance, and life of indigenously manufactured equipment are relatively lower than for imported ones. However, the cost of equipment and spare parts is much higher for imported equipment. With the exception of China, R&D activities and facilities in the region are poor. A few NGOs, such as DCS and ITDG in Nepal, are involved in R&D. The reasons for plant breakdowns include the low quality of equipment installed, improper installation, operation by untrained personnel, and inadequate maintenance.

The overall situation in terms of breakdowns of indigenous plants has improved in China, Pakistan, and Nepal. However, actual improvement of the technology may vary considerably from country to country.

Management of MMHP Plants

The low management capabilities of plant owners are a matter of great concern. Poor management of plants may be attributed to the following factors: negligible attention in terms of plant management; lack of understanding of financial management; poor technical know-how; and owners' low level education.

Operation, Maintenance, and Repair

The level of expertise of operators is very low in Nepal and Pakistan. The turnover in plant operators is high. Many serious breakdowns could have been avoided if the operators had been competent. Delays in repair are common, due to the remoteness of the plant location.

Training

The training facilities for MMHP-related personnel in the region are inadequate, except in the case of China. Limited training is arranged in Nepal on an intermittent basis. Training needs have been identified in the following areas.

- (a) For decision-makers: project economics, technological awareness, funding systems, project implementation, etc
- (b) For communities and their leaders: benefits and limitations of MMHP, role of communities and leadership, end uses
- (c) For surveyors: flow and head measurement, plant layout, geology, hydrology, and so on
- (d) For designers: design, construction, and supervision
- (e) For mechanical/electrical engineers: electro-mechanical equipment, governing/control systems, instrumentation, installation, testing, commissioning, transmission distribution systems, etc

- (f) For manufacturers: manufacturing technology, quality control, dimensional accuracy, etc
- (g) For owners/managers: plant operation, load management, speed/frequency control, book-keeping, organisation and scheduling of maintenance and repair, and public relations
- (h) For operators: operation and maintenance
- (i) For mechanics/technicians: operation, repair, and maintenance procedures
- (j) For bank personnel: technical and financial performance of plants

Plant Capacity Utilisation

There are many cases of poor plant capacity utilisation. These cases are either due to inflated projections of local demand for various services or due to the inability of managers to create the potential demands and end uses. Efforts to increase end uses of MMHP, directed mainly towards electric cooking and water heating, are still to gather momentum. R&D efforts in promoting industrial end uses are inadequate.

Social Problems

The plants serving non-cohesive communities have suffered from pilferage of electricity, difficulties in revenue collection, and difficulties in repair and maintenance. Clan conflicts have proved to result in serious difficulties in plant operation. The problems stemming from such conflicts are water rights' problems, boycott of plants, etc. Difficulties experienced in collecting electricity revenues are common. These can be aggravated by poor quality electricity and frequent interruptions in supply.

Redressal of the Problems: Measures Identified

Measures identified to redress the problems associated with MMHP dissemination based mainly on the findings of the Country Reports are listed below.¹³ However, some of the measures listed have been formulated during or after the Consultative Meeting.

Funding

- Adequate funds should be made available on a regular and consistent basis.
- The prevalent interest rates should be lowered.

Policies and Implementation

- Governments should clearly declare support policies for private, decentralised, and indigenous MMHP installations. Remote and inaccessible areas where extension of grid electricity is not economical, could be earmarked for preferential propagation of MMHP plants.
- Loans and subsidies should be implemented judiciously.

¹³ Reports prepared for ICIMOD.

- Working relationships should be established between agencies such as NEA, ADB/N, and others, in order to avoid overlapping and wastage.
- A suitable institution should be established to oversee the overall development of MMHP, arrange various inputs, and establish liaisons with various agencies.
- Guidelines should be prepared and implemented to evaluate the capabilities of the recipient entrepreneurs, as well as to enquire about potential conflicts within the locality or service area of the proposed MMHP plant.
- Some legislation or guidelines are necessary for sorting out water rights' issues.

Costs

R&D efforts are necessary for reducing the costs of indigenous equipment, as well as other efforts which may include inquiries into cost escalation, evaluating possibilities of importing some of the equipment from neighbouring countries (e.g., India, China), and so on.

Economic Return on Investments

- Adequate feasibility studies should be carried out by an independent organisation to evaluate the business opportunities for a proposed plant.
- Proximity regulations, such as the four-mile limit, should be implemented strictly.
- Plant managers and operators should be adequately trained to manage the business properly.

Technology

- R&D should be enhanced to improve the quality of indigenously manufactured equipment.
- Adequate training should be organised for plant designers, surveyors, manufacturers, installers, and so on.
- Manuals/guidelines should be prepared for designers, manufacturers, surveyors, and installers.

Plant Management

- Adequate training should be organised for the plant owners/managers.
- A system of post-installation evaluation of MMHP plants should be introduced.

Operation Maintenance and Repair

- Adequate training should be organised for the operators.
- Optimal systems of repair should be studied for a given area and the owners should be advised to follow these procedures.

Plant Capacity Utilisation

- Adequate R&D efforts should be made to develop appropriate end uses.
- Training for the community and its leaders should be organised to motivate them to introduce various end uses.