Handpump Technology Network

Technical Paper 1
1998

Guidelines for Selection and Standardisation of Handpump Technology

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Background

Over 1.2 billion people in developing countries throughout the world lack safe water supplies. In view of the financial and technical resource constraints faced by many developing countries, the water supplies will need to be provided initially with a low cost solution. In most cases, this solution takes the form of the handpump. It is estimated that over a billion people across the world already depend on a handpump-based water supply with a capital investment in excess of US$3.5 billion. In India alone, some three million deepwell handpumps serve 500 million people.

To a large extent, the reliability and sustainability of a handpump-based water supply programme depends on the selection of an appropriate technology, its standardisation and an effective quality assurance mechanism. The technology should be reliable and sustainable under country-specific field conditions and with available resources. Standardisation facilitates maintenance by reducing the variety of spares and simplifying the training required in the running of the programmes meant to extend improved water supplies through handpumps.

It is important to point out examples of handpump programme failures attributable to an improper choice of technology. In Sri Lanka, for example, the introduction of deepwell handpumps with galvanized iron riser pipes for use in wells with corrosive water soon resulted in them falling into disuse as the steel pipes contributed to increasing the iron content in water to unacceptable levels. This led to abandoning the water sources. Similarly, frequent breakdowns of a handpump, due to technical and financial resources not being commensurate with the maintenance requirements can make the handpump an unacceptable option. The technology selection therefore needs to be carried out carefully.

A procedure for handpump selection[1] has evolved in the course of the implementation of handpump programmes in several developing countries over the last two decades. This comprises of defining the field conditions; establishing performance criteria; carrying out a literature search to shortlist

[1] UNICEF Guidelines for Handpump Selection & Standardization, 1996

handpumps for field testing; pilot scale testing; large scale testing of one or two handpump models and consultation among sector partners to develop a consensus on handpump(s) for standardisation.

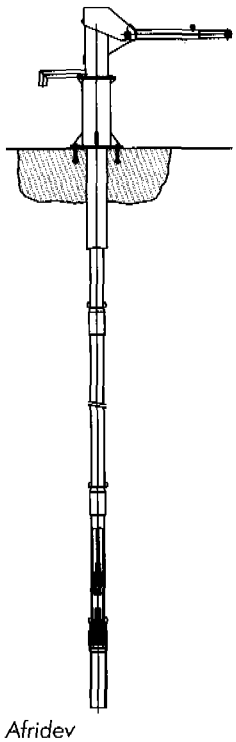
In view of the increasing number of countries opting for handpumps for rural water supplies, there is a clear need for generic guidelines for selecting and standardising handpump technology. This guideline is the distillation of global experiences in handpump programmes and can be applied by governments and donors while advocating for the handpump technology option.

Role of External Support Agencies

Donors, in most cases, are major partners with governments, and powerful advocates for policies, strategies and technologies in the rural water supply and sanitation sector. Consequently, donor advocacy has implications on a national scale. Caution and objectivity, are called for, irrespective of the interest of an organisation, to reach a rapid decision in handpump selection.

Advocating for a better handpump that is cost effective, reliable and affordable by user groups is essential. External support agencies (ESAs) should facilitate the decision-making process, wherever necessary, by offering unbiased support and maintaining objectivity.

Handpump Technology Choice



Afridev

A number of handpump designs, both branded (proprietary) and public domain, are available to meet various field conditions. The Handpumps Project of UNDP and the World Bank has extensively documented laboratory and field test results of 70 different handpump[2] models from developing and developed countries. It is therefore not easy to make a handpump choice unless a proven selection process is followed to decide on the most appropriate model. The selection process is described below:

Define Field Conditions: *It is necessary to collect field data on water quality,* the static water level during the dry season, the type of borehole (lined or unlined), number of users per pump, present and/or proposed maintenance structure, local resources (both, technical and financial) available for maintenance and local manufacturing capability and capacity. For example, if the water is corrosive, the use of handpumps with non-corrosive components will be required.

Establish Performance Criteria: Based on field conditions, define the performance requirements expected of the handpump. This will include minimum acceptable discharge against the maximum head, reliability (frequency of maintenance interventions and at what level that can be managed), maintainability (level of skills and details of the tools required to carry out normal maintenance) and robustness (to withstand expected usage), resistance to corrosion and abrasion and suitability for local manufacture.

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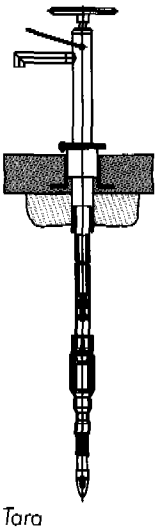
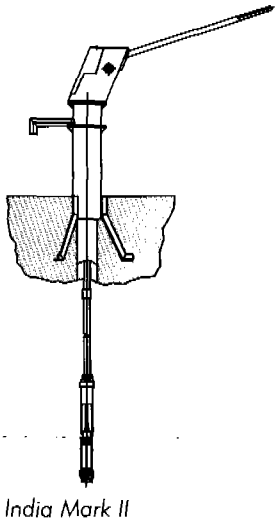
[2] Community Water Supply - The Handpump Option, a World Bank Publication



Tara



India Mark II

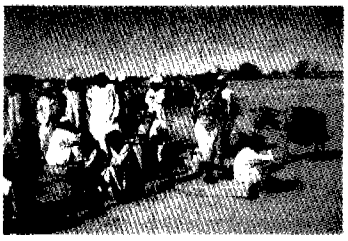
Carry out Literature Search: Carry out a literature search and prepare a list of handpumps meeting the performance requirements. Compare the handpumps based on reliable field data available to select handpumps that have performed well under similar field conditions. Select a maximum of two handpump designs for pilot scale trials.

Pilot Scale Testing: A small number (50 to 100) of each potential handpump selected as per the process described above should be field tested under rigorous conditions (maximum static water level and high usage) and monitored carefully for at least two years to assess its performance in terms of reliability, maintainability, cost effectiveness and sustainability. This field testing is considered sufficient for introducing a handpump on a large scale in a rural water supply project.

Large-Scale Testing: However, if it is intended to adopt a particular handpump design as a national standard, it is necessary to carry out large scale field trials. In such a case, the most successful handpump should be tested and monitored by an independent agency for its Village Level Operation and Management of Maintenance (VLOM) performance on a large scale (500 to 1000), under normal field conditions for at least two years. The handpumps should preferably be spread over three or four locations representing various hydrogeological, geographical and cultural settings. The performance should be assessed in terms of maintainability, reliability, maintenance costs and user acceptability. If the large-scale trials are successful, the handpump design may be considered for adoption on a national scale.

Developing Consensus Among Sector Partners: Through a process of consultation between the Government, the national standards organisation, potential manufacturers, sector partners and communities, a consensus should be reached on the type of pump(s) for national level standardisation. ESAs can play an important role in facilitating this process.

Public Domain Handpumps



The public domain handpumps (Tara, Afridev, India Mark II and India Mark III) developed as a result of concerted efforts of many years by sector partners, governments and manufacturers have been adopted on a large scale in several countries and a vast amount of reliable data are available on their performance. The designs of these pumps are updated regularly and detailed product specifications are available. Moreover, a number of manufacturers make each of these public domain handpumps in many countries. Competition has resulted in lower prices and attractive delivery periods. Additionally, there is no need for the payment of royalties, should a manufacturer in a country wish to start local production. Unless there are overriding reasons, a public domain handpump backed by R & D for fine tuning the design, is always preferred. However, care should be taken to ensure that well-established private sector proprietary handpumps are not discouraged. In any event, the final decision has to be based on many factors, including affordability and sustainability.

Benefits of Standardisation

Handpump standardisation on a national level offers significant benefits that should not be ignored. These include limiting the variety of spare parts and training that is required, more efficient inventory control, minimising fragmentation of market demand thereby increasing the economic viability of local production and reducing the cost of the handpump and its spare parts.

The experience in the last two decades indicates that several countries have benefited substantially by standardizing on one or two handpumps. The standardisation of the India Mark II in India, the Tara handpump in Bangladesh and the Afridev in Pakistan, has been the single most important factor leading to widely acclaimed success stories in these countries. Another common factor was the rigorous field testing of handpumps in a systematic manner before making a country wide standardisation commitment.

The visible benefit of standardisation on public domain handpumps is a reduction in price. For example, the India Mark II handpump was priced at US$ 120 in the early 1980s while in 1998 it is available for US$ 98. By comparison, the price of the Afridev handpump came down from over US$ 600 in the early 1980's to US$ 220 in 1998 in spite of inflation. The savings in training and maintenance costs due to standardisation are also very substantial.

Lessons Learnt

Country level handpump standardisation may take four to five years. There are no short cuts to attain sustainable standardisation. No matter how strong the desire may be to introduce a new handpump model or make a change in its design, the proven process of technology selection although time consuming, must precede the standardisation. Any compromise in this approach will result in a loss of confidence in handpump technology.

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