

AGRICULTURAL MECHANIZATION AND LIVELIHOOD OF RURAL POOR IN BANGLADESH - THE CONTRIBUTION OF REFPI PROJECT

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ABSTRACT

This paper describes the current changes of agricultural mechanization in Bangladesh and the livelihood consequences of it. A research and extension project called Research and Extension in Farm Power Issues (REFPI) has been progressing with the financial support of DFID, UK. About forty sub-projects have been underway on various dimensions of agricultural engineering fields, including machinery, crop and fruit processing, socio-economic and environmental issues. The REFPI works in a slightly different way of implementing projects with competitive research grant. Its contribution of alleviating poverty through agricultural mechanization, including a few case studies, has been discussed. The success of REFPI has already been appreciated by many corners. A process has been initiated following the REFPI model for management of future agricultural research grant at national level in Bangladesh.

INTRODUCTION

Bangladesh's accomplishments in transforming its devastated agricultural sector into one of the most productive farm economics in all of South Asia is a major development success story. One racked by famine and dependent on food imports, the country is now essentially self sufficient in rice, is emerging as a significant exporter of high-value agricultural products and enjoys the second highest percentage growth in per capita income in South Asia. Its success is largely a story of close cooperation between the government of Bangladesh and its people with foreign aid agencies.

Bangladesh has a population of 131 million – about 1007 persons per square kilometer. Having limited natural resources and over burdened with this huge population its economy is basically agrarian and hence, role of agriculture is predominant from grass root to national level. The combined contribution of its all sub sectors in GDP (crops, livestock and fishery) is about 31.5. Sixty-three per cent of total employment is in agriculture and

57% is engaged in crop sector alone. Within the past few years, Bangladesh has reached self-sufficiency in its main cereal, rice. Rice production increased from 11.7 million metric tons in 1974 to 23.1 million tons in 2000, an average annual increase of 3.6 per cent. Wheat production climbed from 0.11 million metric tons in 1974 to 1.8 million metric tons in 2000. Cereal prices are low and stable, and production continues to increase. The economy also is showing rapid diversification particularly in the crop, livestock and poultry sectors. Exports of agricultural products accounted for near about 10.4% of total exports. Furthermore, the contribution of agriculture in agro-based industrial products is also significant. Agricultural exports, bout bulk commodities and higher-valued processed products, grew by nearly 5 per cent over the last five years. The role of its agriculture is unique for food security, poverty alleviation and sustainable economic growth.

EVOLUTION OF FARM POWER IN BANGLADESH

Farm power (either from human, animal or mechanical sources) for crop production, processing, irrigation and transport has become a critically important input in agricultural production in Bangladesh. Over the last two decades, the use of mechanical farm power has increased rapidly. Irrigation is now practically fully mechanised as about one million diesel and electric driven pumps lift ground and surface water. Recent survey reports indicate that by 2000 about 60-70% of the land was tilled by power tillers while marginal farmers have equal access to these machines through private contractor services. In the past women spend many hours processing rice with the foot operated dekhi but today rice hullers and mills have taken over this task.

Small diesel engines imported from China are the most common source of power for all these agricultural activities. At the same time these have also been widely adapted in riverboats and more recently, in motorised vans providing essential transport in the rural areas. A vibrant service sector comprising out of many small (and few larger) businesses has developed to import, distribute and maintain this equipment while most tools, implements and spare parts are locally manufactured by thousands of workshops in all corners of the country.

Despite all these developments, manual labour remains the highest input cost in rice production in the country, as it is still essential for transplanting, weeding, harvesting, threshing, drying and many other activities. No doubt Bangladeshi farmers and rural entrepreneurs will further mechanise some of these operations to reduce costs and increase timeline. Research and extension is required to support this process of mechanisation and for better understanding of the impact this might have on the livelihoods of the rural poor such as marginal farmers, agricultural labourers and rural artisans, both male and female.

THE REFPI PROJECT

Research and extension in Farm Power Issues (REFPI) Project has started functioning in early 2000 in the Department of Farm Power and Machinery (DFPM) of Bangladesh Agricultural University. Department for International Development (DFID) of UK provides financial and technical assistance not only to the DFPM but through a competitive research fund, also to all other institutions that are involved in research and extension on farm power issues. The implementation period is from April 2000 to December 2003

The long-term goal of the REFPI project is to make a positive contribution towards improved livelihoods of the rural poor through facilitating increased access to more effective and efficient farm power and machineries used by small farm and rural systems in Bangladesh.

It intends to reach this goal through strengthening of the capacities of Government, NGO and private sector institutions to carry out appropriate research and extension work on farm power and machineries issues that are relevant for the rural poor. The impacts of these activities are not likely to be measurable during the project duration but are expected to take effect well after completion of the implementation period. In the medium term, the project will make a significant contribution towards institutional development through more capable Department of Farm Power and Machinery (DFPM) at the Bangladesh Agricultural University (BAU) and improved contacts between the BAU and other research and extension organisations (GO/NGO and private) in the country resulting in a more efficient use of farm power and machineries.

REFPI follows the principles set out in the Sustainable Livelihoods Approach (SLA) adopted by DFID and many other donor agencies. REFPI puts SLA in practice through:

- a) Participatory research methodologies by stimulating project partners to engage with the various stakeholders such as small rural businesses, marginal farmers and labourers.
- b) Collaborate implementation of the research and extension projects through meaningful partnerships between GO, NGO and private sector institutions.
- c) Building of capacity of BAU and other partner organisations to sustain RD&E work through provision of institutional training and technical guidance.
- d) Networking between (inter)national organisations that are contributing to an effective farm power sector through contacts, meetings, exchange visits.

Implementation of the project

The DFPM of the BAU is the leading partner in this project and REFPI has located its office there. Two staff members of the Department have joined the project as Project and Research Co-ordinator respectively while, DFID provides a Technical Advisor, support

staff and an operating budget to the project.

A Project Advisory Committee (PAC) is composed of respected persons from different organisations and professional background with an interest in the project's objectives. The PAC meets 2-3 times per year to advise the project management in determining priorities for RD & E projects and the reviewing of the research projects selected through an anonymous evaluation process. The PAC also assists the project in maintaining linkages with other institutions.

The total REFPI project funds are £1,6 million out of which £0.6 million are earmarked for research grants. The RD & E funds are equally available to the BAU as well as other GoB research organisations, NGOs and private sector parties. Research grants are awarded on a competitive basis through a two-stage selection process using concept notes and full proposals.

Guidelines and training for preparing proposals are provided by REFPI to meet the following criteria:

1. Clear relationship to the use of farm power for cultivation, irrigation, harvesting, processing or transport of agricultural products by small farmers, landless or other resources poor groups
2. The need for the research should be demand led and established through a participatory process
3. Proven or realistic pathways for dissemination of the results of the research are available and an integral part of the RD & E proposal
4. Means of measuring the uptake and impact of the project activities have been identified

Priorities for RD & E have been based on a number of participatory farmer's need assessments carried out during the first year of the project. These and consultation with PAC members have resulted in the following RD&E research themes:

By 2002 REFPI had agreed nearly 40 RD&E projects covering a wide variety of subjects (Table 1) and partners (Table 2). The projects locations range from Dinajpur in the North West to Cox's Bazaar in the South East but with a concentration around Mymensingh where BAU traditionally has a strong network.

THE CONTRIBUTION OF THE REFPI PROJECT

Rural life in Bangladesh is changing fast. Rural power is playing a key part in this transformation. A vibrant sector has developed to service the mechanisation process, peopled by businessmen who import equipment to village-level craftsmen who repair it and manufacture tools and spare parts. The number of small shops in villages has increased substantially, as has petty trading in villages and bazaars. We are seeing the

rapid development of rural industry and explosive growth of the rural transport sector. Rural people are taking advantage of these changes to diversify their livelihoods. REFPI has virtually acts as a catalytic agent in creating momentum of alleviating poverty, working in diversified areas agricultural mechanization (Table 1) through GO, NGO and private institutions in collaborative manner (Figure 1).

Access to technology and sources of power is crucial to the poor. This is borne out by the fact that poverty levels are significantly lower in countries that have shown high adoption rates for new technologies. But, all too often, the poor do not have access to power or new technologies. The Research and Extension on Farm Power Issues project (REFPI) aims to address this inequality. It set out to develop and test approaches for delivering appropriate rural power technologies and information to poor rural households.

Table 1 Classification of RD&E projects by subject

<i>Subject area</i>	<i>Number</i>
Equipment (threshers, reaper, spreader, potato, drying, briquette)	13
Food processing technologies	9
Gender targeted equipment	8
<i>Livelihoods, gender and health studies</i>	7
Irrigation systems and equipment	4
Enterprise development	4
Extension packages and field work	3

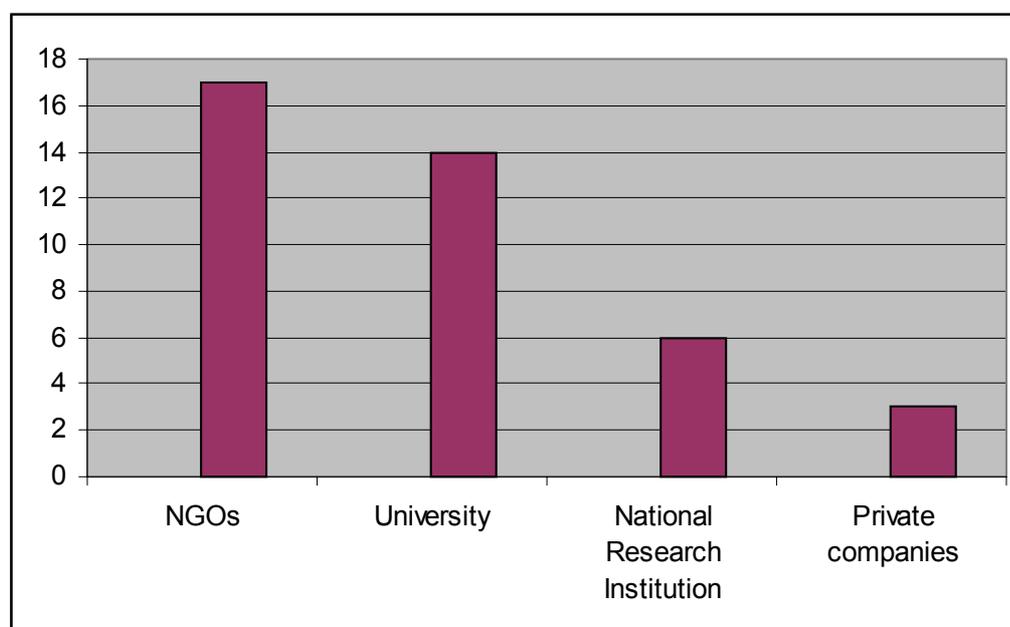


Figure 1: Classification of RD&E projects by lead institution

The achievements of REFPI go beyond establishing a ‘new way of working’. Evidence is

emerging that this new way of working has tangible impacts on the livelihoods of the poor. Among the most impressive and unexpected are to do with increasing poor people's access to farm power, and information on farm power. This alone has:

- Increased labour productivity and reduced labour shortages
- Reduced workloads and drudgery, especially for women
- Created livelihood opportunities, particularly for the landless, such as a hire service for farm implements
- Created a skilled labour pool amongst agricultural labourers
- Improved service availability for those who cannot afford to purchase their own machinery
- Created new livelihood opportunities in agro processing
- Generated employment opportunities
- Stimulated local entrepreneurship
- Empowered partners, entrepreneurs and women

Case study 1: Farm implements and livelihood impact on women in Lalmonirhat District

RDRS is a large national NGO, which works with a local NGO in northwestern Bangladesh to develop and promote simple farm implements for women. Skill development and gender awareness training for men and women have been key parts of the programme. RDRS has tested a range of implements which have met with varying degrees of acceptance among women. For example, women did not take to the seed and fertiliser distributor whereas other technologies, such as wet and dry land weeders, proved more popular. The programme has created a demand for tools within the community, which local blacksmiths are now satisfying. Benefits of adoption include reduced drudgery and time saving for women, development of skilled and more productive labour. In themselves, the tools help to empower women. There is also demand within the community for more sophisticated and expensive machinery and implements – providing RDRS with new challenges.

Case study 2: A locally developed power thresher and livelihood impact on farmers' health and drudgery

GRAMUS, a local NGO in Mymensingh has introduced a paddy thresher locally developed by a national GO research institution on cost sharing basis through a sub-project of REFPI. Men and women equally liked the technology as it has provided a good number of benefits to them such as, decreased working hours and drudgery by 80%; increased income as grain quality improved and grain losses decreased. It is interesting to note that the farmers are better off and are free from stomach ache as they are consuming quality grain today. They had a complain of stomach ache when they could not thresh their harvested grain in a day or two. As a result the wet grain started deteriorating the quality. They had to consume this low

quality grain as it had low market price and suffered stomachache. This is a clear example how mechanization has improved the livelihood of rural.

EMERGING LESSONS

The REFPI project has accumulated three and half years of experience. Some key lessons have emerged about how to make project work relevant to poor peoples' livelihoods.

Lesson 1 : Adopt a practical interpretation of the SL oach

REFPI adopted a broad definition of farm power, embracing all aspects of technology in rural development, covering the three power sources (human, animal and mechanical), the way the power is applied through tools, implements and machines and the effects on the well being of humans and the environment. The message to all those involved in REFPI has been clear: poor peoples' livelihoods are the focus of the project. It took a practical approach by:

- developing a short-hand project title to remind people of its focus: Rural Livelihoods and Farm Power;
- adopting a demand-driven participatory approach to identifying poor peoples' needs and priorities;
- mainstreaming gender and environment issues;
- adopting a multidisciplinary approach;
- bringing institutions that interface with the poor and affect their daily lives into partnership;
- focusing interventions locally, where change can make an immediate impact on livelihoods; and
- selecting RD&E proposals that had a realistic chance of delivering livelihood impacts within the project's timeframe.

Lesson 2 : Focus on development processes, not on target groups

REFPI cut through the difficulties of delineating target groups and debating how they may be reached. Instead, it focused on processes of poverty alleviation. It set out to identify how RD&E on farm power issues can strengthen development processes, which in turn will bring positive livelihood benefits to the poor. These include employment generation, development of income-earning opportunities, improving access to services, improving productivity, skill development, capacity building of local institutions and improvements in working environments (tackling health and safety issues). At all stages, REFPI stressed the need to be explicit about how these processes both directly and indirectly impact on the livelihoods of the poor. The challenge is to identify how RD&E on farm power issues can strengthen development processes, which in turn will bring positive livelihood benefits to the poor'

Lesson 3 : Competitive grant systems can deliver appropriate technology to the poor

The success of the REFPI CGS rests on the establishment of rules and procedures that encourage demand-led, participatory and livelihood-focused research. Many of these built on best practice in CGS such as:

- defining the RD&E agenda by identifying **poor peoples' needs** through a participatory process This is the opposite of the 'normal' way of doing things – where the ideas of the researcher – rather than the needs of the end user - drives the research;
- **Awarding funds** on the basis of merit, which provides an incentive for improving the quality of research from organisations that are subject to minimal performance incentives or sanctions;
- Funding **transparency and accountability** through a transparent and open bidding process by advertising in the national press; use open criteria to assess merit of proposals; adopt a thorough screening process and give feedback on why the proposals of unsuccessful bidders were rejected; adopt systematic and uniform monitoring; adopt appropriate and stringent financial management and develop clear rules on ownership of assets from the project..

Lesson 4 : Successful partnership go beyond role division

Partnership is a cornerstone of the REFPI project, which has promoted the message that, by itself, RD&E will rarely reach the end user. The partnerships promoted through REFPI have bridged many gaps – between technical and socioeconomic disciplines; between commercial and development agencies: between researchers and farmers. This has often challenged the boundaries and 'comfort zones' of members of the various institutions e.g. GO and NGO engagement with the private sector and BAU involvement with the informal sector – the myriad small unregulated metal workers and blacksmiths.

Partnerships often go beyond the expected 'role division', for example, universities researching and NGOs doing the extension. Institutions are increasingly aware of the potential and value of partners' knowledge, expertise and networks.

Case study 3: Agro processing as an entry point for improving livelihoods

A factory processing locally available fruits such as pineapple and jack fruit was established in Madhupur by BAU and a local NGO, Mouchas Unnayan Sangstha (MUS). A MOU was signed between REFPI, the BAU researcher and MUS. The project provided capital for essential equipment, the researcher provided technical support on food processing skills and MUS was responsible for the supply of building and services and the overall management of the project. Twelve local women are now employed in the factory and products are sold as far away as Dhaka. This project has demonstrated what is possible and has grounded in reality the idea of local agro processing, which is much talked about in policy circles. The business seems to be sustainable and is not dependent on continuing government sponsorship, buys its raw materials locally, has generated employment for women, has good food safety standards, produces high quality goods and is connected to rural and urban

markets.

Lesson 5: Use the dynamism of the private sector to reach the poor

REFPI has shown how to work successfully with the private sector. In the absence of government extension capacity in engineering, the wide network of local blacksmiths, machine workshops and entrepreneurs provides the most likely means of scaling up the dissemination of farm power technologies and information. REFPI has seized this opportunity to build skills and capacity in this sector in areas of management, accounting and technical competence. REFPI has demonstrated that the informal private sector is often the most relevant institution in terms of farm power for rural people – generating employment, providing services and as a source of technologies for farmers. Tapping into, and stimulating, the extensive network of blacksmiths and local entrepreneurs at a level that has an impact on livelihoods has been a key achievement of the project.

Case study 4: The dynamism of the private sector: transformation from metal fabricator to agricultural machinery manufacturer

Mahabub, a man in his mid-forties was a metalworker who used to fabricate grills and steel almirah. He was fascinated when a relative – a faculty member of BARI - demonstrated the use of a specially designed plough to the farmers. Mahabub came away with the idea of manufacturing agricultural implements. He also realised the importance of creating demand among farmers for farm implements and the need for capital to manufacture them. He saw REFPI's advertisement in the newspaper and prepared a concept note. REFPI suggested that he link up with the Intermediate Technology Development Group (ITDG), an international NGO. Initially, he had some problems working with ITDG, which wanted him to make spare parts. Mahabub, however, was keen to manufacture agricultural implements. Through negotiation and interaction, they settled on a compromise: Mahabub would receive training from BAU under REFPI to manufacture implements and he would also train the local blacksmiths/manufacturers to make parts. As part of this scheme he visited 8-10 districts to train local metalworkers. This collaboration helped Mahabub to expand markets for his products as he was able to establish links with BAU and NGOs such as Proshika. Mahabub eventually became an enlisted manufacturer of BARI and BRRI.

CONCLUSSIONS

The key lesson that emerges is that the development and extension of farm power technology is an important entry point for improving livelihoods of the poor. Indeed, we might extrapolate further that: ***'If the poor are not given appropriate support to access farm power and technology, they are at risk of being further marginalised from development processes'***. REFPI has demonstrated what is possible; with the right systems and incentives in place, technology research and development can make a difference to poor peoples' livelihoods. However it has achieved this on a small scale. Finally, the impact of REFPI at policy level cannot be ignored also. A proposal has been prepared to form a separate institution, called, Bangladesh Krishi Projukti Foundation, to following the concept of

REFPI to develop an alternative system of funding to improve the efficiency and effectiveness of the prevailing research system through generation, evaluation and dissemination of need-based technologies.

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