PIDS *Journal of Philippine Development*
Number Twenty-One, Volume XII, No. 1, 1985 PIDS

MA-IRRI INDUSTRIAL EXTENSION PROGRAM FOR SMALL FARM EQUIPMENT

Benito C. Gonzalo and Robert E. Stickney

I. INTRODUCTION

In September, 1981, the Ministry of Agriculture (MA) of the Philippines and the International Rice Research Institute (IRRI) initiated a collaborative effort to promote the development and extension of agricultural equipment which would be appropriate for small farms and may be fabricated in the Philippines. The MA-IRRI Industrial Extension Program for Small Farm Equipment has grown out of an informal extension effort initiated by IRRI about 15 years ago, and its objective is to institutionalize the Program within the Ministry and related organizations. The central office of the MA-IRRI Program is located at the Agricultural Engineering Division of the Bureau of Plant Industry (BPI), of the Ministry of Agriculture in Manila.

As of November 1983, 180 manufacturers had become cooperators in the MA-IRRI Program by signing a memorandum of agreement. These cooperators are located throughout most of the Philippines (see Figure 1) and range in size from small blacksmith and metalcraft shops to large-scale industries (see Table 1). Special attention is given to manufacturers located in agricultural areas, thereby ensuring availability of parts and service, creating rural employment, and stimulating innovations and adaptations to local conditions and farmer preferences. The MA-IRRI Program provides them with

---

Agricultural Engineering Division, Bureau of Plant Industry. Paper presented at the Workshop on the Consequences of Small Rice Farm Mechanization Project, December 1-2, 1983, Development Academy of the Philippines (DAP), jointly sponsored by the National Economic and Development Authority (NEDA), Philippine Institute for Development Studies (PIDS), Ministry of Agriculture (MA), and International Rice Research Institute (IRRI).

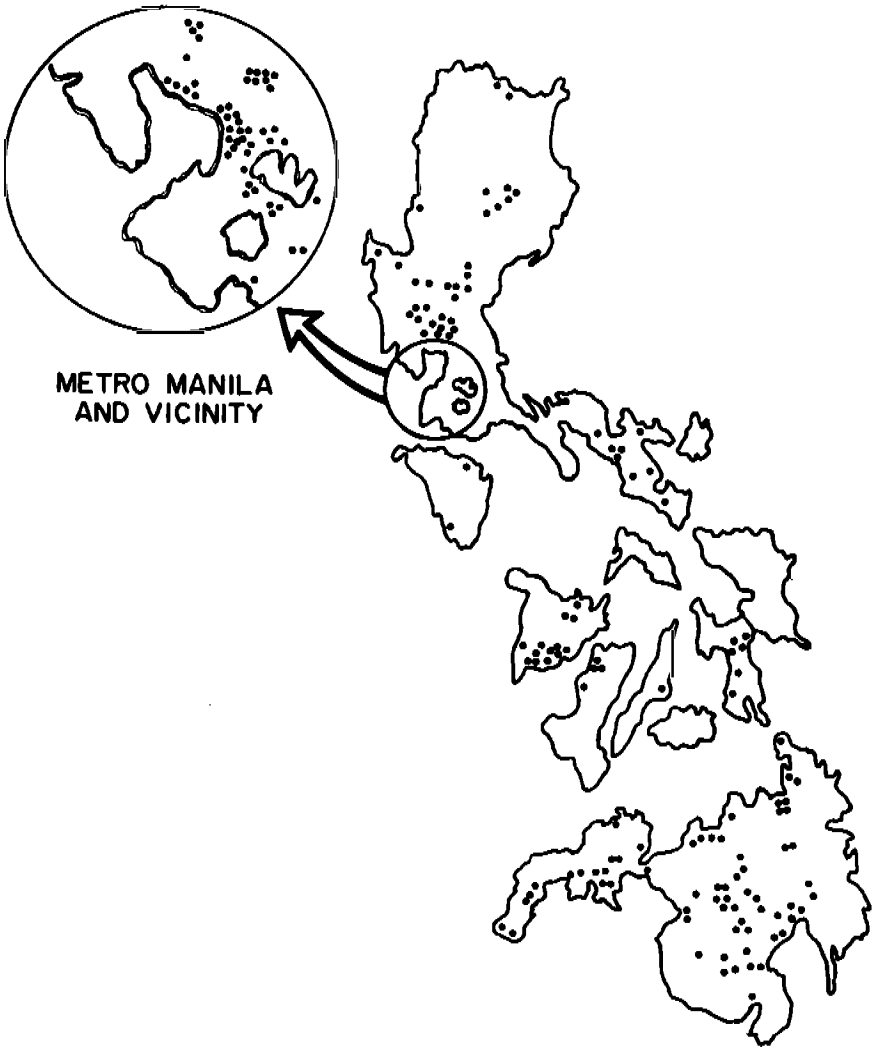


FIGURE 1
GEOGRAPHICAL LOCATION OF COOPERATING MANUFACTURERS OF THE MA-IRRI INDUSTRIAL EXTENSION PROGRAM FOR SMALL FARM EQUIPMENT

designs of agricultural equipment, together with training and technical assistance. In turn, the cooperators agree to inform MA-IRRI of annual production and to sell units only after testing and authorization by MA-IRRI.

TABLE 1
PROFILE OF COOPERATING MANUFACTURERS ACCORDING TO CAPITAL ASSETS AND LABOR[a]

Ranges		*Cooperators (%)*
Capital Assets[b]		
Cottage industry	: Below ₱100,001	43
Small industry	: ₱100,001 to ₱1,000,000	43
Medium industry	: ₱1,000,001 to ₱4,000,000	10
Large industry	: Above ₱4,000,000	4
Labor (Number of employees)		
Below 6		29
6 to 15		44
16 to 50		21
Above 50		6

a. Data as of March 1, 1983.
b. Approximate conversion rate: ₱10 per U.S. dollar.

II. EXTENSION ACTIVITIES

Equipment Promoted by the Program

At present, the MA-IRRI Program is promoting the following types of equipment (see Figure 2):

1. *Lightweight hand tractor.* This hand tractor is designed specifically for small rice farms because it is lighter and less expensive than existing designs in the Philippines.
2. *One-meter reaper.* This reaper unit attaches to the lightweight hand tractor. The principal advantages over existing reapers are: low cost, light weight, local production, availability of parts, and simplicity of operation and repair.
3. *Axial-flow thresher.* Although this thresher is popular in many parts of Luzon and Panay Island, it is relatively unknown in some of the other major rice producing areas in the Philippines.
4. *Axial-flow pump.* This pump is easily fabricated in small shops and is more efficient (300% at one meter lift) than the centrifugal pump which is now most popular among Filipino farmers.
5. *Seed and fertilizer applicator (SFA).* This animal-drawn implement applies fertilizer and seed for upland crops in a single operation. It is the newest addition to the Program and is expected to be especially popular among corn farmers.
6. *Rootcrop chipping machine.* This machine is designed for cutting cassava tubers or other rootcrops into chips to improve drying and storage. It can be powered by pedal or small engine.

Field Demonstrations/Evaluations/Trials

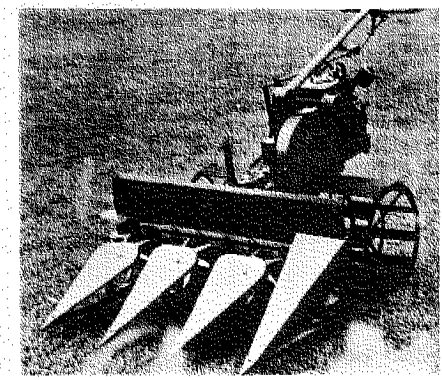
The first step was to conduct field demonstrations and evaluations of the abovementioned equipment in the major rice-producing areas of the Philippines. The MA-IRRI Regional Project Engineers[1] who live in the areas were vital to the coordination of these demonstrations, particularly with respect to ensuring that the attendees included outstanding farmers, leaders of cooperatives, local manufacturers, agricultural extension technicians, and rural bank officials.

The major results of these demonstrations were:

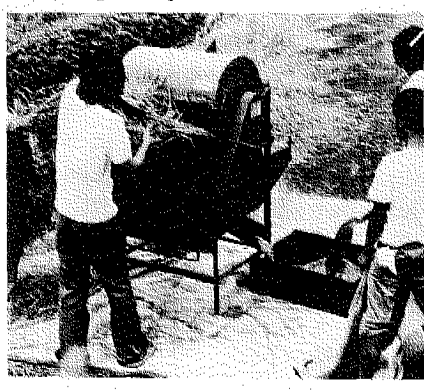
1. In evaluation sessions held at field demonstrations, farmers

1. These engineers are regular employees of the Ministry's regional offices and experimental stations, and they devote only part of their time to the MA-IRRI Program.

Lightweight Hand Tractor

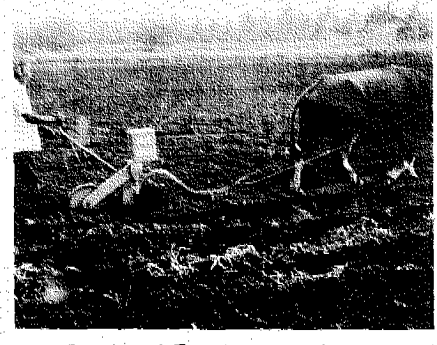


One-meter Reaper



Axial-flow Thresher

Axial-flow Pump



Seed and Fertilizer Applicator

FIGURE 2
EQUIPMENT BEING PROMOTED BY THE MA-IRRI INDUSTRIAL EXTENSION PROGRAM

indicated which equipment would be appropriate and beneficial in their areas;
2. By observing the enthusiasm of farmers for particular equipment, many manufacturers became interested in fabricating units,
3. The MA-IRRI engineers became better acquainted with the manufacturers of the area, thereby recruiting new cooperators and initiating ongoing technical assistance to those interested in fabricating the equipment.

Intensive tests of the performance and durability of the reaper, hand tractor, and thresher were carried out in Mindanao on a 370 ha. farm where rice is grown continuously during the year. The advantage of this farm was that equipment generally could be utilized regularly on up to 2.5 ha. per day, 6 days per week, throughout the year. The test results served as the basis for modifying the original designs to improve performance and durability.

Training Courses

All cooperating manufacturers were invited to attend a two-day intensive training course on fabricating the reaper and hand tractor. This course was given twice during 1982 at BPI in Manila and was attended by a total of 43 cooperators plus 11 engineers who are participating in the MA-IRRI Program. The course was designed to help trainees to understand: (a) the blueprints for the reaper and the hand tractor; (b) the main steps of fabrication and assembly; (c) operation, maintenance, and repair; and (d) the economics of fabrication and utilization of the reaper and hand tractor.

Based on this experience, it may be concluded that manufacturers will devote their time and money to attend training courses if the topic is of sufficient interest to them. In the present case, many of the attendees were from small-scale firms located in provinces far from Manila, the site of the two training courses. The attendees paid for their transportation and lodging expenses, while the MA-IRRI Program covered the cost of providing each attendee with blueprints and instruction materials.

Several qualified cooperators have attended the IRRI Agricultural Engineering training course which is offered twice per year. Since this course is designed for college graduates in engineering or economics, it is not appropriate for the majority of the cooperating manufacturers.

Technical Assistance and Prototype Testing

MA-IRRI Project Engineers make periodic visits to cooperating manufacturers in their area. The purpose of the visit is to provide whatever technical assistance might be needed by the cooperator in fabricating the equipment promoted by the program. In cases where the engineer is not capable of providing the needed technical assistance, he contacts the MA-IRRI central office for information and/or for the help of an engineer who is familiar with the specific problem.

Regarding technical assistance now being provided to cooperators, the most common activities are:

1. To help manufacturers in understanding the blueprints and in finding suppliers of special components (e.g., reaper blades).
2. To loan a reaper and hand tractor to manufacturers who have difficulty with reading blueprints.
3. To perform the prototype test of the first unit fabricated by a manufacturer, utilizing a special test procedure and form. The purpose of the test is to determine that the unit has been fabricated and assembled correctly and that it functions properly in in the field. It is also an opportunity to advise the manufacturers regarding critical adjustments and operating procedures. After passing the prototype test, the manufacturer is authorized by MA-IRRI to proceed with commercial production of the equipment.
4. To assist manufacturers with field demonstrations for farmers (often at the meetings of farmer organizations) and, in a few instances, with applications for loans.
5. To maintain a two-way communication with manufacturers on both problems and improvements that arise in relation to the design, fabrication, or operation of equipment promoted by the program.

III. INSTITUTIONAL RELATIONSHIPS

A primary purpose of the program is the establishment of institutional relationships and technical capabilities which will lead to a national capacity for developing, manufacturing, and marketing agricultural equipment appropriate for small farms. At the end of the 5-year period of this program, an institutional structure similar to that shown in Figure 3 should exist and be functioning in an effective and sustained manner.

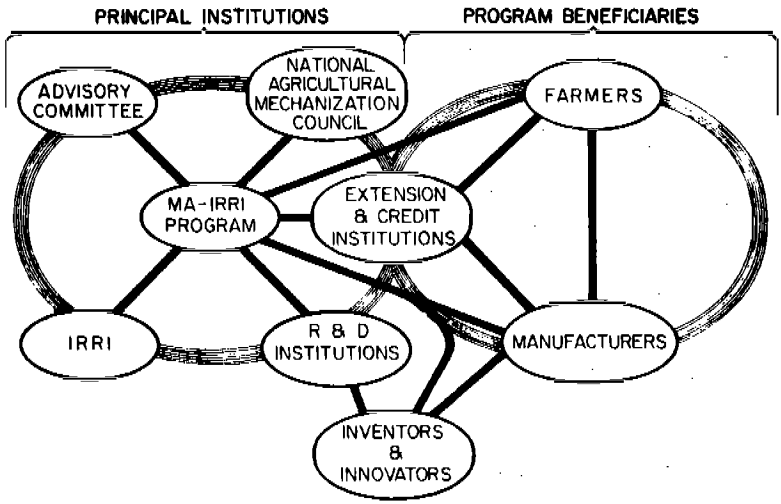


FIGURE 3
INSTITUTIONAL RELATIONSHIPS OF THE MA-IRRI PROGRAM

Although Figure 3 presents a highly simplified picture of the institutional relations affecting the program, it helps us to describe several of the principal factors. The main component is the farmers,[2] who is this case are primarily rice or corn farmers with small landholdings (1 to 5 ha.). The *farmers* purchase agricultural equipment from *manufacturers*. Both the *farmers* and the *manufacturers* are influenced by *extension and credit institutions* which promote certain types of equipment by various means, such as by training courses, field days, accreditation, and loans. There is a wide variety of *extension and credit institutions* in the Philippines, including the Bureau of Agricultural Extension, Regional Development Projects, National Food and Agriculture Council, National Food Administration, National Irrigation Authority, Ministry of Agrarian Reform, Farm Systems Development Corporation, Area Marketing Cooperatives, Samahang Nayon cooperatives, Small Business Advisory Center, National Cottage Industry Development Authority, KKK Livelihood Projects, and banking institutions.

The principal role of the MA-IRRI Program is to provide the *extension and credit institutions* and the *manufacturers* with information on: the types of small farm equipment which should be given

2. *The components of Figure 3 are typed in capital letters for emphasis.

highest priority; comparative advantages and disadvantages of different equipment; appropriate equipment designs and fabrication procedures; proper utilization of equipment by farmers; testing, maintenance, and repair of equipment. The MA-IRRI Program also has direct contact with *manufacturers* through promotional and technical assistance visits, training courses, field days, and feedback sessions to learn from manufacturers about specific problems or innovations relating to equipment design, fabrication, or performance. It is also essential for the MA-IRRI program to have direct communication with the farmers regarding their views on deficiencies of existing equipment and on priorities for new equipment. This communication is accomplished through workshops, field days, and informal surveys, including farm visits and meetings with leaders of farmer cooperatives.

The success of the MA-IRRI program depends largely upon its ability to find appropriate designs of equipment which will be acceptable to both *farmers* and *manufacturers.* Initially, the MA-IRRI program has relied primarily on selecting (and adopting) appropriate equipment designs from the pool of designs developed by IRRI. However, IRRI and the MA-IRRI program are not capable of developing the quantity or variety of equipment needed to sustain a dynamic extension program in the future. One of the objectives of the MA-IRRI program is to help promote the growth of a national capability for developing appropriate equipment for small farms. The main groups are the R&D institutions (universities such as UPLB, CLSU, and VISCA); government agencies such as NAPHIRE, PCARR, and ARO; and regional organizations, such as SEARCA and RNAM) and the *inventors and innovators* who may be independent (e.g., students, farmers, or professional inventors) or employees of manufacturing firms or R&D institutions. The MA-IRRI Program is promoting the R&D *institutions* and inventors and innovators through workshops, field days and fairs, and contests — and it is also encouraging national and international organizations to provide funds to these institutions for R&D on appropriate equipment.

The MA-IRRI Program is guided by an Advisory Committee whose members are the Deputy Minister of Agriculture, the head of the IRRI Agricultural Engineering Department, the director of the Bureau of Plant Industry, the director of the Agricultural Machinery Development Program (University of the Philippines at Los Baños), and representatives of the Central Bank, the Ministry of Industry and

Trade, and the Agricultural Machinery Manufacturers' and Distributors' Association. This Committee meets quarterly to review progress and plans, recommend corrective actions, and ensure that their institutions provide the necessary collaboration.

The Government of the Philippines is now considering a proposal for the creation of a National Agricultural Mechanization Council which would be responsible for policies and analyses relating to agricultural machinery. If the proposal is approved, the Advisory Committee will assist in defining collaborative relationships between the MA-IRRI Program and the National Agricultural Mechanization Council.

IV. SUGGESTIONS ON POLICIES AND ACTIONS

On the basis of the recent experience of the MA-IRRI Industrial Extension Program for Small Farm Equipment, there appears to be a need for policies and actions which would help:

1. Provide a clearer understanding of what types of agricultural equipment would be most beneficial and acceptable to small farmers. (Without this understanding, R&D and extension efforts may be misdirected.)
2. Promote the development of appropriate designs of the agricultural equipment identified in point #1. (At present, extension efforts are severely limited by the shortage of appropriate designs.)
3. Establish a more effective means for providing loans to manufacturers and buyers of small farm equipment. (Example: loans to manufacturers for self-financing of installment sales of equipment to farmers.)
4. Prevent large government purchases of imported agricultural equipment which either are available from local manufacturers (e.g., hand tractors, dryers) or are inappropriate (e.g., combine harvesters).
5. Obtain adequate funds for supporting activities on policies, R&D, extension, and evaluations relating to small farm equipment. (For example, funds might be obtained from existing government duties on imported agricultural equipment.)

It is recognized that these efforts will be of limited value unless government policies and economic conditions promote higher net income for the small farmer.