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9. ABSTRACT

At the request of the AID Mission in the Dominican Republic, a research team from the Industrial Development Division of the Georgia Institute of Technology traveled to the Dominican Republic to assess the feasibility of manufacturing IRRI-designed agricultural machinery in the country and financing its sales to D.R. farmers. Over the past six years, the International Rice Research Institute, located in the Philippines, has developed simple, sturdy, economical power tillers, threshers, dryers, and seeders through financial assistance from USAID. The machines are now being produced, sold and used in the Philippines and other countries in Southeast Asia. The questions to be explored in the Dominican Republic were these: What is the government's attitude toward farm mechanization? Is the Dominican farmer ready and willing to adopt mechanized means of cultivating and harvesting crops? What is the potential market for such equipment? What are the potential resources for manufacturing such equipment? What are the alternative means of financing production and sale of the equipment? What are potential distribution and service channels for the machines? The study results showed that government officials are enthusiastic about the prospect of introducing IRRI equipment. All lending institutions visited assured the team that they are willing to make purchase loans for the IRRI-type machines. Raw materials for the manufacture of the equipment will have to be imported. Briggs & Stratton representatives assured the team that there would be no problem in importing the required power units. The consensus of government officials and agricultural extension agents is that the Dominican farmer is ready and willing to mechanize if the proper machines are available and means of financing them exist. A demonstration program will be necessary. The potential distribution channels and production shops are discussed. Recommendations for followup action are made. These concern importing specialists who can set up a training school for operators and a demonstration program for developing a market for the

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machines. AID funds would support a loan for initial production of demonstration machines and training of operators.

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SURVEY OF MANUFACTURING POTENTIALS FOR IRRI-DESIGNED MACHINERY IN THE DOMINICAN REPUBLIC

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SURVEY OF MANUFACTURING POTENTIALS FOR IRRI-DESIGNED MACHINERY IN THE DOMINICAN REPUBLIC

INTRODUCTION

Background

The research team of Don D. Davis and Gaston A. Parets traveled to the Dominican Republic (D. R.) at the request of the local AID Mission to conduct a preliminary evaluation of the feasibility of introducing IRRI-designed agricultural equipment into the country. The equipment would be manufactured in the Dominican Republic using locally available materials, expertise, and production equipment.

For approximately six years, USAID has been involved in an effort to develop a series of agricultural machines that would be technically capable of satisfying the machinery needs of the small and medium size farmers, that would be simple enough in design to be manufactured with materials and equipment available in developing countries, that would be simple to operate and easy and inexpensive to maintain, and that could be made available to local farmers at a price that large numbers of them could afford.

The result of this effort has been the design and construction of a series of agricultural machines, many of which have proved to be quite successful and are now being manufactured and used in the Philippines and other Asian countries.

Work Program

The team's activities and efforts during the period of time spent in the country were directed towards obtaining information on the following:

1. The local government's attitude towards farm mechanization in general and introduction of the IRRI equipment in particular.
2. Readiness and willingness of the Dominican farmer to adopt mechanized means of agriculture and to identify the potential market for the equipment and devise alternatives as to possible distribution channels for the machines.
3. Availability within the country of the industrial capability, such as equipment, raw materials, and expertise, to manufacture the equipment, and the manufacturers' willingness to actually produce the machinery.

4. Existence of sources of financing available to the farmers for the purchase of the IRRI equipment.

Approach

In order to obtain the necessary information to properly evaluate the potential of the IRRI equipment in the country, twenty-two visits were made to individuals, government and private agencies and institutions, and industrial firms in the metalworking industries in Bonao, La Vega, Santiago de los Caballeros, San Francisco de Macorís, and Santo Domingo.

A complete list of these visits and the names of the officer or officers contacted is included as an appendix to this report.

FINDINGS AND CONCLUSIONS

Attitude of Dominican Republic Government

Without exception, government officials visited were enthusiastic about the IRRI equipment, especially if it could be manufactured in the Dominican Republic. It can. All officials favored mechanization with equipment which could be made available to the smaller farmer at a cost he could pay.

Government officials explained preliminary plans for setting up cooperative distribution centers around the country where farmers could be serviced with all types of agricultural commodities as well as improved seed and other inputs. They discussed purchasing the IRRI machines with their loan funds and then placing them in the service centers for sale or rent to members.

All lending institutions visited assured the team that they were willing to make purchase loans for small-type equipment such as the IRRI machines.

It is recognized that all raw materials for the manufacture of the equipment will have to be imported. However, portions of the frames and structural parts can be cut out of scrap metal, of which there seems to be an adequate supply.

Without minimizing the fact that there will be problems ahead in the manufacture, sale, and maintenance of the machines, government officials and lending institutions are definitely interested in seeing the program introduced. They have adopted a policy for rice production of an average 6% gain in production per year. They recognize that this is going to be difficult to meet using

traditional methods and varieties. They see that mechanization in rice is coming and that it would be much better to base it on locally produced machines than on imported final products.

The government's official policy toward the import of required component parts is friendly. Briggs & Stratton representatives assured the team that they would have no problem in importing the power units required.

Market Acceptability and Demand

One of the most significant factors affecting the success of the project is the potential market for the equipment, which will be determined to a large extent by the readiness and willingness of the large masses of farmers to adopt mechanized means of land preparation and cultivation, as well as mechanical means of crop processing, such as threshing and drying.

During conversations with government officials in the field of agriculture, manufacturers of small agricultural equipment, large agriculture equipment distributors, agricultural extension agents, and others close to or in direct contact with the farmers, the consensus was that the Dominican farmer, in general, is ready and willing to mechanize if the proper machines are available and if appropriate means of financing exist.

Mechanization Professor A. Perez Cuevas of the Instituto Superior de Agricultura, ISA, conducted a research study recently in relation to his professorship thesis which included personal interviews with 80 farmers of all sizes, crops, and from different geographical areas within the country in an effort to gauge the farmers' attitudes towards mechanization. About 25% of these farmers were rice growers. Professor Perez Cuevas found that a very large number of farmers have in some way been exposed to mechanization (water pumps, small or large tractors, etc.) and have, therefore, been exposed to the internal combustion engine.

The conclusion reached by Professor Perez Cuevas through this research is: "Given that a machine or machines suitable to the needs of a particular farmer can be made available at a cost that could economically justify acquistion, and with the means of financing available, the farming community as a whole would favor mechanization." Similar comments were made by extension officials at the Centro de Desarrollo Agropecuario (CENDA) in Santiago, who claim to be in contact through their network of extension agents with nearly 50% of all farmers in the Cibao Valley.

Even though the conclusions reached by the persons and organizations visited could have been biased or overly optimistic, the team feels that local farmers would generally favor the use of machines that do not change their traditional cultural patterns and the benefits of which can be readily visualized, such as the thresher and the batch dryer. Due to their capacity and mobility, these machines lend themselves to group ownership and use, making them desirable to associations and cooperatives of farmers, as well as to individual large farmers. The power tiller should find its place among farmers with 50 to 200 hectares of cropland; it is also suitable to group ownership, or it could be individually owned and used by the farmer to work his land as well as others under contract as is done today with oxen and imported machines.

Other IRRI machines would need more detailed evaluation to determine their suitability to local conditions. The six-row seeder requires good level land and water management, and a lug wheel, similar to IRRI's, has apparently been used in some parts of the Dominican Republic without success. The bellows pump is being improved by IRRI engineers to lengthen the life of the canvas material used in its construction. At this point, therefore, it seems that the machines on which efforts should be concentrated due to anticipated acceptability and demand are the power tiller, the thresher, and the batch dryer.

Market Development and Service

One important activity that will influence the degree of success of the program is the demonstration phase. In order to expose the farmers to the equipment and familiarize them with its operation and advantages, a program must be devised that will include a series of demonstrations to groups of farmers in different areas of the country.

Centro de Desarrollo Agropecuario in Santiago has 18 extensionists in its Extension Service Activity who are in direct contact with large numbers of farmers throughout the Cibao Valley. Ing. Nelson Rodríguez of CENDA's Extension Service has expressed his willingness to participate in the organization of demonstrations to farmers in the Cibao. Similarly, officers at the Ministry of Agriculture, the Instituto de Desarrollo y Credito Cooperativo (IDECOOP), and the Instituto Agrario Dominicano (IAD) have expressed their desire to participate through the purchase of limited number of units that would be made available to farmers for testing and demonstration.

Mr. Juan Nuñez of the Ministry of Agriculture has indicated that he would contract for the necessary technical assistance needed in this area, whether it was from the U. S. or from the Philippines.

Potential Distribution Channels

Several alternative channels should be considered in distributing the agricultural equipment to the farmers, including the following:

1. Direct sale to farmers on a job order basis.
2. Sales through equipment dealers.
3. Sales to the Ministry of Agriculture for distribution through their prospective distribution centers.
4. Direct sales to cooperatives through IDECOOP.
5. Sales through IAD.
6. Sales to the Fundacion Dominicana de Desarrollo (FDD) for distribution to farmers and farmers' associations.

Direct Sales to Farmers. This method can be used by small shops in the rural areas. As is done in the Philippines and other countries, the small shop makes a single tiller or thresher or dryer which has been ordered before production. Many small manufacturers of agricultural equipment in the Dominican Republic now use this method.

Sales through Equipment Dealers. This method can be used by larger shops that would be able to supply distributors with larger quantities of equipment on the basis of an agreement. This is a means of using a presently existing distribution system to the advantage of the program.

Sales to the Ministry of Agriculture. Mr. Jaun Nuñez of the Ministry is presently working with an FAO adviser on restructuring his department. This reorganization will result in the formation of six "distribution centers" throughout the country that would distribute production inputs and farm machinery directly to the farmers on either a credit or cash basis. Mr. Nuñez confirmed the suitability of the IRRI equipment to this program and suggested that Harry Wing, who will work with him in improving farm management practices, be his liaison with AID on this project.

Sales to Farmers through IDECOOP. The IRRI machinery fits well into the IDECOOP program, especially the tiller, which can be used in vegetable fields. IDECOOP provides funds "in kind" to cooperatives in the form of production inputs and equipment, and officials indicated that the IRRI equipment, if locally built, would qualify for distribution and financing to cooperatives with presently available "peso" funds.

Sales through IAD. The Instituto Agrario Dominicano (IAD) is presently using big tractors and rice dryers in the Cibao Valley. The big tractor, however, can not operate in the lowlands around Nagua and Bajo Yuna, where dryer capacity is also needed. There are approximately 3,000 "parceleros" with an average of 50 hectares each in this area and nearly 5,000 in the Valley, some of which are collectively organized. Nearly 80% of IAD's rice production is grown in these two areas.

In the Nagua and Bajo Yuna area, where dryer capacity is not available, farmers are paid considerably less for their rice than directed by presidential decree because of high moisture content.

Sales to the Fundacion Dominicana de Desarrollo. The Fundacion Dominicana de Desarrollo (FDD) is presently purchasing agricultural equipment locally and from abroad and storing the equipment in its facilities for subsequent sale, mainly to farmers associations, on cash or through FDD credit. Officials at FDD also have confired the suitability of the IRRI equipment and have indicated that they could possibly buy the production of small manufacturers without markets for distribution. FDD distributes equipment through 32 "Manicera" and "Industrias Lavador" agencies throughout the country, but the IRRI machines probably would be channeled through its field coordinators, which number approximately 35.

Manufacturing Capability

The raw materials (steel and engines) needed to build the IRRI machines will have to be imported. However, no restrictions as to availability of these items can be anticipated.

Transco, S. A., imports and distributes Briggs & Stratton engines in the country through six sales agencies. The B & S engine has two advantages in that it is suited to the IRRI equipment and considerable expertise has been

developed throughout the country in repairing these engines and even in manufacturing spare parts.

In assessing manufacturing capability, the team visited eight potential manufacturers with 35 or fewer employees that have the equipment necessary to build the IRRI equipment. Five of these, indicated specifically in the appendix, have good potential and are willing to manufacture the initial testing units. It should be pointed out that the shop of Castro Rosario in La Vega was often mentioned as offering good potential, although the team did not have the opportunity to visit it. This shop is presently manufacturing agricultural equipment for FDD.

The team is certain that other shops exist in the size range of up to 50 workers. There are problems in working out distribution systems, however. Manufacturers will require a limited number of firm orders before they will start up, and the demonstration program recommended below will be necessary to develop a market. As demonstrated in the Philippines and more recently in Thailand, once the initial machines have been demonstrated, farmers will generally find the funding to purchase and the demand will grow.

RECOMMENDATIONS AND FOLLOW-UP ACTION

1. The introduction of the agricultural machines chosen for production will require a planned demonstration program. This will involve the planning and operating of a training school for operators. Operators can be chosen from the Extension Service or the Rice Department. The team suggests the training of at least 10 and preferably 20 operators initially.

In order to get the training school in operation it will be necessary to bring into the country someone familiar with the operation and manufacture of the IRRI equipment. It is recommended that an effort be made to get Mr. Joseph Campbell, Cornell University, Ithaca, N. Y. He spent one year at IRRI working on the machines and is an Agricultural Engineer capable of making the necessary adaptations to fit local conditions.

A second alternative is to bring in one of the Spanish-speaking Philippinoes from IRRI. A third is to try to get Fred Hubig from the Guatemala Mission on temporary duty. He has been working with the tiller.

Another source of trainers could be Cali, Colombia. One other possibility is to contact Fred Easman of the Guayan Mission. He has had a temporary duty ex-AID engineer there working with the development and operation of the machines.

According to conversations with Jaun Nuñez of the Ministry of Agriculture, these training activities could be supported from funds that would be made available through USAID.

2. The team will leave one complete set of blueprint specifications for the tiller and for the thresher. A decision should be made on what other machines will be tried so that the required prints can be ordered. At present the tiller, the thresher, the bin dryer, and possibly the six-row seeder are recommended.

3. According to Juan Nuñez, Harry Wing will be the advisor on the loan, and they will be in touch with him as soon as the loan is finalized. Present literature on the machines will be left with him.

4. Funds from the loan could be set up to make prototype purchases of the machines, according to Juan Nuñez. These then would be turned over to the cooperatives that the government plans to set up to service farmer groups. Someone from the Mission will need to get together with the various lending agencies and agriculture loan beneficiaries to work out and follow up on the details. Time does not allow the team to do this, primarily because the loan has not yet been finalized. It is essential that the manufacturers have firm orders and a source of funding for the production of the prototypes so that they can determine their production cost factors and work out the bugs without financial loss.

Appendix

INDIVIDUALS AND ORGANIZATIONS VISITED
BY THE RESEARCH TEAM

Government

1. Secretaría de Estado de Agricultura (Ministry of Agriculture) Juan Nuñez, Director of Agricultural Economics, Santo Domingo.

2. Secretaría de Estado de Agricultura. Cordero Mora, Director of Rice Department, Santo Domingo.

3. Centro de Desarrollo Agropecuario, Zona Norte (Agricultural Development Center), CENDA. Nelson Rodríguez, Extension Service.

4. Banco Agrícola (Agricultural Bank). Ing. Caonabo Camilo.

5. Instituto de Desarrollo y Crédito Cooperativo, IDECOOP. Lic. José M. Skeet Williams, Asst. to the Financial Administrator. Lic. Rafael A. Salado Flores, Int. Auditor. Agrn. Evelio Díaz C., Director of Credit.

6. Instituto Agrario Dominicano. Agrn. Félix Olivares.

7. Juma Experiment Station, Bonao. Dr. Choi, Member of Taiwanese Mission. Agrn. Manuel Castillo.

Shops

1. Taller Agri-Industrial Morotto, La Vega. Rafael Morotto, Owner.

* 2. Taller de Mecánica Broda, Santiago. Luis Marino Heredia, Owner.

3. Taller Victoria. Avenida Imbert #241, Santiago. Juan Arrendondo and Víctor Bordas, Owners.

* 4. Ing. Tulio Acevedo. Arte #9, Santiago.

5. Taller Industrial Marcial Imester. Avenida Central & España, Santiago. Juan Pablo Florentino, Owner.

* 6. Prisar y Domital Agrícola, San Francisco de Macorís. Primo Sartor, President.

* 7. Gutierrez y Hermanos, C. por A. Calle 18 #115, Santo Domingo. Fernando Gutierrez, President.

* 8. Sella Industrial, C. por A. Ramón Cáceres #101, Santo Domingo.

Others

1. Transco, S. A. Importers and Distributors of Briggs and Stratton. Ernesto Dobse, General Manager. Santo Domingo.

2. Implementos y Máquinas, C. por A. Caterpillar and John Deere, Distributors. Rafael Pimentel, General Manager. Santo Domingo.

3. Instituto Superior Agrícola (ISA), Santiago. Ing. Pérez Cuevas, Professor of Mechanization.

4. Industrias Portela, Navarrete.

5. Volunteers in Technical Assistance, VITA, Santo Domingo. José Alcantara, Director. Richard J. Lera, Latin America Coordinator.

6. Compañía Financiera Dominicana, Santo Domingo. Tomás (Jim) Pastoriza, Raimundo Garrido.

7. Fundación Dominicana de Desarrollo, Santo Domingo. Bolívar Báez, President. Jaime R. Fernández, Director of Resources. Hilton Kelley, Director of Equipment and Materials.

* Shops identified as numbers 2, 4, 6, 7, and 8 are all potential manufacturers with adequately equipped shops and skills. These shops have an estimated capacity of producing four to five machines each per month.

There is in La Vega at present a shop manufacturing plows and hand tools. This was set up through a loan from Compañía Financiera Dominicana. The team could not locate the shop, but it and others are present.