Study Report on Project of Equipment for Rural Infrastructure Development in The Republic of Nicaragua

February 1996

Japan International Cooperation Agency

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PREFACE

In response to a request from the Government of the Republic of Nicaragua, the Government of Japan decided to conduct a basic design study on the Project of Equipment for Rural Infrastructure Development and entrusted the Japan International Cooperation Agency (JICA) to conduct the study with the assistance of the Japan International Cooperation System (JICS).

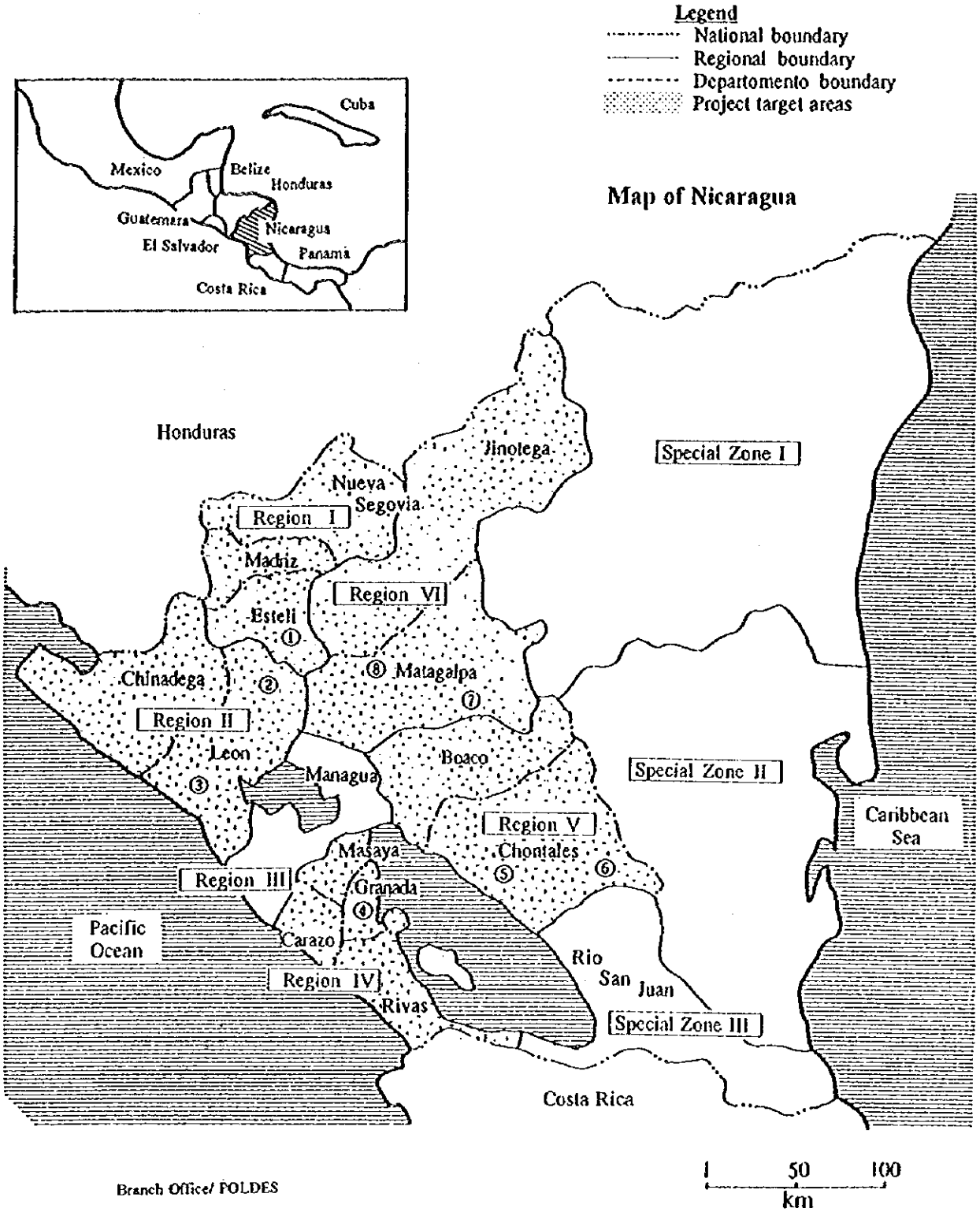
JICA sent to Nicaragua a study team from September 25 to October 19, 1995.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Nicaragua for their close cooperation extended to the team.

February 1996

Kimio Fujita
President
Japan International Cooperation Agency



Branch Office/ POLDES

Region	No.	Location
I	①	ESTELI
II	②	EL SAUCE
	③	LEON
IV	④	NANDAIME
V	⑤	JUIGALPA
	⑥	LA GATEADA
VI	⑦	MATIGUAS
	⑧	MATAGALPA

Note 1: Administrative districts are divided into Regions I-VI and Special Zones I-III, and ... indicates the Project target areas.
Note 2: Names within the Regions are Departmento names.
Note 3: ① to ⑧ within the Regions indicate the locations of the branch offices (Unidad) of POLDES (the implementing agency).

ABBREVIATIONS

FAO	Food and Agriculture Organization
INRA	Instituto Nicaraguense de Reforma Agraria
MAG	Ministerio de Agricultura y Ganadería
MCE	Ministerio de Cooperación Externa
MCT	Ministerio de Construcción y Transporte
PNDR	Programa Nacional de Desarrollo Rural
POLDES	Programa de los Polos de Desarrollo

CONTENTS

Chapter 1 Background of the Project

In the rural areas of the Republic of Nicaragua (hereinafter referred to as "Nicaragua"), large numbers of retired soldiers, former guerrillas, refugees, and people returning home from abroad are attempting to rebuild settled lives following the end of many years of civil war. Moreover, many former small -to- medium-sized farmers, including farm workers who have become independent farmers after receiving land following the agricultural land reform, have come to practice agriculture and livestock. However, these small -to- medium-sized farmers possess inadequate technology to perform profitable farming, insufficient any low-interest credit system and lack of the capital to procure the necessary machinery and equipment. Also they possess hardly any means of carrying out agricultural production activities or the transportation of products. As a result, productivity levels and incomes are low, and the living standard of these farmers is poor.

Another factor affecting the low level of agricultural productivity is the fact that there are not even decent access roads to the nearest towns, villages and cities (Municipio). In many rural areas that are very remote from Municipio, the only means of transporting agricultural materials and products is along narrow tracks that only allow passage by donkey or horse. For this reason, the transportation of required agricultural materials in the production activities and the shipping of agricultural products to markets (including collections by merchants) are difficult, and this is resulting in post-harvest losses and denying the farmers the opportunity to raise their incomes. Furthermore, in these circumstances it is very difficult for the farmers to become motivated to increase production and practice market-based commercial farming. In addition to the above problems, because the water supply becomes extremely scarce during the six-month long dry season, the farmers are forced to move the pastures of their livestock around in order to obtain their own living water and drinking water for their animals.

In response to this situation, the Government of Nicaragua, in one of its most realistic measures to vitalize agricultural production, has reorganized the cooperatives and federations (Union) centered around the small -to- medium-sized farmers, and has earnestly striven to increase the numbers of cooperatives and cooperative members and thus establish and strengthen an implementation setup. Specifically speaking, the government is carrying out various support measures (securing means of production, means of constructing rural access roads and means of transporting products to markets, and providing credit allowances and other services to back up these measures) for the benefit of the rural area cooperatives and federations, which are striving through the participation of farmers to improve the agricultural production infrastructure.

This policy is called the Polos Program and was commenced in 1991. The Polos Program aims

to encourage the joint use of tractors, combine harvesters, and other agricultural machinery and equipment among small -to- medium-sized farmers organized into cooperatives. And also it aims to develop the rural economy and improve the living standards of farmers through, among other things, promoting the cooperatives into the basic units for securing the means needed to improve the agricultural infrastructure and transportation of products, establishing self-revolving funds that can provide small loans to farmers, and diffusing agricultural technology.

An important factor in advancing the establishment and expansion of these small -to-medium-sized farmer's cooperatives is the joint-use machinery and equipment (tractors, harvesters, bulldozers, etc.) that were previously procured under the Food Production Aid Program (2KR) of the Japanese Government. Becoming a cooperative member for a small subscription fee is a great advantage for farmers in that it allows them to use the above-mentioned items of machinery and equipment, which would be practically impossible for individual farmers to purchase by themselves.

The Government of Nicaragua requested the Government of Japan to provide the Grant Aid for the procurement of further machinery and equipment such as bulldozers, cargo trucks, etc., which have long been in great demand by the farmers belonging to the agricultural cooperatives.

Chapter 2 Contents of the Project

2-1 Objectives of the Project

The provision of support to the cooperative activities of the small -to- medium-sized farmers in rural areas (Polos Program) has become the most important issue within the agriculture-related development plan of the Government of Nicaragua. More than 76 cooperatives have been formed ever since the first one was established in 1992, and it is the machinery and equipment, which were procured under the 2KR of the Government of Japan, that fulfill the central role in supporting these cooperative activities. The Project aims to procure joint-use machinery and equipment such as bulldozers and cargo trucks, which the cooperatives strongly desire, by making sure that the cooperatives and federations use such equipment in the same ways that they put the 2KR equipment to use, and it aims to further strengthen the support being given to the activities of the farmers' cooperatives.

2-2 Basic Concept of the Project

The Project, having the ultimate objective of revitalizing agricultural production, intends to realize improvement of the agricultural production infrastructure in the rural areas of five Regions through giving support to the activities of the farmers' cooperatives located there. The cooperatives the estimated quantities of the Project machinery and equipment that would be required to carry out planned rural access road construction and repair work, the digging of ponds, the transportation of agricultural products, etc. Based on these estimations, POLDES (Programa de los Polos Desarollo) made the final decision on the quantities, grades, etc. of the necessary machinery and equipment.

Regarding the actual use of the machinery and equipment, POLDES, which will act as owner and management responsibility, shall lease them out directly or via its branch offices (Unidad) to the cooperatives or federations in each Region. Regarding the coordination of machinery and equipment use between separate cooperatives, the federations, acting as the superior bodies, shall have a certain degree of authority, however, all final decisions shall be made by POLDES.

2-3 Basic Design

2-3-1 Design Concept

The study team surveyed a number of Regions (below which come the Departomento and Municipio), and observed rural access roads that have been constructed or are being

constructed, as well as ponds and fields that have been prepared using the bulldozers that were procured under the 2KR. By doing this, the team was able to confirm at first hand that the bulldozers are being put to effective use by the cooperatives and federations and their members. Furthermore, from interviews held with cooperative members, cooperative and federation leaders, POLDES branch office managers, etc., the team was able to directly receive data on the actual use of the bulldozers and hear what kinds of machinery and equipment are desired in future. The team also surveyed the marketing, retailing, and service situation in Nicaragua with regard to the machinery and equipment under consideration.

Based on the information obtained, the contents of the machinery and equipment requested by the Nicaragua side were examined and the design concept described in the following paragraphs was arrived at.

a. Bulldozers

Bulldozers are to be used in new construction or repair of access roads to the nearest Municipio (or access road to the nearest Municipio roads), the construction of ponds, and the reclamation and preparation of agricultural field by farmers acting individually or in a joint effort. The distance of roads to be constructed and area of land preparation are planned by each of the cooperatives under the supervision of the POLDES branch offices, and the total amounts of work excluding that to be carried out with the existing bulldozers are as shown in Table 1 (Planned Use of Bulldozers and Cargo Trucks). Based on these totals, POLDES determines the number of bulldozers to be allotted to each region upon giving consideration to the scale and operating capacity of the POLDES branch offices and cooperatives in each region, and the priority placed on each region within its own support plan.

Table 2 shows the results of trial estimation of the annual number of days of bulldozer use in each region in the case where the procured bulldozers are used as planned by the cooperatives. The conditions used in calculating the contents of each type of work were confirmed in interviews conducted by the study team when it surveyed work sites. While the results vary from 140-290 days per bulldozer per year depending on the region and year concerned, it can be seen that the number of bulldozers is not on the whole sufficient to execute all the plans for use. Looking at the state of use over the past three years of the bulldozers that were procured under the 2KR shows that they operate on average for roughly 100 days per year, and, if one considers the fact that the rainy season in Nicaragua lasts for half a year, it is thought that an operating rate of around 150 days per year is appropriate. POLDES, also, targets 100 days per year as the minimum operating level, and is promoting to raise operating days of the existing bulldozers. Thus, the overall number of bulldozers and

regional distribution plan contained in the request are appropriate and, it can be expected that the newly procured bulldozers will be put to sufficient use.

b. Cargo Trucks

It is planned, following the further improvement and expansion of access roads, that the farmers' cooperatives and federations coordinate their schedules to borrow the cargo trucks from the POLDES branch offices and use them jointly, in order to transport materials from markets and deliver products to markets at rates that will be cheaper than those charged by merchants and other private distributors. The number of cargo trucks and regional distribution plan contained in the request were again discussed and determined by POLDES based on the transportation plans of each of the cooperatives (Table 1). A request for additional five trucks (8-ton load capacity each) was put forward during the site survey, so reconfirmation of the appropriateness had to be carried out.

As in the case of the bulldozers, upon trial estimating the annual number of days of cargo truck use, this was found to vary from 120-180 days per truck per year, and the requested contents were found to be appropriate. Regarding the truck sizes of eight-ton and ten-ton loads, these were determined upon surveying the wishes of farmers via their cooperatives. 8-ton cargo trucks shall be the main, however, for districts where agriculture is particularly active and large transportation loads are forecast, the larger 10-ton cargo trucks were selected for reasons of transportation economy.

c. Individual Repair Instruments

Not many years have passed since the procurement of the 2KR agricultural machinery and equipment (tractors, combine harvesters, etc.), and there haven't been too many cases of breakdowns requiring repair. However, as time goes by and more machinery and equipment are procured, it is forecast that more and more breakdowns will occur in the future. Reducing costs incurred as a result of repairs and increasing the operating efficiency of machinery and equipment will come to be important issues from now on.

In view of this and based on its policy of building a setup that will minimize the consignment of machinery and equipment breakdown repairs to private workshops, POLDES also requested individual repair instruments such as lubricators, welders, hydraulic pullers, compressors and lathes in addition to mobile workshop cars.

However, based on the results of surveys made into the state of the regional offices and farmers' cooperatives and federations in terms of human and physical resources, it was

decided not to include such individual repair instruments within the Project for the reasons described below:

- The functions of the individual repair instruments basically overlap with the functions of the mobile workshop cars.

- The POLDES branch offices and farmers' cooperatives and federations currently possess hardly any repair facilities or equipment, and the insufficient repair setups would not allow the requested instruments to be put to effective use if they were simply procured without making other preparations.

- POLDES aims to reduce the burden (expected to rise in future) placed on farmers in cooperatives who consign repairs to private-sector workshops, and it is considered that learning to handle mobile workshop cars, which are fitted with sets, albeit small, of repair instruments, would be the most fitting way to start any plans for the preparation of an overall repair setup.

It shall be assumed in advancing the Project that any breakdowns which cannot be repaired using the mobile workshop cars shall continue to be consigned to private workshops for the immediate future.

d. Mobile Workshop Cars and Tools for Repair

Although POLDES currently stations one or more mechanics in each branch office to inspect and repair the machinery that was procured under the 2KR, the near total absence of any repair equipment means that this repair service is at its limit and the branch offices have to rely on private workshops in the cities. This is a main factor behind rising repair costs and also falling operating rates, and therefore POLDES has made the strengthening of the support setup for the inspection and repair service as one of the highest priority issues in advancement of the Polos Program.

One mobile workshop car shall be deployed to the POLDES branch offices in each target region (five in all) upon giving overall consideration to the numbers of benefiting farmers, the planned numbers of rural access roads for construction, the activities of the cooperatives, etc. of each region. In specific terms, the mobile workshop cars shall be used in the maintenance and repair of the 28 bulldozers, 35 cargo trucks, 125 agricultural tractors, approximately 300 harvesters and seeding machines managed by POLDES and the cooperatives, as well as the agricultural machinery owned by farmers, whether they belong to cooperative members or not. POLDES shall dispatch the mobile workshop cars, manned

by mechanics and their assistants, around the regions to carry out the maintenance and repair of such machinery and equipment.

As preparation of the POLDES repair setup has only just started, the instruments carried by the mobile workshop cars shall be limited to basic items such as testers, welders, generators, air compressors and other tools; and metal processing equipment such as lathe or requiring other special technology shall not be included. The general purpose repair tools shall also be selectively provided to the aforementioned five branch offices together with the mobile workshop cars. By doing this, it is planned to establish maintenance and repair setup model sites within each region.

e. Trucks (Low Bed Trailer Truck and Low Bed Truck with Winch)

The trucks shall be stored at a site in Managua under the management of the POLDES headquarters. Regarding the low bed trailer truck to be used for carrying bulldozers, POLDES plans to lease it out with driver based on the plans of use received from the cooperatives and federations in cases where self-movement by bulldozers may be uneconomic due to distance or damaging to paved road surfaces. The low bed trailer truck shall be able to carry bulldozers of up to approximately 20 tons, procured by the project.

As for the low bed truck with winch, this shall be used for carrying broken down agricultural machinery for repair to private workshops in Managua or other major regional cities, and it shall be leased out with driver by POLDES when requested by the cooperatives and federations. This truck shall be able to handle agricultural machinery such as the tractors and combine harvesters that were procured under the 2KR. The loading capacity should be maximum five tons. If POLDES can provide services like this for which private companies have needed to be previously relied on, they can be utilized when needed and at lower prices than before, and this will not only relieve the economic burden placed on cooperative members and the cooperatives and federations, but also enable operating rates of machinery and equipment to be raised.

Table 1

Planned Use of Bulldozer and Cargo Truck

Region	POLDES Branch office	Cooperative			Rural access roads(km) Construction		Rural access roads(km) Maintenance		Pond(No.) Construction		Pond(No.) Maintenance		Field preparation (Manzana)		Transportation (km)
		No.	No. of farmers	No. of beneficiaries	'96	'97	'96	'97	'96	'97	'96	'97	'96	'97	'96
I	1 Esteli	9	694	4.164	70.0	66.0	50.0	111.0	52	21	0	8	2.0	1.7	69.473
II	2 El Sause	10	713	4.278	98.9	107.3	64.5	76.0	78	61	0	12	4.1	2.4	96.154
	3 Leon	4	179	1.074	6.1	14.0	10.0	5.0	0	10	0	0	0.0	0.0	36.846
	s. total	14	892	5.352	105.0	121.3	74.5	81.0	78	71	0	12	4.1	2.4	133.000
IV	4 Nandaime	11	1.233	7.398	35.0	59.0	24.8	46.0	26	27	0	4	0.0	0.5	70.048
V	5 Juigalpa	19	770	4.620	135.3	176.7	115.6	174.0	135	115	0	43	3.4	1.3	150.480
	6 La Gateada	9	269	1.614	39.7	17.6	19.0	41.0	0	0	0	0	0.1	0.4	137.520
	s. total	28	1.039	6.234	175.0	194.3	134.6	215.0	135	115	0	43	3.5	1.7	288.000
VI	7 Matiguas	7	266	1.596	93.0	100.0	73.0	39.0	85	69	0	38	3.6	0.8	141.192
	8 Matagalpa	7	364	2.184	82.0	52.0	74.0	44.0	54	34	0	4	0.0	0.0	144.576
	s. total	14	630	3.780	175.0	152.0	147.0	83.0	139	103	0	42	3.6	0.8	285.768
	Total	76	4.488	26.928	560.0	592.6	430.9	536.0	430	337	0	109	13.2	7.1	846.289

Table 2 Trial Estimation of Bulldozer and Cargo Truck Operating Days

Necessary Annual Operating Days per Bulldozer(1996)

Region	No. of POLDES Branch office	Bulldozer No.	Road		Pond		Field preparation	Total days
			Construction	Maintenance	Construction	Maintenance		
I	1	3	155.6	16.7	17.3	0.0	3.3	192.8
II	2	3	233.3	24.8	26.0	0.0	6.7	290.9
IV	1	2	116.7	12.4	13.0	0.0	0.0	142.1
V	2	6	194.4	22.4	22.5	0.0	2.9	242.3
VI	2	6	194.4	24.5	23.2	0.0	3.3	245.4

Necessary Annual Operating Days per Bulldozer(1997)

Region	No. of POLDES Branch office	Bulldozer No.	Road		Pond		Field preparation	Total days
			Construction	Maintenance	Construction	Maintenance		
I	1	3	146.7	37.0	7.0	1.3	2.8	194.8
II	2	3	269.7	27.0	23.7	2.0	3.9	326.3
IV	1	2	196.7	23.0	13.5	1.0	1.2	235.4
V	2	6	215.9	35.8	19.2	3.6	1.4	275.9
VI	2	6	168.9	13.8	17.2	3.5	0.8	204.2

Trial calculation conditions:
Rural access road construction 150m/day/bulldozer
Rural access road repairement 1km/day/bulldozer
Pond construction 1 pond/day/bulldozer(4 hours working time plus transfer and preparation time)
Pond repair 2 pond/day/bulldozer(4 hours working time plus transfer and preparation time)
Field preparation 7 days/Ha/bulldozer(40 hours leveling time÷15 hours banking time÷transfer time, etc.=7 days)

Note: 1Manzana=0.705Ha

Necessry Annual Operating Days per Cargo Truck(1996)

Region	No. of POLDES Branch office	Truck No.	Transport distance(km)	Operation days per year
I	1	3	69,473	116
II	2	4	133,000	166
IV	1	2	70,048	175
V	2	8	288,000	180
VI	2	8	285,768	179

Trial calculation conditions: 200km/day(4-5 hours running time÷loading/unloading time, etc.)

2-3-2 Basic Design

(1) Overall Plan

POLDES, acting as the owner of the Project machinery and equipment, shall lease out them directly or via its five branch offices to the farmers' cooperatives and federations in accordance with their respective plans of use. The coordination of use among cooperatives shall partly be entrusted to the superior federations, but POLDES shall make all final decisions.

It is planned that POLDES will lease the machinery and equipment out for a charge that is to cover maintenance, fuel costs, operator expenses, etc. It appears that it will be possible to keep the lease charge to the same level or lower than the charge that was adopted in the case of the 2KR machinery and equipment. The remainder of the lease charge after running costs have been subtracted (same as the counterpart fund in the 2KR) shall be saved in the special fund bank account of PNDR (Programa Nacional de Desarrolo Rural) and, as was also the case in the 2KR, shall be put to effective use in promoting cooperative support activities and the other operations of POLDES. Table 3 shows the list of planned machinery and equipment deployment sites, while Figure 1 indicates a conceptual diagram relating to machinery and equipment use.

Table 3 Machinery and Equipment Deployment Plan by Region

Region	Region I	Region II		Region IV	Region V		Region VI		POLDES	Total
POLDES branch office	Esteli	El Sause	Leon	Nandaime	Juigalpa	La Gateada	Matiguas	Matagalpa	Headquarter	No.
Bulldozer	3	2	1	2	4	2	4	2	-	20
Cargo truck(10t)	1	1	1	1	2	1	2	1	-	10
Cargo truck(8t)	2	1	1	1	3	2	3	2	-	15
Mobile workshop car	1	1	0	1	1	0	0	1	-	5
Tools for repair	1	1	0	1	1	0	0	1	-	5
Low bed trailer truck	-	-	-	-	-	-	-	-	1	1
Low bed truck with winch	-	-	-	-	-	-	-	-	1	1

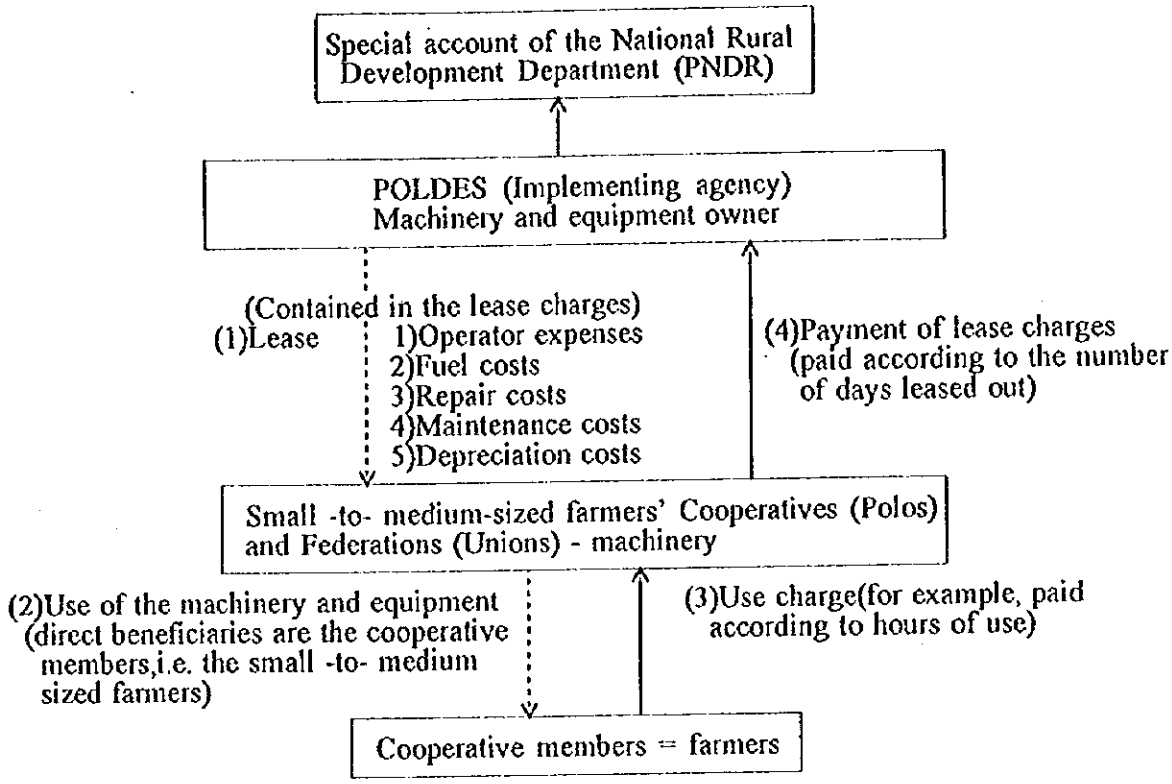


Figure 1 Conceptual Diagram of Machinery and Equipment Use

(2) Machinery and Equipment Plan

The important design points for each item of machinery and equipment based on the design concept are described in the following paragraphs.

a. Bulldozers

In view of the experience gained in using the bulldozers procured under the 2KR and the desire to keep the repair level the same, bulldozers of the same type as those procured under the 2KR (approximately 120 HP) shall be procured. This is the desire of the Nicaragua side, too. Moreover, triple shank ripper shall be used rather than single shank ripper because they allow higher work efficiency.

b. Cargo Trucks

It is planned that the cargo trucks be used to carry a wide range of items such as agricultural materials and products, livestock, etc. on its way to market. Therefore, general purpose truck chassis which shall be fitted with the wooden platform and walls that is widely used in Nicaragua shall be adopted to allow diverse use.

c. Mobile Workshop Cars and Tools for Repair

The POLDES branch offices, farmers' cooperatives, federations currently possess hardly any repair machinery, and maintenance and inspection activities are limited to regular daily works that are carried out by mechanics stationed at each branch office. Therefore, the tools, machinery, and instruments carried by the mobile workshop cars shall be limited to items possessing the most basic repair functions, while items that require special technology shall be avoided.

d. Low Bed Trailer Truck

The bulldozers that were procured under the 2KR and those planned for procurement here are a medium class type weighing approximately 20 tons or less. Thus, a low bed trailer truck with a load capacity of roughly 20 tons shall be procured. The low bed trailer truck that has been introduced at Leon City has a heavy steel plate loading ramp, the attachment and removal of which requires the hard work of four or five people. In view of this, a lighter metal (such as aluminum) loading ramp that can withstand the weight of bulldozers shall be adopted.

e. Low Bed Truck with Winch

This shall be used to transport broken-down agricultural machinery to repair workshops in Managua or other regional cities in cases where the repair setups by neither POLDES, the cooperatives, nor federations are able to handle the breakdowns. As the target machinery will only weigh five tons or less, the truck shall be the low bed type fitted with a loading ramp and a winch for lifting machinery onboard.

Based on the above points, the plan of machinery and equipment procurement under the Project shall be as indicated in Table 4.

Table 4 List of Machinery and Equipment

Item	Description	No.
Bulldozer	Approx. 120HP, angle & tilt blade, 3shank ripper	20
Cargo truck	Payload: 10t, wood body	10
Cargo truck	Payload: 8t, wood body	15
Mobile workshop truck	With crane, generator, welder, air compressor, tools etc.	5
Tools for repair	Mec./elec. tools, elec. equipment, jacks etc.	5
Low bed trailer truck	Payload: approx. 20t, with loading ramp of light metal	1
Low bed truck with winch	Payload: approx. 5t	1

Regarding the bulldozers, cargo trucks, and low bed trailer truck, upon surveying condition of market entry, repair and service setups, market prices, and so on, it was found that procurement from either Japan or a third country would be possible. Regarding the country of origin (third countries), American products are by far the most popular followed by products made in neighboring countries such as Brazil and Mexico. However, in addition to having only a minor share in the market, the Brazilian, Mexican products, etc. include items for which it is difficult to obtain sufficient assurances of quality reliability from the manufacturers.

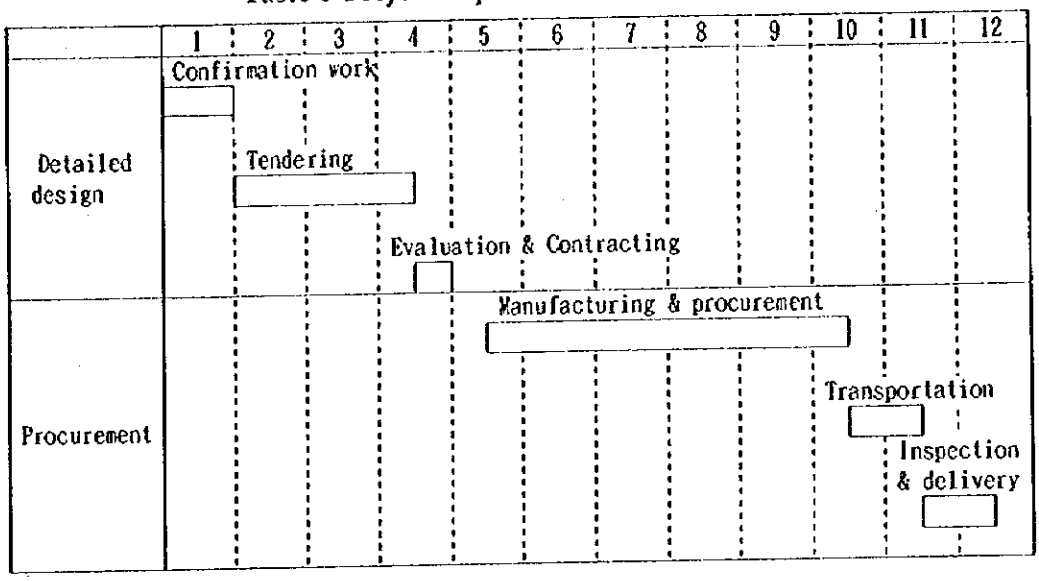
As for the other items of machinery and equipment, the survey team was unable to obtain reliable information on sales and maker service capabilities for third country products.

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Schedule

Table 5 Project Implementation Schedule



3-1-2 Obligations of Recipient Country

(1) To take prompt measures relating to the landing and customs clearance of the machinery and equipment to be procured at the port of entry to Nicaragua, and to bear all expenses incurred in these activities.

(2) To carry out the internal transport of the machinery and equipment following unloading at the port of entry, and to bear all expenses incurred in this.

(3) To ensure that the machinery and equipment to be procured under the grant aid are placed under the ownership of and operation and maintenance by POLDES, the implementing agency, and to ensure that they are effectively utilized by the farmers' cooperatives under the supervision of POLDES.

(4) To store the machinery and equipment in a suitable place and in good condition.

(5) To secure a sufficient budget and staff including mechanical and electrical mechanics to ensure that the machinery and equipment are properly utilized and maintained.

(6) To exempt Japanese nationals engaging in the provision of services from customs duties and national taxes that may otherwise be charged in Nicaragua based on the contracts that have been verified by the Government of Japan.

(7) To provide the necessary measures for the above-mentioned Japanese nationals to enter, leave, and stay in Nicaragua for execution of their work.

3-2 Operation and Maintenance Plan

The Project machinery and equipment shall, as was mentioned previously, be deployed to the POLDES branch offices in each region, and the branch office staff shall be responsible for the operation and maintenance (the low bed trailer truck and low bed truck with winch, however, shall be stationed at the POLDES headquarters in Managua, and two drivers and assistants each shall be employed). POLDES is committed to strengthening its repair service setup to target not only the machinery and equipment planned for procurement under the Project, but also all the machinery and equipment owned by the farmers' cooperatives and their members (mainly consisting of items procured under the 2KR). And it plans to bolster its engineering staff based mainly around the mobile workshop cars to be procured under the Project.

Regarding the operation and maintenance costs, fuel costs, operator expenses, etc. of the Project machinery and equipment, lease charges will be collected from the user farmers' cooperatives. Thus, the operation and maintenance costs will basically be covered in the same way as was the case with the 2KR machinery and equipment, and it is thought that no problems will arise regarding the operation and maintenance. As for the initial operation and maintenance costs that cannot be covered by the lease charges, it is planned to divert funds from the part of the national investment budget (set to increase from 1996 onwards) set aside for the Polos Program and the 2KR counterpart fund.

Table 6 shows the breakdown of the planned lease charges for the bulldozers and cargo trucks. Charges for the other machinery and equipment shall also be set based on the principles shown here. It is expected that the charges will eventually be around 70% of private sector prices (lease charges or service fees).

Table 6 Breakdown of Planned Lease Charges

(Unit:Cordova)

Items	Bulldozer (hr)	Cargo truck (quintal x km)
Fuel	52.50	0.0399
Driver's expenses	15.00	0.0190
Filters & Lub.	12.50	0.0171
Oil	10.00	
Repair cost	25.00	0.0190
Storage charge & insurance	35.00	0.0190
Depreciation	100.00	0.0760
Total	250.00	0.1900

US$1=¥100=7.7Cordova, quintal=0.46kg

Chapter 4 Project Evaluation and Recommendation

4-1 Project Effect

(1) Direct Effect

a. In addition to being used by small -to- medium-sized farmers (mainly cooperative members) to improve their own agricultural production infrastructure, the bulldozers that were procured under the 2KR are also being used in the construction and repair of rural access roads. Because all local residents take part in these activities, the bulldozers are not only benefiting the activities of the farmers' cooperatives, but also they are playing a part in rural area development in a wider sense. The bulldozers scheduled for procurement under the Project, also, will make a significant contribution to both improving the agricultural production infrastructure and developing the rural areas in general.

   Thus, the benefiting population of Project implementation will be, directly, 27,000 farmers belonging to the cooperatives plus the many thousands more waiting to have their membership applications processed, and indirectly all the residents living in the rural areas (farming population is 1,470,000: FAO 1993).

b. In specific terms, it will become possible to construct and repair approximately 500 km of rural access roads per year. Furthermore, the construction of between 300-400 ponds per year in readiness for the dry season, the reclamation and preparation of additional cultivable land, and other improvements to the agricultural production infrastructure will be made possible through the participation and self-aid of the small -to- medium-sized farmers.

   The rural access roads will be used by surrounding residents for general purposes, and the contribution they will make in terms of making people's everyday lifestyles more convenient will be huge. Moreover, the additional ponds will free farmers from the need to frequently move their livestock around in search of water during the dry season and will thus make stable ranching possible.

c. Until now, the small -to- medium-sized farmers had encountered great difficulties in transporting agricultural materials and delivering their products to markets. The improvement and expansion of the rural access road network, combined with the cargo trucks that will be procured under the Project, will give farmers a means of joint transportation and direct access to markets. This in turn will breed commercial awareness in the farmers and make it possible for them to transport materials and products when

they need to and at low costs. In specific terms, approximately 850,000 km of low cost truck transportation will become possible every year. This will be equivalent to the transportation of at least 6,800,000 km/tons of agricultural products, and the cost of this transportation will be 40% cheaper than would be the case if private carriers were used. Combined with the reduced post-harvest losses of farmers, these reduced transportation costs will lead to the higher incomes and improved living standards for the small -to-medium-sized farmers.

d. Quantifying the economic effect of the mobile workshop cars, the low bed trailer truck, and the low bed truck with winch is extremely difficult, however, POLDES estimates that it will be able to offer a repair service 70% cheaper than private workshops. Combined with the improved operating rates of bulldozers, cargo trucks, and other agricultural machinery, this will enable regular maintenance and repair costs to be reduced.

(2) Indirect Effect

a. Promoting the improvement of the rural area infrastructure for the development of agriculture will raise the productive motivation of all small -to- medium-sized farmers, whether they are cooperative members or not, and this will lead to increased agricultural production and productivity.

b. By reducing the post-harvest losses of agricultural products and promoting the distribution and marketing of products in season, the Project will contribute to the growth of rural area economy and the expansion of agricultural product exports from such areas. The resulting increase in national income will improve the external debt standing of the country and contribute to economic reconstruction.

4-2 Recommendation

Concerning the joint utilization and management and operation of the bulldozers, cargo trucks, and other machinery and equipment scheduled for procurement under the Project, the POLDES branch offices, farmers' cooperatives, and federations already have experience of using the machinery and equipment procured under the 2KR. Therefore, no problems can be found to exist in the management and operation setup. However, regarding the repair machinery and equipment (mobile workshop cars and tools for repair), these items will form the crux of the POLDES plans to build a model repair system. Although mechanics have been stationed at each branch office and are carrying out daily maintenance inspections and repairs, further bolstering of manpower will be indispensable in order to enable the functions of the Project machinery and equipment to be fully exploited. POLDES is fully aware of this point and it

plans to use an increased budget to strengthen its staff in line with the technical contents that are required.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