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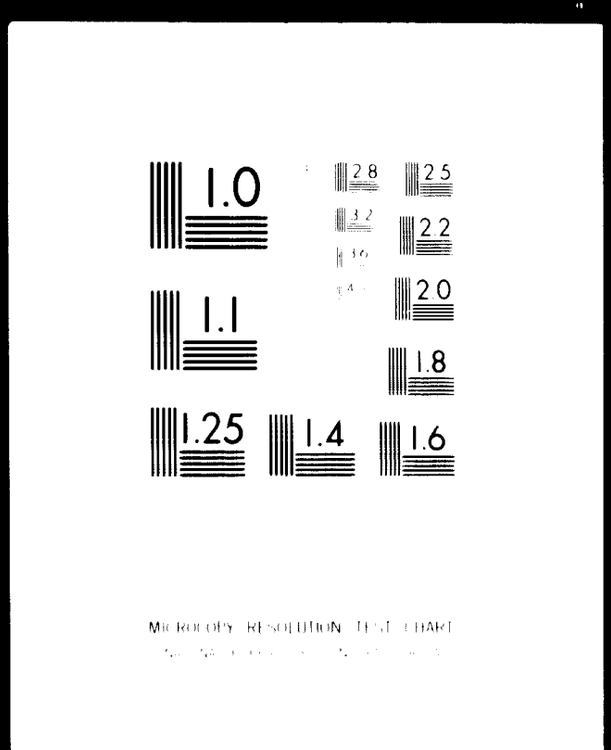

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COUNTRY STUDY REPORT

on the

STATUS OF AGRICULTURAL MACHINERY INDUSTRY

in

PHILIPPINES

Information compiled
during
a fact finding survey.

UNIDO, Vienna
January 1969

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* Note: The opinions expressed in this document do not necessarily reflect the views of the Secretariat of ECAFE or that of UNIDO.

INDEX

PHILIPPINES

SUMMARY

I. General patterns of agriculture

The Philippine Archipelago has 7.8 million hectares of arable land of which 5.6 million are cultivated.

The total population is estimated to be 34.6 million of which about 57% are engaged in agriculture. The population density upon cultivated land is around 6.2 per hectare.

The main crops are paddy and maize, that occupy perspectively 40% and 27% of total planted areas, coconuts, Manila hemp (abaca), sugarcane, fruits, and root crops.

Except for hauling nuts and minor cultivation, there is no substantial use of farm machinery within the 1.6 million hectares of land planted to coconuts.

II. Pattern of farm mechanization

About 12,000 four-wheel tractors and 7,500 power tillers are now in use.

The market in 1967 for four-wheel tractors is around 1,500. The demand is expected to increase to 6000 tractors by 1975. About 60% of these are within the 55-70 hp which are used by contractors, plantations and large-scale sugar planters.

The demand for power tillers by 1975 is also expected to increase rapidly from 2800 to 7000. These are used for paddy cultivation.

Other farm equipment that are needed in large quantities are centrifugal and paddy propeller pumps, stationary diesel and gasoline engines, sprayers,

/power paddy

power paddy threshers, likewise rice hullers, driers, and improved milling equipment.

The trend of sales, now limited to an extent due to farmers' low incomes, will depend upon the availability of loans to farmers at better terms and upon the judicious pricing of farm equipment.

III. Manufacturing industries and ancillary facilities

Two companies are assembling tractors without any local content except for batteries. Tractor tyres are not produced locally. Power tillers are imported almost entirely assembled.

Small to medium-scale manufacturers are producing various types of pumps, rice processing equipment, and a few other farm equipment.

For manufacturing farm equipment, there are facilities for supplying raw materials and castings and to a limited extent, some accessories used for automotive vehicles.

Through the newly created Board of Investments, the government is providing incentives to promote the establishment of new industries.

IV. Conclusions

The Philippines has a substantial market for powerful tractors within the range of 55-70 Hp, power tillers within 8-12 Hp, engines, pumps, rice and maize driers and processing equipment, and simple implements for paddy cultivation.

If local production of tractors could hardly be considered, then it is recommended that manufacturing facilities should be provided for producing power tillers, diesel engines and rice and maize driers, and existing facilities for producing rice processing equipment and irrigate-pump sho...

/be expanded.

be expanded. Present small to medium-sized farm machinery manufacturers must orient their operations towards an integrated industrial basis, to fully meet the local requirements for pumps, and to undertake the production of power threshers, knapsack sprayers, and other farm implements.

Section I

General Pattern of Agriculture

The Philippine Archipelago, a chain of 7,000 islands and islets stretching almost a thousand miles north to south, lies just above the equator, between latitude 4°23' and 21°25'N and longitude 116°30'E. Land area is about 30 million hectares of which 96% is accounted by eleven islands. The two largest islands are Luzon and Mindanao with a land area of 10.5 and 9.5 million hectares, respectively.

The climate is divided into a wet season from about June-November and a dry season from December-May. The country is visited with rainfalls and typhoons that diminish in frequency and intensity from North to South. Population and crop-growing centers are however visited frequently with bad weather.

1. Land Utilization

(a) Land distribution by nature:

Based on 1960 statistics, 7.8 million hectares were agricultural lands of which 5.6 million were cultivated, 0.4 million were for pastures, 0.6 million were woodlands attached to farms, 1.1 million were idle lands and the balance of about 20.1 million were forests.

(b) Land utilization by crop

Based on 1966 statistics, 3.1 million hectares were planted to rice, 2.1 million to corn, 1.6 million to coconuts, 0.3 million to sugarcane, 0.2 million to Manila Hemp (abaca) and about 0.5 million hectares to diversified food crops.

(c) Size of holdings

The national farm average was 3.6 in 1960. There are however substantial size differences according to the crops planted, such as about

/3.0 hectares

3.0 hectares for paddy, 2.5 for corn, 13.9 for sugarcane, 5.8 for abaca, 4.4 for tobacco, and 1.7 for coconuts.

(d) Type of holdings

Full farm ownership characterizes about 45% of Philippine farms. This represents 53% of the total crop land area. Another 14% of the farms are operated by farmers who partly own the lands that they work. Various types of tenancy prevail on 40% of the farms representing over a quarter of the crop land area.

The bulk of this land (85% by number of farms and area) is formed under some form of sharecropping agreement.

One-tenth of 1% of the farms and 5% of the farmed area are operated under the manager system.

(e) Land Reform

Started in 1963, the land reform programme is designed to give the tenant farmers greater incentives for increased productivity by gradually abolishing share tenancy and supplanting it with leasehold operation preparatory to owner cultivatorship. Implementation however is still limited due to lack of supporting funds to carry out the "packaged" programme.

2. Population

The national population which is growing yearly at approximately 3.3% is estimated in 1967 to be 34,656,000, of which about 70% is made up of persons below 30 years of age. The working population (1965 estimate) is about 10,102,000 of which 56.7% is engaged in agriculture, including forestry and fisheries. Persons engaged in agriculture is proportionately decreasing.

3. Agricultural Production and Farm Incomes

(a) Agricultural Production

The Philippine agricultural economy is composed of two sectors: one producing the basic food requirements and one for exports. Except for sugarcane and pineapple production, all other crops are produced by small scale planters.

The production in 1966 of major crops with their corresponding planting areas are as follows:

	Production (000 M. tons)
Rice (paddy)x/	4,513
Maizex/	1,483
Sugarcane	13,000
Sweet potatoes and yams	657
Cassava	580
Coconut (copra)	1,610
Tobacco	58

x/ 1967 figures

In 1967, agricultural production provided 35% of the gross domestic product and about 3/4 of the total export proceeds.

In 1968, about 200,000 metric tons of rice was exported for the first time to a nearby country. The increase in production is due largely to the adoption of improved rice varieties. Should this trend continue, it will be a departure from the country's former position of being a net rice importer.

/The production

The production of sugar is being increased to cope with the increasing requirement of the U.S. market. The prospects of substantial sugar exports appear unlikely by 1974 during which time the trade agreement allowing Philippine sugar to enter the U.S.A. at premium prices would have expired.

Production of commercial export crops show a possible growth rate of over 10% to support an overall agricultural growth rate of 5%.

(b) Farm income

Based on a study made in 1967, the average farm incomes derived from planting the five major crops are as follows:

	Crops				
	Paddy	Corn	Coconut	Sugarcane	Abaca
Yield per hectare in m. tons	1.32	0.67	0.96 1/	6.57 2/	0.63 3/
Farm harvest price in U.S. dollars/m.t. equivalent	94	66	123	73	140
Gross income per hectare in U.S. Dollars	125	44	119	480	88

(1 dollar - 3.90 pesos)

1/ As processed desiccated coconut

2/ As milled centrifugal sugar

3/ As stripped unmanufactured abaca.

(c) Exports

Philippine exports were valued at about U.S.$890 in 1967. The top ten exports accounted for 87% of all export revenues. These are logs and lumber, copra, sugar, coconut oil, wood and cork manufacturers, [illegible], desiccated coconut, feeding stuff for animals and abaca.

/Approximately

Approximately 75% of the total value of Philippine exports were composed of export of raw or simi-processed agricultural products.

(d) Economic Studies on Rice Production

(a) Based on farm management studies1/ conducted in Loguna, the tenant nets an additional income of ₱360 or $95 for one rice crop using improved seed varieties. The cost analysis is based on a 22% yield increase, use of irrigation and modestly, fertilizers and pesticides, payment for hired and family labour and rental for land tenancy, and a 35% increase to US$ 120/net in the price of the improved yield.

(b) Finding in another recent survey2/ showed that a farmer is able to repay in instalments the price of a purchased power tiller from the income derived with the sale of paddy and from the proceeds of contracting the tiller for off-farm cultivation. This survey covered 50 farms having an average size of 4.6 hectares, where double cropping is extensively practised. Irrigation and appreciable amounts of fertilizers and pesticides are used. The yield of paddy was about 30 m.t. per year, or 3 ton/ha crop. These improved farming practices characteriestic of tiller-owning farms do not however represent the country average.

The farmer contracts his power tiller to cultivate between 10-20 hectares at a billing rate ranging from 25-35 pesos daily or $6.50 - $9.00 or equivalent to about $120 yearly. This amount is necessary to meet the yearly instalment payment for the power tiller which is about $350.

1/ Farm Management Studies of Costs and Returns in Rice Production by Research Barker and [illegible] Quintana. Paper presented during the fourth [illegible] Session, 3-8 May [illegible], Bangkok

2/ Mechanization of Rice Production by Stanley [illegible] Johnson, [illegible] Quintana [illegible]

(c) Based on 1967 estimates, a Philippine farmer has an average yearly income of about ₱590 or US $150. Purchase of farm machinery will have to be justified not only from increased income derived from resulting better farming techniques, but also from off-farm incomes that are found to be higher. The government will also continue and perhaps increase its support price for the purchase of grain.

4. Framing Practices

(a) Irrigation Facilities

In 1960, the total area receiving irrigation water and planted to first and second crops was at least 900,000 hectares of which 40% was concentrated in Central Luzon.

Types of irrigation in use include gravity systems constructed and administered by the national governmen, pump irrigation systems designed and financed by the national government and operated communally or privately by private users, and communal and private systems constructed and operated without government assistance. The latter is responsible for irrigating 60% of the irrigated lands.

Out of 5,580,200 hectares of cultivated land in the country, only 11% were irrigated. Out of the three million hectares of paddy fields, only about 15% are irrigated and hence suitable for double cropping. The country has approximately 6.5-7.5 million hectares of potentially irrigated planting areas. The maintenance terrains considerately restrict the land area cultivable for farming.

~~1/xxItxisxxreported~~

/1/ It is

1/ It is reported that there was a 68% average higher yield from an irrigated field as compared to non-irrigated fields. Based on the national averages reported in 1961, irrigated fields yielded 38% more than non-irrigated fields for the first crop and 53% more for the second crop. These estimates excludes yields of upland-grown rice.

(b) Use of fertilizers

Fillipino farmers are applying fertilizers at rates much below recommended levels even when fertilizer consumption doubled in four years (1962-66).

Based on a recent study 2/ by 1970 the effective demand for fertilizers will only be about 7% of the potential demand if the ideal rate of fertilizer application were employed.

According to another study made by a local fertilizer company, only 30% of 2.4 million farmers used fertilizers in 1964 in only 22% out of about 8 million hectares of cropland areas. Furthermore, only 30 kg/ha compared to the 70-100 kg. as recommended were used for lowland rice planting. It is estimated that the whole country will obtain a yield increase worth ₱1.70 to ₱4.20 for every additional ₱1.00 spent for fertilizers.

(c) Plant protection

About 3,300 metric tons of basic pesticide ingredients were imported in 1967 by approximately 30 firms who are engaged one way or another in formulation, repacking, and distribution of agricultural chemicals under various brand names.

To combat principally the rice stem and the rice blast diseases, two

/chemical

1/ Asian Development Bank, Asian Agricultural Survey, Vol. II (1968)

2/ Economic Monitor, April 10, 1967

chemical manufacturers are considering the manufacture of insecticides, principally benzene hexachloride (BHC) in terms of 6% yanma granules at a capacity of 3,000 metric tons/year. Installation plans may proceed as soon as the government depletes its imported BHC supply.

It is reported that insect pests' damage (excluding rodent devastations) account 20-30% annual loss of the rice crop.

(d) Sugarcane

A significant degree of mechanize cultivation is practiced in sugar-growing farms of which 43% are over 200 hectares in size and only 20% are below 10 hectares. Such large farm sizes and the incomes derived from sugar export support the use of farm machinery.

Sugar plantations like the one visited, the Canlugang Sugar Estate in Laguna, employ tractors primarily for cultivation. With the case of Canlubang, the extent of use of farm equipment is up to the level of 0.5 h.p. per hectare. Tractors are used for deep (20") plowing using single mouldboard plows, for furrowing and sometimes for sub-soiling. But other operations like fertilizing and cane harvesting are done manually, since these have been found to be still economical.

Due to better farming practices, the yield of cane per hectare amounts to 62 tons which upon milling produces about 6.9 tons of cane sugar. Outside farms net only 75% as much.

(e) Paddy.

It is reported that 10% of the 3.4 million hectares of paddy field is by this time planted to the improved rice variety - IR-8 and related strains.

Section II

Pattern of Farm Mechanization Centre

1. Farm Machinery Population

a) Farm machinery centers Herewith is a tabulation of the 1968 population of selected farm equipment based on the best available estimates to date. In cases where difficulties were encountered in estimating, the 1960 official population figures are instead listed:

Items	Estimated 1968 Population
Four-wheel tractors	12,000
Power tillers	7,500
Engines	(.....)
Water pumps	90,000
Threshers	8,000
Sprayers	60,000
Sugarcane crushers	2,300 1/
Abaca stripping machines	5,700 1/
Rice and corn mills	3,500
Rice hullers cleaners including cone-type mills	4,000
Power cultivators	(....)
Animal plows	1,951,000 1/
Harrows	1,315,300 1/

1/ Estimated by the Bureau of Census in 1960

Farm machinery population is to be understood as the summation of total sales and importations, disregarding obsolescences and non-users.

/Rice Mills Inventory

Rice Mills Inventory According to a 1966 survey made by the Rice and Corn Board, herewith is the breakdown of the number of existing mills:

Mills for	Types					
	Cono		Kiskisan		Total	
	Number	Capacity	Number	Capacity	Number	Capacity
Rice	1,089	147	4,215	191	5,304	338
Corn	157	9	424	23	581	33
Combined rice and corn	204	22	1,322	70	1,526	92

Note: Capacity is measured in thousand cavans (46 kgs net) paddy input per day of 12 hours operation.

(b) Ownership of Farm Equipment and Work Animals In 1966-67 a survey was conducted of rice farmlands in Central Luzon to investigate the pattern of ownership of farm equipment and animals by size of farms. For farms below 1.5 hectares in size the typical equipment was 1 plow, 1 harrow and 1 carabao; for farms between 1.6 and 3.5 hectares, 1.4 plows, 1.5 harrows, and 1.5 work animals; for farms above 3.6 hectares, 2 plows, 2 harrows, and a carabaos. Of the 114 farms covered in the survey, while several indicated tractor use, only 1 farm owned a tractor.

Tractors and carabas were used almost wholly for land preparation work.

Possession of weeders and sprayers were not significant since depending upon the farm size, ownership ranged from only 10-38% of farms surveyed.

Total draft animal population in 1960 was as follows:

Water buffaloes	1,863,000
Cattle	189,000
Horses	210,000

/2. Imports

2. Imports and Production of Farm Machinery

a) Imports

Figures showing the amount of importations of agricultural machinery and implements during the five-year 1962-67 period are found at the end of Section II.

Tractors, power tillers and engines of all types are imported since there is no local manufacture. Even animal drawn plows and harrows are imported.

b) Taxes

Tariffs vary within the range of 5-10% of the C.I.F. value depending upon the category of farm machinery. Power tillers and tractors below 50 Hp are reported to have a 5% duty. Higher tariffs are to be expected when there are local firms producing products identical to the ones being imported.

There is a sales tax reported to be within 7-10% of the commodity price.

c) Production for Farm Machinery

I. Riding Tractors

(i) Existing Demand

In 1967 the demand for tractors was about 1,550.

(ii) Production and Sales

In 1967, two firms - International Harvester and GAMI, Inc. - assembled about 1,200 tractors. All others are reported to merely import the tractors.

In 1967 sales of the following firms are estimated to be around 1,500 tractors.

/Name of Company

Name of Company	Tractor Make	Market Share %
GMI	Ford	48
International Harvester	International Harvester	23
Radioweather Trading Co.	David Browne	10
Benison	John Deere	7
Agricultural & Industrial Machineries, Inc.	Deutz	7
Polaris Marketing	Massey Ferguson	5
		100

In 1967, tractor sales excluding attachments are estimated to be around P35 million.

Japanese small 4-wheel tractors were recently introduced in the market. Sales in 1967 being limited were considered to be negligible in estimating the above mentioned market distribution.

In 1967, sales according to tractor sizes are estimated to be as follows:

Tractor size	Percentage
55 HP and below	30
56-70 HP	60
71 HP and up	10
	100

Tractors within the 60-65 HP range are popular. Buyer preference is for increasing horsepower.

About 60% of sales are accompanied with purchases of harrows, rotary tillers, and disc plows.

(iii) Selling Prices

Based on list prices supplied, herewith is a tabulation of 1968 retail selling price averages according to categories of tractor horsepower:

/Horsepower Range

Horsepower Range	Selling Prices	
	Pesos	U.S. Dollars (1 dollar - 3.90 pesos)
* 40 and below	15,900	4,100
41 - 50	17,800	4,500
51 - 60	22,000	5,600
61 - 65	26,900	6,900
66 - 72	27,000	7,000
** 72 and up	42,100	10,800

* Selling price stated is based on a 37 HP tractor, the only one available in the market within the 40 HP and below category.

** For a 83 HP tractor

Note: The dealer provides a 5-10% discount for cash sales and perhaps another discount subject to customer bargaining.

Based on the list price averages, local tractor prices are considerably high compared in general to those in nearby countries.

(iv) Tractor Models

The tractor models in the market with their corresponding horsepowers are as follows:-

	Model	No. of Cylinders	Engine HP
David Browne	DBT 990	4	55
	880	3	46
	1200	4	67
Ford	5000	4	67
	2000	3	37
International Harvester	B614	4	62½
	423	3	42
Massey Ferguson	MF135	3	45½
	178	4	72½
John Deere	3020	4	[illegible]
	1020	3	43

All engines are water-cooled.

/(v)

(v) Usage of Tractors

Tractors are principally used for cultivation purposes in large sugar farms, pineapple and banana plantations. It is reported that tractors are also used to a limited extent for hauling coconuts to the processing areas and for pulling sugarcane-laden trailers to the mills, should there be no rail transport facilities available.

Caged wheels were developed for use of tractors in wet paddy fields.

Marketing

It is reported that there are about 120 dealers of which a number provide service facilities.

5. Production and Sales of Power Tillers

Existing demand

In 1967, the demand for power tillers was about 2,800. Nearly all the power tillers purchased were used for paddy cultivation in rice-growing areas principally in Central Luzon.

The introduction of power tillers to the country dates back since about 10 years ago when the first units for demonstrations were imported through the Reparations Agreement. The demand however began to be appreciable only during the past 3-4 years when other Japanese power tiller manufacturers established their own small assembly shops in collaboration with Filipino firms and the ensuring sales improved.

Production and sales

Two firms have facilities for assembling power tillers from imported CKD sub-assemblies.

/Sales

Sales during the past three years were as follows:-

Year	Sales (No. of Units)	Number of Firms
1965	420	4
1966	1,087	7
1967	2,323	7

There were another eight firms that were engaged in the market in 1967. Their limited sales being intended for introductory purposes are considered to be negligible.

II. Power Tillers

(i) Firms Established

Fifteen firms, as follows, are reported to be engaged in the assembly and marketing of power tillers.

Brand	Name of Local Firms
Daikin	Overland Automotive Distributors
Fuji	Clinton (Phil.) Distributing Co., Inc.
Furukawa	Penala Commercial
Hakorette	Philippine Factors, Inc.
Hiromoto	FEISCO, Inc.
Honda	Mariwasa Distributors
Iseki	Radiowealth, Inc.
Komatsu	Agric. and Industrial Machineries, Inc.
Kubota	E.R. Angeles & Co.
Land Master	Singer Marketing Corporation
Mitsubishi	SBA Commercial Co., Inc.
Robin	Gayem Corporation
Satoh	Marnex Commercial Co.
Suzue	Agro-Industrial Sales (Phil.) Inc.
Yanmar	Pacific Star, Inc.

/...

All except Hakorette and Landmaster are Japanese brands.

As arranged in the order of descending sales, the following brands were the popular ones in 1967:

(a) Kubota
(b) Iseki
(c) Mitsubishi
(d) Honda
(e) Satoh
(f) Fuji
(g) Hinimoto

Sizes of power tiller sold ranged from 4½ - 14 Horsepower. Majority of the sales in 1966-67 were within 8 - 12 horsepower.

(ii) Selling Prices

Based on list price information supplied on November 1968, the average retail selling prices of power tillers in the Philippines are as follows:

Type of Engine	4.5 - 6		6½ - 8		8½ - 10		11 - 14	
	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline
Average selling price in:								
Pesos	5730	3500	5600	3950	7174	6200	8633	-
U.S. Dollars ($1 equals 3.60 pesos)	1470	975	1420	1010	1840	1590	2200	-
Retail price in Japan in U.S. dollars (360 yen equal 1 dollar)	-	365	584		-	1020	1050	-
Price difference		167%	122%		56%		120%	

Notes: (1) Power tillers with mounted diesel or gasoline engines are sold with a 5-10% cash discount from list prices.
(2) In Japan, prices include the rotary attachment, an integral part for power tillers sold beyond 8 hp in sizes.
(3) In Japan, a set of caged wheels is priced about U.S.$22; a rotary cultivator, about $13.

/Sales of

Sales of power tillers could be higher should selling prices be reasonably lowered and the borrowing terms - 9-12% interest and 2.5 years to pay-relaxed.

In the Philippines, there is a wider price difference ranging between 15-40% in favor of the diesel to the gasoline engine, as compared to around 20% difference in Japan, where most of the imported engines come from.

A Japanese power tiller manufacturer normally utilizes a system of distributors and dealers, the former providing service and maintenance facilities. A distributor with his dealers numbering about 15 are able to sell about 750 per year. The manufacturer's cost of marketing is 50% of the factory selling price. The farmer gets a 10% cash discount and a loan at 8% interest payable in two years.

It is reasonable to expect that a Japanese power tiller manufacturer will export at a price near to its factory selling price. Considering freight charges and other costs involved in the assembly and marketing, the ensuring Philippine retail prices are found to be considerably higher than prices in other Asian countries.

Future trend in the mechanization of rice farms

Mechanization of rice farms has started although it will take a considerable length of time before there will be a significant saturation of the paddy household market. Roughly projecting the sales trend up to 1975. The power tiller population by that time will not be more than 40,000. Reconciling this to the mechanization of about 1 million rice farms, this then would merely represent a 4% penetration, and 6-8% at most if the power tiller will continue by that time to be contracted to other farms.

/III.

III. Production and Sales of Engines

There is no significant production of engines for agricultural purposes.

The amount of limited data available do not provide a reliable estimation of the engine market.

IV. Production and Sales of Pumps

In 1967, the demand for pumps for agricultural use was about 6000 units. The projected demand in 1970 and 1975 are roughly estimated to be about 10,000 and 20,000 respectively.

V. Production and Sales of Other Farm Equipment

Except rice and corn milling equipment and a few hullers, all other farm equipment - threshers, sprayers, etc. - are imported.

The limited amount of data available does not enable us to estimate the size of the existing markets.

VI Use of Rice and Maize Mills

The following describes the types of milling used:

(a) The "Kiskisan" is a locally made mill consisting of a huller and polisher. Accessory equipment are the blower and sifter. The huller requires about 6 horsepower, and with the polisher, blower and sifter, about 15 horsepower. Unit capacity ranges from 170-340 kilograms/hr of milled rice. Average recovery of milled rice is approximately 60% by weight. Popular sizes are the smaller ones that are portable for accessibility to remote farms. About 30% of the country's palay production are milled with small "Kiskisan" units.

(b) The "Cono" mill is a locally-made larger mill, having combined capacities in operation ranging from 380-1,730 kg/hr for rice. The usual equipment consists of hullers, polishing cones, graders, separators, and aspirators. Also included are scales, bucket elevators, screw conveyors, blowers, cyclone dust collectors, motors, drives, and other necessary

accessories. The power requirements range from 20-40 horsepower. Average recovery of milled rice is approximately 67% by weight.

About 50% of the palay is processed in the "cono" mills. Over the years, the number of "cono" mills has increased more than the number of "Kiskisans". This is due, in part, to the greater ease with which "cono" mills can be financed through the Rice and Control Board (RICOB).

Although some foreign model mills are being imported, most of the mills are manufactured in the country.

c) Hand pounding. Most of the remaining 20% of the total paddy production is milled by hand and a very small amount by rubber rolling mills.

Although there is a sufficiency in the supply of locally-made milling machinery, there is a great need to improve the yield of perfect grains and reduce broken grains by the use of improved designs. Improved rice quality is a prerequisite for the export market.

3. Furture Demand for Agricultural Machinery

Herewith is a breakdown of the estimated sales and projected demand of selected farm machinery.

	1968 Annual Sales	Projected Demand 1970	1975
Four-wheel tractors	1,500	1,800	4,000
Power tillers	2,800	3,500	7,000
Engines	n.a.		
Micro-gasoline[1]	(...)	4,000-7,000	-
Small gasoline[2]	(...)	3,000-5,000	-
Small diesel[3]	(...)	6,000-10,000	-
Medium-sized diesel for tractor[4]	(...)	200-300	-
	(...)	1,800	-

/Water pumps

Water pumps	6,000	10,000	20,000
Power sprayers and dusters	(...)	5,000	-
Hand-operated sprayers & dusters	(...)	10,000	-
Power operated paddy threshers	(...)	3,000	-
Foot-operated paddy threshers	(...)	2,000	-

(a) Tractors. The increase in demand is expected to be at least 10% per year. Sales are expected to increase by 25% per year should credit financing be available. About 550 tractors representing about 30% of the national tractor sales were sold last year through the $5 million I.B.R.D. farm mechnization loan. Another I.B.R.D. loan for the same purpose is expected to be coming.

Sales are influenced to a strong degree with the stability of the sugar industry since quite a number of the buyers are sugar planters.

(b) Power tillers. The demand is expected to increase conservatively by 10-15%. Sales of power tillers will continue to depend to a substantial degree on the availability of loans. The following factors are however bound to increase sales dramatically within the next 3-5 years.

1. Expectation of another farm mechanization loan now pending with the I.B.R.D.
2. Anticipation of the purchase by the government through the Rice and Corn Production coordinating Committee of about 3,300 power tillers to be used for fully implementing by 1970 the first phase of the rice farm mechanization program for farms beyond two hectares in size.
3. Expectation of higher farmer income through use of improved rice varieties, double cropping, and the expansion of irrigation facilities.

/4.

4. Realization of sales by the other eight newly-starting firms taking into account their efforts to expand into new areas of distributions.

5. Plans of two local firms to engage by 1970 (as reported) in the larger scale assembly of about 3,000 power tillers. The amount of local content may not be significant initially although they have intentions to progressively increase it.

Farmers buying power tillers are expected to continue engaging in off-farm contract work since this side business has been found to be profitable and helpful in servicing the instalment payments for the tillers purchased. Despite increased crop production, farm incomes within prevailing conditions in agricultural may not by themselves be enough to pay out the purchases for power tillers, and other important farm equipment as well.

Sales of power tiller will continue to depend on a substantial degree on the availability of loans, such as the $5 million I.B.R.D. loan which during 1967-68 made possible the acquisition by farmers of 700 power tillers. This quantity roughly represents 50% of the national market during that time.

(c) Pumps. Manufacturing facilities are reported to be available to cope with the country's pump requirements for agriculture. The government however is expected to continue importing irrigation pumps from Japan under the Reparations Agreement. In 1967, it is reported that 1300 units were imported by the Irrigation Service Unit, a government agency. These pumps upon installation are sold to farmers at near cost under a ten year payment plan. Due to lack of financing, local pump manufacturers are unable to compete.

(d) Threshers. There are no substantial manufacturers although two or three firms are reported to start manufacturing soon hand and peda l-type threshers.

(e) Diesel Engines. Another firm has been licensed to manufacture by 1970 9-12 Hp four-stroke one cylinder horizontal diesel engine at an annual

/capacity

capacity of 1000. This firm is reported to be able to meet entirely the national demand for this type of engine.

(f) Small Trailers. Although national requirements are reported to be merely 500/year, the demand is expected to increase with the increasing transport needs for rice and corn. There are 3-4 firms reported to be manufacturing trailers.

Power Tillers. In the near future, there will be a modest start in power tiller manufacture with increasing local contents. Sizes applicable for local needs may be in the range of 8-12 Hp.

Items	1963		1964		1965		1966		1967	
	Qty. (pcs)	* Cost (CIF)	Qty. (pcs)	* Cost (CIF)	Qty. (pcs)	* Cost (CIF)	Qty. (pcs)	* Cost (CIF)	Qty. (pcs)	* Cost (CIF)
1. Plow animal	6,107	330,354	7,511	365,217	1,223	47,539	2,553	26,194	971	433,231
2. Cultivators animal drawn	233	81,763	111	33,471	815	193,906	627	99,711	253	107,133
3. Harrows animal drawn	618	241,698	3,223	258,046	272	77,722	32	38,082	940	219,751
4. Other Agri.Machinery for the Preparation of Soil	1,071	179,993	3,391	697,230	10,355	388,423	3,744	933,812	9,70[illegible]	2,[illegible]3,135
5. Reapers	-	-	112	3,724	102	5,201	6,080	12,809	12,129	46,763
6. Rice thresher	50	3,128	70	2,602	73	18,193	133	36,034	273	124,108
7. Mowers	1,217	17,965	859	15,565	273	22,252	238	24,086	299	5,438
8. Rice Hullers Cleaners Incl. cone type mills	2	700	10	2,124	10	3,965	964	18,166	31	12,516
9. Other machinery harvest thresher	25	48,659	299	86,284	1,535	80,477	266	171,016	321	129,925
10. Tractors, includes power tillers	1,006	4,362,739	3,252	3,790,248	618	2,215,607	634	2,414,241	1,93[illegible]	6,915,135
11. Crawler	1,686	3,106,441	386	4,069,902	239	2,428,492	331	4,083,877	2,429	11,026,790
12. Engines, stationary gasoline and kerosene	-	-	-	-	18,739	1,159,688(FOB)	-	-	-	-
13. Diesel and semi-diesel engines, marine, stationary and loconotive	-	-	-	-	4,971	4,608,091(FOB)	-	-	-	-

* Cost in US dollars equivalent.

Section III

MANUFACTURING INDUSTRIES AND ANCILLARY FACILITIES

There are firms producing pumps for agricultural use and rice and corn milling equipment. Some firms produce although in limited quantities threshers, hullers, and animal drawn equipment. There are facilities for the assembly of tractors and power tillers from CKD subassemblies, although quite a number of these firms continue to import the machinery as complete units.

1. Farm Machinery Manufacturing

(a) PAMMA It is reported that member companies of the Philippine Agricultural Machinery Manufacturers Association (PAMMA) represent about 80% of the total production of agricultural machinery in the country. All others, some 50 medium-scale manufacturers and a number of small ones are reported to produce the remaining 20%.

Distributors of farm equipment belong to a separate organization - Agricultural Machinery Distributors Association.

A brief description about the nature of manufacturing operations existing in the country and their development are as follows:

Tractor Assembly Two firms, International Harvester, Inc. and G.M.I, Inc. are locally assembling I-H and Ford tractors respectively from imported CKD components. All components are imported except locally-available tires, batteries, and the casted weights for the front end loading.

The International Harvester assembly line for tructs and tractors located at Mandaluyong, Rizal is run by about 85 shop workers of which 6-7 are engaged in tractor assembly.

Tractor implements - rotary cutter, plows, and harrows - are sub-contracted to local small-scale manufacturers.

/There are

There are no plants at the moment to manufacture tractors, since the relatively small market and the limited ancillary facilities in the country do no apparently justify its economical manufacture.

Power Tillers A substantial number of the power tillers sold in the market are merely assembled from imported CKD countries.

In collaboration with a Japanese manufacturer, a local firm was licensed to manufacture 10-12 Hp diesel power tillers starting with an annual capacity of 1800. Except for certain gears, the body, and minor components, the firm will import the main CKD components from Japan.

Small Riding Tractor. Two firms are reported to be developing separately small 4-wheel tractors, one with tracks, driven by 10-12 Hp diesel engines that will initially be imported. Intended selling price is roughly estimated to be ₱5,000 or $1250.

It is reported that there are problems in developing suitable gear reduction systems.

Integrated Rice and Corn Storage and Milling Systems. The government has under study the installation of a system of integrated units having grain rolling capacities ranging from 3,000 to 12,000 metric tons. The units will be located in the rice and corn growing centers and in certain parts. The units will have facilities for receiving grain - handling and scale weighing equipment, mechanical drying, milling, and storage in silos. It has been estimated that an investment of $20 million for the initial number of recommended installations will economically justify in terms alone of the reduction of grain losses adherent with existing conventional storage and handling. The justifications for the increment excludes the increase in yield and product quality resulting with the use of the modern milling equipment.

/Corn

Corn Driers. It is reported that more corn mills are being erected in the corn producing areas in Southern Philippines. The government supports this program and there are plans to export corn starch. Mechanization will involve the installation of driers, milling equipment, and modern storage silos.

Engines

- There are no facilities for the substantial manufacture of small engines.
- There are plans to manufacture by 1970 single-cylinder four strokes horizontal diesel engines of 9-12 horsepower at an initial capacity of 1,000 per year. The NASSCO, a government corporation engaged in ship-building/repair and steel making also plans to manufacture 7½ hp gasoline engines and 10 hp diesel engines starting with a local content of 70%.

Rice and Corn Mills - There are five manufacturers for rice and corn milling equipment supplying the requirements of a bout 9,000 millers, mostly operating on small scale. There is however the need of improving the design of the equipment to reduce the amount of broken rice, to adopt with the new rice varieties.

Agricultural Implements - Four plants are reported to manufacture plows, harrows, etc. One of the leading manufacturers has an installed annual capacity of about 15,000 steel ploughs and 100,000 pieces of parts.

Sugar and Oil Expelling Equipment

Existing - Two manufacturer fabricate components of sugar mills such as crushers, rollers, and rollers. One of them manufactures under licence clarifiers, stabilizers and evaporators.

2. Pump manufacturers

Name of Company	Company Information	Type of Pump	Details of Manufacturing	Plans	Other Products Manufactured
Feati Industries	100% local capital	Centrifugal water pumps, 17 sizes ranging from 2" - 12"	Rated: 2400/year, has foundry and machine shops. 150 employees. Wages: P6-15 daily or $1.50-3.75	Develop a rice drier	Electric motors, fans, air conditioners, carbon dioxide, sodium silicate.
Marsteel Corp.	-	Centrifugal 2 to 12" water pumps	Produced 800 in 1967	-	Tractor crawler parts, valves, grinding equipment.
Mechanical Center	-	Volute centrifugal pumps Self-priming turbine	Production: 2000/year 120 production employees, of which 60 are agricultural implements	Manufacture power tillers	Elbows, valves, betl and screw conveyors
Philippine United Foundry	100% local company	Centrifugal pumps	Rated: 600/year	-	Manually operated corn grinders.
U.S. Engg. Co. (USECO)	Manufacturing affiliate of Atkins Kroll Capital 60% Filipino and 40% American	Deep-well tube pumps	90% local content: valves, impellers, rubber bearings, spider rings are locally manufactured.	Possibly manufacture of submersible pumps that draw 40 feet head. Manufacture 10-20 Hp crawler-type tractors	High pressure pumps for sprinkler systems in sugar and vegetable fields. Vertical-shaft impellers.
		Low-head paddy pumps	600-1400 gpm delivery at 6-20 feet. Requiring 4-10 Hp. Kohler imported engines. Production: 400 in 1967. ½ ha. plant area, 1200 sq.m. covered 54 manufacturing employees of which 10 are engineers/technicians, and 18 are non-production workers.	Manufacture rice driers under licence from Aeroslide.	

Name of Company	Company Information	Type of Pump	Details of Manufacturing	Plans	Other Products Manufactured
Oriental Machinery Manufacturers	100% local company	1½-4" centrifugal pumps Kohler engine imported	-	-	Blowers, coils for magnetos.

2) Other Manufacturers of Farm Machinery

Name of Company	Company Information	Details of Manufacture	Plans
F. Bernabe & Sons	-	1. Rice and corn driers and bulk storage (100-150 Mt capacity) 2. Small frames for farm harrows supplied to International-Harvester. 3. Non-tipping 5-20 ton sugar cane trailers	Develop a four-wheel tractor using 8-12 Hp. diesel engine.
Warner Barnes	British Co.	Jobbing manufacturer for sugar cane unloaders and mixing tanks for the sugar mills. Markets locally-made hullers, engines, pumps, corn shellers, and grinders.	Developing rice threshers
Integral Engineering and Marketing Corp.	Local company	Manufacture crawler attachments, plow frames, and 3-point hitches. (The ball and socket components are imported).	Manufacture and market a design involving the attachments for the conversion of a jeep to a crawler-type tractor for use in paddy fields.

3. Availability of materials, components, and ancillary facilities Existing

(a) Steel (i) As of 1967, there were 23 rerolling plants of which five were equipped with scrap melting facilities. Annual melting and rolling capacities are 184,500 and 366,200 m.t. respectively.

(ii) One cold rolling mill having an annual capacity of 120,000 m.t. supplies the steel requirements of fine galvanizing plants having a combined capacity of 211,000 m.tons.

(iii) One tinning plant has a rated annual capacity of 72,000 m.t. of tinplates produced by the hot-dipped and electrolytic processes.

(iv) Two small plants produce pig iron from ore.

(b) Foundries There are around 140 foundries producing roughly 20,000 - 30,000 m.t. mostly of ferrous castings yearly. Production of non-ferrous castings is about 100-200 metric tons annually.

(c) Machine Tools Only two firms produce small drills, power and hydraulic presses and one firm fabricates machine tool spare parts. The bulk of the country's requirements are imported.

(d) Automotive Parts There are 14 medium-sized manufacturers producing chiefly the automotive replacement parts requirements for brakelinings, leaf springs, radiators, crankshafts and connecting rods. All other automative parts which are the major ones are imported.

/Plans

Plans

(a) Steel The first integrated iron and steel plant will be in production by the end of 1969. The plant will produce initially 430,000 m. tons of finished products.

(b) Machine Tools The government has included in its Four-Year Economic Plan the establishment by 1970 of a machine tool factory at a projected cost of P156 million or $40 million. There is no information now showing the realization of this project.

(c) Cold Rolling Mill Another mill producing about 60,000 metric tons of cold-rolled plates and coils is expected to be in operation by this end of 1967.

4. Local Problems of Developing Industries Manufacturing Agricultural Machinery

(a) Lack of supporting ancillary industries. The manufacture of tractors, power tillers, small engines, power sprayers, and other major farm equipment is contingent upon the availability of local facilities to manufacture the major components. Foundries producing malleable, steel and non-ferrous castings, machine shops producing precision tooling, and suppliers of specialized parts like valves, pistons, etc. are necessary.

The availability of such facilities in the country are limited in general. It would however be beneficial for the country to undertake a study about the level of existing engineering industries and their development in relation to the integrated manufacture of farm machinery.

(b) Fragmented efforts on the part of many small-scale manufacturers. As observed there is no existing single manufacturer in the country that

/manufactures

manufactures on an integrated nature farm machinery and implements. An organised company that will manufacture pumps, engines, threshers, sprayers, rice processing equipment will obviously derive the advantages of larger scale of operations, optimum use of manufacturing facilities, and broader scope for expansions.

(c) Competition through government importations. To implement agricultural programmes, the government would naturally rely on available foreign suppliers' credit and the Japanese reparations for the supply of agricultural machinery. And the same case applies to registered cooperations, regional developing authorities, and perhaps even pioneering agro-industries to come who take advantage of their tax-free importing privileges. But due consideration must be given by the government in forming a policy to promote and safeguard the interests of local manufacturers.

(d) Lack of organized marketing. Since agricultural marketing is conducted on a limited scale by small-scale manufacturers on limited means, there is a need to provide assistance in improving the distribution and marketing facilities.

(e) Lack of financing farm equipment purchases of farmers. Aside from this, the farmer is confronted with high interest rates and shorter pay-out periods for equipment purchases, which in other countries are given at subsidy.

/Section IV

IV. POLICY TOWARDS FARM MECHANIZATION

1. Incentives by the government for farm mechanization

(a) General Programmes

Apart from the government-supported recent acquisition of 15 million farm mechanization loan from the I.B.R.D., there has not been any known government policy that encourages farm mechanization. Indirectly however farm mechanization together with the other agricultural inputs are being promoted with the expansion of particularly the rural banking systems.

The government is concentrating its efforts in establishing more irrigation facilities, in expanding the use of improved rice varieties, and quite recently, in the establishment of integrated mills for the storage, drying, and processing of rice and corn. The government however is beginning to consider the mechanization of rice paddies beyond two hectares in size by the acquisition of power tillers. Its implementation however will depend upon surmounting the recurring problems of financing, apart from the usual guarantees required by agricultural institutions that farmers are able to afford payments.

In other countries, governments subsidize to a significant extent sometimes providing for free to farmers, the purchase of minor farm equipment such as threshers and plant protection equipment. There are no indications however that the government will provide subsidy, much less to consider it.

The promotion of the use of farm equipment is therefore left to the private industries which are made up largely of small manufacturers. At times, they run into direct competition from the government who finds it rather convenient and proprietary to import its requirement from Japan using available government funds through the Reparations Agreement.

/(b)

(b) Executing Governmental Agencies

Herewith are statutory bodies, of which some are directly under the Department of Agriculture and Natural Resources, performing major activities related to agriculture.

1. The National Irrigation Administration and the Irrigation Service Unit engage in the operation, maintenance, and extension of irrigation systems. The former administers to existing national irrigation systems, mostly of the gravity type, whiel the former under the Department of Public Works and Communications specializes in the purchase (quite a number from abroad) and installation of pumps for irrigation.

2. The Rice and Corn Board (RICOB) implements a law passed in 1960 ensuring that only nationals can mill, warehouse, transport, and distribute rice and corn.

Under the auspices of the RICOB, the Development Bank of the Philippines and the Philippine National Bank of the Philippines have loaned around 150 million pesos or $38 million to farmers wanting to engage in grain marketing. Out of this sum, approximately 20 million pesos or $5 million was used for constructing 200 warehouses and corn mills.

3. The Bureau of Plant Industry (BPI) undertakes plant improvement research, produces and distributes seeds and plant materials, and suppresses pest and disease outbreaks.

The BPI composed of ten divisions with eight regional and 56 provincial offices and employing over 2,000 persons, maintains 27 experimental stations of which some are seed-testing laboratories and seed-multiplication centres for the IR-8, BPI-76, and C-18 rice varieties.

4. The Cultural Productivity Commission conducts economic and social research on farmer activities.

/5.

5. The Bureau of Agricultural Extension, as the name applies, is entrusted with agricultural extension work. It has an employment of over 5,000 persons of which about 45% are involved in farm management programmes.

6. The Rice and Corn Production Coordinating Council coordinates all agencies of the government in the drive to self-sufficiency in rice and corn.

7. The Rice and Corn Administration (RCA) supports the price for rice and corn by contracting grain purchase, from farmers, its storage, and then its orderly disposal at stabilized prices.

(c) Price Supports and Regulations

There are no export taxes nor export subsidies for agricultural products. Agricultural imports are subject to fixed duties. There are however direct import controls on some agricultural commodities. Rice and corn imports are prohibited unless the National Economic Council believes that a domestic shortage is likely to occur. Should there be a need, the Rice and Corn Administration imports rice free of duty and taxes directly or through the private trade. Imports of coffee and coffee products, fresh onions, garlic, cabbage and potatoes are also controlled.

High tariffs are imposed on food preparations or crops locally produced.

Price supports.

(a) The Rice and Corn Administration buys ordinary clean and dry paddy at a minimum price of 16 pesos per sack of 45 kg, or equivalent to US$90/m.t. (Conversion: US$1.00 = P3.90).

(b) Support prices for corn range from P8 to P13 per sack of 56 kg or $37-60/m.t., depending on the quality.

(c) The government-buying price for Virginia-type leaf tobacco is P1.50-P3.60 per kilogram, or $385-920/m.t., depending on the grade.

/(d)

(d) There is no law regulating the production of any crop, except sugar. The Government regulations on the production of centrifugal sugar depends upon the allotment set by the United States government. Present quotas allow for the production of 17 million short tons of which 1,050,000 short tons is for export to the United States.

2. Rural Development

A) Financing Agricultural Programs

(a) Agricultural Financing Institutions banks that are starting and a network of private commercial banks providing short-term loans of agro-industrial nature, the following are the sources (mostly government-supported) of financing for agriculture:

(i) Rural Banks As of the end of 1967 there were 369 rural banks with aggregate resources amounting to P410.8 million or US$105 million, and capital share stock consisting of P67.1 million or $17 million of private investments and P53.9 million, or $13.8 of government counterpart capital. During the past 15 years, the rural banks granted 2,700,000 loans worth P1.85 billion, or $475 million.

Recently, the rural banks administered a $5 million credit line obtained from the World Bank to finance loans for farm mechanization and irrigation. About 87% of the loan was utilized for farm mechanization, of which P.3.1 million or $3.4 million was used for financing the purchase by farmers of 1,482 tractors (tractors and power tillers combined). Since the credit line is exhausted, an additional $15 million is reported being negotiated with the I.B.R.D. for the same purpose.

/The U.S.

The U.S. Agency for International Development recently seeded a P5 million or $1.3 million fund known as the Systematic Programmes for Rural Economic Assistance Development (SPREAD). In one year, three government concerns contributed to the fund which accumulated by the end of 1967 to P29 million or $7.5 million. Under a supervised credit programme, loans from this fund will be provided to the farmers to take up modern farming methods. Additional funds are forthcoming.

In 1967, in support of the Central Luzon Development Programme, 110 rural banks within the locality extended P96.6 million or $26 million to 114,000 farmers for meeting operating expenses of which farm mechanization is included.

(ii) Development Bank of the Philippines (DBP)

This government-owned development bank provides loans on agricultural development projects. These include loans to finance the production phase and industrial loans to finance the processing, storage, and trading aspects of the particular industry. Examples are loans for the conversion of non-irrigated into irrigated rice lands through the installation of pump units and for the acquisition of mechanical rice driers. During the past three years, loans provided to agriculture averaged P60 million or $15 million yearly.

(iii) The Philippine National Bank (PNB)

This government-owned commercial bank at the close of 1967 had total resources amounting to P3.3 billion or $845 million. In 1967, P520 million or $33 million went into agricultural loans - 30% for sugar production, 21% to paddy, 11% to coconut, and 16% to livestock, poultry and other food crops.

/(iv)

(iv) The Agricultural Credit Administration (ACA)

With the recent breakthrough in rice production, this agency among other functions provides liberal credit to small farmers and cooperatives. About P57 million or $15 million in loans were released during the past three years. A revolving fund of P250 million, or $64 million was authorized although only $27 million has been released as of mid-1966.

In 1967, as a specialised rice marketing organization on the national level, the Grains Marketing Cooperative of the Philippines was organized by nine cooperatives and six individual producers.

ACA also engages in the procurement and distribution of fertilizers, pesticides, and certified rice seeds.

(v) Arrangements of Loans for Farm Equipment

A loan equivalent to 50% of the purchased price of a piece of a farm equipment is given by a rural bank if the equipment were mortgaged, and 100% if a collateral such as properties were to secure the loan. Payment period ranges from 2-3 years normally for small loans bearing interest at 12%. The Philippines National Bank and the Development Bank of the Philippines provide larger loans bearing interest at 8-9% and payable at a longer period of 5-7 years.

The Development Bank of the Philippines under the Agricultural Guaranty and Loan Fund allows a dealer to import farm machinery on behalf of interested farmers who are entitled to receive loans for the pruchase of the imported equipment. The bank provides the dealers with the facilities to open letters of credit up to a certain amount against presentation of promissory notes.

A loan to be obtained through the I.B.R.D. fund for farm mechanization

/involves

involves participation by other institutions. The dealer finances 10% of the loan value and provides a 10% discount for cash sales. The I.B.R.D. working through the auspices of the Central Bank provides 60% and the rural bank another 10%. The farmer provides the remaining 10%.

3. Research, testing, and educational institutions

(a) Educational Facilities

There are about 40 agricultural high schools, 20 colleges, and 5 universities specializing in agriculture. Worthy to mention are the state institutions - University of the Philippine College of Agriculture in Luson and Central Mindanao University in Southern Philippines - and private institutions - Araneta University and Xavier University. These are three institutions providing undergraduate degrees in agricultural engineering.

(b) The International Rice Research Institute (IRRI)

The Agricultural Engineering Division of the IRRI as supported by the Rockefellers and Ford Foundations is located at the premises of the University of the Philippines College of Agriculture at Los Banos, Laguna. The IRRI is conducting studies on:

1. The economics of farm mechanization
2. Design of machinery

In the design of machinery, the Institute engages in applied research and in the development of suitable prototypes primarily for rice-growing. Such prototypes developed are to be tested and evaluated in rice-growing countries. Upon acceptance, the prototypes are released without royalties to interested parties for manufacture.

Development work of various stages is being undertaken on the following mechanization phases of rice growing:

/1.

1. Land preparation

2. Post emergence plant protection equipment

3. Harvesting

4. Threshing

5. Drying of paddy

1) Land Preparation An improved rotary tiller designed to prevent slippage in wet-field cultivation was evolved. This tiller has a larger diameter compared to the existing one has an alternative configuration of blade arrangement resulting in less slippage and a favourable transfer of its weight to the rear wheel for improved traction.

Being studied are the existing types of tillers and caged wheels, on how to improve the angle, spacing, etc. with the case of the latter.

2) Post emergence equipment Developed and being tested is a portable engine-driven (Knapsack-type) type of weeder that can clear out weeds from three rows of rice plantings in one pass. The power weeder has a rigid shaft and a sliding suspension hitch.

An experimental anhydrous ammonia applicator to be mounted in small 6 Hp walking tractors has also been developed and tested. The applicator mounted with a tubular bracket on the front and of the tractor has a capacity of 8.5 kg of ammonia.

3) Threshing A prototype of a drum type of power thresher having a rotary screen separator has been developed. This thresher has been known to thresh and separate freshly harvested paddy even under heavy dew or rain conditions and even when the grain moisture level exceeded 30%

Another prototype developed is a simple table-type power thresher driven

/by

by a 4 Hp air-cooled engine. Four persons can carry this thresher weighing 160 kg to locations normally inaccessible by road.

4) Others Being developed is an experimental rice drier.

5) Staff The division is composed of 3 designing engineers, 10 shop workers and a bout 20 field workers.

The future programme of activities might include a Product Engineering Team that will test and evaluate proven prototypes, conduct marketing studies, and perform liaison functions with interested manufacturers.

c) Agricultural Colleges and Agri. Eng. Institutions

There are 7 Agricultural colleges in Philippines of which 3 colleges have Agricultural Engineering curriculums. Agricultural Engineering Department of college of agriculture has agricultural engineering courses, Apart from education, the department is designing seed drills, power weeders and harvesting machines.

Section V

POLICY TOWARDS INDUSTRIALIZATION

1) Incentive for investment

The following is a listing of organizations providing incentives in one way or another towards the establishment of industries, whether large or small scale.

1. The Board of Investment was recnetly established to develop and promote under incentives pioneer or non-pioneer areas of investment. Depending upon the type of investment, a registered enterprise, having at least 60% Filipino capital participation is entitled to such protection and privileges such as:

(a) Tax-free importation of capital equipment and spare parts.

(b) Remittance of earnings and repatriation of investment out of the country.

(c) Anti-dumping protection

(d) Accelerated depreciation

(e) Post-operative tariff protection

(f) Net operating loss carry-over

(g) Deduction of organizational and pre-operating expenses.

(h) Net operating loss carry-over

(i) Tax credit on domestic capital equipment to user and manufacturer.

(j) Deduction for expansion of reinvestment.

(k) Employment of foreign nationals.

(l) Deduction of organizational and pre-operating expenses.

(m) Tax credit for withholding tax on interest.

(n) Exemption from all taxes under the Internal Revenue Code except income tax on a gradually diminishing percentage from registration up to December 31, 1981.

/(o)

(c) For export-oriented industries:

(i) Double deduction of promotional expenses

(ii) Double deduction of shipping costs on Philippine vessel, 150% of shipping cost on foreign vessels.

(iii) Special tax credit on raw materials.

Investors on registered enterprises are also given tax exemptions on capital gains and sale of dividends within a prescribed period. Philippine nationals who are members of the social security systems are provided loans to purchase shares of stock in any registered enterprise.

2. Regional Authorities. Recently established were regional development authorities to engage autonomously in developing prescribed areas. Any enterprise which becomes a subsidiary of regional authorities may avail itself of the tax incentives enjoyed by said authorities.

3. Agricultural cooperations. Registered cooperatives are entitled to tax exemptions including tax-free importations of agricultural supplies.

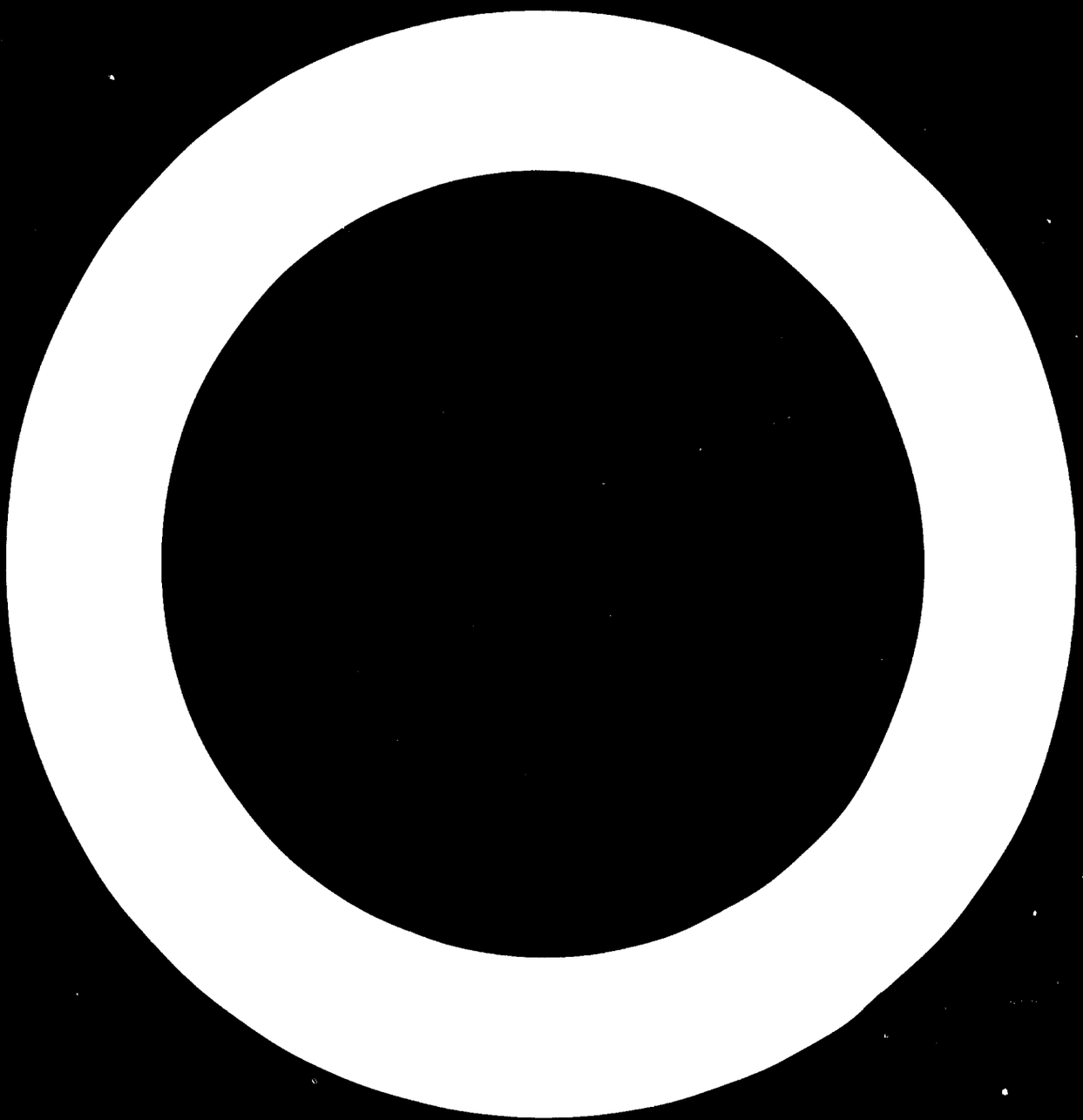
4. Registered cottage industries. Registered small-scale manufacturers are granted certain tax exemptions.

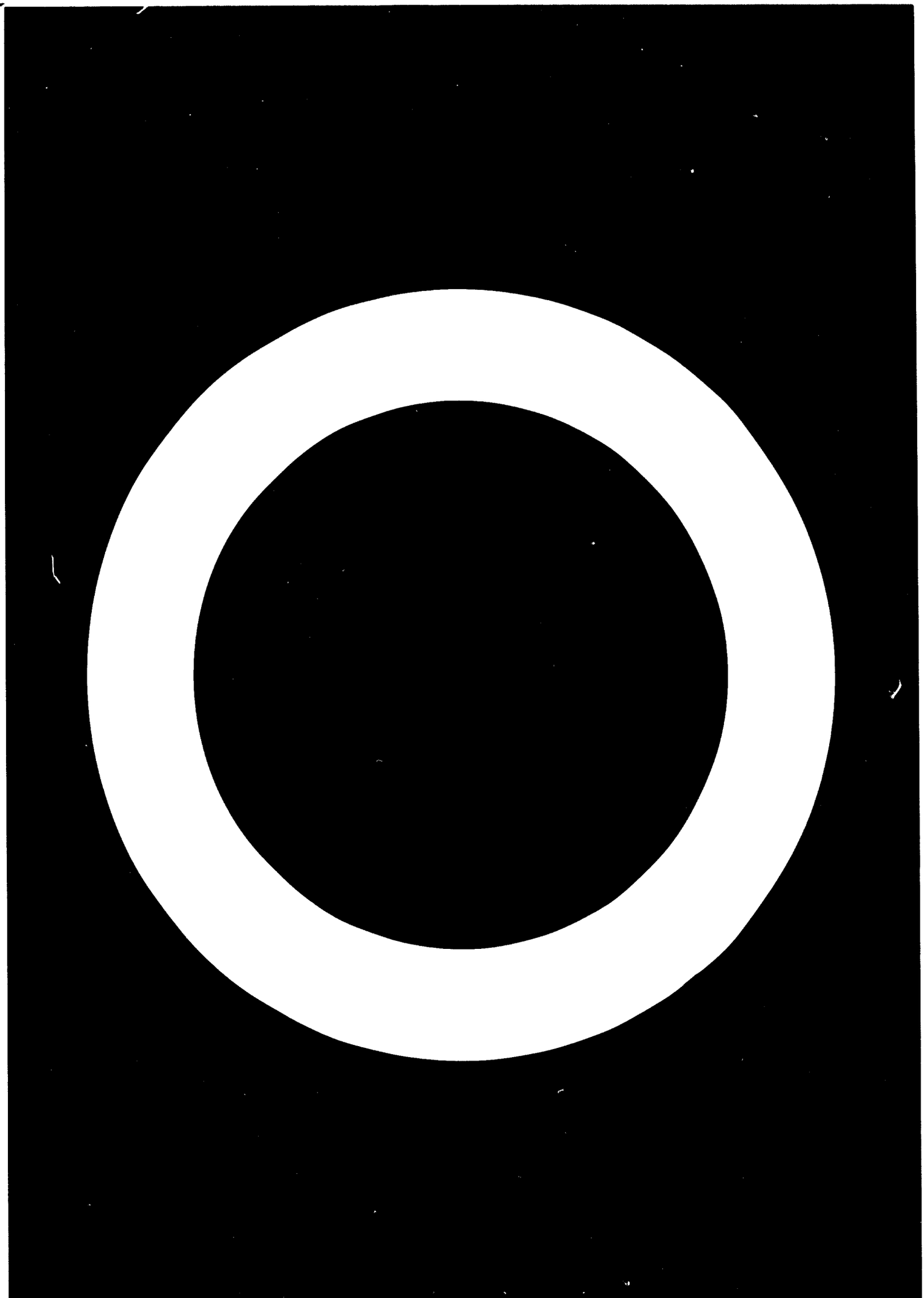
3. Priority Investment Areas.

There are about 56 industrial projects requiring an aggregate capital investment of P3.75 billion, or almost US$1 billion, proposed to be undertaken for the five year 1968-1973 period. Seven are in mining involving P403 million and the rest are in manufacturing, of which included are the the following fields of agricultural machinery and their ancillaries:

/1.

1. Manufacture of power tillers at a starting rated capacity of 10,000.
2. Manufacture of small diesel engines at a starting rated capacity reported to be 3,000 units.
3. Manufacture of machine tools at a rated capacity of 6,000 units of drills, lathes, etc. Estimated project cost is P156 million or $40 million.





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(2) "Tractors and Farm Machinery"

(3) "Castings Industry"

(4) "Machine Tool" Industry

(5) "Rice and Corn Mills"

14. Johnson, S.S. "Performance and Economics of Use of Small Equipment in Tropical Monsoon Countries: The Case of the Philippines. A paper presented during the 1968 Annual Meeting of the Japanese Society of Agricultural Machinery at Kyoto, Japan. April 6-8, 1968.

Appendix B

Persons and Organizations Visited

1. Office of the President, Presidential Economic Staff, 1440 Arlegui Street, Manila
   - (a) Mr. W.P. de Roda, Jr.
     Deputy-Director General for Investments
   - (b) Mr. Ramon Cardenas
     Special-Assistant to the Director General
   - (c) Mr. Eduardo Corpus
     Acting Director, Special Programs Office
   - (d) Mr. Andres C. Manipula
     Director, Industrial Programs Office
   - (e) Mr. P. Millian
     Senior Industrial Officer
   - (f) Mr. Jose V.S. Cedro
2. Office of the United Nations Development Programme, Philamlife-Building
   Mr. Andrew Joseph, Resident Representative
3. Department of Commerce and Industry, Plywood Building, T.M. Kaleno Street, Manila
   - (a) Mr. Marcilo I. Balatbat, Honorable Secretary
   - (b) Mr. Jose Sta Ana
     Senior Executive Assistant
4. Asian Development Bank, Metropolitan Bank Building, Makati, Rizal
   Mr. Shigeo Gamamoto, Technical Assistance Officer
5. Bureau of Plant Industry, San Andres, Malate, Manila
   - (a) Mr. Viante B. Arancillo, Asst. Director for Operations
   - (b) Mr. Julian Bulanadi, Consultant
6. Canlubang Sugar Estate, Canlubang, Laguna
   - (a) Mr. Cesar T. Mannon, Farm Manager
   - (b) Mr. Rodolfo R. Tingzon, In-charge of Transportation
   - (c) Mr. Arturo D. Govvez, Mechanical Engineer

7. Philippine Agricultural Machinery Manufacturers Association Myers Building, Port Area

   Mr. Justino Saptangco, President

8. International Harvester, Mandaluyong, Rizal

   (a) Mr. Alfredo Salvador, Plant Superintendent

   (b) Mr. R.M. Manking, Vice President

9. University of the Philippines, College of Agriculture, Agricultural Engineering Department, Laguna

   Dr. Laritin

10. Board of Department, Project Development Department

    Mr. Abelardo Viray

11. Marsteel Corporation

    Mr. Hermes D. Bautista

12. Atkins, Kroll & Co. Inc., Machinery and Engineering Division

    Mr. Tomas A. Blanco, Manager

13. F. Bernabe & Sons, Inc.

    Mr. Faustino Berneho, Sr., General Manager

14. Feati Industires

    Mr. Segovia, General Manager

15. Philippine National Bank

    Mr. Nicholas S. Fernandez, Vice President

16. Industrial Engineering & Marketing Corporation

    Mr. Bartolome P. Silayan, Executive Vice-President

17. Philippine Iron Manufacturing Co., Inc.

    Mr. Robert Young, Assistant to the President

18. Warner Barnes & Co., Engineering Division

    Mr. David Walker, Manager

19. Trans-Pacific Steel Industry

    Mr. Alex E. Rodrigues

20 Oriental Industries

    Mr. Bill Obligacion, Proprietor

21. Radiowealth Trading Corp.

    Mr. Pongos, General Manager

    Mr. Yasuo Doi, Resident Representative of Iseki in the Philippines.

22. International Rice Research Institute, Agricultural Engineering Department

    Mr. Amir U. Khan, Head

23. Secretary of Dept. of Commerce and Industry, 6 Floor, T.N. Kalaw, Manila

    (a) Mr. Balmaceda Coraelio

/Appendix C

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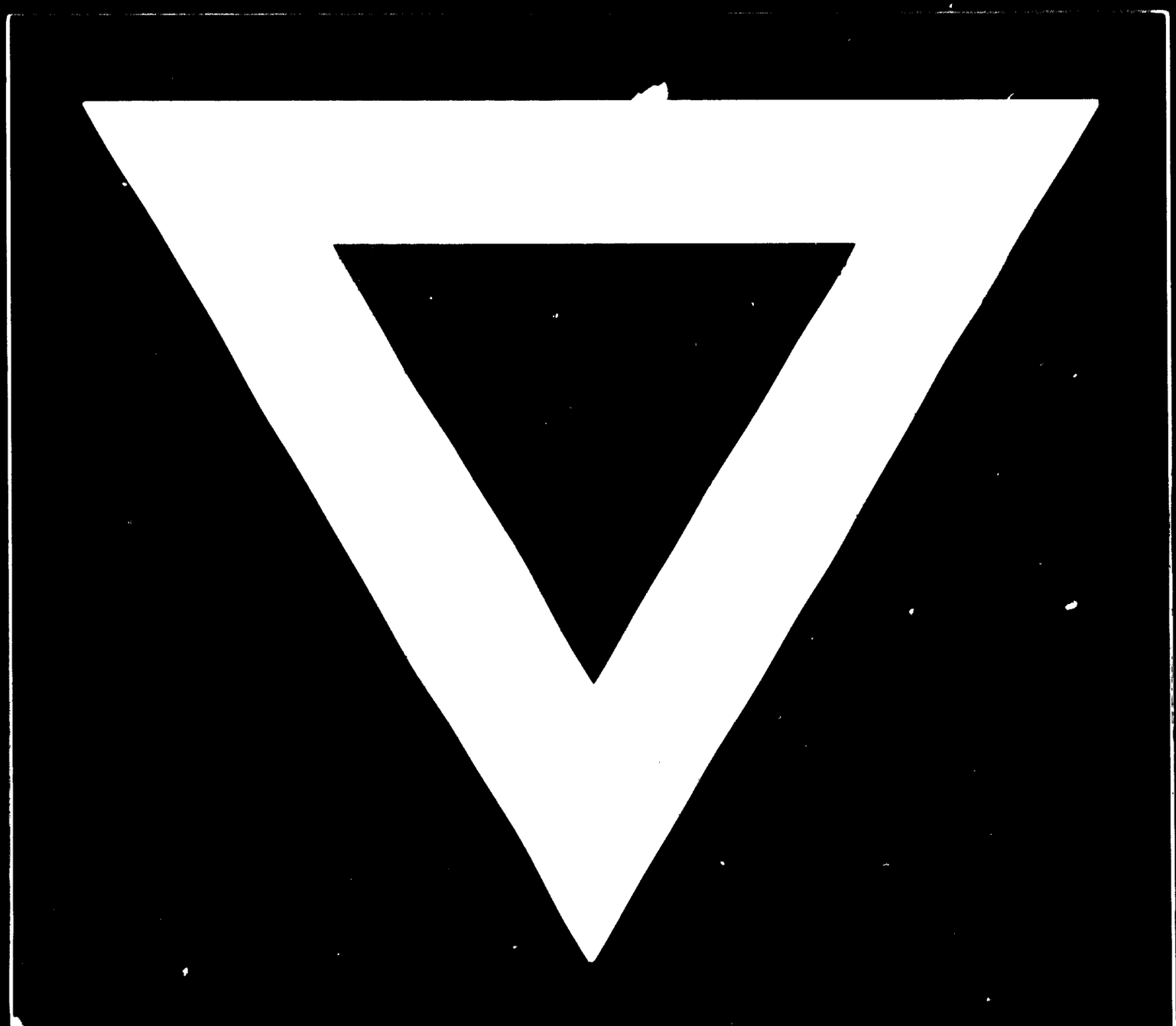

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