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COUNTRY STUDY REPORT

on the

STATUS OF AGRICULTURAL MACHINERY INDUSTRY

in

INDONESIA

Information compiled
during
a fact finding survey.

UNIDO, Vienna
January 1969

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

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SUMMARY AND CONCLUSIONS

INDONESIA

I. General Pattern of agriculture

Total area under crops is around 17 million ha for a total population of about 112 million. Average population presure upon cultivated land is roughly 7 persons by ha, but it reaches 1 ha in Java where most of the population is concentrated. About 75% of the population is engaged in agriculture.

Main crop is rice upon around 50% of total area and maize (25%), of which Java alone commands 55% of total rice and 75% of total maize area.

For 12 million of holdings average size is about 1.6 ha with 8.6 million below 1 ha, and only 277,000 above 5 ha. An efficient irrigation system covers more than 30% of the total area but agricultural practice has to be improved as the progress in use of fertilizers and high yielding varieties is too slow.

II. Pattern of farm mechanization

Farm mechanization is in its very first stage of development. Most of the cultivation operations are made by hand or by draft animals with traditional implements. Population of tractors is only 5,000 (mostly used in estates) and of power tillers 3,000 the recent imports being almost none. The only modern implements becoming popular are hand sprayers and dusters and irrigation pumps. Future needs will be very important mainly for sprayers hand or power operated, paddy threshers, engines (gasoline type because of low price of gasoline) pumps, rice hullers. Tractors and power tillers will be required temporary in small number respectively 200 and 1,500 for 1970.

III. Manufacturing Industries

The development of industry is limited by the economical situation, the lack of foreign exchange and of trained technical personnel. The State Industries after a suitable reorganization must take a significant role in the manufacturing of the equipments needed by agricultural sector of Indonesia.

IV. Conclusion

1. Due to local conditions, farm mechanization has to be developed in Indonesia in the most economical way and considering, at first, the basic priori of increasing the yield of food crops.

2. It is suggested to state enterprises and local entrepreneurs with the help of international institutions and of manufacturing companies of other count. to consider the manufacturing upon a national basis of subsequent machines and i plements which are immediately needed:

a) Gasoline engines 3/10 Hp, pumps sprayers and dusters, paddy threshe and hullers.

3. It is also recommended that power tillers are also manufactured with international manufacturers' technical collaboration.

4. It is also recommended that steps should be taken to reinforce the rural credit system and make available inputs such as seeds, fertilizer and machinery on an integrated basis.

SECTION 1

GENERAL SURVEY OF AGRICULTURE

Republic of Indonesia extends from 6° latitude north to 11° south and from 95° to 141° east longitude. The farthest distance East to West is 5,110 kms and North to South is 1,885 kilometers.

Indonesia is made up of about 3,000 islands and the five largest island groupings are as follows:

Table 1.1 Distribution of Population and Land Area

	Total Land Area (000 sq. kms)	Percentage to total	Population 1961 (million)
Java and Madura	132.2	6.9	16.0
Sumatra	473.6	24.9	15.7
Kalimantan	559.5	28.3	4.1
Sulawesi (celebes)	189.0	10.0	7.1
Bali and other islands	144.1	7.7	5.6
West Irian and the Moluccas	421.9	22.0	1.5
Total	1,904.3	100.0	97.1

In 1967 the national population was estimated to be about 112 million. Nearly 65% of the national population growing at about 2.3% yearly is concentrated in the Western Java, the centre for commercial and agricultural activities. All other islands are scarcely populated. The government is now undertaking resettlement programmes.

1. Land Utilization

a) Land distribution by Nature

As of 1964-65, the overall land distribution was as follows:

Table 1.2

		million ha
Total geographical land area		190.4
Total forest area	122.8	
Total land other than forest	67.6	
Area under food crops		14.0
Area under estate crops		1.7

Thus, forest area commands about 65% of total geographical area and total crop area is about 23% of the area other than forests.

b) Land distribution by Crops and major agricultural Production

Table xk 1.2 gives the area and production of major crops in 1966.

Table 1.2 Area and Production of Selected Agricultural Crops

	Area (000 hectares)	Production (000 tons)
	1966	1966
Rice (paddy)	7,665 x/	14,102
Maize	3,106 y/	2,874
Sugar cane (total cane cut)	100	7,500
Sweet Potatoes and yams	453	2,308
Cassava	1,565	10,845
Soybeans	589	353
Ground nuts (in shell)	383	498
Cotton seed	15	6
Copra	-	-
Tobacco	153	137.0
On estates	67	42.0
on farms	66	44.0
Cotton (lint)	15	3
Tin		
Rubber (estimate)		710

Note x/ 55% and y/ 75% in Java.

Area under estate crops are given in table 1.3 as of 1964.

Table 1.3 Area under Estates and Planted areas (1964)

(.00 ha)

	Under Estate	Planted
1. Land used	194.9	68.1
2. Private land	1.1	1.0
3. Industry land	747.5	417.8
4. Agricultural concessions	629.6	306.0
5. Land hired from individual farmers	83.5	-
6. Building area	1.0	77.0
7. Total	1,720.6	869.9

There were 1,142 Nos. of estates in 1962 and the following table 1.4 gives the estimated area of major estate crops in 1965.

Table 1.4

(000 ha)

	Total	Mature
1. Rubber	505.3	349.7
2. Tea	67.3	63.1
3. Coffee	39.8	36.1
4. Oil palm	107.8	92.7
5. Cinchona	2.4	2.1
6. Sugarcane	87.0	-
7. Tobacco	11 (in 1962)	-

Considering the food crops, paddy and maize command about 50% and 25% of total cropped area of which Java alone has 55% and ⅔ 75% area under paddy and maize.

Irrigated Land Table 1.5 shows the extent of irrigation of farm holdings:

Table 1.5

	000 ha	% of total
Total area	12,884	100.0
Area irrigated	4,075	31.6
Dryland	8,809	68.4

According to 1963 census, table 1.6 gives crop index of irrigated paddy and non-irrigated paddy:

Table 1.6

(000 ha)	Irrigated paddy	Non-irrigated paddy
"Net" paddy area	4,075	1,249
"Gross" paddy area	4,522	1,244
Irrigated paddy crop index	111.0	99.6

Maize and paddy outputs are expected to increase with the production of the BIMAS, an integrated scheme to clear and develop a targeted area of about 1.5 million hectares, of which nearly 500,000 is claimed now to be planted to paddy.

c) Size of Holdings

According to the census of 1963, there are 12.2 million holdings comm[illegible] an area of 12.9 million ha. Following is the table regarding size distribution pattern of holdings:

Table 1.7

Size of farms (ha)	Number of holdings (000)
0.10 - 0.49	5,423
0.50 - 0.99	3,218
1.00 - 1.49	1,518
1.50 - 1.99	654
2.00 - 2.99	653
3.00 - 3.99	263
4.00 - 5.00	136
Above 5.00	277
Total	12,144

It is estimated that about 11% of the number of farms above 2 ha size of holding command around 30% of the total food cropped area. There are about 277,000 holdings with above 5 ha holding size.

d) Type of Holdings

According to 1963 census, following table 1.8 gives the ownership pattern of holdings.

Table 1.8

Land Ownership	No. of holdings (000)	Area (000 ha)
Total No. of holdings	12,236	12,864
Fully owned	7,844	9,039
Partly owned	3,559	3,255
Fully not owned	833	540

e) Land Reforms

The land ceiling policy is for limiting individual land ownership to two hectares in Java and five hectares outside Java. According to 1963 census, about

82% of the land was operated by owner farmers as shown in table 1.9.

Table 1.9

	000 ha	Percentage
Total farm area	12,884	100
Owner operated	10,663	82.8
Operated not by land-owner	2,221	17.2

2. Cattle Population

Cattle population including buffaloes has remained constant from 1960 to 1965 as shown in table 1.10.

Table 1.10

	Estimates in million	
	Total 1960	Total 1965
Cows	6.5	6.5
Buffaloes	2.8	2.9

3. Farm Income

At present the average yield of paddy is about 2 to 2.5 tons per ha. or about 1 ton of milled rice. The price is about Rp 18-20 per kilo. In irrigated area, two rice crops are grown. Thus the gross income with paddy cultivation per ha is Rp 20,000 per crop or Rp 40,000 per year. It has been reported that a farmer normally is capable of investing in machinery which will cost up to Rs. 10,000.

4. Farming Practices

Double cropping in paddy is practiced only in about 10% of the irrigated areas and all of the non-irrigated paddy areas grow single crop only. Double cropping with paddy and other winter crops are practiced in some areas where irrigation facilities are available. All farm operations are carried out manually with bullocks. Usage of fertilizer, improved seeds and pesticides is on a limited scale.

SECTION II

PATTERN OF MECHANIZATION

1. Agricultural machinery formation

a) Agricultural Machinery Census - 1963

Table 2.1

	Total Number of Farms using Farm Equipments/ Implements	Number of Implements/Farm Equipments
Plows	3,402,419	4,032,050
Special plows	1,100,152	1,549,910
Hand dusters	11,657	13,676
Combined duster sprayer	6,595	626
Wind Mill - Pump	200	200
Hand operated pump	19,360	30,609
Other type of pump	14,504	50,624
Rice huller	26,398	36,941
Cane crushers	26,182	28,506
Rubber rollers	25,629	42,176
Tractors	1,610	4,116
Carts	74,000	85,151

b) Farmwise Ownership of Major Agricultural Machinery - 1963

Table 2.2

	Number of Farms		
	Owned	Not owned	Both
1) Hand sprayer	20,495	125,404	12,51
2) Hand Duster	3,636	57,612	527
3) Duster/sprayer	2,942	21,869	1,04
4) Power sprayer	101	940	14
5) Wind water pump	257	360	20
6) Hand pump	14,876	2,671	73
7) Other pump	1,904	2,610	6
8) Paddy huller	14,904	42,000	2,46
9) Cane crusher	23,124	5,601	1,23
10) Tractors	760	1,595	10
11) Carts	69,639	19,620	1,74

2. Import and Production of Farm Machinery

a) Imports

No reliable data is available.

b) Production

There is one state enterprise manufacturing pumps, petrol engines and hand operated sprayers. About five private manufacturers producing pumps and hand operated sprayers. Although reliable data is not available the table 2.3 gives the estimated production.

Table 2.3 Estimated Production of Farm Machinery

Item	Specification	Annual Production 1967-68		
		State enterprise	Private	Total
Petrol engine	3-4 Hp	less than 1,000	Nil	less than 1,000
Pumps	3-5 Hp	500	500	1,000
Sprayers	Hand operated	5,000	1,000	6,000

There are no factories manufacturing bullock drawn implements and hand-tools on a significant scale.

3. Demand and Sale of Farm Machinery

The present demand for farm machinery is limited only to simple equipment such as hand sprayers, small pumps and hand tools, due to low of purchase capacity of the farmers and lack of loans and subsidies. It is interesting to note that a local manufacturing unit has a high inventory of unsold 3 Hp engines. However, it is reported that imported similar engines have sufficient demand. Due to lack of effective marketing organization, sales programme, and statistical data, sales and present demand figures cannot be estimated effectively. However, taking into account the agricultural pattern and government policies, table 2.4 gives the estimated demand of farm machinery by 1970.

Table 2.4 Estimated Demand (1970) and total Production (1967-1968) of farm machinery

Item	Specification	Estimated yearly demand up to 1970	Total Produc. [illegible]
Petrol engine	3-4 Hp	3,000 - 5,000	less than 1,0
Diesel engine	8-10 Hp	2,000 - 2,500	Nil
Pumps	3-5 Hp	3,000 - 3,500	1,200
Sprayers	Hand operated	25,000-30,000	5,000
Sprayers	Power Sprayers	3,000 - 5,000	Nil
Power threshers	3-5 Hp	5,000-10,000	Nil
Power tiller	6-8 Hp	1,000 - 1,500	Nil
Tractors	35-40 Hp	150 - 200	Nil

5. Users of farm machinery

Since [illegible] 1951 on Java, Sumatra, Kalimantan, and Sulawesi mechanized upland rice estates projects were established using tractors and their implements for land clearing, soil preparation, etc. However, these were established through government agencies, and from the past few years no large scale new mechanized farms have been established.

Tractors are mostly used on estate. Usage of tractors and other farm equipment on individual farm is limited.

6. Future Demand and Trends in Designs

There appears to be no definite laid out policy or planning with reference to overall requirement of power machinery and equipment for the country as a whole. However, the following seems to be the trend in requirement in general.

a) Pumps: Limitation of irrigational facilities is one of the limiting factors for increased acreage and intensity of cultivation. Hence agricultural centrifugal pumps and mainly propeller pumps are required and will have a demand. As electricity is expensive most of these pumps are to be engine driven. Presently pumps are not manufactured on a signific[illegible]

quantity. 2" to 6" pumps in two or three sizes are required in large volume.

b) Sprayers: The immediate demand is for hand sprayers which are low in price. The present volume of production is low. Both hand sprayers and knapsack power sprayers are required by 1970 in significant quantities.

c) Threshers: For the present pedal operated paddy threshers are required. However, by 1970, power operated threshers are required.

d) Engines: Engines are required for pumps, threshers, sprayers, rice hullers, power tillers, etc. Due to small price difference between diesel and gasoline, it is recommended that gasoline engine are given priority. As low volume of demand for power sprayers, requirement for micro-gasoline engines of 1-2 Hp may have to be met through imports. However, there will be a demand for 3-10 Hamx horsepower gasoline engine for other agricultural usage.

e) Rice Processing: There are about 700 units of commercial 1 ton rice/hour and 7,000 nos. of small ones with a capacity of 300 kg milled rice per hour. Larger hullers are imported. Small ones are also imported but a few are assembled also. The future requirement may be of 1 - 1½ ton/hour capacity for community use and contract operations. However, it is recommended that a detailed study is conducted regarding the requirement and optimum capacity.

f) Power tiller: No effective manufacture has been undertaken. Power tillers of 5-6 Hp, 8-10 Hp and 8-12 Hp have been imported, although it is felt that the most popular Hp range is 7-8 Hp.

g) Scope of ~~x~~ Riding Tractors: For the present, all of the riding tractors are imported and most of the big tractors are used in big estates only. The tractors in usage are mostly International Harvester, Massey Ferguson, Hanomag, Fordson, John Deere, Zetor and Lanz tractors of 35-60 Hp in use.

Total population is estimated to be 5,000; however, due to lack of [illegible] etc., the effective working population is estimated to be about 2,000. Total existing market for major makes in 1967 and 1968 is estimated to be as follows:

a.	International Harvester	80 - 100/yr
b.	Massey Ferguson	30 - 50/yr
c.	Fordson	20 - 30/yr
d.	Other makes	20 - 30/yr
	Total	150 - 210/yr

Thus the present market is only about 200 units per year - mostly for estates. Tractor equipment such as plows, harrows, post hole diggers are also sold. There are no import restrictions. The foreign exchange is to be obtained through "Export Bonus" scheme, which is in the open market at the rate of Rp 450 per US$1 for large equipment such as tractors and Rp 0 per US$1 for small items such as power tillers, etc.

Thus it is seen that the market for riding tractor is limited. An effective market may be created only if farmers purchase capacity is increased together with cooperative usage and grant of subsidy and loans. Thus in general, Indonesia has a potential for usage of farm machinery. The above are the most important items which will have a demand. However, it is necessary to conduct a detailed market analysis for the above product ranges as the first step towards farm mechanisation.

CHAPTER III

Manufacturing Industries and Ancillary Facilities

1. Farm Machinery Manufacturers

There are no exclusive manufacturers of farm machinery. For the present only one state enterprise and a few small scale manufacturers are producing a few farm equipment on a limited scale. Hence the industries are discussed in the following sub-section.

2. Other engineering Industries

P.N. Boma, P.N. Sarata, P.N. Bisma, P.N. Indra and P.N. Jabung Mas Guna are the five state enterprises in the engineering manufacturing field. ~~Manufacturing~~ For the present, P.N. Boma is producing hand sprayers and 3 Hp petrol engines and P.N. Indra and P.N. Sarata ~~are~~ are producing pumps on a limited scale. It is expected P.N. Indra will in future ~~manufacture~~ manufacture exclusively agricultural machinery. In the private sector the manufactures are of very small scale. Power Padi Tractor Company which has assembled a few power tillers is not operating in this field from the past two years due to foreign exchange difficulties. The following table 3.1 gives the details of the engineering industries visited.

Table 3.1 Details of Engineering Industries visited

1. Name	P.N. Boma	P.N. Barata	P.N. Indra	Padi Tractor
2. Address	Pasuruan, East Java, Indonesia	Tajabong, Surabaja, East Java	Surabaja, East Java	Tjawang, Raj Djakarta
3. Manufacturing Units	3 workshops at Kinska, Turango and Waraba	3 units 1. Surabaja - E. Java 2. Tegal - C. Java 3. Sukabumi - W. Java	1 Unit	1 Unit
4. Total staff	700 of which direct labour - 400, engineering staff, about - 6-10	Unit 1 743 of which operators 672, supervisors 46, managerial 26 Unit 2 129 Unit 3 109 Tot 1 3 units: 981	325 of which direct labour - 268, supervisory 11, technical staff 46 and engineers 20	350 (No agricultural equipment manufactured or assembled during the past two years).
5. Area	Total: 240,000 sq.m. Covered: 20,000 sq.m.	60,000 sq.m. almost totally covered	Area: 4,000 sq.m. Covered: 6,000 sq.m.	
6. History	Started in 1920 by Dutch interests and nationalized in 1958.	Nationalized in 1958	-	-
7. Product Line	Unit 1 Kinska bridges, sugar machinery, rolling stock, foundry, sugar processing pumps, coffee processing equipment such as drier, blow fan, rotor, oven, etc. Also perform contract work. Unit 2 Turango Gasoline 3 hp engine, hand sprayer engine components, such as pistons, cylinders,	Unit 1 Surabaja 1. Road roller - MV-6 (mechanical) Yugoslavia, 200 units/yr to supply 1,000 units in 5 years to state public works. Delivered 300 Total capacity of 3 units 1. Sugar cane rollers 400/600 T/yr 2. Rubber m/c 200 T/yr 3. Steel construction 500	1. Sugar mill machinery 2. Pumps - centrifugal/and screw type 4" to 10" 3. Plate works, machine parts, construction jobs, assembly of diesel engines for marine usage, job order components and foundry items.	Assembly of power tillers, threshers, etc. and training of farmers only.

	rings and die, cast parts for spare parts market, generator motors Unit 3 [illegible] parts for sugar refining units, fabrication, etc.	4. Spare parts 500 T/yr 5. Bolts, rivets, etc. 120 6. Road rollers 1,2[illegible] Total 4,120	Capacity 1. Sugar mill 24 pcs/yr 2. Machine elements 100 T/yr 3. Pumps 3[illegible]/yr Assembly of diesel engine [illegible] 120, 105, 70, first batch of 84 Nos. Assembly started in early 1967	
8. Total Capital	In 1967, total capital (re-evaluated) 1 billion Rp., sales turnover 22 million Rp. and working x capital 10 million Rp.	Fixed capital investment $1.79 million for existing facilities. Total fixed xxxxxxxxxxxxxxxxxxxxxxxxxx capital investment for road roller project $1.87 million		
9. Average monthly wages	1. Skilled worker Rs.2,500 and varies between 1,500 -4,000 p.m. 2. Technicians having at least secondary education school) Rs. 7,000 3. Freshly-graduated engineers Rs. 6,000	Same as P.N. Boma	Same as P.N. Boma	
10. Agricultural Equipment Production 1967-68	1. Hand sprayers 5,000 x unit 2. 3 hp petrol engine. Only a few produced. Problem of marketing acceptance. Manufacture xxxxxxx at a standstill. High inventory of unsold engines.	No agricultural equipment manufactured. Others (1967) 1. Sugar cane rollers 553 t. 2. Rubber machine 77 3. Steel construction 209 4. Spare parts 132 5. Bolts, nuts, etc. 32 xxxxxxxxxxxxxxxxxxxx 6. Road roller (new) 135 7. Road roller (accessory) [illegible] Total 1,[illegible] t.	1967 Pumps - 120 Others Sugar mills - 24 Machine elements -70 tons	196[illegible] number of power tillers assembled 196[illegible]-66 - 1,[illegible] 67 - [illegible] Models Fuji Robin Iseki [illegible] [illegible], etc. Total [illegible] - [illegible]

11. 1968 Sales turnover	Total Rs. 130 million of which sprayers 40 million and engines - very little	8-10" pumps, 150/year	Sale of pumps - 50 units Value Rp. 3 million	
12. Future plans	Unit 1 140 Hp 3 cylinder diesel engine for machine use Unit 2 Scooter, power, lawn mower 5-10 Hp diesel engine (collaboration with Yugoslavia planned)	Unit 1 a) Progressive manufacture of road rollers, with 3 cylinder 24 Hp Perkins diesel. local content 1967 - 0%, 68 - 6%, 69 - 23%, 70 - 34%, 71 - 49.7%. Importing whole engine in 1971. In 1971 total staff for "road roller project" - 269 people. Total import content 10.6 million for 200 road rollers. Plans also for stone crusher manufacture.	1. Power tiller 5 Hp prototypes produced in 1967 Rice huller 3 Hp, 6 units of prototypes produced in 1968. Imported engine from Japan used on prototypes	a) To submit to the government for financial assistance and for the importation of rice hullers, power tillers to be levied to farmers.
13. Existing Facilities	Unit 1 Foundry - ferrous C.I. capacity 6 tons/week, sheet metal equipment; fabrication welding machine shop Unit 2 Die casting machine shop; welding Unit 3 Same as Unit 1 (not visited) Good machinery equipped. About 25 recently acquired machine tools of which 12 are lathes.	Unit 1 Steel casting: Max. 12 t. Capacity ; 1,000-2,000 tons/yr; machine shop; ferrous foundry. 4 cupolas - 2 Boilermers (3 rotary furnaces) 1 crucible cutting gears machines, Good laboratory metallurgical analysis.	1. Foundry - 30 tons/month 2. M/c shop 3. Fabrication shop	Nil

A. General Information Impression about State Enterprises

i) Wages and Benefits The general salary structure appears to be low compared to other countries. Normally all the enterprises visited work single shift. The annual paid holidays are 12 excluding 12 paid national holidays. There are no sick or casual leave benefits. Medical treatment or reimbursement is free for family. Housing facilities to senior officials only. Employees get 1.5 kg rice per month free and two sets of uniforms a year. It was informed that salary structure of stat enterprises are higher than local private enterprises. Pension scheme is after 30 years of service or after 55 years of age. Employee's contribution to pension is 2%. It is interesting to note that medical expenses budget is almost 100% that of salary budget and pension contribution budget from company is about 2% of annual budget.

ii) Availability of Electricity Availability and rate of electricity in is one of the limiting factors. The rate is Rs. 25/kwh and it has reported that electricity charges constitute about 10% of factory operating budget.

iii) Duties on Components and Manufacturers' engineering Items

a) on import of completely assembled units such as engine, etc., the customs duty is nil and import duty is 10% of landed cost.

b) on imported CKD items such as diesel engine, truck, bike parts, custom duty is nil and import duty is 10%. Sales tax of 20% is levied on assembly cost including labour cost on engines and 10% on pumps.

c) on import of raw material such as steel etc., customs duty is nil import duty is 10% and sales tax of 20% levied on the total finished component value.

iv) Present Product Line of State enterprises Repetitive facilities appear to be available in all the plants and sub-units. The ferrous foundry, machine shop, sugar with components, fabrication shop for construction jobs, sheet metal machine for heavy plate and vessel bending are some of the examples. Thus all the units appear to manufacture same or similar products. Secondly, all units appear to

depend substantially on job orders received at random. Thus the full manufacturing capacity is not fully utilized. As reported however steps are now being taken to streamline the facilities and the range of products to be manufactured. Emphasis on production of agricultural machinery appears to be limited for the present.

v) Machine tools, Equipment and quality Control Most of the machine tools and equipment appears to be old and outdated. There are a few relatively new machines. However, lack of foreign exchange and capital appears to be the limiting factor to modernize the existing plants.

vi) Existing Product range of Agricultural Machinery

a) Gasoline engines 3 Hp: It appears that the engines produced have not been successfully marketed and appreciable amounts are in stock. In 1968, production of these engines was limited.

b) Hand sprayers: Total annual demand is estimated to be between 25,000 -30,000 units. No reliable data is available for the sales in 1971. Manufacturing capacity may be available for producing yearly 8,000-10,000 sprayers.

c) Pumps 4" - 10" (Centrifugal and Screw Type): Maximum production is of "screw type" in the range of 10, 20 and 30 Hp. The production is orientated towards the requirement by Bureau for Village Development, Department of Internal Affairs and Department of Agriculture. The following is the requirement in 10, 20 and 30 Hp ranges and 66% is for 20 Hp screw type pumps for irrigation:

1969	Nos. 784
1970	1,040
1971	936
1972	930
1973	1,030

About 150-200 units are manufactured by private sources and the price usually 10% cheaper. Another 200-300 may be the production figures for very small units.

vii) existing Prototype Stage of Development

1) Power Tiller 5 Hp Four prototypes with Japanese engine have been produced. Estimated sales price is 1,000. It is reported that exist machinery is not adequate to manufacture the same. If sufficient fun are available to import the machinery, there are plans to produce 240 units per year.

2) Rice Huller It is proposed to make 3 Hp rice huller, capacity 300 K A couple of prototypes have been made with imported engine. If sufficient funds are available for import of additional equipment, it proposed to manufacture the same. The estimated selling price is Rp 325,000 or US$810.

viii) Main Problems of existing State Enterprises

a) low salary for technical new operators, engineers, etc.

b) lack of working capital.

c) lack of special machines.

d) existing machinery outdated.

e) lack of experience in design and mass production.

f) lack of technical training.

g) lack of orientation and planning in integrated product line.

h) lack of marketing organization.

xxxxxxx

ix) Future Plans of the State Enterprises

A. Manufacturing

Considering the duplication of work facilities and products of the st enterprises, many international agencies since 1964 had recommended streamlining manufacturing facilities and integrating product lines. is reported that the government in considering reorganization of the existing facilities along with the following programme of manufactur

1) P.N. Hema

a) Diesel engine 5-10 Hp (Assistance from UNF of Holland)

b) Petrol engine 3-25 Hp.

3 Hp - own design

12 Hp - own design

20-25 Hp - under licence

2) P.N. Perata

a) Road roller equipment

b) Castings

c) Steel structures

d) Sugar mill machinery

3) P.N. Diesa

a) 250 and above Hp diesel engine - under collaboration from UNF of Holland.

4) P.N. Indra

a) Power Tillers

b) Rice Hullers

c) Tractors

d) Sprayers

e) 60-250 Hp diesel engines under licence from ~~Ruk~~ UNF of Holland

f) Other agricultural equipment

5) P.N. Sabang Khrauna

a) Textile machinery

b) Foundry

c) Steel structures

d) Pumps for tin mines

B. Marketing

Two years ago, a central state marketing organization "ETHILATRONIAKA L is being established to market all products of state enterprises. The staff at present number about 50. This organization is responsible for sales only while service is to be rendered by the manufacturing concerns. Special cells for different products have not yet been worked ou

C. Future Manufacturing Activities

As reported, M.M. India in joint venture with Yugoslavia proposes to manufacture tractors and implements, irrigation pumps, small diesel engines and sprayers. The rated capacities of the proposed manufactures are as follows:

1.	Hand sprayers	50,000 units/yr.
2.	Power sprayers	1,000 "
3.	Pumps	1,000 "
4.	Diesel engines	1,700 "
5.	Tractors for agricultural usage and implements	240 "
6.	Tractors for land clearing and equipment	120 "

B. Agricultural Machinery Manufacturers in the Private Sector

There are a few manufacturers of irrigation pumps, hand operated sprayers, small hand operated threshers and cast iron roller rice hullers. But the total production capacity is very much limited. There are six agricultural equipment, such as power tillers, diesel engines, sprayers, etc., importers in the country.

a) Indy Tractors Company, Tjawang, Djakarta

i) Assembly Programme The objective of this Company is to assemble power tillers and threshers etc. render after sales service and train the farmers in the usage of equipment. From 1962 to 1966, about 1,800 power tillers and 175 threshers were assembled. In 1967, about 200 [illegible] of power tillers were assembled. However, from the middle of 1967, no assembly of power tiller or equipment has been undertaken due to lack of fun finances, of foreign exchange availability of rural credit and more than all of market due to very meagre purchase capacity of the farmers. The Company, from 1962-63 has assembled varied makes of Japanese tiller such as Fugi Robin, Iseki, Ishikawajima, Sanoh, etc. Today, it is looking for foreign collaboration in the field of power tiller, rice mills, hullers etc.

ii) Training Programme From the past 4-5 years, the Company, as reported by them, has trained about 2,000 farmers in the field of usage of agricultural machinery. Each group of 250-300 farmers were trained for a period of 6 months with the local farmers family. The overall fig. were met by the labour rendered by the trainees to the farmers and the charges of custom plowing done by power tillers as a part of the training programme.

iii) Future Plans

a) Rice Hullers: It has been estimated by this Company that the efficiency of land pounding of paddy to rice is about 47%, whereas by power rice hullers is 57%. It is proposing to the government make available the finances to import rice hullers and loan them to villages. It is estimated that a total of 40,000 sets of rice hullers costing US$40 million will process the paddy of the whole country.

iv) Package Programme The firm also would like to propose to the government that agricultural package plans to be undertaken in blocks of 2,500 ha and all inputs such as machinery, seeds, fertilizer, water, etc. to be made available together with proper farm training programme. It is estimated that the total cost of such input will be about US$100 per ha.

3. Ancillary Industries and Raw Materials

Except for foundry, sheet metal work and fabrication, there are kak limited ancillary engineering industries.

i) Castings

a) Castings: Ferrous - Foundry facilities are available. The casting quality in the foundries visited is about B.S.9 - B.S.10. These foundries are not mechanized. As the present castings are heavy components for slow speed sugar mill machinery, the quality control aspects

to be not too critical, although such a rigid quality and inspection are desirable.

b) Casting: Non-ferrous (aluminium die-casting) - One sub-unit of state enterprise has facilities. The engine piston etc. are die casted. Testing of material at laddle is not carried out.

c) Casting - steel P.N. Barata has 1,000-2,000 tons/yr. capacity with maximum 10-12 tons weight, the quality control at laddle stage. The final casting is analysed in the central lab afterwards.

d) Malleable Casting There are no facilities available anywhere in Indonesia.

ii) Forgings P.N. Barata has facilities for bolts, rivets and simple parts only. No facility for complicated or critical forging parts if required.

iii) Press Parts All units have sheet metal rollers for heavy fabricated equipment. But no facility for complicated press parts.

iv) Electrical Equipment and battery Battery and certain electrical components are locally made.

v) Hydraulic Parts No manufacturing facilities are available.

vi) Transmission Components No manufacturing facilities are available.

vii) Tyres and Tubes Good-year tyre company with an investment of $10 million has a capacity of 350,000 tyres/year and INTIKOB which is government owned has a capacity of 160,000 tyres/year. The third company "PALI[illegible]" which is also to be owned by the government is in the planning stage and will have capacity of 160,000 tyres per year.

viii) Raw Materials All steel is to be imported. A rolling mill for construction steel is proposed either with foreign technical assistance and may come in operation by 1972.

ix) Machine Tools All machine tools and machinery is to be imported. It is to be pointed out that most of the existing machinery is old and outdated.

There are a few relatively new machinery. The lack of foreign exchange and finances, import of new machinery for upgrading existing products and also for new products has not been possible.

4. Technical Personnel

Availability of technical personnel especially in the field of manufacture is limited. There are no modern facilities for training workshop mechanics and operators. There is a need to strengthen the aspect before any steps towards industrialization is taken up.

SECTION IV

POLICY TOWARDS MECHANIZATION

1. Incentives by the Government

a) Existing Industrial Policy

As explained in the previous section, the state enterprises are working below capacity. Now there is a move to streamline the product line and manufacturing facilities and a central marketing body has been created. The role of the private enterprise is also limited in the field. It is proposed that starting next year protection may be extended to domestic agricultural machinery. The import duty may be increased from next year and more facilities given to local manufacturers

b) Five-Year National Reconstruction Plan (1969-1973)

The five-year plan in principle has given priority to national food supply. But the concrete description of the policy and appliance is not yet available. The same will be made public very soon. The overall policy will give food and input for food production top priority. Manufacture of agricultural machinery, especially hand tools, sprayers, pumping sets etc. are to be encouraged. The steps encouraging manufacture are:

1. Credit facilities to local manufacturers
2. Higher tariff on imports
3. Import planning - emphasis on import of raw material
4. Technical assistance from international agencies.

2. Rural Development

a) Rural Credit

The price of imported power tiller is Rp 250,000. The estimated price of proposed state manufactured power tiller is Rp 400,000 and rice huller is Rp 325,000. Thus, it can be seen that with the existing pattern of agriculture, the farmers' purchase capacity is very much limited. Although there are village and rural banks the rural loans to farmers for purchase of farm equipment is not very significant.

The rate of interest in the open market is about 10-15% per month. There is no subsidy on purchase of farm equipment. However, government grants loans for pac programme activities such as for fertilizer, insecticides and spraying for 1968. spraying is also undertaken by the government through funds devoted to insectici and spraying. Cost of package plans is about US$40 per ha for fertilizer, insecticides, seeds and spraying.

b) Emphasis on Rice Production

a) Production Total Domestic Production of rice is about 14 million tons and importation is about 100 - 2x 200,000 metric tons. Plans are underway to increase the production through increased area, higher intensity and management techniques.

b) i) Usage of fertilizer Max In 1964-65, total consumption was 1 mill tons, whereas the domestic production was 100,000 tons. Hence emphasis has been laid on the expansion of the domestic production which can meet only 10% of requirement at the present. In 1968-69, import of fertilizers will be 400,000 tons. The national average consumption is 100 kg/urea and 50 kg of super phosphate per ha for rice production. Total requirement in 1973 will be equivalent to 200 millions of urea. The target for 1973 is 150 kg of urea and kg of super phosphate per ha for rice production. It is also proposed to bring 1.5 million ha by 1969 and under demonstration ea area which is now only 500,000 ha.

ii) Manufacture of fertilizer The following are the existing produc and future plans:

i) Plant at Sumatra (Pusri Plant) Capacity is about 100,000 tons of urea/year and to be expanded by 200,000 tons of urea per

ii) Plant at East Java (Gresik Petro-chemical Complex) This is with technical aid from CONSUITS of Italy with a mix capital of

456.1. The capacity will be 45,000 tons of urea and 7,000 tons ammonia and 150,000 tons of super phosphate. This project is in planning stage.

iii) Plant at South Java (Tjilahit) This is under study. This is to with technical assistance from U.S.S.R. This will have a capacity 100,000 tons of single super phosphate.

3. Research, Testing and Educational facilities

As the facilities towards the above aspects is very much limited, it is necessary to strengthen the same.

4. Training and extension service

There are little emphasis on training and extension service. It is recommended that a national programme towards training and extension is instituted.

SECTION V

POLICY TOWARDS INDUSTRIALIZATION

1. General Trend of Economy

A series of inflations at the rate experienced in Indonesia has left a critical mark on production, distribution, price structure and income distribution throughout the country. However, at the beginning of 1966, steps were taken to stabilize the currency and minimise the effect of inflation.

Thus this inflation experienced by Indonesia has left marks on all fields of production and one of the very interesting features is the lack of growth of manufacturing sector which is normally the most dynamic part of a developing economy in general and Indonesia in particular where import restrictions were very rigid up to 1966. The rate of gx growth of industry has been only 1.5% with negative industrial manufacturing growth as shown below:

Table 5.1 Growth by Industry, 1958-1964

(Official estimates, percentage)

		1958-64	Average
1.	Agriculture and Forestry	10	1.6
2.	Fisheries	38.2	5.6
3.	Mining and quarrying	43.3	6.1
4.	Manufacturing	- 1.2	-
5.	Construction	13.2	2.1
6.	Transport and Communication	21.6	3.3
7.	Others	6.8	1.1
8.	Total	9.7	1.5

However, during the next five years, aim is at a higher level of production in agriculture, enginsering and manufacture as shown in table 5.2.

/Table 5.2

Table 5.2 Net Domestic Product by Sectors of Origin

Million of Rupiahs at 1968 Prices

	1968	1969	1970	1971	1972	1973
Agriculture	1,245	1,280	1,320	1,360	1,410	1,465
Food	(820)	(845)	(875)	(905)	(940)	(980)
Cash Crop	(225)	(230)	(235)	(240)	(250)	(260)
Others	(200)	(205)	(210)	(215)	(220)	(225)
Manufacturing	315	330	345	375	400	435
Large scale	(115)	(125)	(135)	(155)	(175)	(200)
Small scale	(200)	(205)	(210)	(220)	(225)	(235)
Net Domestic Product	2,660	2,820	2,960	3,110	3,270	3,450
Index 1968 = 100	100	106	111.3	116.9	122.8	129.7
Rate of Growth %	-	6.0	5.0	5.0	5.1	5.5

2. Incentives for government investment

80% of the manufacturing industries at present are controlled by the state enterprises. Starting this year, it is proposed to re-organize the industrial sector as follows:

a) Public Companies To be held by the government with independent management. Activities market orientated. No government budget facilities - these are pri[illegible] enterprises.

b) Public Corporations These are to act towards public utility and commercial activity with partial government budget facilities.

c) Public utilities There are public utilities like water supply, etc. - and acts with government budget facilities.

The terms of credit to private manufacturers are of many types. For food sect[illegible] "soft" loans carry 3% interest per month (market rate 10% per month) and for investment credit the rate of interest is 1½% per month and on working capital 3%. Regarding pure public companies, the participation by private and public foreign and domestic participation with the government is encouraged.

It is interesting to note that some companies and estates which were nationalized have been handed over to the respective owners now. It is reported that effective steps are being contemplated to promote foreign investment and incentives for industrial participation are being formulated. It is felt that with an integrated investment programme, Indonesia will start on a rational and dynamic industrialization.

3. Assistance needed through International agencies

a) Assistance to evaluate and recommend the items to be manufactured.

b) Starting of pilot farms where integrated input usage is demonstrated.

c) Assistance in the engineering field in the area of manufacture and quality control.

d) Assistance in the field of agricultural engineering education.

e) Assistance in rural extension and demonstration with respect to usage of agricultural machinery.

SECTION VI

GENERAL CONCLUSIONS

1. It appears that the country has potentials for dynamic agriculture, xxx altho with the existing conditions there is a need for an integrated approach on the use of inputs - seeds, fertiliser, water and machinery.

2. The farmers' purchase capacity appears to be limited hence usage of modern techniques and machinery is likewise limited especially when there is a lack of government loans and subsidies.

3. There is a need for threshers, hullers, pumps, sprayers and xxxx engines.

4. Regarding engines, considering the oil resources xxxx and price structure of gasoline and diesel engine manufacturing facilities, availability of foreign exch. and technical skill of farmer, it is recommended that gasoline engine may be given priority in the range of 3-5 Hp for pumps, threshers, hullers, etc. and 8-10 Hp for pumps and power tillers.

5. There appears to be limited market for power tillers. As it is necessary to educate the farmers, it is recommended that emphasis should be given for import of a few selected makes in sufficient quantities, demonstration and extension programmes, and take up local manufacture at a later date.

6. There appears to be no big demand for tractors. Hence any local requirements may be met through judicious import for some time rather than plans for manufacture.

7. There is a necessity for proper sales and service organizations in the field of farm equipment.

8. In the field of hand tools and improved bullock drawn implements, it is necessary to start manufacture of the same on an engineering basis.

9. It is necessary to start agricultural engineering institutions, research and demonstration centres.

10. It is recommended that programmes for training field operators and industrial technical operators are started at an early date. It is recommended that cooperation and assistance from international organizations is obtained to formulate and implement the above pumps programmes.

Section VI

CONCLUSIONS

1. There is a good demand in the Philippines for powerful tractors (56-70 Hp) which constitute 60% of the total of 1,500 units sold in 1968. The total market is expected to increase up to about 6000 in 1975 provided that good credit facilities were to be made available to the farmers and that the sugar industry from where most of the tractor buyers come from were to face a bright future.

2. A great number of small tractors could be purchased by farmers if a cheap "paddy tractor" were to be introduced. Considering present conditions, the local manufacture of tractors would not be feasible, except possibly for the partial manufacture under a suitable cooperation with a nearby country, of one selected model within the range of about 65 Hp.

3. Power tillers will be required in significant quantities - 3500 in 1970 and 7000 in 1975. Local assemblers have not only to expand their assembly facilities but also to undertake the progressive manufacture of power tillers.

4. The demand for small diesel engines appears to be substantial enough to consider their local fabrication, provided that good quality and judicious selling prices are established.

5. The local pump manufacturers must be able to supply the entire local demand. They however need to specialise in production, to increase their scale, and to improve quality control and manufacturing techniques.

6. There are good possibilities for medium-scale manufacturers to produce most of the other implements needed by the farmers, i.e.:

/Power paddy

Power paddy threshers

Power sprayers and dusters (with imported engines) mounted

i plements for tractors; disc ploughs, cultivators, etc.

7. Taking into account the potential demand for dryers and the existing facilities and experience in the production of small and medium-sized rice mills, emphasis must be given to manufacture drying and processing equipment for rice and maize.

Appendix A

Reference - Literature

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2. Agricultural Census - 1963, Report 1; Biro Pusat Statistik; Djakarta.
3. Statistik Indonesia - 1964-67; Biro Pusat Statistik; Djakarta.
4. Economic Development of Indonesia (6 volumes); International Bank for Reconstruction and Development; International Development Associat Asia Department, February 1968.
5. Country Report.

Appendix B

Persons and Organizations Visited

1. UNDP Djakarta

   a) Mr. G. Grisgono, Deputy Resident Representative.

   b) Mr. Nemir Cocez, UNIDO Team Leader.

   c) Mr. Fair Banks, UNIDO Mech. Eng., Metal working.

   d) Mr. P.V. Badami, UNIDO.

2. Department of Industries, Djalan Kebon Sirih-36, Djakarta

   a) Mr. Mak Garli Halim, Secretary General

   b) Mr. Ir. Iwa. Sumarno, Department of Basic Industries (counterpart).

   c) Mr. Suparso-Salangjudo, Director, Production.

3. Department of Agriculture, Department of Pertanian, A.I. Imanbontjol, Kantor Djakarta.

   a) Mr. I. Soenadi, Asst. to Secretary General of Projects

   b) Mr. Soe D. Djanto, in charge of Agricultural Machinery

   c) Mr. Soe Parso, Director of Fisheries.

   d) Mr. Soe Hartono, Director of Rice Processing

   e) Dr. Tafal, Director of Animal Husbandry.

4. Government State Enterprises

   A. P.N. Semen Gresik, East Java

      a) Mr. Hertanto, Mechanical Engineer

      b) Mr. Sudjoko, Economist.

   B. P.N. Barata Surabaja, East Java

      a) Mr. Soepano Arsad, Asst. to Board of Directors.

      b) Dr. S. Hutapea, Director - Finek

      c) Ir. Tjieu Lian Siang, Director- Muda

      d) Mr. K. Soesono, Director - Utama

   C. P.N. Indra Surabaja, East Java

      a) Ir. Harsito-Semai, Director - Utama

D. F.N. Subang Marauke, xxxxx Djakarta

a) Ir. S. Prajitno, General Manager (counterpart)

5. Padi Tractor Kawang, Djakarta

a) Drs. Th. Mohammad Nobel, President & M.P.

6. P.T. Masayu, xxx Djakarta (Dealer for International Harvester Products)

a) Mr. O. Samuya - Motor Trucks and Agricultural Equipment

b) Mr. Al. Macky - Assembly and Spare Parts.

7. Bureau of Evaluation and Licencing, National Development Planning Body, Jalan Imamonjol, Tamansuropati, Djakarta

a) Ir. Subekti.

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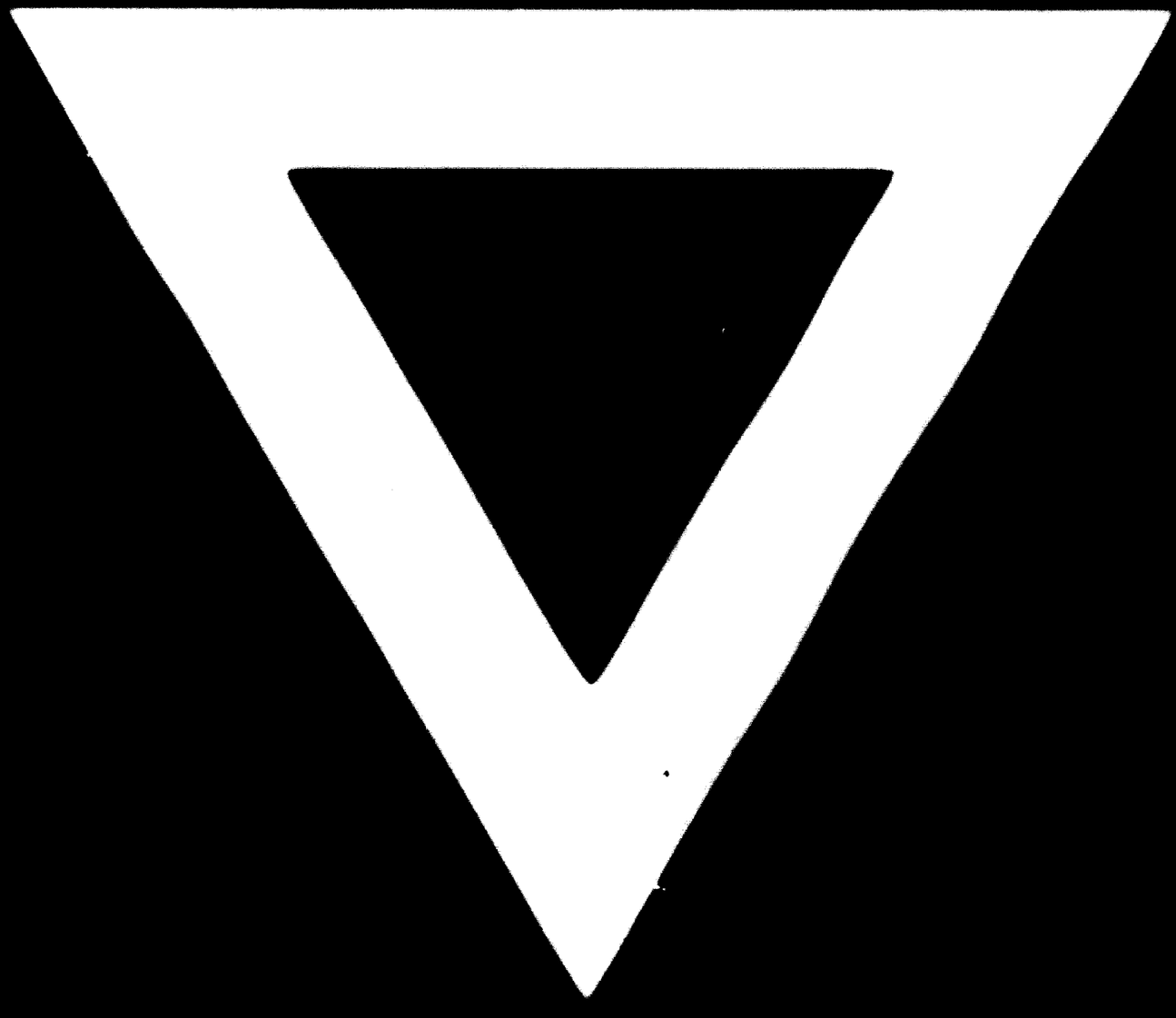

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