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PROGRESS REPORT

OF

SMALL FARM EQUIPMENT EXTENSION PROJECT IN INDONESIA

(from September 1980 to August 1981)

by

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Agricultural Engineering Consultant

September 1981

Preface :

This is an on going project and was earlier funded by U.S.A.I.D. mission, Jakarta during its phase I (from March 1978 to August 1980). Major activities and results achieved during the above phase I of this project is enclosed as appendix 1.

During this first year of phase II of this project (funded as part of an IRRI's regional project by U.S.A.I.D. Washington) work accomplished compared to the work planned at the beginning is shown in the enclosed work-plan activity chart as appendix 2. It may be noted that also the altered future work plan is indicated in the above chart.

Brief description of the major activities undertaken during this one year is as following :

Development work :

Translation into Bahasa Indonesia and redrawing of all original design drawings received from IRRI - Los Banos has continued. In cooperation with Metal Industries Development Centre (MIDC) standardization (of raw materials and purchased components) work according to the local availability is completed for hand tractors, and paddy threshers.

In this project's workshop, built proto-types of hand tractors, paddy threshers, axial flow pumps, transplanters and weeders (and carried out modification work) after *field testing them.

*Field testing is one of our major constraint since the equipment has to be carried everytime as far away as Sukamandi research station (60 Km. from Jakarta).

Since we needed a bigger and higher head pump than the current IRRI 6" axial pump for West Sumateran conditions, we designed and built a two stage 8" axial flow water pump for the first time in this workshop and is currently under testing.

Preliminary readings of its performance is quite promising.

We have also built 2 proto-types of manually operated punch planter (IATA Design) as these are felt needed for upland seeding in gogo-ranca areas and also in transmigration areas. Extensive field tests will be undertaken during the second year of this project before releasing to the local workshops.

Built first proto-type of manual driven (bicycle pedal operated) paddy thresher as suitable equipment for densely populated areas.

In order to improve the quality of locally built products, we have built jigs, fixtures and guages for hand tractor and transplanters, and first sets are being sent to first cooperative manufacturers in various provinces.

Training :

Conducted one week intensive training programme at Jakarta from April 6th to 11th. Twenty participants from staff of DIPERTA, Perindustrian, Cooperative manufacturers from West Sumatera, South Kalimantan and South Sulawesi participated. List of participants with their designations and provinces along with the training programme is enclosed as appendix 3

Judging from the level of participation and interaction between the participants and instructors it can be said that it has been a very effective and two way learning experience.

This experience ought to enable us to design and conduct future training courses with greater effectiveness. We have decided to conduct once a year training course at Jakarta mainly for the provincial staff engaged in extension work like DIPERTA, Perindustrian, Banks who are mainly or likely to be involved in our field extension work in the provinces. Also conduct training courses technical in nature one in each selected province mainly for the operators and workers of cooperative manufacturers as indicated in work plan.

Participation in National farmers Exhibition

Two thousand selected farmers from all over the country gathered to participate in PENAS IV held this year from June 20th to 27th at Barabai, South Kalimantan. Since South Kalimantan happened to be one of the three selected provinces for our field extension work, two sets of hand tractors, threshers, transplanters, axial flow pumps, weeders and a drier built at our Tanjung Barat workshop were sent to Barabai for the above occasion. This display has attracted not only several hundreds of farmers, G.O.I. officials but also visited by the Minister of Agriculture. After the above exhibition, DIPERTA of South Kalimantan has taken up the task of demonstrating the above equipment in farmers fields. Already one local manufacturer at Banjarmasin has been motivated and taken up the manufacture of thresher and axial flow pump.

Evaluation of locally built hand tractors and imported tractors
in Luwu

U.S.A.I.D. mission in Jakarta has undertaken a major area development programme in district Luwu, South Sulawesi. More than 10,000 Ha has been brought under double crop irrigation. Due to the shortage of agricultural labour, there was a scheme to introduce tractors into the area. There was a difference of opinion as to whether the imported 4 wheel tractors or locally built hand tractors were more suitable and economical in that region.

At this stage when our project was consulted we have agreed to undertake a two year comparative study of imported Japanese mini tractors (About twenty and more are already introduced into the area) and locally built IRRI designed hand tractors. Prepared a project proposal by introducing 10 indigenously built hand tractors in Luwu and monitoring closely by keeping detail records for a period of two years. Costs for this study have been estimated around \$ 64000 which has been agreed to be funded separately by the AID, mission in Jakarta. The detail proposal showing the estimates and work plan is enclosed in appendix no. 4.

Presently we are busy in completing 10 sets of hand tractors which are to be shipped to Luwu before September 1981, so that they are ready for use during the ploughing season starting November 1981.

We believe this study will not only bring out comparative economic performance of locally built Vs imported tractors, but also the findings should help GOT to take a clear cut policy decision with regard to tractorization in the country. Further we feel this exercise will activate this whole area like in West Sumatera for the manufacture and utilization of entire range of IRRI designed equipment.

This then will be our major challenge and commitment for the next two years *in Luwu*.

Further field extension work and progress in West Sumatera :

Number of local manufacturers during the 2 years of our extension work has increased from two to five mainly producing paddy threshers and hand weeders. The demand for paddy threshers in this province continues to be ahead of the production capacity by the above five manufacturers. Further PPMU of Bank Indonesia has conducted a small study on the credit needs of paddy threshers in this province and they have estimated the requirements are likely to go upto about 2300 paddy threshers. A copy of their summary statement is enclosed as appendix no. 5.

This province is criss-crossed with several small riverlets and ~~from~~ these, innumerable traditional Bamboo waterwheels are being used to lift water upto six to eight meters. But each wheel's capacity is only one to 2 Ha and besides the cost and maintenance of these Bamboo wheels is increasing as per the increase of local wages. Also they are vulnerable to any sudden floods etc.

Therefore there exists a great potential for introducing axial flow pumps in this province.

We are proposing to install two pumpsets in two desas to test under the field conditions and to work out the economic feasibility of pumping and increasing their cropping intensity. Besides, this should be a good demonstration to the interested farmers.

We are also proposing to demonstrate and introduce paddy transplanters during the year 1982.

However, the two hand tractors built in Bandung by a cooperative manufacturer which were shipped to West Sumatra did not give satisfactory performance. Therefore we are now shipping two additional transmission boxes built (exercising greater quality control) in our proto-type workshop for further tests and demonstration in West Sumatra.

Introducing driers in West Java :

During February/March 1981 harvesting in Karawang district, it has been reported in the newspapers that more than 10,000 tons of paddy have been spoilt and therefore not accepted by BULOG to be purchased from KUDs, due to improper drying of paddy.

In order to study the effectiveness and economics of IRRI paddy drier under field conditions we are proposing to install during 1982, two driers in Karawang district, one with KUD and

and one with a private rice huller and monitor closely for a period of one year. Unless this type of field testing and demonstration work is undertaken, we find the introducing and extension of this kind of equipment is difficult.

Major activities and results achieved by IRRI-DITPROD project
during its phase I (March 1978 to August 1980)

I. Total list of 12 cooperator manufacturers assisted by this project and their indigenous production of farm equipment is attached herewith.

II. A field day was organized on November 20, 1978 at the grounds of Conrad Hilton Hotel showing the exhibition and demonstration of locally made farm equipment. This function was well attended by senior staff of G.O.I., U.S.A.I.D. and several other international donor agencies.

III. In order to develop a strategy for field extension work in the provinces, a pilot project in West Sumatra was started in late 1978.

1. There, two sets of hand tractors, portable threshers and a paddy drier were used to demonstrate in few "kecamatan" intensively since March 1979.
2. Since then two local manufacturers were identified and helped technically to manufacture paddy threshers, weeders and water pumps. Due to above series of demonstrations, the demand particularly for paddy threshers has increased considerably, and now a third small manufacturer has just shown his interest to start manufacturing paddy threshers.

IV. New IRRI-DITPROD office and workshop facilities were built at Pasarminggu.

1. An old U.S. (A.I.D.) donated workshop under Food Crops directorate has been allotted to this project in November 1979 for building proto-types of farm equipment and to train the local staff attached to this project.
2. In this premise, a new office wing has been built for accomodating consultant-counterpart staff, with a conference room etc. The old machines have been repaired and some new essential equipment has been purchased.
3. In this above workshop one set of thresher, hand tractor, trailer, axial low head pump, seed planter, husk furnace have been built since February 1980 and at the same time training (on the job) about 20 persons of G.O.I. attached to this project.
4. One week intensive training programme has been conducted for 8 staff members of Sub-directorate of mechanization in February 1980.
5. Organized a field day on May 29th 1980 attended by senior staff of G.O.I., U.S.A.I.D. and several other International agencies. Permanent exhibition of small farm equipment manufactured locally under this project's guidance was inaugurated by the Director general of Food Crops Production, G.O.I.

6. Same afternoon a seminar was conducted which was attended by about 60 representatives from local manufacturers, DIPERTA staff from 4 provinces, and Agricultural Engineering faculty staff of IPB, ITB and Gajah Mada. 4 papers were presented and discussed in detail.
7. Prepared strategy and work plan for IRRJ-DITPROD project Phase II (from September 1980 to September 1985).

VRR

September '80

Appendix 2

Planned Activities	1980												1981												1982											
	← First project year												2nd project year												3rd project year											
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
1. Selecting dealers & collecting bench mark data																																				
2. Sending demonstration equipment to provinces																																				
3. Demonstration of equipment																																				
4. Selection of RUD/Polom pok tani & their hiring it for one season																																				
5. Identifying at least one local workshop & rendering all assistance for building 1st prototype																																				
6. Actively promote for more number of workshops and dealers into the programme																																				
7. Coordinating with local banks for providing credit to purchasers of equipment																																				
8. Training of provincial staff at Jakarta																																				
9. Technical training to operators, mechanics & workshop staff																							1						2				3			
10. Manufacturing prototypes, making alternatives and developing production aids, etc.																																				
11. Longterm testing at Sukamandi & Irya																																				
12. Performance & quality testing of locally built equipment in provinces																																				
13. Translation of all drawings, standardisation of materials components, production processes & value analysis of costs, etc.																																				
14. Field day in Jakarta in May/June																																				
15. Field day in Provinces approximately																																				
15. News bulletin - 6 monthly																																				
17. Internal evaluation report (Progress report)																																				
18. Planning to be completed for the next 3 years																																				

x Not executed

--- Revised targets

Δ 9&12 will be conducted simultaneously

Appendix 3.

DAFTAR NAMA DAN ALAMAT PESERTA
LATIHAN PENGRAJIN ALAT-MESIN PERTANIAN TAHUN 1981

No.	Nama	Alamat Kantor- No. Telp.	Alamat Rumah - No. Telp.
1.	Abubakar Tahir Bsc.	Kanwil Dept. Perin- dustrian Jl. W.R. Supratman No. 4, Ujung Pandang Telp. 22841 - 22749.	Jl. Sabutung No.- 188 Ujung Pandang Sul-Sel
2.	A. Denny D.S. Bsc.	Diperta Kalsel Jl. Sudirman No. 5 Banjar Baru. Telp. No. 57.	Jl. P. Hidayatul- lah Gg. Nangka No. 103 B, Martapura.
3.	Damin	Balai Teknologi Per- tanian Bedali Lawang Dr. Cipto, Kotak Pos 4, Lawang Telp. 170.	Jl. Dr. Cipto Gg. IV, Bedali - Jatin Rt. 20
4.	Dedi Adeli	Diperta Kab. Dati II Bandung, Temon Pos No. 3 di Baleendah Telp. 71174, Bandung.	Jl. Sodangserang No. 57, Cikutra Bandung
5.	Djailani Arifin Mastur	Kanwil Dept. Perin- dustrian Propinsi Kal-Sel Jl. P. Antasari Ba- rat No. 3 Kal-Sel, Telp. 330.	Jl. Merpati No. 2 Banjar Baru Kal-Sel.
6.	Gagah Suasawan	Pertukangan Besi "U.D. BLIMBING" Jl. Laksda Adi Sucip- to 20, Malang. Jatim.	Laksda Adi Sucip- to 20, Malang Jatim.
7.	Haryono, Ir.	IP3/BPTP Sukamandi Teronol Pos Cikampek II. Telp. 157 Subang-Jabar	IP3/PBTP Sukamandi Teronol Pos Cikam- pek II, Telp. 157 Subang-Jabar.
8.	Herman Rafii, Ir	Diperta Kab. Solok Jl. K.S. Tubun Solok - Sumbar Telp. 33.	Jl. R.A. Kartini Ex. Mess Sibual - Buali, Solok Sumatera Barat.

- | | | |
|--------------------------|---|--|
| 9. K. As Hadi | Pertukangan Besi
"U.D. BILIMBING"
Jl. Laksda Hadi Sucipto 20, Malang.
Jatin. | Jl. Laksda Hadi-Sucipto 20
Malang, Jatim. |
| 10. Kasiman | Staf Bengkel Mekanisasi Pertanian. Dit. Bina Produksi,
Telp. 782557, Pasar-minggu, Jaksel. | Wisma Tani
Ragunan, Pasar-minggu, Jaksel. |
| 11. Lukman HK, Ir. | Kanwil Dept. Perindustrian Prop. Sumatera-Barat.
Jl. Setia Budi No. 15
Telp. 22345. Padang. | Jl. Setia Budi
No. 15, Padang. |
| 12. Masriah Ratna, Ir. | Diperta Kab. Dahi II
Banjar, Martapura,
Kalsel. | Jl. Garuda No. 8
Banjar Baru,
Kalsel. |
| 13. M. Djafar Parussengi | Jl. Amrullah No. 20
Telp. 81290. Ujung-Pandang. | Jl. Sunu II/26
Ujung Pandang |
| 14. M. Effendy Hamdani | Jl. Amrullah No. 20
Telp. 81290, Ujung-Pandang | Jl. Bungaya No.-45 M, Ujung Pandang. |
| 15. Ruspandie HS | Industri Las/Bubut
"H. SABLIL-K"
Jl. Nagasari 140/8
Banjarmasin. | Jl. Nagasari 140/8
Telp. 3579-4802.
Banjarmasin |
| 16. Soehardjo | IRRI - DITPPOD
Jl. Rawabambi No.-13.B, Pasaringgu
Jak-Sel. Telp. 782557. | Monteng Dalam
Rt. 005/013
Kec. Tebet
Jak-Sel. |
| 17. Sofyan St. R. Ameh | Fa. Sarasah Industri
Jl. St. Syahrir/Simpang Limau-Bukittinggi
Telp. 22897. Sumbar. | Jl. St. Syahrir/Maggis Rt. Solayan, Bukittinggi
Sumbar. |
| 18. H. Sunardi | Biro Konstruksi Tugas
Jl. Raya No. 18 Bekasi
Jakarta Timur
Telp. 481786. | Asrama Tugas
Rw. 4/Rt. 008
Pulejadung, Jakarta. |
| 19. Syahril Bernawan | Bank Indonesia
Jl. Sudirman
Telp. 26411, Padang | Padang Baru IV/16
Telp. 23899,
Padang. |

20. Wahyu Subandrio, Ir.

Jl. Raya Hajimena
Lampung Selatan
Lampung

Komp. Tani Makmur
Tegineneng, Km 38
Lampung Selatan
Lampung.

21. Zaimal Zubir

Bengkel Diperta Da
ti 11 Sumbang,
Bukit Linggi, Telp.
22823.

Gadut Bukittinggi
Sumatera Barat.

22. Zainal Arifin

PT. LINGGA WASTU JAYA
Jl. Raya Bekasi Km. 18
Pulojagung/Jatinegara.
Jakarta Timur.
Telp. 881786.

Jl. Let. Suprpto
No. 53. Jakarta-
Pusat.

AGRICULTURAL ENGINEERING COURSE SCHEDULEMonday, April 6, 1981

7.30 - 8.00	- Opening ceremony by Ir. Soebrata speech by V.R. Reddy & Dr. J.R. Cowan	
8.00 - 8.30	- Speech of Director of Food Crop Production	Ir. Jafri J.
8.30 - 9.30	- Farm machinery and equipment development policy in Indonesia	Ir. Soebagyo
9.30 - 10.00	- Industrial extension project (IRRI program)	V.R. Reddy
10.00 - 11.00	- Locally farm machinery and equipment development	Drs. Moch. Chafied
11.00 - 12.00	- Problems in manufacturing, farm machineries equipment	Zainal Arifin (Alsintani)
12.00 - 13.00	- Lunch	
13.00 - 14.00	- Farm machinery equipment test- ing in Indonesia	R. Dadang Tarmana A.E.
14.00 - 17.30	- Discussion	
17.30 - 19.00	- Tea break	
19.00 - 19.30	- Slide show	

Tuesday, April 7, 1981

7.30 - 9.00	- Design and specification of Hand tractor	R. Dadang Tarmana A.E.
9.00 - 10.30	- IRRI technical drawing	Ir. Koes S.
10.30 - 10.45	- Tea break	
10.45 - 12.00	- Hand tractor materials	Ir. Koes S.
12.00 - 13.15	- Cost analysis in manufacturing/ using Hand tractor	Heradji A.
13.15 - 14.00	- Lunch	
14.00 - 17.30	- Hand tractor disassembly & assembly	Kasiman/ Ir. Koes
17.30 - 19.00	- Tea break	
19.00 - 23.00	- Discussion	Discussion team

Wednesday, April 8, 1981

7.30 - 9.15	- Design, specification & technical drawing of transplanter	Ir. Soebrata
9.15 - 10.30	- Design, specification & technical drawing of weeder	Wiyanto BSc.
10.30 - 10.45	- Tea break	
10.45 - 13.15	- Material cost of manufacturing & using transplanter & weeder	Ir. Rudy
13.15 - 14.00	- Lunch	
14.00 - 17.30	- Demonstration/testing of transplanter	Suardi/ Ir. Subrata
17.30 - 19.00	- Tea break	
19.00 - 23.00	- Discussion	Discussion team

Thursday, April 9, 1981

7.30 - 10.30	- Design/specification and technical drawing of thresher	Soewardjo
10.30 - 10.45	- Tea break	
10.45 - 12.00	- Thresher material	Mulyoto BSc.
12.00 - 13.15	- Cost analysis of manufacturing & using of thresher	Ir. Handaka
13.15 - 14.00	- Lunch	
14.00 - 17.30	- Disassembly & assembly of thresher	Soehardjo/ Ir. Rudy T.
17.30 - 19.00	- Tea break	
19.00 - 23.00	- Discussion	Discussion team

Friday, April 10, 1981

7.30 - 9.15	- Design/specification and technical drawing of axial pump	Ir. B. Gultom
9.15 - 10.30	- Cost analysis of manufacturing & using of axial pump	Ir. Handaka
10.30 - 14.00	- Break	
14.00 - 17.30	- Demonstration/testing of axial pump	Endon/ Made Dasnaya
17.30 - 19.00	- Tea break	
19.00 - 23.00	- Discussion	Discussion team

Saturday, April 11, 1981

7.30 - 9.15	- Design /specification & technical drawing of dryer	Moelyoto
9.15 - 10.30	- Economical aspect of dryer	Moelyoto
10.30 - 10.45	Tea break	
10.45 - 13.15	- Demonstration/testing of axial pump	Didi H./ Chalid
13.15 - 14.00	- Lunch	
14.00 - 17.30	- Discussion	Discussion Team
17.30 - 19.00	- Tea break	
19.00 - 21.30	- Evaluation	
21.30 -	- Closing ceremony	

Sunday, April 12, 1981

7.30 - - Sightseeing

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PROGRESSIVE MANUFACTURE OF IRRIG SMALL FARM EQUIPMENT IN INDONESIA

No.	MANUFACTURERS	Hand tractor Upto		Thresher Upto		Pump Upto		Drier Upto		Transplanter Upto		Other imple- ments Upto		REMARKS
		78/80	80/81	78/80	80/81	78/80	80/81	78/80	80/81	78/80	80/81	78/80	80/81	
1.	PT. BUMA SAKTI, Bandung	11	-	19*	24*	-	-	17	20	-	20	42	10	*Th6, Th7, Th8 (includes 37 "cleaner & 5 trailer)
2.	PT. MUSUNAMA, Tegal	26	4	30	30	-	-	9	-	-	-	135*	-	*Weeder
3.	PT. KARYA HIDUP SENTAU- SA, Yogyakarta	40	150*	-	35	-	-	-	-	-	-	-	-	*Thai type (this party makes rice hullers, thresher etc. of Japanese design.
4.	PY. MARTANI, Palembang	1	10	-	-	20*	-	-	-	-	-	-	-	*Hydraulic ram pump
5.	PT. KUBOTA, Semarang	-	6	-	-	-	-	-	-	-	-	-	-	
6.	CV. SURATMAN, Solo	2	8	13*	21*	-	-	-	-	-	-	200+	800+	*Th7 Axial flow thresher +Weeder
7.	PT. TUGAS, Jakarta	5	11	-	-	10	-	-	-	-	-	-	-	*Diaphragm pump
8.	PT. NEW RUHAAN INDONESIA Jakarta	-	15	-	-	35	1200	-	-	-	-	-	-	
9.	PT. SUTAN KASIM, Padang	-	-	16*	8*	-	-	-	-	-	-	-	-	*Th6 +Weeder
10.	PT. SARASMI, Padang	-	1	10	24	-	-	-	-	-	-	20*	35*	* Weeder
11.	BENGKEL DIPERTA BUKIT- TINGGI, Sumbar	-	-	1	1	-	1	-	-	-	-	-	200*	*Weeder

No.	MANUFACTURERS	Hand tractor		Thresher		Pump		Drier		Transplanter		Other imple mens Upto		REMARKS
		Upto 78/80	80/81	Upto 78/80	80/81	Upto 78/80	80/81	Upto 78/80	80/81	Upto 78/80	80/81	Upto 78/80	80/81	
12.	BENKEL LAIN DI SUMPAN.	-	-	-	15	-	-	-	-	-	-	-	50*	*Weeder
13.	BENKEL H. SABRI, Banjarnasin, Kalesel.	-	-	-	2	-	4	-	-	-	-	-	2*	*Weeder
14.	BENKEL TANJUNG BARAT, Jakarta.	1	2	3	4	2	6	-	-	*1 ¹ / ₂ +	3+	-	5=	*Trailer +Seeder =Weeder
Total		86	207	92	164	59	1211	26	20	2	23	397	1102	
Cumulative total		200		256		1269		46		25		1499		
Grand total														3004.

OUTLINE OF THE RECOMMENDATION FOR POWER THRESHER
CREDIT SCHEME

1. PURPOSE

KIK/EMKI (or KREDIT MIDI) financial assistance is to be made available to individual farmers or group of farmers (kelompok tani) to purchase power thresher.

2. JUSTIFICATION

There is shortage of labour in agricultural sector in West Sumatra, leading to increased harvesting costs year by year. Any machinery which increases the productivity of labour, particularly in post harvest activities of rice, is therefore welcome by farmers.

3. AREA SELECTED

A KIK/EMKI or KREDIT MIDI scheme should be envisaged predominantly in double cropped areas where two time of rice cultivations is possible due to the availability of water/irrigation facilities and harvesting/threshing has to be performed quickly.

The caring personnel should take an active part in surveying the area with the cooperation of Dinas Pertanian personnel. The minimum command area of one unit of thresher should be 15 ha.

4. ECONOMICS OF THE PROJECT

Besides reducing labour cost for threshing, any power thresher operated will also reduce the losses of paddy grains (around 4.3 ton/year). Farmers who use the service of the machine will get benefits in terms of :

- reduced self employment for threshing (or more time for other profitable business)
- reduced costs for hired labour
- higher collectibility of grains of yields per ha.

From investor point of view, the project is financially feasible; under the given assumptions, the Internal Rate of Return on Investment (IRR) is 37.2% and Benefit Cost Ratio is 1.24

Details of economic analysis are given in the main report page 9-11

5. TERMS OF CREDIT

Amount of credit recommended is 90% of investment which is at present : $90\% \times \text{Rp.}550,000 = \text{Rp.}495,000,-$

The rest Rp.55,000 is to be self-financed (by using the customer's own funds).

With a six month grace period, credit should be fully repaid in the 3rd year.

6. IDENTIFICATION OF THE BORROWERS

The project could be implemented either by a single individual farmer or a group of farmers.

Tractor owners, key farmers, *umpul tani* or a group of farmers in a compact area could be eligible.

The following qualifications of borrowers have to be ensured:

- should be in a position to supervise the operation of the unit himself,
- should have sufficient managerial capacity
- should be in the position to maintain his family without difficulty during the non operating time of the machine and be able to service the loan.

7. COLLATERAL

The machine itself would be used as security; other properties could be additionally used. Since the amount of credit is small there should be no problem in collateral.

TRANSFER OF SMALL FARM EQUIPMENT TECHNOLOGY TO DEVELOPING
COUNTRIES EXPERIENCES GAINED IN INDONESIA

Transfer of any new technology to a traditional rural society is part of the major problem our world is facing today in bringing about the rural development. Increasing the productivity of land and man is perhaps the first step that is needed to break the vicious circle of non development in rural areas. It is here the importance of small farm equipment technology lies, in that its main objective is to increase small farmer's and his farm's productivity (and thereby his income) while decreasing his drudgery.

Choice of technology :

But then what should be the size, level of sophistication of farm equipment and its socio-economic impact on the rural society from a long range point of view. We are aware that several developing countries in a hurry to bring about change, are resorting to the importation of latest technology at a high cost (refer Appendix I), sacrificing their long term interest. While this may have some justification (if any?) in basic, or essential and urban consumer industries, but certainly not when it comes to farm machinery and equipment specially when it is to operate in rural areas, and for small farmers.

It is in this context, small farm equipment technology

By V.R. Reddy, April 28, 1981

developed at IRRI, is the appropriate one in the sense that it is simple enough to be handled by small farmers and then fabricatable in small workshops of rural urban towns with some initial guidance. Here we need to qualify, the present range of small farm equipment developed at IRRI caters to about 10¹ to 15 Ha of land/season. Since the average farm holding size in several developing countries are much smaller, ranging from 0.5 Ha to 3 Ha, the above IRRI developed farm equipment will not be economical unless these are purchased by more enterprising farmers and hired to neighbouring farmers. Therefore, perhaps it can be argued that there is a case for developing manual and animal powered farm implements suitable for 1 to 2 Ha farm-size holdings to be able to serve a large number of farmers in the rice growing countries of the world.

Socio-economic consequences of new technology:

This is an important aspect, our social scientists are constantly bringing it to our notice. Essentially their stand is that in densely populated countries with considerable unemployment and underemployment of agricultural labour, any productivity increasing (and thereby labour displacing) technology will aggravate the social distribution problem further. This is a concern which deserves all sympathy and understanding.

¹Assuming the time available for operating this equipment is about 30 to 45 days for each season, except TR8 which can probably cater above 50 Ha of Paddy yields.

In several instances, however, the existing scenario is interpreted differently according to one's perception and conviction as to what is good for the country.

In the absence of good field research data² it still seems to be a grey area for any valid interpretation, and therefore there exists a great deal of controversy on this issue. In fact in Indonesia, even at the highest policy making level there exists two opposite schools of thought on farm mechanization policy, with the result no clear cut policy decision is as yet taken on this subject.

However, we need to distinguish between the farm mechanization with the most sophisticated imported technology and with a larger content of labour displacement to an indigenously produced simpler farm equipment produced locally by myriad small workshops spread all over the country displacing labour in smaller doses. And we know the diffusion of this second kind of technology can be a slow but a growth process at grass roots level, not only increasing the productivity of farms and farmers but strengthening the rural industrial base and creating additional non-farm job opportunities. After all these are some of the basic indexes of real economic growth in any country.

In fact we observe in Indonesia, due to the vacuum created by the absence of such an indigenous farm equipment industry, the justification for the imported equipment seems much.

²Full data and complete analysis of the 'Consequences of Mechanization' study are still awaited.

greater as stated earlier,

Sometimes we feel there is a tendency on the part of our over enthusiastic social(istic!) scientists to sweep with the same broom in raising their objections against these qualitatively different levels of technologies, for example one hears similar objection, is put forward even against manually operated implements like sickle and weeder being introduced in Java.

Taking technology to the country:

Like in any outreach extension project work, the first requirement that needs to be fulfilled is the concerned Government's full involvement and active participation by providing adequate staff, facilities and local budget for carrying out the project work. While the ministry of Agriculture can be the major Counterpart agency, but the active involvement of the industries ministry due to the very nature of this project work is rather essential.

So far major efforts of IRRI's subcontract programmes and industrial extension projects were concentrated in giving technical drawings, and other required technical information to the cooperator manufacturers within the country. This approach did not bear any results in Indonesia inspite of 5 years of sub-contract programme from 1973 to 1978.

The first major problem we have identified when the industrial extension project was started in 1978, was to create local market for the locally produced equipment which should

be a priori for any substantial and sustaining growth for an industry of this nature.

Field extension work:

The first decision we have taken was to choose West Sumatera province as a pilot project area to test out our ideas and learn our lessons in actually carrying out the field extension work and then to develop a national strategy plan for the entire country.

Two sets of demonstration equipment were sent to the area and with the help of provincial directorate staff intensive demonstrations were carried out in a district. Simultaneously we were able to motivate two local small workshops to take up the manufacture of IRRI design equipment and all the technical assistance required was rendered. We are glad to state here that within less than two years, more than 300 hand weeders and 45 paddy threshers have been manufactured and sold. At the present moment the demand for the above equipment far exceeds the production capacity and now three more workshop units have taken up the manufacture. The demand for pumps and hand-tractors is likely to increase in the coming months with the local bank credit being made available to the intending farmers and coops.

With the experiences gained here, we have been able to prepare strategy of workplan for the second phase of this project. Detail guidelines for field extension work of this nature is appended as 2.

Modification and prototype development work

Locale specific problems of each country is a reality which needs to be confronted before any spread of technology is attempted. In the case of farm equipment, it is not only the soil and field conditions that vary, but also the availability of Engineering materials and their standards need to be adopted.

In Indonesia we had to redraw almost all drawings in local language incorporating some modifications, standard materials and components easily available locally, etc. We have taken up the development of a manually (with bicycle drive) driven paddy thresher specially for smaller farmers in Java. This also provides job training opportunity for development work to local project staff.

Institutionalization

Training of the local cadre who are going to man and be involved in this project is the heart of an extension project like this. After identifying the full scope of work in this field, and organization chart with job description is prepared, a copy of the same is appended as 3.

In Indonesia the present counterpart organization of our project, Subdirectorate of Mechanization is being proposed as a National Institute of Farm machinery. A high level National Mechanization policy Committee of GOI has been formed recently on the recommendation of RNAM. Task force for preparing a comprehensive plan by working out and coordinating with

several organizations within the country has also been named. IRRI-DITPROD has a key role to play in this formidable and important task.

Summary and conclusions :

Small farm equipment that increases farmer's productivity (and thereby his income) while decreasing his drudgery and which can be built locally by small workshops spread over in small urban towns of the country is the most appropriate choice of technology for developing countries.

Creating local demand for such farm equipment in the initial stages is a priori for involving and stimulating the local production by small workshops.

For the sustained growth of this whole process, it is important for a project of this nature to be institutionalized by training the local staff from the very beginning.

Finally the success of an extension project like this essentially depends on government policies encouraging local farm equipment industry and simultaneously discouraging indiscriminate importation of such farm equipment which can be manufactured locally.

Present and proposed Water lifting devices for increasing
food crop production in West Sumatera

At present in some districts like Kabupaten Agam, Kabupaten Padang Pariaman, Kabupaten Sijunjung, Kabupaten Pesisir Selatan one comes across innumerable 'Kincir Air' (Bamboo water wheels) very ingeniously constructed lifting small quantities of water from the small river-lets that flow through the above districts.

While the exact number is not known, but hundreds of them (if not thousands) are operating, each one irrigating anywhere from 1 to 2 Ha of paddy fields.

The present cost estimated is about Rp. 100,000,- to Rp. 150,000,- depending on the diameter of the water wheel ranging between 8 to 12 meters. The yearly maintenance costs are estimated around Rp. 10,000,- to Rp. 15,000,-, provided no flood damage which is said to occur once in 3 to 4 years. In any case the life of this wheel is expected to be not more than 3 years. Therefore the present cost of irrigation/Ha works out roughly about Rp. 20,000,- to Rp. 30,000,-/Ha/season, which is very modest compared to the additional income generated by the assured irrigated crops.

The major disadvantage, however, is that the fields beyond 50 to 60 meters from the bank of the riverlets cannot be irrigated with these water wheels.

Therefore there is a great potential for introducing low cost head pumps (such as IRRI type axial flow pump) in the above mentioned areas of West Sumatera. However, the feasibility of such pumpsets and the practical problems that may be encountered need first to be studied on a pilot scale. It is therefore proposed to select two villages (preferably in two different districts but not very far from each other for monitoring purposes) with water resources where first bench-mark-data-survey needs to be conducted indicating the existing number of water wheels along with their economics and the number of hectares presently irrigated and the future potential that exists. The second step would be to instal two pumpsets (one 6" and one 8") in each village and monitor them for a period of at least one to two seasons. In these trials, private Vs social ownership of these pumpsets could be studied as well.

The estimated cost of small scale 'pumpanisasi' pilot project
in West Sumatera

1. Survey cost	Rp.	500,000,-
2. Cost of 4 pumpsets & their installation	"	3.000,000,-
3. Cost of two local supervisors for monitoring & record keeping for two seasons (at Rp. 30,000,-/month for 5 months each)	"	720,000
T o t a l		Rp. 4,220,000
		\$ 7,000
		=====

Cost of operation and repairs to be collected from the farmers who are likely to be benefited from the above irrigation.

The above pumpsets are to be gifted to DIPERTA for future demonstration work.



Five major achievements from 1978 to 1980

1. On November 20, 1978, organized a demonstration cum exhibition of IRRI type small farm equipment manufactured locally at Hilton grounds, attended by senior officials of G.O.I., IRRI (including Director general), U.S.A.I.D. (including H.E.U. Ambassador of U.S.A. and director U.S.A.I.D. Jakarta), International donor agencies, (including World Bank, Asian Development Bank, U.N. Agencies) Manufacturers, dealers and other guests.
2. Building of IRRI-DITPROD office facilities, and rehabilitation of an old workshop for building proto-types and training of local cadre at Tanjung Barat, Pasarminggu in January 1980.
3. One week intensive training course conducted for the engineering staff of the Subdirectorate of Mechanization, Jakarta in February 1980.
4. Carrying out Intensive field extension work since October 1979 in West Sumatra, where already two local manufacturers have produced more than 30 threshers, one hand tractor and several hundreds of weeders.
5. Organized an opening ceremony of permanent exhibition of locally manufactured IRRI type equipment by the Dirgen of Food Crops Production on May 29, 1980. Attended by senior officials of G.O.I., international donor agencies, local manufacturers and dealers, and staff of Agricultural Engineering faculties. Later in the afternoon about 60 persons (representing Agricultural and industry ministries of G.O.I., Agricultural Engineering faculties, local manufacturers and dealers) participated in the workshop about the manufacture and extension of locally made small farm equipment.

Four important goals we are aiming in the 2nd phase of this project until 1985 are :

1. To extend intensive field extension programmes to four or five more provinces.
2. To modify and build suitable small farm equipment in our Tanjung Barat workshop required in various parts of Indonesia through it.
3. To assist in the formation of a national mechanization committee and to influence policy makers for creating suitable environment for the development of indigenous small farm equipment industry.
4. To train Indonesian staff and complete the process of institutionalization of our industrial extension project by September 1985.