

Industrial Extension
Evaluation of introduced agricultural equipment and
support measures for increased local production and
use of machines in South Sumatra
(Fifth assignment, April-July 2006)

Gerald Hitzler

PREFACE (Assignment April – July 2006)

The South Sumatra Forest Fire Management Project (SSFFMP) is a technical co-operation project jointly funded (in terms of the financing memorandum IDN/RELEX/1999/0103) by the European Commission and by the Government of the Republic of Indonesia through the Ministry of Forestry (MoF).

This report has been completed in accordance with the project Overall Work Plan (OWP) and the Annual Work Plan (AWP) IV - 2006,

in part fulfillment of

Activity 3.2.3.1: “Further develop field level examples of land utilization types at 13 villages”,

Activity 3.2.3: “Establish field-level examples, that include gender aspects, of participatory multi-stakeholder land and resource use planning including effective fire management, in selected villages” and

Activity 3.2: “Promote sustainable natural resource management based on co-management arrangements”

to achieve Result 3: “Capacities created and initiatives supported to bring land and natural resources under sustainable management”

to realize the five-year project purpose, which is “Aid and facilitate the establishment of a coordinated system of fire management at province, district and sub district and village level throughout South Sumatra province in which all involved stakeholders, including the private sector, work together to reduce the negative impact of fire on the natural and social environment”

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The report has been prepared by:

Gerald Hitzler
Industrial Extension and Agricultural Specialist

The report is acknowledged and approved for circulation by the SSFFMP Co-Directors

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Dr. Dodi Supriadi
National Co-Director

Dr. Karl-Heinz Steinmann
EU Co-Director

EXECUTIVE SUMMARY

To support the community development in poor areas with low income, SSFFMP distributes and equips farmers groups of priority/selected villages with agricultural equipment and machinery as part of income generating activities. The additional income generation should support the reduction and prevention of forest fire.

The distributed equipment should be appropriate, of good quality and if possible locally produced. Local production of agricultural machinery and tools contributes to the creation of new job opportunities and employment. Further, additional know how got gained and developed among local production workshops.

All the places where project machinery was provided got visited. At almost all places advice was given to the operators on how to use and on how to do important maintenance. Further demonstrations were given how to work with the machines to receive good work results and good product quality. To support maintenance and repair activities by the operators each farmer's group got a large toolbox additionally provided.

At the project villages it got observed that most of the equipment was in use, some was still parked; some was used only once or twice and then not touched again. There were several reasons mentioned for use and not use.

Operators were less experienced and didn't know how to use. Some farmer's groups were not properly set up and not operational.

Members were dissatisfied with quality of work or expected work delivered for free.

The prices for some commodities processed went down or strong competition appeared and made the business unattractive.

Some of the machines were supplied from other provinces and not adapted to the local conditions or delivered machinery quality was low and less functional.

The machinery got checked, test- and demonstration runs got executed. During the tests the suitability was often immediate visible. Some of the machines were newly provided and the farmers saw first time performance and function. During test of some equipment it was immediate visible that technical changes and improvements been necessary. Workshops got selected and machines were sent there for improvements and changes. The work was overseen by the consultant and inputs direct given.

Machinery was selected for local production and decisions were taken what could be locally repaired and maintained. To mention the production of flatbed rice dryers with incorporated improvements, the design changes on ploughs for two wheel tractors, improvements on fodder chopper for cattle feeding and pellet machinery for fish feed production. Recommendations for changes and improvements were given as well as on production and how to improve product quality and endurance.

Workshops got intensive instruction on how to manufacture and to repair machines. New machines were produced and improvements on project provided machines were executed under guidance. For standardizing production of equipment assistance in making jigs and fixtures was given. To mention the production of the blower for the rice flat bed dryer or the making of the improved plough for two wheel tractors together with a workshop.

RINGKASAN EKSEKUTIF

Didalam rangka pemberdayaan masyarakat pada desa-desa miskin dengan pendapatan masyarakat yang rendah, SSFFMP membantu kelompok-kelompok tani pada desa-desa prioritas dengan peralatan dan mesin pertanian sebagai bagian dari kegiatan peningkatan pendapatan masyarakat. Peningkatan pendapatan masyarakat ini adalah merupakan sebagian pula dari upaya pengurangan dan pencegahan kebakaran hutan dan lahan.

Peralatan dan mesin pertanian yang didistribusikan seyogyanya haruslah yang layak, mempunyai kualitas yang baik dan sebaiknya buatan lokal. Pengadaan peralatan dan mesin pertanian buatan lokal akan memberi kontribusi terhadap penciptaan peluang lapangan kerja yang lebih luas. Lebih jauh lagi, tambahan ilmu pengetahuan akan diperoleh dan berkembang diantara bengkel-bengkel produsen lokal.

Semua tempat dimana proyek telah memberikan bantuan alat dan mesin pertanian telah penulis kunjungi. Pada hampir semua tempat-tempat tersebut, telah diberikan contoh dan saran-saran penting kepada para operator tentang bagaimana mengoperasikan dan memelihara alat dan mesin pertanian sebagaimana mestinya. Demonstrasi langsung dengan penjelasan yang lebih rinci juga diberikan untuk bagaimana memakai alat dan mesin pertanian agar memperoleh hasil kerja yang produktif dan berkualitas baik. Guna mendukung kegiatan pemeliharaan dan perbaikan oleh para operator, setiap kelompok tani memperoleh tambahan bantuan satu kotak besar berupa kunci-kunci dan peralatan lainnya (toolbox).

Pada desa-desa prioritas yang dikunjungi, ditemukan kebanyakan peralatan dan mesin pertanian sudah pernah dioperasikan, sementara beberapa diantaranya masih belum; beberapa baru digunakan satu atau dua kali saja dan sebagian yang lain belum dipergunakan. Ada beberapa alasan dikemukakan mengapa ada yang sudah dioperasikan dan mengapa ada yang belum. Sebagian operator menyatakan kurang berpengalaman dan kurang/tidak mengetahui bagaimana cara mengoperasikan alat dan mesin yang ada. Pada beberapa kelompok tani ditemui kurang dapat menyetel peralatan sebagaimana mestinya mengakibatkan peralatan tidak berfungsi sebagaimana mestinya.

Sebagian anggota kelompok tani menyatakan tidak puas dengan kualitas hasil kerja dari alat dan mesin, dan sebagian yang lain mengharapkan jasa/produk hasil kerja secara gratis. Kualitas produksi dan harga komoditi yang diolah rendah dan ketika ada pesaing yang kuat dari luar maka usaha menjadi tidak menarik lagi.

Beberapa peralatan dan mesin didatangkan dari luar propinsi, yang ternyata tidak sesuai dengan kondisi lokal atau memang karena alat dan mesin pertanian yang didatangkan tersebut kualitasnya rendah sehingga kurang berfungsi dengan baik.

Peralatan dan mesin yang ada dilapangan telah diperiksa, ditest sebagaimana mestinya. Pada saat pengetesan, kesesuaian dari alat dan mesin tersebut langsung dapat terlihat. Beberapa alat dan mesin ditemui baru pengadaannya dan petani baru pertama kali melihat kinerja dan fungsi dari alat dan mesin tersebut. Selama pengetesan beberapa peralatan segera terlihat bahwa perubahan teknis dan penyempurnaan memang diperlukan. Perihal tersebut konsultan segera menyampaikan saran dan rekomendasi guna perbaikannya.

Alat dan mesin pertanian bantuan proyek tersebut diatas dipilih untuk produksi lokal dan diharapkan pemeliharaan dan perbaikannya dapat dilakukan oleh bengkel lokal pula. Penyempurnaan dan perbaikan peralatan dan mesin pertanian yang dilakukan antara lain adalah pembuatan alat pengering gabah berbahan bakar sekam dengan beberapa penyempurnaan, perubahan design atas alat bajak pada tractor tangan roda dua, penyempurnaan alat pencacah rumput dan penyempurnaan mesin pembuat pellet pakan ikan. Beberapa rekomendasi juga diberikan terhadap perubahan dan perbaikan alat dan mesin baik untuk meningkatkan produksi dan kualitasnya maupun untuk ketahanan mesin agar dapat beroperasi lebih lama.

Bengkel-bengkel lokal telah banyak memperoleh petunjuk-petunjuk penting bagaimana untuk memproduksi dan memperbaiki alat dan mesin pertanian. Pembuatan peralatan dan mesin pertanian yang baru dan pengembangan/penyempurnaan terhadap alat dan mesin bantuan proyek dilaksanakan sesuai petunjuk konsultan. Guna standarisasi produksi peralatan, kepada bengkel-bengkel lokal tersebut telah diberikan bantuan didalam pembuatan jigs and fixture. Perihal tersebut dapat disebutkan didalam proses pembuatan blower untuk alat pengering gabah berbahan bakar sekam atau didalam pembuatan alat bajak yang disempurnakan untuk handtraktor roda dua bersama-sama dengan bengkel setempat.

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1. INTRODUCTION

SSFFMP distributes and equips some selected farmer groups, women groups of priority villages with agricultural equipment and tools to provide them the opportunity to generate additional income. The additional income should reduce the need to slash and burn forest for subsistence agriculture. The machinery should also support and intensify the production of cash crops on converted land and lead to a sustainable agriculture on this land.

Hence sustainable agriculture on converted land reduces the need for new land claim from primary and secondary forest. Less land clearance results also in less use of fire.

The distributed machinery should get used by the different farmers and women's groups according to their own need and gusto. The project only requested a formal set up of the group with elected group leader, cashier, machine operators and listed members.

The use of the machines should be not for free for the members. Fees had to be fixed for the work executed. It was also necessary to decide whether non group member could also request the services and the amount for the fee they should get charged for.

The fees for the members had to be fixed on a certain level to cover all costs of operation like: fuel, oil, spare parts, maintenance and repair, depreciations, operator salaries and others.

Some problems appeared among the groups. Many members had the impression that the services should be for free or on a very low fee provided. Because of the fee problem and others some groups had difficulties to establish themselves and get operational and the machines into operation.

Groups, active and using the machines faced some other problems. Often the chosen operators had less experience in operation, maintenance and repair and therefore the use was inefficient, executed work had often low quality and was not satisfying for the members. In some cases the members used the services from professional providers again.

Some of the provided machinery needed changes and improvements to fit to the local conditions and needs.

Existing local workshops had difficulties in production, repair and improvement of some of the provided equipment.

To solve some of the problems mentioned above, the consultant's work should deliver certain solutions and should result in following achievements:

- Communities should be equipped with effective and durable agricultural machinery and equipment
- Strengthened maintenance and repair capability and reduced independence on outside services
- Adaptation of distributed machinery and equipment to local conditions and integration of local experience

2. MAIN TASKS AND ACTIVITIES EXECUTED ACCORDING TO THE TERMS OF REFERENCE

2.1 Screen available (project provided) agricultural equipment in selected villages

One of the consultants task was the check and run of the machines provided by the project to farmers groups. During the checks observations were additionally taken at farmers places, villages, hard ware shops and workshops about machinery and tools used and available.

It can be generally concluded that as poorer the living conditions of the communities as less machines are in use. This may relate direct to soil conditions, like salinity, fertility and other factors like water supply and rainfall pattern.

Education provision and bustle of the communities plays also an important role on the living conditions. In certain areas there is also a strong willingness to invest in high risk business like the production of bird nests what is thriving at present and where probably more money is made than with rice cultivation.

Village Upang, Upang Curia, Talang Lubuk, Makati at Banjuasin district

At areas like Banjuasin district, certain mechanisation in agriculture is visible. Machines like paddy threshers are common and visible in the field. Some manufacturers exist, partly producing good quality product. At Upang and Upang Curia several workshops are active in thresher and other equipment production. Some of them are also doing redesign of ploughs for two wheel tractors, repair of tractors, engines and even rice mills.

One assessed workshop (Bengkel Mentari) at Makati village is producing a good and strong paddy thresher. His quality is seen as the best among farmers. Even the threshers are heavier than from others and must be often transported by boat to the operation places. The workshop is also doing ploughs for two wheel tractors with a redesigned shape. As shear he uses cut outs from circular saw blades.

Several rice husk fueled paddy dryers are already in operation around Upang. The dryer business got initiated by a sample dryer provided by the projects community development program. From the project the blower, rice husk stove and other material got provided to build the 3-4 ton dryer placed at a community owned rice mill at Upang. Rice millers and farmers immediately realized the potential of such a dryer and the possibility to solve their paddy drying problems.

Several workshops are already engaged in making blowers and rice husk stoves for flatbed dryers like:

- Mr. Subroto, Upang, Jalur 8, Jambatan 2, Desa Saleh Agung
- Mr. Mamat M.K., Upang, Jalur 8 Salek
- Workshop Andal, Desa Upang Ceria, Jl. Harapan No 9, Dusun III

The blowers and husk stoves manufactured need some improvement, but till now best craftsmen ship and finishing is delivered by Mr. Mamat M. K..

Mr. Haji Daeng Matems, a rice mill owner and farmer at Upang Ceria owns and operates a dryer at his place. The dryer, especially the blower and the husk furnace are of low quality, produced by workshop Andal nearby.

Mr. Daeng Matems is innovative and willing to bear risk and could be seen as a key farmer.

Two years ago he purchased a 3 wheel mini combine, probably Chinese made with Indonesian name tag. The threshing unit is not properly functioning and the machine has problems with the harvest conditions at the place. Harvest is done mainly in wet soil conditions and the machine bogs down frequently.

Coco nut roll mills are frequently used in the villages. For daily cooking, house wives bringing their coconut flesh to shop owners for milling. A small amount is charged for the service.

For milling rice flour and corn flour some shops owns hammer mills. The service is also offered to households for a charge. The hammer mills are mainly Chinese made and bigger ones (dia \geq 30cm) are driven by diesel engines (8-12 HP) while for smaller types petrol engines are used.

Two wheel tractors are frequent visible in the fields also in the Upang area. Wet field preparation for rice cultivation presents is the common task for the tractors. Usually a kind of mould board plough is used. The ploughs are all modified with a winded mould board and a knife shaped shear. Further the frames are reinforced to prevent bending and torsion. In certain areas wood parts and roots are still in the ground as the land is just since a couple of years under cultivation.

The standard ploughs gets easily bended and torn when hitting obstacles in the soil. Further the common ploughs provided by the big Javanese manufactures are not properly working in the area. Therefore redesign and modifications are done by local workshops to improve performance.

Other originally provided implements like roll harrow and leveler rake are also weak in design and getting improved by workshops before use in the paddy fields.

For local transportation at some places two wheel tractors are in use, attached to single axle trailers. The trailers are locally made from wood; car axles with rubber tires are attached. In many places earth roads are common, passable in dry weather conditions. As soon it rains the roads are muddy and terrible slippery and passage is impossible by wheeled vehicles.

Certain villages in the area face the problem of not having wide enough earth roads for tractor and trailer use. Often many channels crossing the paths in the villages, passable by one or two coco nut stem used as bridge.

Often fields are not reachable on roads or paths, therefore machinery like threshers and two wheel tractors are often dismantled and carried piece by piece into the field by men or by boat sometimes over longer distances.

Villages Pagar Desa and Muara Medak, Muba district

At Muba district in the north of the province not so much machinery and tools could be seen in the fields. The district has another structure where oil palm plantations are dominating. The plantations are mainly owned by big companies, hired labour is doing work like harvesting, planting and so on.

A minor percentage of the plantations are owned by small holders, often in areas where plantation operation is not profitable for the big companies. At harvest the fruit bunches are transported by boat over kilometres to a jetty and then load over to a collecting truck hauling the fruits to the mill. The shape of the fruit bunches looks often poor indicating low oil content.

The two villages mentioned above are situated along a river some kilometres away from the main road to Jambi and only reachable by boat in about 1 hour.

The area got newly opened some years ago and deforested. As the forests are gone most saw mills along the river are closed down. The moved in settlers are living from cassava and upland rice cultivation. Some goat keeping is established but on a small scale. Because of the low income in the area almost no machinery is visible in the field. The low income does not support machinery use.

Some char coal is produced from secondary growth and sold or used at own household for cooking. The before usual cooking with kerosene stoves got abandoned because of the high kerosene price.

Some rice mills are established in the area and households having access to them, but often long travel by boat or walk is necessary to get rice for consumption milled.

From the two villages (Pagar Desa, Muara Medak) the request was forwarded to the project for the provision of two village size rice mills. The rice mills should be public or village owned and the operation should generate additional income at the village for the benefit of the whole population there. One of the rice mills (Pagar Desa) got already established and operational in 2005, the other one in Muara Medak got operational during the consultancy period in June 2006.

To make sure maintenance and repair could be provided to the rice mills some workshops got visited. At the town of Bajung Lincir situated at the main road to Jambi and close to the border, some workshops got evaluated. At the time none of them was engaged in agricultural equipment production. But on request threshers could be produced. Some of them are able to repair rice mills and diesel engines (mainly change of parts and welding repair).

Village Ulak Kemang, Oki district

The village stretches along a river. The solid houses build are indicating that the area is not so poor. People along the river are mainly living from fish breeding. The fish is kept in bamboo cages in the river. In the back some rain feed rice is grown and some cassava. Organised irrigation is not existent as water lifting with power pumps is too expensive and the rice price not covering the higher production costs.

Not much machinery is used in rice farming there sporadically threshers and two wheel tractors are visible at farmer's places or in the fields.

Fish feeding is done manual, the feed, often Golden Snail (a rice pest) is chopped with knives and then thrown into the cages.

The project provided a farmer's group some machinery for fish feed production (pellets) for additional income generation. Till now the machinery is not yet commercially used by the group.

2.2 Check and run tests on conditions of agricultural equipment supplied by the project

After arriving, most of the machinery distributed by the project got visited at the respective places. The equipment got inspected and some performance tests were executed. Some machines could not be tested as they were still kept in store and needed the mounting of the engine beforehand like the threshers in Muara Telang. The performance of the threshers from West Sumatra and from the Quick two wheel tractors got already observed during the assignment last year.

The coco nut fibre processing machinery stays idle since the training in 2004. During the last year's assignment it was possible to test operate the coco nut fibre husker. A test report got written about.

For most of the machines performance evaluation sheets are set up, stating performance, observations and recommendations for improvements and changes.

The performance evaluation sheets you will find at Annex of the report (Numbering with M1 – M10)

Machine place:	Mangsang, District Muba
See also Annex:	Evaluation sheet No M1
Type and amount of machines:	1 Fodder cutter, Padang type, flywheel, with 6HP Yanmar diesel engine L 60 (air cooled)
Conditions and test:	<p>Machine based at a farmer's group for feeding Bali cattle</p> <ul style="list-style-type: none"> -At machine delivery the farmers didn't get an introduction how to operate and maintain -Group less experienced in cattle keeping and feeding <p>First visit</p> <ul style="list-style-type: none"> -Machine not used at first visit -Visual inspection, low workmanship, machine not to expected standard <ul style="list-style-type: none"> -First test with grass -V-belt jumps down -Re adjustment of engine -Chopping result not satisfying <p>Second visit</p> <ul style="list-style-type: none"> -Second test after improvements -Chopping result much better -Test with grass, coco nut leaves, kelapa sawit leaves <ul style="list-style-type: none"> -Farmers don't know of feeding other than grass -Missing tools for maintenance & repair (M&R)
Observations	After first test machine was taken to workshop in Palembang for improvements

Recommendations:	<ul style="list-style-type: none"> -Knives, counter knives, bearings, feeding opening, handle bars, V-belt safe guard got improved or add -Farmer's group needs training in cattle feed production/ planting of new crops to sustain cattle breeding -Consider growth of feed plants in oil palm plantations -Introduce feeding of unusual feed like coco nut leaves, kelapa sawit leaves, king grass, maize stalks, leguminous... -More training about chopper operation and maintenance -Project should hand over an tool box with various tools for M&R (already considered and executed by the project) -In case new grass choppers are ordered it should be stronger build like the Vietnam type
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Machine place:	Pagar Desa, District Muba
See also Annex:	Evaluation sheet No M2
Type and amount of machines:	<ul style="list-style-type: none"> Rice mill unit -1Yanmar huller HW 60, with Yanmar diesel TF 85 -1Yanmar polisher YCP 220, with Yanmar diesel TS 230 H -1Beam scale -1Bag sewing machine
Conditions and test:	<ul style="list-style-type: none"> -Rice mill handed over to farmer's group Harapan Jaya in 2005 -Machinery sheltered in a barn -Machines on concrete base and U-shape frames -Set up of machines so far okay -Polisher screens broken and replaced, damaged by nail <p>At first visit test run together with operators</p> <ul style="list-style-type: none"> -Speed test of both units with RPM tester, marking setting at engine throttles -Alignment of engines and machines needs improvement, flat belts not running parallel -Milling result okay -Instructions to operators about equipment maintenance -Greasing of water pump -Engine oil change, -Air filter cleaning -Fuel filters cleaning and change, quality and purity of diesel -Water level at radiators and cooling drum -Polisher, fan pulley, tightening of bolts as pulley was moving -Difficulties in tightening flat belts, engine bases no slotted holes -Recommended use of magnets fixed at filling hoppers to prevent damage by iron parts like nails, bolts <p>Second visit activities</p> <ul style="list-style-type: none"> -Hand over of tool box for improved maintenance & repair -Fixing of additional U-shapes under the huller engine with slotted holes for alignment and belt tensioning

	<ul style="list-style-type: none"> -Opening of huller as oil leakage appears during test. Solution, right speed setting for huller -Additional recommendations about operation, M&R, specially the engines -Test milling of paddy -Activities executed together with operators and one workshop staff
Observations Recommendations:	<ul style="list-style-type: none"> -Whole floor at shelter should get covered with concrete -Fowls should kept out of the place as food production takes place -A tool box with various and necessary tools for good M&R should get handed over (Already considered and executed by the project) -The additional U-shapes at polisher engine are not yet fixed as additional cutting work was necessary -Exhaust pipes should get extended as the engines pollutes the air inside the building -Inside the feeding funnels of huller and polisher strong magnets should get fixed to collect metal parts -Additionally the feeding funnels should get covered with a strong wire mesh screen, spacing about 10 x 10mm to sieve out foreign matters from paddy -The real entrepreneur's spirit is not yet developed among the farmer's group to operate the mill successfully and lasting

Machine place:	Muara Medak, Dist. Muba
See also Annex:	Evaluation sheet No M3
Type and amount of machines:	<ul style="list-style-type: none"> Rice mill unit -1Yanmar huller HW 60, with Yanmar diesel TF 85 -1Yanmar polisher YCP 220, with Yanmar diesel TS 230 H -1Beam scale
Conditions and test:	<p>The rice mill should get operated by a farmers group</p> <p>First visit</p> <p>At first visit in May 2006 the place was still under construction. The shelter was finished and the work about the concrete machine foundations should start.</p> <ul style="list-style-type: none"> -Together with the farmers U-shape machine frames got laid out to find the best position of the machines in the shelter. -The machines got test fixed at the frames to check alignment of machines and engines -The supplied tools are not sufficient for set up and M&R <p>Rice mill operator training (second visit)</p> <ul style="list-style-type: none"> -The consultant participated at the operator training as technical advisor -During the training the set up of the machinery was finalized together with the operators and the farmers group -Instruction were given about proper set up, operation, M&R of huller, polisher and diesel engines -A test milling was executed and the adjustment of huller and polisher trained

Observations Recommendations:	<p>-The U-shape bases were a bit short and not to recommendations of the rice mill manufacturer</p> <p>-The engines needed additional U-shape base with slotted holes to improve and ease alignment and belt tensioning</p> <p>-The project should supply a tool box with additional tools for M&R (got already executed during operator training)</p> <p>-At the huller engine a 5" flat pulley was fixed instead of the original provided 4" to operate diesel engine on a lower speed as engine power is sufficient</p> <p>-Speed of engines and machines were checked via RPM tester</p> <p>-The coolant pump at the 23 HP engine got delivered wrong and has to be turned on the base. The issue got explained and discussed with the operators</p> <p>-Exhaust pipes should get extended as the engines pollutes the air inside the building</p> <p>-The whole place should get a concrete floor for easy cleaning</p>
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Machine place:	Muara Telang, Dist. Banjuasin
See also Annex:	Evaluation sheet No M4; M5
Type and amount of machines:	<p>-1 Rice thresher Bogor Type -2 Rice thresher Multi Guna Type Power sources Honda petrol engine 8.5HP</p> <p>-2 Two wheel tractors Brand Quick with 8.5HP Diesel Kubota with implements: -single mould board plough -roll harrow -leveler rake -cage wheels -rubber wheels</p>
Conditions and test:	<p>The machinery got visited at 02.05.06 together with other project staff A discussion took place with members from the farmers group operating the machinery</p> <p>Threshers: The threshers could not be observed in operation as there was no harvest season at the village. But the machines were seen at the shelter</p> <p>-One of the multi guna threshers was heavy used indicated by the worn down teeth -At the machine the supporting rings of the drums are partly bended, specially those carrying the straw blower blades -All the threshers looked already run down, even they are stored in a shelter -V-belt safety covers got removed or are fallen away during use -Maintenance is done by the 4 operators according to the village head -Heavy repair is done by a workshop at a neighbouring village, but machines must be transported by boat to the place</p> <p>Two wheel tractors: The tractors were not in operation at the visiting day. One machine was parked inside a rice mill at Muara Telang and got inspected</p> <p>-The tractor was engaged in about 20ha soil preparation</p>

	<ul style="list-style-type: none"> -The engine was taken down from the chassis and stored inside the rice mill -Chassis and implements were covered with oil for rust prevention -Cage wheels were less worn -Roll harrow was dismantled, because of the wear of the sleeve bearings -The shape of the mould board plough got changed by a local workshop. A steel shear and an angle iron sliding shoe got fixed to improve work performance -A drainage pipe got fixed by the operators at the engine cylinder head to drain and change frequently cooling water
<p>Observations Recommendations:</p>	<p>Threshers:</p> <ul style="list-style-type: none"> -About half of the teeth at each thresher got removed to increase flow through performance -Complaints about high grain losses, thrown out together with the straw at straw blower -The concave bars space is about 10-12mm, a recommended spacing would be 18-22mm -The grain is not clean enough for final packing, high impurities of chaff and straw. A reason for low performance could be the wrong positioned air guidance blades and the chute beneath the concave. -Straw is thrown not too far away from the machine, one reason maybe the declining angle of the straw outlet guide (The distance the straw is thrown away is seen as an indicator for good performance by the users!) -Some of the cover fasteners are broken and not functioning anymore -At both multi guna machines the drum is scratching at the body because of too less spacing, or body sheets are bend inwards because of broken welding spots -Drum bearings are not greased, the nipples are partly missing -At Bogor type thresher, louvers in the cover too steep, causes a too fast passing through of straw -Most used materials at threshers are too weak and thin and not to a suitable standard and quality <p>Recommendations regarding threshers:</p> <ul style="list-style-type: none"> -The threshers from West Sumatra presents not a good sample of craftsmanship -A local manufacturer at Makati village produces good quality threshers -His threshers presents the standard in quality and performance for farmers in the area -When machinery is provided or promoted local sources should get scored first -In case machinery is locally purchased the buyers have the chance to bring it back to the manufacturer for repair, maintenance and improvements -The workshop from Makati gives one year warranty on threshers <p>Two wheel tractors:</p> <p>It got observed that the originally provided implements are not very suitable and lasting.</p> <ul style="list-style-type: none"> -The sleeve bearings of the roll harrow needs repair as well as the bended frame. (The sleeve bearings are steel in steel instead of steel in brass bushings or hard wood) -The ploughs got improved by local workshop because of not satisfying performance <p>-Regarding the observed habit of frequent change of cooling water during operation, the operators need again clear instruction about proper maintenance and operation to prevent damage of the engine by this nonsense habit. It is of more importance to keep the radiator clean from dust and dirt to ensure safe operation of the engine.</p> <ul style="list-style-type: none"> -A tool box with various and necessary tools for good M&R should get handed over (Already considered and executed by the project) -Workshops nearby may need some advise how to repair the roll harrow and the plough properly to increase life cycle and improve work performance in the field

Machine place:	Talang Lubuk, Dist. Banjuasin
See also Annex:	Evaluation sheet No M6
Type and amount of machines:	<p>Coco nut fiber processing machinery</p> <ul style="list-style-type: none"> -1 Coco nut husk processor (Pangurai Sabut Kelapa) with diesel engine 23hp -1 Rotating sieving cylinder for fiber cleaning, driven by electrical motor and generator -1 Hydraulic packing press for fiber, hydraulic pump driven by diesel engine 6.5hp
Conditions and test:	<p>The place got first visited on 26-27.05.2005 by the author. During this visit a test run of the husk processor was executed. Since then the machines were not used again. Till now the coco nut fiber processing is not working due to several reasons. (Marketing problems, production problems, quality of fiber, women's group motivation,...)</p> <p>Test of the husk processor had shown some results:</p> <ul style="list-style-type: none"> -Machine is sheltered, but needs more space around for better access -Cover of processing machine is difficult to open, bolted instead of using hinges and clamps -Machine needs a proper base from concrete or big wooden beams. -The internal set up needs changes and repair to prevent clogging and to improve quality of work -Fibers are winded around the drum and also clogging the counter pegs -The fiber outlet gets also clogged during operation <p>Rotating sieving cylinder visual observations:</p> <ul style="list-style-type: none"> -Machine is sheltered -Base frame is too weak, machine bends and swings -Make shift conical cylinder general too weak, frame should be stronger -Used wire mesh too weak bends and breaks easy, first damage is done by children, some parts of the mesh are already missing -The bearings of the rollers on intake side are only sleeves, bolts are used as axle, the iron rollers rotate direct on the bolts -Belt drive and chain drive have no safety covers to prevent accidents and injuries <p>Hydraulic packing press:</p> <p>According to the reports from the women's group the press is not working well. The visual examination of the press proofed the women's statement</p> <ul style="list-style-type: none"> -Top cover difficult to lift for filling -Pins holding the top cover getting bend during pressing -Sliding fork holding back the pressed fiber is missing -No slots in chamber and piston to ease the insert of binding strap -Bottom gate too weak and getting bend during operation -Piston has no guide at side, at unequal filling piston rod gets bend -The pump delivers only 50 bars pressure, the gear pump should deliver at least 120 bars -The power unit is very clumsy and difficult to move and operate
Observations Recommendations:	<p>Recommendations husk processor:</p> <ul style="list-style-type: none"> -Move machine away from the wall more into the shelter to get more space for access -Cover should get hinges and fastener for quick opening and access to inside -Machine and engine should get a proper concrete or wooden beam base -Changes at pegs and counter pegs inside to prevent clogging and winding -Changes at fibre outlet to reduce clogging

	<p>Improvements rotating sieving cylinder:</p> <ul style="list-style-type: none"> -Stronger base frame -Stronger frame for conical cylinder -Stronger wire mesh for conical cylinder -Roller bearings at intake side -Belt drive and chain drive with safety cover <p>Recommendations about press:</p> <p>After visual inspection it got obvious that the press needs a redesign to get functional. Some important technical parts need urgent change:</p> <ul style="list-style-type: none"> -Change design of top cover to ease open and closure -Addition of sliding fork to hold back pressed fibre -Add slots in chamber and piston to ease insert of binding strap -Piston plate should get side guide to prevent bending of piston rod -Check the safety valve of the pump to get a higher pressure of 120bars -Mount engine, pump, tank and control valve on a frame to make unit more handy
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Machine place:	Talang Lubuk, District Banjuasin
See also Annex:	Evaluation sheet No M7
Type and amount of machines:	<ul style="list-style-type: none"> -2 coco nut flesh roller mills driven by 4 HP Robin petrol engine -2 electrical motor driven coco nut rasp mill -1generator set with 9HP petrol engine (set Chinese brand Yamamoto)
Conditions and test:	<p>The machinery was handed over to a village women's group</p> <ul style="list-style-type: none"> -The machines were used for a VCO training in 2004 sponsored by the project. Since then not used again. <p>The roller mills got inspected:</p> <ul style="list-style-type: none"> -Some bolts of the roller mill been fallen of, specially at the V-belt safety guard -The V-belts were not properly tensioned and slipped -The petrol engine didn't start and needed some effort to get into operation <p>For a test one V-belt was taken off to operate only one milling unit at one frame. Both roll milling heads got tested. The mill produced at Palembang showed much better performance and function than the head origin from West Sumatra. The milling result was satisfying for the by standing women's group members</p> <p>The rasp head mills were also standing unused in the corner even in 2005 improvements got also executed. Complains are that the women's group members are not used to this type of mill. But during the VCO training in 2004 the machines got used and use was demonstrated to them!</p>
Observations Recommendations:	<p>After executing a test with the roll mills the recommendation was given to operate only one mill head with each petrol engine.</p> <p>Additionally the used mill head should get a 4" aluminium pulley instead of the 3" one used at present.</p> <p>The 3" pulley will keep the engine speed more stabile</p> <p>The women operating the mills may need more advice and instruction in operation</p>

	<p>and maintenance to be more independent from the usual by standing and always better knowing men.</p> <p>In 2005 there were complains about the low milling performance of the roller mills. Therefore additional 2 milling rolls been added and the frames extended to use the full power of the engines. Further the mills got equipped with V-belt safety guards to reduce the danger of accidents. Anyhow, even with the improvements the mills been not used again. It seems there are other reasons for the women's group members not to continue the VCO business. The performance of the mills seems not the real reason behind!</p>
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Machine place:	Desa Sung Sang II Perajen Jaya, District Banyuasin
See also Annex:	Evaluation sheet No M8
Type and amount of machines:	<p>2 Two wheel tractors Brand Quick with 8.5HP Diesel Kubota</p> <p>Implements:</p> <ul style="list-style-type: none"> -single mould board plough -roll harrow -leveler rake -cage wheels -rubber wheels <p>2 Rice thresher Multi Guna Type, West Sumatra Power sources Honda petrol engine 8.5HP</p>
Conditions and test:	<p>Machinery is stored at the village heads house in a dry place. Only one 2-WT and one Thresher were used because at the visiting date only one farmer's group (Kurnia Abadi) was operative.</p> <p>Tractor conditions:</p> <ul style="list-style-type: none"> -Use tractor still in good shape, was used for about 10ha soil preparation -Mould board plough got not used, only the roll harrow, because of the soft soil conditions -Sleeve bearings of roll harrow are worn out from use and because of less suitable design -As observed in other places, the operators also drain frequently the cooling water and refill with cold one <p>Thresher conditions:</p> <ul style="list-style-type: none"> -Only one thresher was used, but shows already heavy wear -Pegs are removed to increase performance -Remaining pegs are heavy worn, specially near the feeding opening -Petrol engines are stored at different place and got not inspected <p>Maintenance and small repair is done by the operators. Oil change, filter cleaning and change, cleaning and greasing of the machines is done. Till now the machines are in a better shape than at other place.</p>
Observations Recommendations:	<ul style="list-style-type: none"> -As observed at other places, the operators also fixed a drain pipe at the engine cylinder head to drain frequently the hot water out of the cooling system during work in the field. Then they fill cold water in again. This habit will do damage to the engine because of heat/cold stress. -The sealed radiator cooling system of the engine is designed to cool sufficient even under heavy engine load and work. -Workshops nearby may need some advise how to repair the roll harrow and the plough properly to increase life cycle and improve work performance in the field -The operators mentioned that they had extended the cage wheels width by fixing

	<p>additionally the cage wheels of the second idle tractor.</p> <ul style="list-style-type: none"> -The extended wheels increased the paddling and soil mixing effect of the machine in soft soil and reduced the bog down in water holes and deep soil spots in the fields. -Negative effects are the much more increased load to the bearings at the drive axles. This parts will fail much faster than during use of standard wheel sets
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Machine place:	Desa Upang Ceria, District Banyuasin
See also Annex:	Evaluation sheet No M9
Type and amount of machines:	Flat bed dryer IRRI Type for paddy drying 7-8 ton capacity
Conditions and test:	<ul style="list-style-type: none"> -At both places visited, the dryer beds looked well made -Dryers are covered by roofs -Blowers low craftsmen ship and looked run down, -Settings/ alignment of engines and blowers weak craftsmen ship -No greasing of bearings at blower -At one place engine cramped with rice husk bags -Aluminium wire mesh at both dryers partly broken and not repaired, paddy trickles into the air duct below -At husk burner, cascade grade and side walls bended by heat and heavy oxidized
Observations Recommendations:	<ul style="list-style-type: none"> -The dryer from Haji Daeng Matems, was heavy used, indicated by the huge heap of ash in the back yard -As observed at both dryers some of the components needs improvements and changes in design -According to the owner the drying of one charge of 7tons needs about 15 – 20 hours. -Even with the weaknesses of the installed dryers it seems that the owners are happy with the drying function. <p>Dryer bed:</p> <ul style="list-style-type: none"> -Instead of the aluminium wire mesh punched sheet metal should be used as screen. The aluminium screen gets too easy damaged during unload by metal scope and other tools <p>Husk burner:</p> <ul style="list-style-type: none"> -To extent the live span the burners should get made of brigs, specially the cascade fire grade made from fire brigs -The heat exchanger should get dropped, instead a direct burner should get used (Vietnam type burner). The hot flue gases are direct lead into the front opening of the blower -If the flue gases are direct used much less heat is needed and much less husk must be burned. -According to IRRI there is no change on smell or taste at the rice afterward, as the husk burns very clean with less smoke and fly ash <p>Blowers:</p> <ul style="list-style-type: none"> -All the observed blowers are in bad shape and low craftsmen ship -Bearings are loose sitting on the axle; this is probably caused by the imbalance of the fan and the non precise seat of bearings and axle. -A stronger axle should get used instead of 1" change to 1,5" dia -Use of bearings with conical locknut to fix it properly on the axle -Stronger blower house, stronger brackets and stronger base -Use of two V-belts, bigger V-belt pulleys, at engine two row B dia 6" instead 4", at blower use of 4" instead 3" dia -Use of single frame for engine and blower, use of set screws for belt tensioning and

	<p>alignment</p> <ul style="list-style-type: none"> -Proper balancing of blower with axle to avoid high vibration, use of balancing rig <p>Note:</p> <ul style="list-style-type: none"> -To sustain the dryer introduction and use, it is recommended to improve the present existing dryers by giving the owners advice on changes and improvement. -Workshops producing components like blowers and husk burners should get good samples for copying and advice how to make jigs and fixtures -Frequent extension visits from project staff or involved institutions like BPTP should take place to support the process and ensure the building of good functioning dryers -A workshop should produce a good sample blower what could be later shown to other workshops and rice mill owners
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Machine place:	Ulak Kemang, District OKI
See also Annex:	Evaluation sheet No M10
Type and amount of machines:	<ul style="list-style-type: none"> - 2 pellet making machines with petrol engine 3.5HP -1 hammer mill dia 30cm with Chinese diesel engine 8HP
Conditions and test:	<p>First visit:</p> <ul style="list-style-type: none"> -The hammer mill and one pellet machine were used once and then put back into the store without cleaning. Salted fish was milled and pelletized -The pellet machine was not damaged by the waste because of the tin dipped coating, but the feed opening at the table was heavy corroded -The set screw at the engine pulley got lost probably because of the bad thread cutting in the aluminium pulley <p>-The hammer mill was heavy corroded inside because of the salty fish residue.</p> <p>-The ring screen was broken at several places due to corrosion and wrong operation. It seems small iron parts or stones also went through</p> <ul style="list-style-type: none"> -The removal of the screen with the supporting rings was very difficult, rings and machine casing were sticking together because of the rust -One V-belt was down and the other not enough tensioned -The greasing twist caps of the mill's main axle were dry and empty -The group was missing tools for maintenance and repair activities <p>For improvements and changes, the pellet machines got dismantled and the mincers with the drive were brought to a workshop for repair and improvements. The ring screen from the hammer mill got also repaired at a workshop. Two screen samples got purchased additionally.</p> <p>Second visit (operator training on pellet making):</p> <ul style="list-style-type: none"> -The machines got assembled together with the operators as practical training on maintenance, repair and operation -Important points got discussed and explained -A toolbox was handed over to the group for maintenance and repair -The machinery was tested and pellets were produced
Observations Recommendations:	<ul style="list-style-type: none"> -The operators got sufficient instruction about maintenance, repair and operation of the machines -It got obvious to them that the machines needs immediately cleaning after using to prevent corrosion damage -They got direct involved in maintenance and repair activities as well as in the dismantling and reassembling of the machines for improvement on certain components -A tool box with some most needed tools got provided by the project to enable the operators to execute better maintenance and repair

	-A workshop nearby got also involved in some repair activities. In future he could get more involved in necessary repair
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2.3 Identify machinery which can be locally produced/ repaired

After visiting the machinery at the various place and certain tests and demonstrations, considerations took place about what kind of machinery could be locally produced.

Rice husk fired paddy dryer

The question got partly solved by the moving time. The project provided paddy dryer at Upang village was already used as sample for manufacturing of more dryers in the area. On request of some local rice millers 3 workshops had already started to manufacture dryer parts like the blowers and the rice husk stove. Four dryers are already installed and in operation. Some quality problems on workmanship and materials got observed, but are solvable. The build dryers could be repaired by the manufacturers nearby.

Power thresher

Production of power threshers is already established and threshers are available or in use at most project places. Some machines need certain improvement on materials, but depend also on the wishes and likes of the user. Light weight threshers are easier to transport but usually not lasting that long than heavier build machines from good materials. Repair of threshers presents no major problem in case workshops are near. In Upang and surrounding village enough manufacturers are based for production and repair.

Two wheel tractors and implements

Two wheel tractor manufacturing needs certain production machinery and skills not available at most visited village workshop. At small workshops it is possible to produce simple models like those once promoted by IRRIT but it is not recommended as the experience from the past shows. Small workshops are usually not able to produce the quality provided by large established manufacturers.

Many workshops are able to repair tractors and components like the diesel engines, gearboxes, cage wheels, handle bars and the implements.

Like in the case of the ploughs, local workshops are able to produce improved ploughs and are able to repair them. Improvements are also executed at other implements like roll harrow and leveller rake to increase the life expectancy. Trailer production for two wheel tractors is also locally possible and established in some places.

Rice mill units

Village size rice mills are produced by some big manufacturers in Indonesia or are imported. The production needs sophisticated machinery and skills normal village workshops not having.

Many village workshops are able to maintain and repair rice mills including the used diesel engines.

Hammer mills

The hammer mill market is dominated by imported Chinese models. The mills are simple made, mainly from cast iron. Instead using cast iron parts workshops could do welding construction designs, but would be more costly and could not compete with the imported Chinese cast iron models.

Maintenance and repair could be done by workshops, also the making of the base frame for the assembling of mill and engine.

Simple pellet making machines

Machines like the type provided by the project to the farmer's group at Ulak Kemang village could be manufactured by a village workshop with certain equipment. Components like pulleys what need turning could be ordered from suppliers with the right bore size and thread cutting for fitting on the bicycle rim. Instead of the V-belt drive between bicycle rim and mincer, a chain drive could be also installed. Repair is also easy and at most workshops possible.

Fodder chopper, Padang type

The chopper could be produced at local workshops, but certain parts like the drive axle, pulleys and the knife hub needs drilling and turning. Most small workshops do not have lathe machines. Parts must be turned at other mechanical workshops. Sheet metal cutting, frame making and welding are at most places possible.

In case new choppers are locally ordered, the Vietnam type chopper should get copied. The machine is much stronger designed and will last much longer.

Coco nut flesh roll mills (Mesin Parut Kelapa)

Many parts of the mills need turning and milling. Therefore it is not recommended to produce at small workshops. Larger workshops with the needed machinery are able to do as a workshop is doing in Palembang.

In case small workshops like to produce, they could buy the roll mill unit, produce the machine frame and mount roll mill and engine. Not to forget the V-belt safety cover.

Coco nut flesh rasp

The making of this machine is also possible at small village workshops. The electrical motors and the plastic trays must be purchased at hard ware shops. The supply of rasp heads is not established in South Sumatra, the local production must be established or the heads ordered from West Sumatra. The angle iron stand, cutting of the plastic trays and the assembling of the units could by done by local workshops.

Coco nut fibre processing machinery:

Coco nut husker

The husker could be produced at a workshop with lathe machine, gas cutting and strong welding machine. A machine purchased from the project is not very functional and has some technical problems what needs to be solved before production is recommended.

Coco nut fibre sieving machine

The form the project provided sieving machine is functional but needs also some improvement to increase functionality and live expectancy. A manufacturing workshop should have a lathe machine for turning parts, further welding and cutting equipment.

Hydraulic baling press

The press should be used for baling coco nut fibres and strapping of the bales. A test by the farmer's group showed very disappointing results. The press needs very strong improvement till satisfying operation is reached.

A workshop interested in manufacturing, need well developed know how to get this type of press functional. Till now the production is not recommended as long design changes are not executed.

Notice about coco nut fibre processing:

At present the production of coco nut fibre processing machinery could be not recommended. The low and dissatisfying performance of the machinery is one reason why the women's group at Talang Lubuk village is not continuing with the processing of fibres.

The probably more important reasons present's the low price for fibres offered by dealers (120-140 US\$/ton). In case dealers are interested in purchasing, they usually asking for large amounts per month, the group is also not able to produce. And of course dealers like to see samples of fibres and pressed bales, properly shaped.

In case the project likes to continue to promote fibre processing, visits should be made at commercial processing enterprises to gather more information about the business and to see the machinery used there. The visits would be also helpful to establish contacts and marketing channels. The involvement of government institutions like Perindustrian /Perdagangan in the marketing is doubtful and less promising.

2.4 Select some local workshops which are interested and capable in production and repair

For production and repair activities one workshop in Palembang got selected. The workshop was already known to the project from earlier joint work in fire fighting equipment.

Nevertheless other workshops got visited and evaluated. They are situated near to the machinery provided by the project.

The workshops at Upang, Upang Curia and Makati are already involved in agricultural machineries should get further visited and considered as potential producers. They are capable to get involved in repair& maintenance activities.

Following find the addresses and names of the workshops visited and their present range of equipment they could produce apart from maintenance and repair activities:
(The B number in brackets indicates the Workshop survey sheet No B. at the Annex 6.1)

-Mr. Adih, Workshop Mentari, Desa Makati (B1)

Good quality thresher, plough, roll harrow, leveller rake, engine repair

-Workshop Andal, Desa Upang Ceria, Jl. Harapan, Dusun III No. 9. (B2)

Produced blowers and rice husk furnaces for paddy dryers, but in case he continues he needs support to increase the quality.

Threshers, diesel engine repair, rice mill repair

-Mr. Sudjarno, Desa Telang Jaya (B3)

Threshers, engine repair

-Workshop Berkah Tabah, Desa Telang Jaya (B4)

Threshers, improved ploughs, engine repair

-Mr. Subroto, Desa Upang, Jalur 8, Jambatan 2, Dusun Saleh Agung (B5)

Threshers, two wheel tractors, improved plough, improved roll harrow and rake

-Mr. Mamat M.K., Desa Upang, Jalur 8, Dusun Salek (B6)

Threshers, two wheel tractors, blower and rice husk furnace

At Muba district in Bajung Lincir town two workshops got visited capable of maintenance and repair activities:

-Mr. Gatot Sumarji, Workshop Las Wiro, Bajung Lincir (B7)

Repair: rice mill, diesel engine, thresher

-Mr. Barnawi, Workshop Putra Kombet, Bajung Lincir, Jl. Palembang- Jambi Km 203 (B8)

Repair: rice mill, diesel engine, thresher

At Oki district Ulak Kemang village one workshop got visited and considered capable for maintenance and repair activities:

-Mr. Ishak, Ulak Kemang (B9)

Repair: pellet machines, hammer mill, engines

The workshop of Mr. Ishak is less equipped with machinery and tools, but capable of maintenance and repair of the pellet making machinery provided to the farmer's group at Ulak Kemang. During the first extension visit at the village the consultant had surveyed the workshop.

At this first visit the two pellet machines and the hammer mill got dismantled for repair and changes. The workshop owner came over by themselves and got also actively involved in the work together with some group members.

-Mr. Santoso, Workshop Sentosa, Palembang (B10)

Threshers, coco nut flesh roll mills, sugar cane mills, blowers, rice husk furnaces, improved ploughs,...

2.5 Provide instruction and guidance to selected workshops

Workshop Sentosa, Palembang (B10)

For work with and for support reasons, one workshop at Palembang was chosen. The workshop Sentosa is known to the project as work got already executed together during previous years mainly in the field of fire fighting equipment.

The workshop owner showed already in the past interest in agricultural/ food processing equipment and gained certain experience in the production of machinery like threshers, sugar cane mills and coco nut flesh roll mills. He is also frequently involved in maintenance and repair activities of such equipment.

From the project a farmer's group at Mang Sang village got a fodder chopper provided. The machine was not working satisfying and therefore brought to the workshop for repair and improvement. At the time a local workshop was not yet identified there for repair.

During the chopper repair at Sentosa, the consultant paid frequent visits to the workshop and instructed staff and owner about the necessary changes and supervised partly the changes. For better understanding a drawing set of the fodder chopper was provided. Dimensions for knives got fixed together and later on accordingly executed. Among other work, changes at the drive shaft got executed and a safety guard at the belt drive got fixed.

In 2005 changes and improvements on the project provided coco nut flesh mills were also executed by the workshop and supervised by the consultant.

The project also distributed two wheel tractors with implements over the years. During visits at Upang and other place it got obvious that the original with the tractors provided implements are less suitable, specially the ploughs. At several visits in the area it got observed that many workshops there were redesigning and improving ploughs for two wheel tractors there.

The project is planning to give training in tractor operation to a farmer's group in Simpang Tiga village, district Oki. The group there got also 2 two wheel tractors with implements provided by the project. Therefore the decision was made to build an improved plough together with workshop Sentosa. The improved plough should be demonstrated during the training to farmers and should get copied later on by local workshops at the village.

The work on the improved plough was executed together with the workshop owner and staff. The project got discussed and the shape of the new plough got designed together. A carton cut out was made from the mould board, and later on accordingly shaped. The frame got additionally reinforced to prevent bending when hiding remaining tree roots in the soil during ploughing.

For improving the quality and performance of flatbed dryers, the project decided to build a sample blower and a sample rice husk furnace to demonstrate to farmers and rice millers, mainly at Upang and Upang Curia village.

First consideration was to work with a workshop located at one of the villages. Because of difficulties to go there and because of lack of some tools and machinery it was decided to use workshop Sentosa for the task.

The sample blower production went quick ahead. Drawings from a Vietnamese blower got provided. Adaptation work as well as measures and size of materials got discussed. The blower looks much more professional as the models produced by workshops at Upang and Upang Curia.

The work at rice husk furnace went also on but was not finished at end of consultancy work. Anyhow design and measures got discussed, drawings and other inputs provided. It could be expected that the finished furnace will be also of good quality and will provide a good sample for other workshops for copy.

Improvements on pellet machines for fish feed, given to the farmer's group at Ulak Kemang village got also executed together with workshop Sentosa. The work could not be done with a workshop based at Ulak Kemang because of missing machinery for metal working.

Workshop Mr. Ishak, Ulak Kemang (B9)

During the first visit at Ulak Kemang the machinery for fish feeding provided by the project got surveyed by the consultant there. At this visit the workshop of Mr. Ishak got also consulted about his possible capability to maintain and repair the machinery.

The farmer's group and the consultant dismantled the equipment for failure of parts, damage by wrong operation and manufacturing mistakes. Mr. Ishak came over and got also involved in the work. He got a first hand impression about the machines, the function and some specific needs on maintenance and repair. Later on during the set up of the machines for a pellet making training certain parts got brought to his workshop nearby for repair and welding.

2.6 Assist workshops in standardizing equipment through jigs and fixtures

The use of jigs, fixtures and moulds makes the production of larger quantities of parts easier, as the shape and size is fixed or kept in a certain range. Additionally, the quality increases and keeps constant during production of a large amount of same products. Another positive effect is the production cost reduction for a larger amount of parts. With an increasing amount of units produced the variable costs are declining as initials for jigs, fixtures and moulds are covered by more units (Economy of Scale).

But even for the production of a smaller quantity of parts or machines it makes sense to do some simple jigs and fixtures.

For the production of the blower from the rice dryer some jigs were made. One special jig was made for the cut out of the fan blades. An additional one got manufactured for shaping the fan blades and for the later on following positioning and welding at the base disc. The work was mainly done by workers from Sentosa with guidance from the consultant.

The blower manufactured at Sentosa should be used as a best sample and model for copying by other workshops at Upang and other areas.

For the improvements on the plough another jig was introduced. A cut out of the mould board from carton was made to find the best suitable shape for it. Later on the workshop shaped the plough according to the cut out.

It is expected that the newly shaped plough will perform better in the field than the ones sold by the big manufacturers from Java. In this case the plough will also serve as a model and will also get copied by local manufacturers.

3. SUMMARY OF ACHIVEMENTS AS PER TERMS OF REFERENCE (Consultant's Main Tasks)

- Available, project provided agricultural equipment got screened in the project villages. Most of the equipment was in use, some was still parked, often at village head office or house. Some was used only once or twice and then not touched again. There were several reasons observed for use and not use. Operators were less experienced and didn't know how to use. Farmers group were not properly set up and not operational. Members been trying to monopolize some work and business and therefore other members gave up to participate and use the provided machines. Members were dissatisfied with quality of work or expected work delivered for free. The price for some commodities processed went down or strong competition appeared and made the business unattractive. Some of the machines were supplied from other provinces and not adapted to the local conditions or delivered machinery quality was low and less functional.
- The machinery got checked, test- and demonstration runs got executed. During the tests the suitability was often immediate visible. Some of the machines were newly provided and the farmers saw first time performance and function. During test of some equipment it was immediate visible that technical changes and improvements been necessary. Workshops got selected and machines were sent there for improvements and changes. The work was overseen by the consultant and inputs direct given.
- Machinery was selected for local production and decisions were taken about what could be locally repaired and maintained. To mention the production of flatbed rice dryers with incorporated improvements, the design changes on ploughs for two wheel tractors, improvements on fodder chopper for cattle feeding and pellet machinery for fish feed production.
- Workshops got selected for the production of certain machinery and for maintenance and repair. Especially for maintenance and repair some got selected close to the machinery. Those workshops are often not so good equipped with tools but are capable for repair of the equipment even about the more demanding diesel engine.
- After selection one workshop got intensive instruction on how to manufacture and to repair machines. New machines were produced and improvements on project provided machines were executed under guidance.

- For standardizing production of equipment workshops got assisted in making jigs and fixtures. To mention the production of the blower for the rice flat bed dryer or the making of the improved plough for two wheel tractors together with an chosen workshop.
- All the places where project machinery was provided got visited. At almost all places advice was given to the operators on how to use and on how to do important maintenance. Further demonstrations were given how to use and how to work with the machines to receive good work results and good product quality.
- Recommendations for changes and improvements were given. Workshops manufacturing machines got advice on production and on how to improve product quality and endurance. Farmers and women's group got advice and instruction on how to use, how to produce and also how to maintain the machines. Written recommendations are also given in the report about changes and improvements.

4. RECOMMENDATIONS

-The groups involved in cattle breeding should get training and instruction how to grow other crops for feeding. At some places normal grass supply is short and not sustaining a further growth of the number of cattle. Promote further a more efficient stable design to reduce nursing work for cattle. Think about systematic collection of dung /urine and use as fertilizer and compost.

-Demonstrate the fodder chopper to other groups to show the sources of additional feed supply from normally not used crops and plants by chopping with the machine.

-Consider the grazing of cattle in oil palm plantations. Use of space between the trees for fodder crops growing.

-Search for more information about coco nut fibre processing equipment and fibre marketing. Think about further inputs regarding machinery improvement and the farmer's group motivation owning the equipment.

-Consider the installation of an improved paddy dryer at a rice miller's place for demonstration and as an incentive to workshops nearby to improve quality and design of own products. Consider also the possible contribution of IRRI regarding a new type of rice husk furnace. Investigate more the economics of the dryers and find out why the business is taking off quickly.

-Consider more practical training and advice about use of newly supplied equipment to avoid wrong use, damage and disappointment

-Investigate more the economics of machinery provided. Present possible income increase to farmers groups (rice mills, contract work of threshers and two wheel tractors, pellet making, rice dryers, fodder chopper)

-At places where two wheel tractors got supplied check the possible use for transportation by an attached trailer. There may be the need for changes and improvements on village roads and narrow bridges. State the possible additional income by transportation work.

5. FINAL REMARKS

From the project provided machinery and equipment provides the farmer's groups with the possibility to generate additional income for living and to extent the agricultural activities. Some of the groups organized them selves quite well and are able to use the machinery for the benefit of each member and the community. Other are not so active and having their difficulties in getting set up and use the machinery.

Some machinery is functioning well and in intensive use some is less or not used. Technical problems are one reason; some of the machinery got improved and performs much better than at the beginning.

Sometimes the expectations are very high or overdrawn about the possibilities and the earnings by using mechanization. For the agricultural services offered by the groups, fees are charged. The fees must cover operational costs, depreciations, operator's salaries, maintenance & repair activities to keep machines functional. Those costs are often not considered and much lower fees are expected by users.

Self organizational skills are required from the groups to keep the machines and the business operational and running. Even the project provides many support in setting up and operational support at the beginning, later on the groups are on their own.

Introduction of agricultural mechanization provides also the change for local workshops to get active involved in production of equipment as well as in maintenance and repair. Know how is acquired and production skills developed. Local equipment production creates new jobs in rural areas and reduces the tendency to migrate into the big cities.

- 6. ANNEXES**
- 6.1 Workshop survey sheets**
- 6.2 Machinery evaluation sheets**