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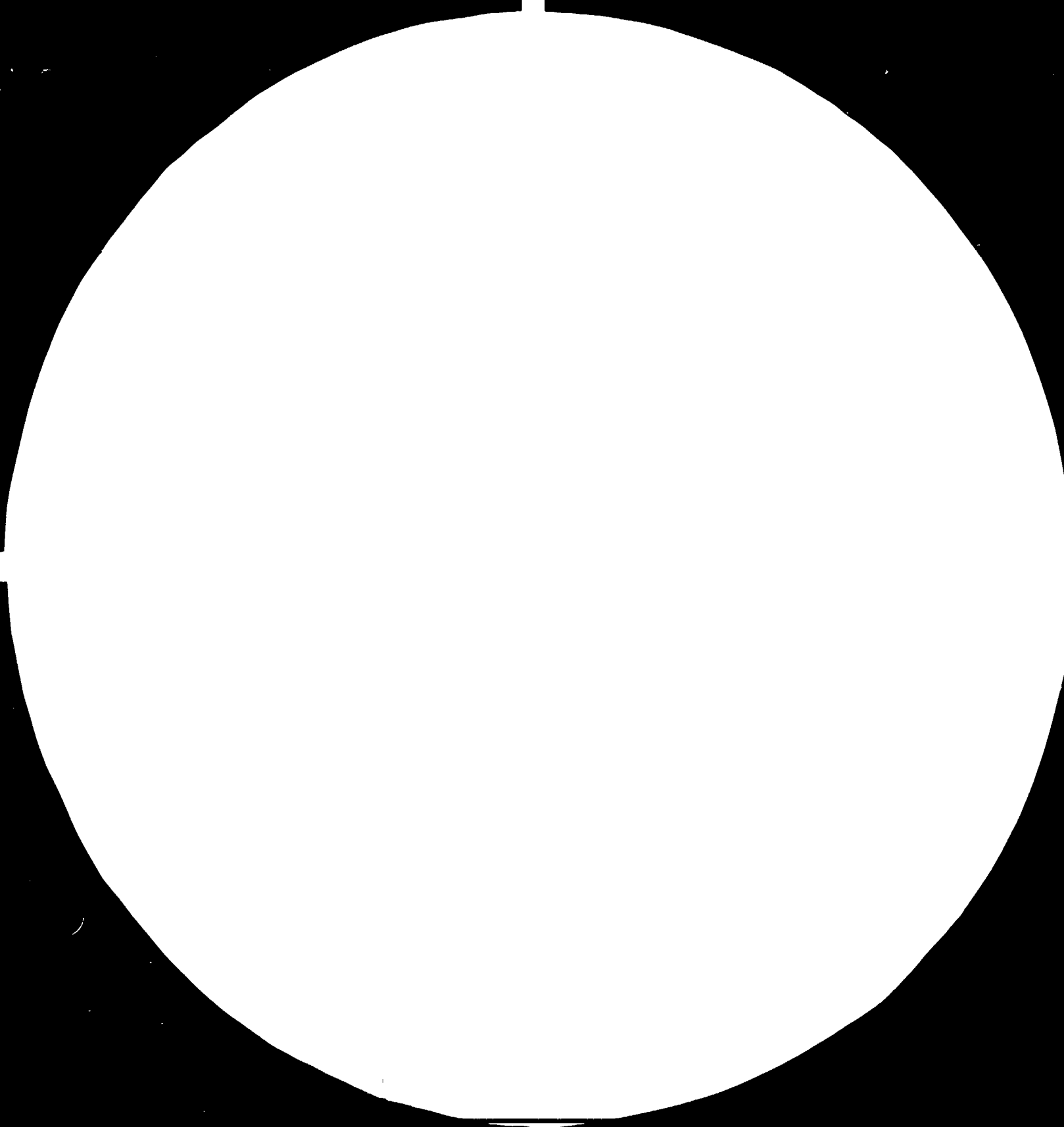

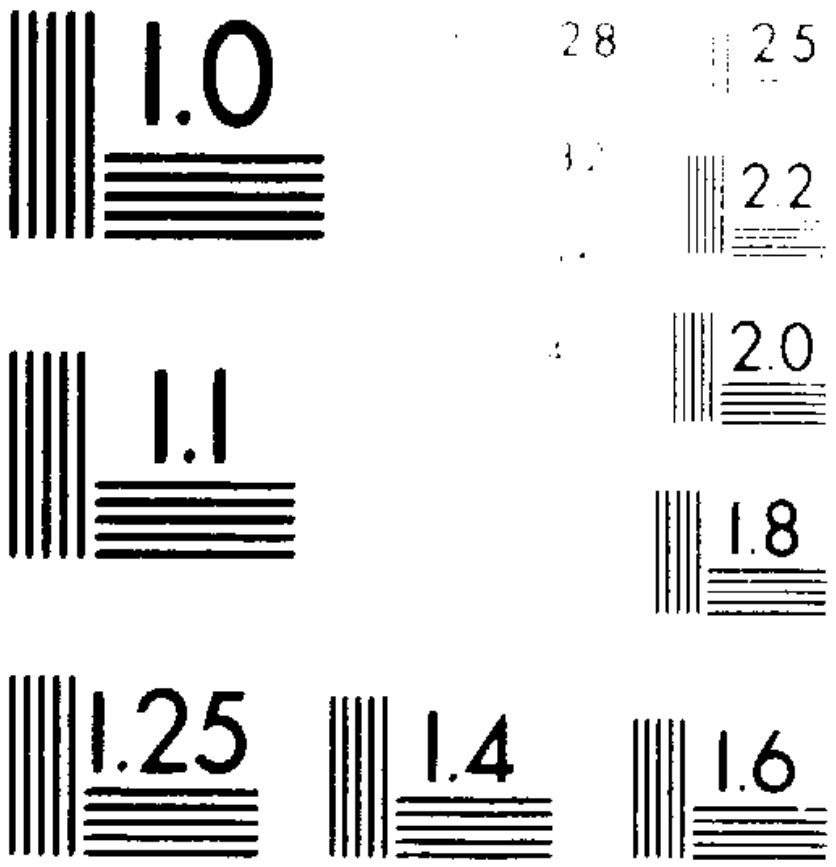

UNIDO/UNDP

14278

Indonesia.

ASSISTANCE TO THE DEVELOPMENT OF SMALL INDUSTRY IN INDONESIA (East Java and Bali).

(PROJECT DP/INS/78/078)

DEPARTEMEN PERINDUSTRIAN

DIREKTORAT JENDERAL INDUSTRI KECIL

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TERMINAL REPORT UNIDO PROJECT

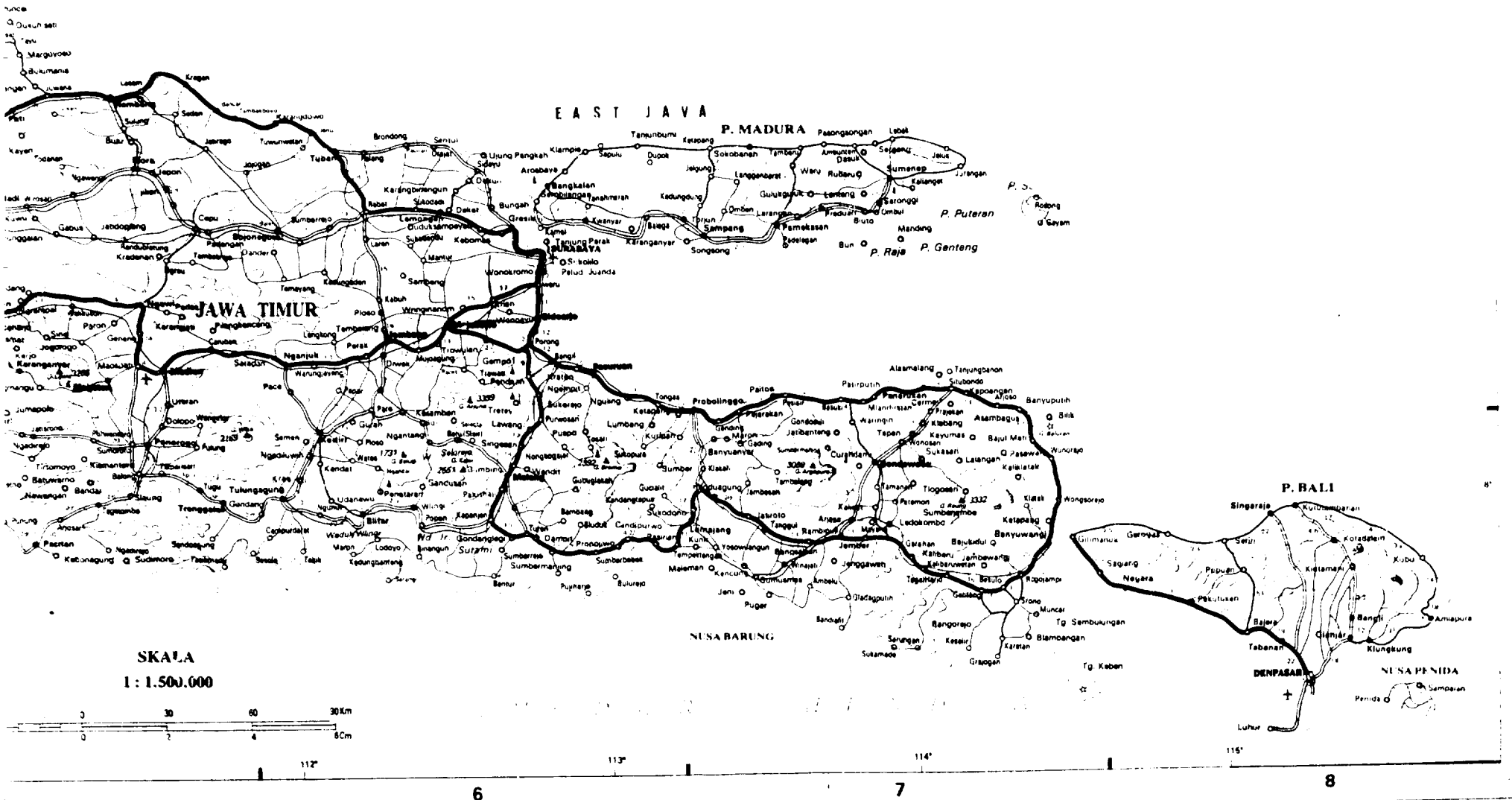
DP/INS/78/078

in East Java and Bali

October 1982-December 1984

December 1984

Sven Ursberg


EAST JAVA
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SURABAYA
P. Puteran
P. Raja
P. Genteng
NUSA BARUNG
P. BALI
NUSA PENIDA
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1. Structure of the Small Industries.

General outlook.

The industries we have come across and directly been involved in, have an average of about 10 (ten) employees, are situated at the homestead of the entrepreneur/owner and have a yearly turnover of about 10,000US$. Of course, the size and turnover varies extremely but for the reader to understand the character of these industries we believe this is a well chosen average. The production can be categorized as handicraft since generally electrically powered tools are not available. They are home industries in its broadest sense, since it is difficult to separate the production from the household economy and they are family enterprises with generally half the employees belonging to the family of the owner.

Despite their low investment of machinery, shed and intrastructure, they are surprisingly stable, a stagnant stability with a well established local market but with no room for expansion. Of course the profit does not allow any investment and cheap labour will not motivate this. We can talk about a traditional treshold where more drastical changes will allow further development.

There are obviously benefits of this style of traditional industries, such as: protection from outside producers by the villagers, a fairly high understanding of production and skill created through generations of people, and by using the home as production place, reduce overhead and labour costs. The disadvantage is, that changes come slowly since the owner in the village is de-

pendant to the will of the community. He can not completely control his company. Traditional life is highly appreciated and may not encourage the entrepreneur to work harder, longer time or do something regarded as untraditional. This create also low willingness of risk-taking, and investing in domestic housing rather than industrial sheds is judged as a better investment. And unfortunately this proves often to be true, not because of bad profitability in the industry, but due to a tremendous value increase in housing. This effect prevents, unfortunately, investment in production.

Still we believe that the future of the small industry looks brigat in Indonesia, but much support is needed to pass the mentioned treshold to get self expansion power. Here we believe that the government, the multinational and big national companies and other foreign bodies can do a lot to bring these small industries to "take off" as soon as possible.

The typical type of production suitable for the small industry, we believe, is part production, subcontracting and products made of raw materials demanding quite small investment.

2. Strategies of the UNIDO Team.

The international expert arrived in October 1982, but first in April 1983 the UNIDO team was complete with a local expert, a local counterpart, two secretaries and a driver. We spent the first time of our contract to study the structure of BIPIK (Government project for support of small industry), PPIK (part of BIPIK dealing with soft and hardware to the industrial clusters) and Kanwil Per-

industrian (Department of Industry's Provincial Office) in Surabaya, to find what channels we could use for information, work and followups. It created some confusions in the start, since it seemed that the government officers did not expect us to put demands on them. We got a good opening to the administration via the PPIK head, that remained good since then, and made it possible to approach concrete problems. In Bali we worked directly with the BIPIK head that was very co-operative already from the start and made the working climate easy there.

Since East Java and Bali is a vast area with about 300.000 industries we decided to focus on certain subjects to achieve a better effect. Our resources in manpower and funds were also very limited and we wished to gain some notable results. We gave preference to the following tasks:

a. Give advice on CSF/UPT (Government owned service workshops in the industrial clusters) workshops, management and equipment;
b. Give general training to officials and entrepreneurs in related subjects;
c. Create pilot projects in the clusters which can give a demonstration effect;
d. Give advice on specific technical, managerial and economical problems to the entrepreneur;
e. Design machinery and equipment that can be produced locally.

3. Sectors where we could perform and be received.

There is a great variety at industries in our area and to select sectors in which we could nave an impact is difficult. Most of these industries are situated in clusters of 25 - 150 industries in each village and they are developed productionwise, which means that all the industries in cluster have the same type of production but not necessarily producing the same products. We realized that to get a measurable result within the limited contract period, we had to select production sectors of importance, (many industries of the same kind and a demonstration that could be received), due to our own ability and to receptiveness of the industrial community. After some prior investigation work we pointed out the following sectors that were promising:

a. Leather tanning and leather goods production;
b. Bamboo work, mainly of splitted bamboo;
c. Non ferrous casting. mainly aluminium and brass;
d. Blacksmithing;
e. Wood work, mainly plywood products.

We have certainly worked with about 10 other subjects but rather occasionally with the aim of supporting individual entrepreneurs rather than the community. Of course the result of this work is less important for the general development of the sector.

In the 5 mentioned production sectors (a - e) there are government service workshops that have supported us with personnell and technical help. We believe that these 5 sectors have a good future and should receive further support. Their products have a promising market, and the production as such, form basic industries out of which

new industries can spring. For future work we would like to add some more sectors that we have not yet been able to cover, such as:

f. Ceramic industries;
g. Ferrous casting;
h. Furniture production (knock down furniture).

To achieve a better result in the ongoing work as well as the planned, we need more time, personnell and funds.

4. Leather and Artificial Leather Industry.

Vegetable tanning has old traditions in Java. The active tanning liquid is produced by bark from Acasia and from the Segawe tree. In fact, many species of trees can be used but traditionally the mentioned species are the common ones. It is the base or acid content in the bark that preserves the leather and makes it soft and strong. Lime is used for dehairing and defleshing the hide before the treatment of bark liquid. The baths with the lime or bark liquid is traditionally kept in containers of wood or cement and the hides are piled on top of each other. It is believed that this compact piling of hides makes better use of the bath. In fact it is the contrary. The piling does not allow the bath to expose the hides. The tanning becomes uneven and a lot of defects on the hides occur due to "waking" treatment in the baths.

One particular difficult problem in Java is the pricing of the hides. From the cattle holder to the

tanner there are too many middleman and the prices of hide are at a level where Indonesian tanners can not compete with the world market. The way should be shorter and cheaper from the slaughter to the tanner to make possible for a positive development of the leather industry in Indonesia.

In Magetan a leather industrial estate is build by the Industrial Department. Several of the entrepreneurs here have been persuaded to rebuild their baths with racks for hanging the hides. There has been resistance to this with the argument there is room for less than half the number of hides in a bath. That is correct. But on the other hand the quality has improved by hanging, and more and more entrepreneurs are converted to the hanging method. When the more successful entrepreneurs changes their production techniques the others will follow after some time.

In the leather estate there is a CSF, common service facility with a range of machinery for leather treatment such as:

a. Revolving drums for bath treatment of hides;
b. Splitting machines for cutting layers of the hides;
c. Fleshing machine for removing inside flesh of the hides;
d. Rolling machine specially for cow hides to be pressed to sole leather;
e. Stolling machine to beat the hide to be soft;
f. Embossing machine to print leather images on the face side of the leather;
g. Shaving machine to cut the hide to even thickness;

h. Buffing machine to grind the hide to suede leather.

The foundation of the CSF workshop is not stable due to clay and inpropriate drainage by the contractor. The floor has sunk in parts of the workshop and for these leather treatment machines that are very heavy, we made up foundation layouts. All the machines have now been installed and the ground seems to carry the weight. We have also suggested additional electricity, since power is not enough for running all the machines at the same time. This work has not yet been completed, but as a whole the workshop is working good and is probably one of the best utilized CSF in East Java.

P.T. Haka is one of the biggest leather producer in Indonesia and a lot of their production is exported. They deal with chrome tanning mainly and export wet blue, finished leather and leather products. P.T. Haka is a private owned enterprise in the outskirt of Surabaya. P.T. Haka was selected by the government to supervise the Magetan industrial estate. We call it foster father scheme. An office was established in Magetan for this service. Due to P.T. Haka's internal production problems and maybe also to lack of incentive, this activity has unfortunately gone down to a sleeping level. We still have hopes that P.T. Haka can consolidate themselves and open new work with the Magetan leather estate since we believe they are the most competent company for this matter.

Products of local leather is made all over East Java like sandal shoes, belts, handbags, suitcases, gloves, protection gloves etc. in centras in Malang, Gresik, Ma-

dura, Sidoarjo. About half of the production has a low quality that can only be sold locally, 40% middle level to be sold in the bigger cities and 10% for export. With fairly small means, the quality can be improved to reach a far bigger share at the high quality market and to reduce the import. We believe in support for further development in this sector.

Since there is a strong sector of artificial leather in East Java competing with the leather industry, we wish to mention this production in the same chapter. It is the suitcase manufacturing cluster in Tanggulangin. There are 150 entrepreneurs forming this naturally grown cluster. The co-operation union is strong here, running a bulk purchase store, a small service centre and a sales and showroom. The leather imitation is produced in Indonesia and is cheap while the metal brackets, hinges and lockers are still imported. The suitcases produced here are of a good quality and much of the produce is sold in Jakarta. We have a good relation with the co-operation leaders and have visited them regularly to give advice on design, quality and market. We are convinced that most of the metal parts can be made in Indonesia and a further program to support this metal production is needed. Of course, imitation leather can not substitute real leather and the support of these two sectors must be coordinated to avoid competition. The trend of the artificial leather is on the advance and people must be informed not to be blinded by the beauty of the artificial leather but to look more to the function to give leather a fair share of the market.

5. Bamboo Industry.

Bamboo is growing commonly all over East Java and Bali. Most of the bamboo is of a low and knotty quality not suitable for advanced production. Traditionally this bamboo, green with many joints, is used for house building like poles and beams. For the walls, mats with the entire thickness is used. Of course this material does not last long, but is so cheap that regular change of bamboo material is possible. The lasting time is about 10 years.

For finer works the straighter bamboo with finer fibers are used. They are often yellow but not always. This bamboo is cut into fine strips sometimes only 0.5 mm thick and is used in complicated products often of ornamental character. Bamboo splitted products have a long history in Asia and the only tool needed is a knife and a very good portion of skill. By modern time the shapes of these products have changed to be more functional and still with the esthetic touch. Bamboo strips are also dyed to give pattern images to the woven products.

In later times, machines have been designed to increase the production of strips and sticks. But for the finer work it still has to be done by hand and will probably be so for the future.

In Magetan we have supported the development of a bamboo work service workshop. Several machines were installed like:

a. Surface planning machine for removing the outer

skin and the joints of the bamboo;

b. Circular cross cutting saws for cutting the bamboo to suitable lengths;
c. Stripping must still be made by knife and hand;
d. Slicing machine cuts the bamboo into thin layers;
e. Splitting machine cuts the bamboo into sticks.

All the machines except for the splitting machine (due to missing parts) are working good now. We spent several days there just servicing the machines and training the operators. The machines are not of good quality and that means that they must be adjusted continuously to maintain the performance. To develop this centre, much attention must be given to the entrepreneurs, operators and machines. Also support in design and marketing is needed, since traditionally this sector is economically weak, but we can see a tremendous potential in this sector. For that reason, all efforts should be made to continue the promising start for the bamboo community in Magetan.

Products of importance are: hats, ladies handbags, lampshades baskets and similar products. We have also come across production of decorative mats in Bali, to be used as wall or roof decoration. With a good marketing, this product has certainly an export market, but standardization and quality control is one of the main problems.

We have not touched bamboo furniture production. In Bali bamboo is the common furniture material. The design is attractive and with government support this cheap furniture could certainly reach a big market in Java too.

6. Non Ferrous Casting.

Moulds.

Casting is one of the oldest crafts known to man. At the bronze age (bronze is an alloy of copper and tin) that has past most of cultures in the world thousands of years ago, people knew how to form metals by melting and pouring into moulds. The first known moulds were made of wood. We call that casting with permanent moulds. Of course wood is not a good mould material since it burns, and clay came into use. To make the clay mould stronger it was burned over fire. The clay moulds can only be used once, but they are cheap and fast to produce and more formable than wood, so it had still an advantage. This clay mould are called ceramic mould. There are two principal differences in making ceramic moulds.

1. A solid pattern made of wood or metal is pressed into the clay and removed and the hollowed part forms the cast.
2. A wax pattern is made exactly as the expected cast padded with clay, burned over fire for the wax to evaporate. The hollow room left by the wax is filled with metal.

The advantage of no. 1 is that the production of moulds are faster and cheaper. The advantage of no. 2 is that the casting can be more complicated with many intricate details in the same casting. The first is the principle of sand casting and the second of investment casting. Both techniques are still used in East Java and with improvements can be regarded as modern casting. We

have done some work in this field that will be described later.

The pit furnace.

The traditional furnace is simply a pit in the ground fired by wood or charcoal. It is vented by a manually powered blower made of two hollow logs with goat skins as bellows. The fuel, the forests were abundant and just for free. There was no real reason to change this furnace since it served its purpose. For this reason the design of the pit furnace has remained for 3000 years due to prehistorical excavations. With an increasing demand of wood or charcoal the price has risen to the same level as oil fuels if not more. Still the pit furnace is used extensively all over Java, sometimes with improving brick-lining, electric blowers, simply because no alternatives have been available. It is difficult to introduce something now when the old system works and costs literally nothing.

Why does it have to be changed? Maybe within twenty years time there will be no more forests in Indonesia. With the present growing population no industrial production can depend on wood based fuel in the future. And of course, with a good fuel policy we may be able to save the last forests that are so much needed for a good ecological balance of nature.

How can we change to a more economical way of casting? The price of charcoal is 100 - 200Rp/kg (10-20 cents) and with great heat losses in the furnace makes the casting very expensive and unprofitable. The casting costs are about 200 - 500Rp/kg brass. The majority of the entre-

preneurs have no electricity (about 1000 in East Java), are fairly poor and can not afford any expensive investments. How to attract them?

The refractory furnace.

Luckily there is a producer of quality refractory stones in Surabaya that is willing to cooperate with us in rpoducing a pilot furnace. We gave the following criteria when designing the furnace:

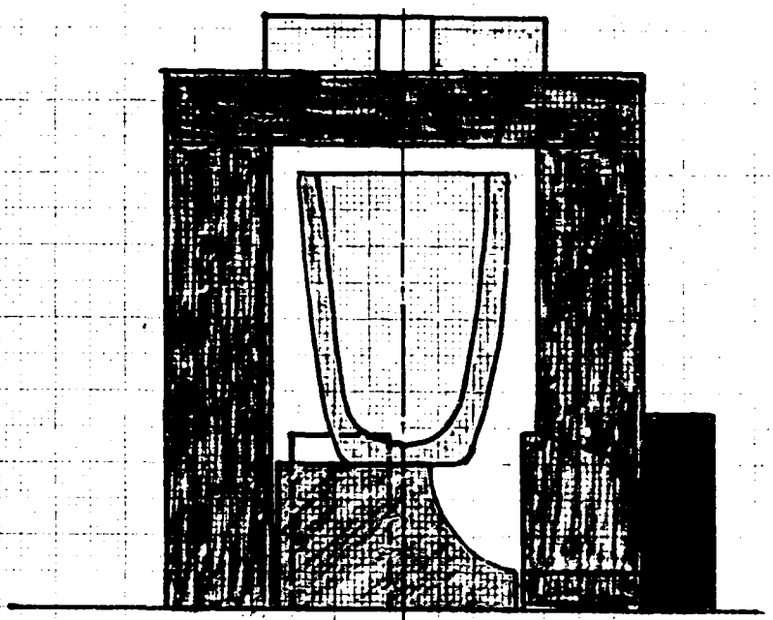
1. It should be made of locally available raw materials to secure future supply of stones from this refractory producer or anybody else capable of producing refractory stones.
2. It should be runned without electricity to be interesting to as many entrepreneurs as possible.
3. We choose kerosene as the fuel, since it is available everywhere, it is the cheapest liquid fuel, and it is clean which means that no exhaust system is required. Indonesia produces its own oil and kerosene which is subsidized for household purposes.
4. The technology should be well proven, not to lead the development to a "dead end".
5. The equipment must be very cheap.

So far we have managed our criteria except for the crucible that is still imported. We do extensive trials to find a technical formula for production of crucibles.

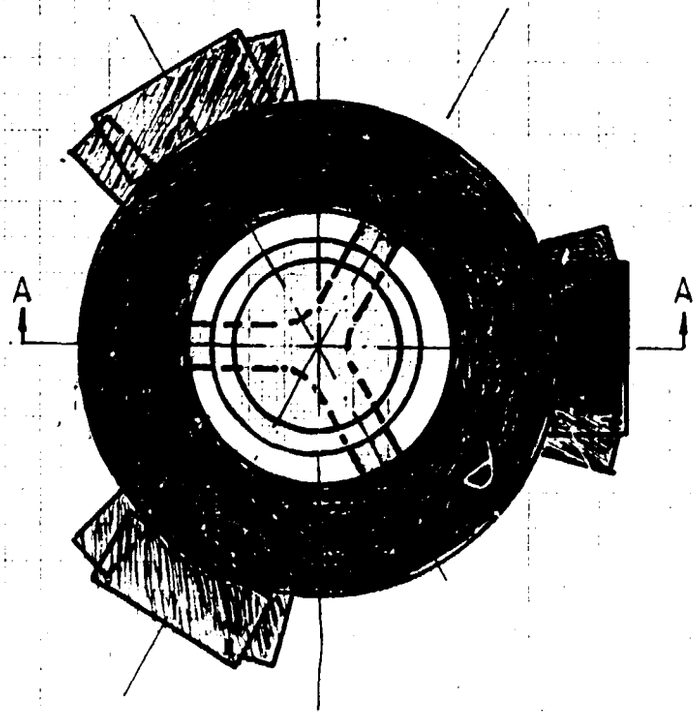
The design.

Furnace for AF 80 crucible

Furnace with cover
Section A-A



Furnace without cover



- Sectioned area
- Upper cover
- Lower cover
- Crucible
- Crucible stand
- Fire gate
- Body

Scale 1:10

In fact our road have been far from trouble free. The first design was made for 200 kg of brass per charge and our goals were put too high. In fact very few entrepreneurs can charge that quantity per heating and a half full crucible means bad economy. The first furnace was also built by local firebricks, which showed to be unsatisfactory due to great heat radiation. The cement used for filler was too brittle and had to be continuously repaired. Wise of our first trials we made up a new design. We increased the body walls tO 15 cm from 12 cm, decreased the volume of the crucible to 100 kg and we used better quality refractory stones all through. These actions gave immediately a good result.

Data of refractory furnace for AF 80 crucible.

Time to melting from cold furnace	1 hour
Time to casting from full crucible	2 hours
Time from recharge to casting	1 hour
Fuel consumption	12 litres/hr.
Fuel economy	1 litre kerosene/4 kg brass
Cost of casting	50₹/kg brass
Maximum Temperature	1050°C

Only one man is needed to operate the furnace with 2-3 men for the pit furnace. The melting time is half as for the pit furnace and the cost of casting ¼ -1/10 of the pit furnace costs. If the refractory furnace is used once a week for a year, the direct gain for the entrepreneur is 5 million ₹ (5000 $) regarding fuel costs and better recovery, compared with the traditional furnace.

We still realize that to introduce a new system

will take a long time due to traditional resistance and the increased investment of 500.000 Rp (500 $).
In the prospect of that the whole investment is gained within a month time, convincing will not be too hard.

At the moment there are eight furnaces erected, bought but not yet in function or ordered to the following places:

a. Bondowoso (1 in production);
b. Pasuruan (1 in production);
c. Yogyakarta (1 in production, 1 bought and 2 ordered);
d. Jombang (1 bought but not yet in production);
e. Mojokerto (1 ordered).

Most of these furnaces are built in the government service workshops as pilot projects. A very promising sign is that now some private entrepreneurs have ordered it. We also wished to mention that this furnace is a general non-ferrous furnace suitable for most metals with a melting point below 1000°C. Any further information about price, weight, fire resistance can be given by BIPIK, Departemen Perindustrian Jalan Kedungdoro 86 or directly from the manufacturer LOKA, Jalan Raya Karangpilang 24 Surabaya, Tel. Sepanjang 34.

Casting Metals.

The raw materials for the small entrepreneurs are mainly scrap. We have advised them how to select scrap and divide it before casting. This is a difficult task since there is no cheap and simple way to analize the

content of the scrap. What we can bring is a general understanding how to select the scrap by form, colour and sound. Far better results can be reached by this simple way. Also to add minerals to the melt to compensate for evaporated metals (like zink in brass) to make the metal more fluent, reduce gases and separate the slag. To convince the caster to remove all foreign metals mechanically, not in the crucible, to avoid influence of unknown metals, have caused some resistance it involves hard labour. But in most areas there are improvements.

Not all metals that are put in the crucible and will melt are suitable for casting. As an example is aluminium sheet products. Casting aluminium named silumin contents of about 20% Si (silica). Of course if only casted scrap of silumin is used the problem is simple, but some of the scrap is already casted by inferior metals, and that makes the selection difficult. Aluminium sheets makes the melt clogging and porosity appears in the cast. There is much more training needed in this field and we hope that it can be further provided.

The Casting.

There is no mean of checking the temperature before casting, more than the visual judgement. Since the alloy is not exactly known a pyrometer is not very useful since the casting temperature is due to the alloy. The furnace operators have a good skill in judging the fluentness of the melt and this does not cause any problems. The problem is mainly with inpure melt and the function of the mould. The inpurity of the melt can be solved by:

a. Careful selection of scrap;

b. Using of slag separation agents (like glass powder);
c. Produce moulds with a good function.

About 30% of the brass casted goods are rejected or repaired. We have worked with the entrepreneurs to help them with these problems, but much more can be done. Often it is rather a matter of learning, not so much of investment in better machines or materials. Of course a combination is the best.

Investment Casting.

We described earlier the principal of investment casting or lost wax casting, as it is often called. It is an old but still efficient way of casting. Some improvements can be done to reach a quality good for industrial products:

a. Production of wax patterns in rubber moulds;
b. Fireproof clay for the casting mould;
c. Enlarged sprues to increase pressure in the moulds.

This casting technique should remain in the future as the most efficient way of casting ornaments and complicated items.

Sand Casting.

The sand casting is here of a very low level. Mainly because lack of knowledge in model making and sand composition. We have started work in this craft such as finding sources of good silica sand, clay improved mould-

ing techniques. Using right sand and clay means that the sandmix can be reused up 100 times which means lower moulding costs. We have the best perspective to succeed in this craft since the labour skill is good. Special training in model making is needed which we regard as the weakest link. Sand casting is the craft that must be developed to satisfy the machining and vehicle industry, and supply them with ingots for further treatment.

We have made several trials with aluminium and brass, and we have certainly found the right sand and clay. Next step will be to train the entrepreneurs in sand moulding with openable moulding boxes.

Other techniques.

Ceramic moulds is just a variety of the sand casting where the sand has a higher content of clay, is burned on fire to get hard. This technique has had a higher production cost since the sandmix can not be reused and burning makes the moulding costs higher. Permanent moulds of metal is a very good technique. The form requires simplicity and the casting precision is low, but casting costs will be very low. Permanent moulds needs development here, and gives a quick result.

The Products.

At present the most common products are aluminium and brass casted ornamental products. With an upgrading of this industry, there is a range of new products that can be produced to satisfy the needs of the expanding mechanical industry. The perspective in this engineering field looks bright.

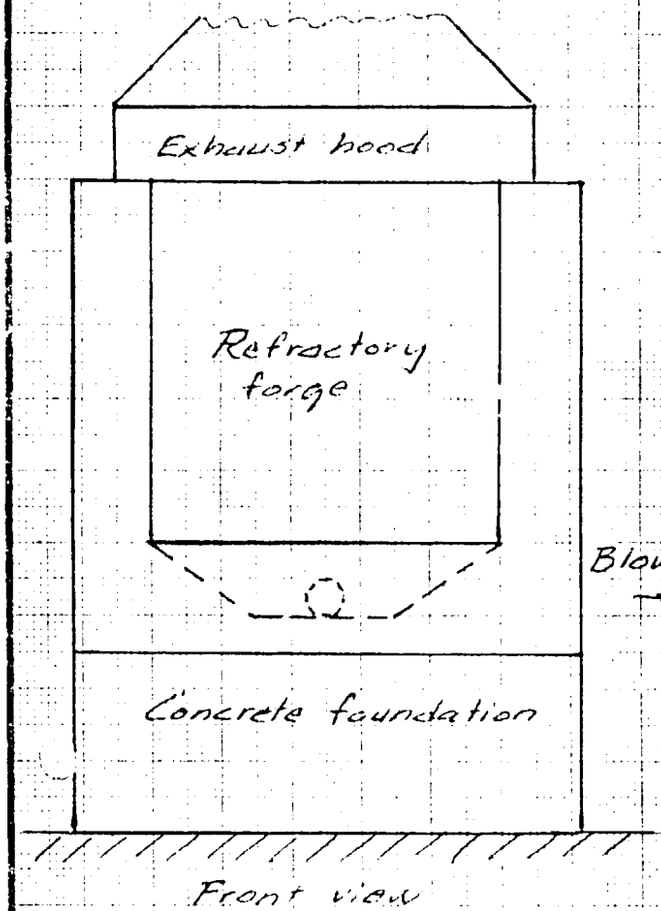
7. Blacksmith Craft.

The heating place, the forge, is similar to the one described as the pit furnace in the chapter of non ferrous casting. The forge is usually lined with locally produced fire bricks and the blower of the tree trunk-goat skin type. The anvil, a steel block, is anchored to a log laying on the ground and the rest are handtools. The shed is generally very simple with a roof on poles, bamboo walls covering two or three sides of the shed, the forge in a corner and the anvil at the middle.

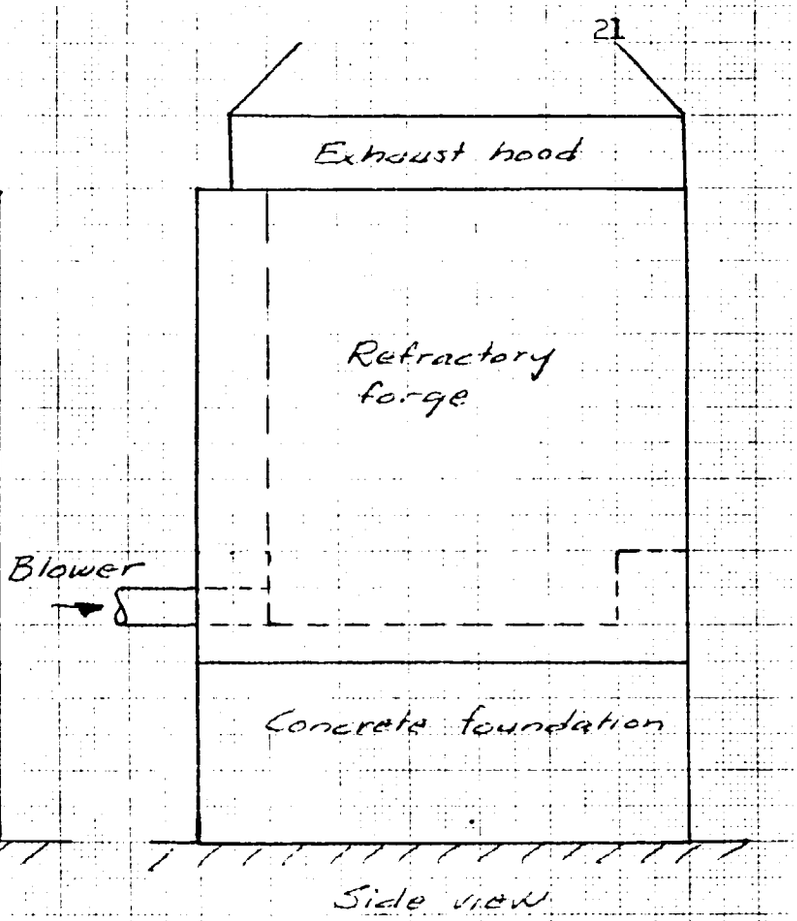
Raw materials used are scrap from ships, train cars, trucks and waste from engineering workshops. There are no facilities to test the raw material in terms of rate of carbon and hardness. The testing is mainly done by beating or grinding, and the experience of the blacksmith is what counts. To achieve a uniform quality is impossible at the moment but a lot can be improved. In training of the entrepreneurs we have given practical suggestions how to improve selection of raw materials and simple carbon testing.

The forge is too much heat and fuel consuming and the UNIDO team has made a design aimed to reduce the fuel costs and also to make the heat more even. By using refractory stones, the maintenance will also be minimal. This forge is designed for Madiun's CSF but not yet erected.

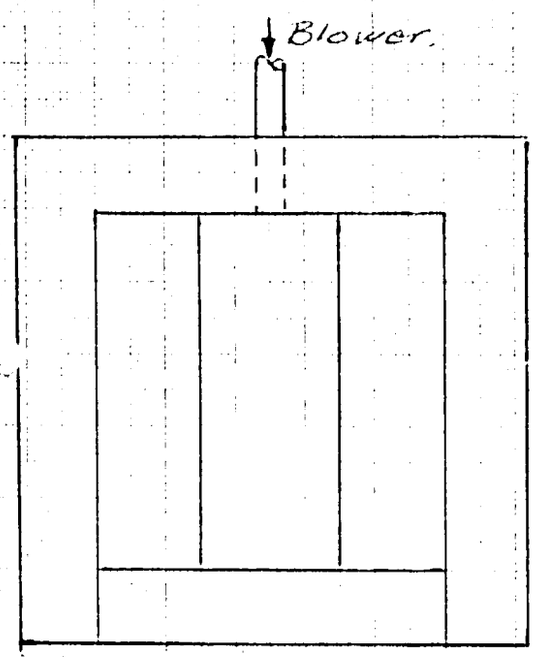
Health and safety is a big issue for the blacksmith workshops. The working environment is mostly very bad with ill health as a result. In training we have pointed out the following:



Front view



Side view



Top view

Forge

for blacksmiths

skala: 1 : 10

a. Working positions.

Mostly, people are working in squatting or sitting positions. This creates bad blood circulation and pains in the back. Working should be standing upright when working, and sitting when resting. This means that forges and anvils must have the correct working height, which means about 70 cm above the floor.

b. Ventilation.

Smoke and fumes from the forge creates iritation and sickness in the lungs and eyes. It is therefore important that the air is changed continuously in the workshop. The forge should also be placed so that it does not interfere with the anvil work and preferable with an exhausthood and chimney. Smoke is tiring for the body and eyes and lower efficiency is the result.

c. Light.

Bad light makes the eyes tired and a poorer product as the result. Long time effect will be eye infections and changes of eye sight. Spectacles are not practical to use in the blacksmith room. Good light will preserve the eyes of the workers and give a better working result.

d. Anvils.

The anvils are generally too light. It does

not give the correct response when hammering. The result of this is that it takes longer time to produce and the workers will be more tired. About 100 - 150 kgs is a good weight for an anvil, but the cost of such an anvil is considerable, but is paid quickly in increased production. The anvil should be mounted on a wooden block so that the labourers can move freely around the anvil.

e. Hammers with a good quality and in a good range of weight. The hammer is the working tool and have to respond properly towards the anvil. Bad hammers create also tiredness.

All this health and safety measures (a - e) was told in training of blacksmith entrepreneurs and we think that they are positive to changes. A problem is always to motivate changes that costs money. The development of the blacksmith industry can be seen in a long perspective.

Mechanization of the workshops is a very great step up for most of the blacksmithers and is economically not possible in his present level of production. Mechanical hammer is the most important tool but requires also specialization of the products. The result may rather be less manpower, not increased production and the target is missed. One solution is that there is one mechanical hammer for the whole cluster purchased by BIPIK or the Co-operation unit as a pilot project to study the effect of such investment. Electrical power in the workshop can also mean electric light, electrical blowers and other electrical aids. It does not directly mean improved or increased production though.

Die production for a mechanical hammer means that more complicated products can be produced like key wrenches and motor parts. The dies are very expensive and normally this is developed in the bigger industries. Smaller products can be produced in the small industry if a great number is required.

Present prodects.

The black smith production is mainly handtools for the agriculture. A big consumer is the Transmigration programme, a government department that supplies the transmigrated people with tools in their new homeland. Tools like knives, hoes, axes, sickles and spades. To improve the design for the future is also needed but traditional resistance of tool form is difficult to overcome.

8. Handicrafts in Bali.

There is a long tradition of crafts in Bali. Previously for decorative and religious purposes. Since the tourism began to flourish and invade Bali, the craft came into trade. The skills of the craftsmen are generally very high. The best qualities are highly appreciated and paid for. During the last ten years the number of the craftsmen have increased tremendously. Normally the skill is transferred from father to son in the family companies. Due to the fact that the birthrate is very high in Bali, it is natural that many craftmen's children turned into handicraft trade, when the profit was good. At the beginning of this decade, there was a drastic change. Tourism dropped notably in number of visits, but also in rate of foreign exchange due to economic

stagnation in the country of the visitor. Times were getting rough for the common craftsman. With the specialization they have, it is difficult to change jobs or accept the present situation and start producing new products. Most entrepreneurs await better times and struggle for their daily bread. It is also difficult for a previously prosperous company to reduce production and expectations. Many craftsmen who own land, have the security for feeding the family, but this small "side production" can not create new working capital. There is a need of new and fresh ideas to cure this situation and to give new hope for this people.

There is a variety of crafts in Bali.

The variety of handicraft in Bali is very great. The most common crafts are: Wood carved sculptures, Carved wooden furniture, Jewelry works, Horne and bone crafts, Paintings in oil or natural dyes, Bamboo and straw works, Stone and cement sclupture, Garment and textile production, Ceramic works. There are other minor crafts, but these mentioned have the greatest importance for the Bali trade regarding sale and number of employees.

The crafts can be divided in three market sectors as follows:

A. Crafts mainly relying on the tourist market are:
   a. Wood carved sculptures.
   b. Jewelry works.
   c. Horn and bone works.

B. Crafts mainly relying on local or national demand are:

a. Carved wooden furniture.
b. Bamboo and fibre works.
c. Stone and cement sculptures.

C. The remaining crafts relying on both A and B are:
a. Paintings.
b. Garments.
c. Ceramic works.

Wood craft in particular.

Due to the decline in tourism regarding number of visits and length of stay, the sale of the products relying on the tourist market (sector A) have dropped notably during the first years of this decade. The craft that take the biggest market share in this sector is the carved scluptures, furniture and other items made of wood. There are several reasons for this. Wood carving have a long tradition in Bali and was produced to decorate the temples and homes a long time before it came into trade. It is a natural part of the Balinese life.

Wood is a comparatively cheap raw material and earlier easily accessible. For carving only simple tools are used. Small investment and working is required to start a good wood carving production. The young members of the family can easily be engaged in less skilled work like prepairing the raw material and finishing, sanding and polishing the products. Typical factors for a successful family company or home industry. Accordingly, these products are cheap and accessible to most people. Not to forget the Indonesian market. Many of these carved products are "exported" to Java by Javanese tourists. During the good seventies tourism was booming and

the number of wood carving workshops were growing like muchrooms. The offspring of the masters started their own workshops and the development of the wood carving trade went a little too fast. The quality of the production decreased for some producers and gave way for quantity. Particularly regarding the ornamental wooden products. When the market now is reduced there is an overflow of statues and allied products in the shops, stores and showrooms. Still the first-class producers is fair, even with reduced prices. For the second and third class producers, sales are not good, and they represent certainly the majority of the wood carving producers. The tourists have become few, more cautious in buying and more quality minded. All these factors together have caused extended negative result.

Wood species and wooden products.

There are many wood species in the Bali wood craft. Some are found locally, but most kinds are brought in from other inlands as Kalimantan, Sumbawa, Lombok and Java.

Brown and black ebony, of which brown ebony is most common, is a heavy crack proof wood, suitable for detailed and delicate carved work pieces. Density normally exceeding 1.0 and price about 250 Rp/kg.

Jati wood is a teak type of wood extensively grown in Java and is the most popular kind of wood for furniture. It is fairly crack safe and density of 0,7 is normal. The colour is milk chocolate when finished. It does not show the same smooth appearance as ebony and is consequently not as suitable for statues. Price 150.000 - 300.000 Rp/m^3 due to quality and log size.

Sandal wood, a light yellowish wood, similar to

camphor in structure, is mainly used because of its spicy attractive smell in products such as fans. The popularity and scarcity of this wood makes it very expensive, about 5.000 Rp/kg.

Coconut trunk and specially the root clump, is used for making stools, small tables and chairs. This material, which is actually not wood, is very heavy with a density of about 1.0. The material is fibrous, greasy and not suitable for joinery or detailed ornamental carving. The surface becomes rough when fibres are cross cut. The furniture mentioned are made in one piece.

A number of softwood spieces are locally available to cheap prices, about 50.000 Rp/m^3. The common characteristics of the species: low density (0.3 - 0.5), bright in colour ranging from pale gray to yellow, some cracks easily and shrinkage is great while drying (especially cross fiber wise). This drying is a problem because the entrepreneur can normally not afford to keep the wood in store long time enough for a proper drying. If too wet wood is used in carving, the work piece will crack and twist once it is finished.

Soft woods are generally more receptive to insect attacks than the hard woods. No cheap and effective wood preservative have yet been found for these craft products. Formalin is used as a wood preservative to a limited extent, but can not be recommended as a good treatment since it is expensive and may cause damage to the people and environment due to its toxic effects. Animals, napkin rings, fruit imitations, banana plants are carved in soft wood and are colour painted. These products can be regarded as low value products and find most of its markets locally used in weddings, ceremonies and hotel

decorations.

Diversified products.

There is a real need of new productions in Bali. The present production is too much directed to ornamental goods, and we wish to introduce more types of functional goods. The entrepreneurs are mostly artists, which means that it is difficult to change their attitudes to production, because it generally intrudes in their artistic performance. The change must be taken slowly, step by step, in order to give the new products both having artistic and functional values.

It is with pleasure we will note that we have found an entrepreneur with modern thinking who has taken the initiative in working with plywood. His name is I Made Geria in Peliatan. He is an experienced wood carver and painter, but he sees the future difficulty in selling the ornamental goods. Therefore he has developed different items in plywood. They are mainly animals designed as puzzles, when built together they can be used as pen-stands.

We hope, since he has a good impact on the people of Peliatan, that if he succeeds in his new production, he can form a good example for the other entrepreneurs.

The Products.

Until now some new products in plywood Unido have incented are such as:

1. Animal Puzzles.

2. Jumping Frog.
3. Bali Map Jig Saw Puzzle.

We have now the plan to introduce:

1. Jig Saw Puzzle of Letters.
2. Jig Saw Puzzle of Figures.
3. Learn Alphabet Puzzle.
4. Play House in Balinese Style.
5. Lettered Wooden Blocks (Cubes).

The common theme for the se products: they are educational toys. With these toys we wish to attract new markets. Visiting parents from Indonesia as well as from abroad and local learning Institutions (Schools).

The Raw Material.

Plywood of 3 ply, 3 - 4 mm thickness is easy available, but the quality is generally low. The better plywood produced in Sumatra is not available anymore in Bali, but plywood produced in Kalimantan is easily found in many shops in Denpasar. Present price is Rp 3.5000 - Rp 5.000 for standard size sheets.

The Quality.

This Kalimantan Plywood is produced of fairly hard wood. The result of this is that the surface is rough and sometimes porous. The harder woods are normally more brittle (non-elastic) and tend to split. This makes the working with this plywood more difficult. The glue between the layers is not well absorbed in the wood, which results in that layers easy separates.

The Jig Saw.

For cutting figures in plywood the best tool to use is a jig saw. There are several types:

1. Hand Operated.
2. Foot Operated.
3. Electric Powered.

The hand operated jig saw is the cheapest and the most common one. Price around 1.500 Rp. The foot operated jig saw may be available in Denpasar, but we haven't found any yet. The electric powered jig saw ir ordered from Surabaya or Jakarta and is the most effective but most expensive of types. Price around 400.000 Rp. The cutting speed of the electric powered jig saw is about 4 times higher that for the manual powered and cut also with better precision. Even if the price of this electric saw is high, in a continuous production, it will be paid in fairly short time.

It seems difficult to get good quality blades for the jig saws in Denpasar, but we will further check up this matter.

Problems in cutting the plywood.

Whatever machine is used, splitting edges of the figures can not be avoided. But the finer blade (small teeth) and slower cutting speed is used, less splitting will appear. Also finer blades break easier which will mean less continuous production and higher production costs.

Problems in sanding the plywood.

Too coarse glass paper, number 2 or coarser, will rip off the splitted edges even more. Carefulness when sanding, and sanding along the grain will give a better surface. But the edges of the plywood item must be rounded by sanding, because they are very sensitive to thrusts. This requires a lot of work but will also give the items a more attractive look.

Problems in painting the plywood.

The plywood is very absorbant which makes the painting difficult. The paint used is an acrylic water based paint (Paragon), and it is absorbed by the wood. This paint is commonly used in the handicraft communities for painting wood carvings and decorations. It is simple to use and dilluted only with water. Many layers must be applied with this paint to get a smooth surface. Still the paint is cheap (800 - 1.000 ₱/kg). It will be expensive to use this paint because of the many layers that give more work and higher paint consumption. The paint is difficult to apply with brush and gives stripes after the hairs. A final layer of varnish will secure the surface against wearing and dirt.

Recommendations.

1. Carefulness has to be taken when selecting the plywood sheets to get the best qualities suitable for production of toys.

2. Cutting should be made by a fine blade and high

speed (when using electric jig saw). Push slowly the workpiece through the saw to avoid unnecessary splitting of the edges.

3. Apply a waterbased filler (plamir) before sanding the workpiece. It can be applied by spatula or by brush if dilluted with little water. Found in Denpasar to a price of 800 Rp/kg. If applied by brush it may have to be done two times if not all holes are filled with the first layer. No sanding is necessary in between the two layers.

4. Sanding with fine glasspaper, no. 0 to no. 1, will give the smoothest result with less scratches. A lot of time must be spent to make the edges round and smooth, to make the product more attractive and to hide the coarse raw material underneath.

5. The workpiece can be off dusted with a damp cloth before applying the paint. Applying paint with spray painting will give a better surface than by brush, but must be better tested before final recommendation is given. Detail painting must be done by brush in any case. The final layer of farnish can also be done by spray painting.

Since plywood is a difficult but economical material to work with, we will try to continue this work by designing products specially suitable for plywood.

9. Shipbuilding at Telaga Biru, Madura.

The present launching system at Telaga Biru is expensive and dangerous. Expensive because it takes a long time, sometimes 1 - 2 months, and involves many employees. Dangerous because of the long launching time, the weather can get bad when the boat is half way to the sea.

Suggestion.

A concrete platform (1) can be erected as in figure 1 on the beach, with enough distance from the tidal water. The concrete platform should be steel reinforced with piles support (2) to avoid cracking or sinking of the concrete platform. The ship can be built in a wooden cradle (3) that will support the ship during building and transport to the sea. Under the wooden cradle, rollers are fitted permanently in the concrete platform, or temporary down to the water (5). The temporary roller track can be moved between the erection sites (A, B, C) when launching is planned. With this system, launching can be made in one day. The cradle (3) will follow the boat until floating and then reused for a new boat building. The function of the cradle is to support the boat during launching and make the rolling risk free.

Design of the Boats at Telaga Biru.

The hulls of the boat have a good proportional design, but the deck houses are over dimensioned (Fig. 3.1) and can give a good hull a bad seaworthiness.

For security there are several reasons not to

Boat building at Telaga Biru

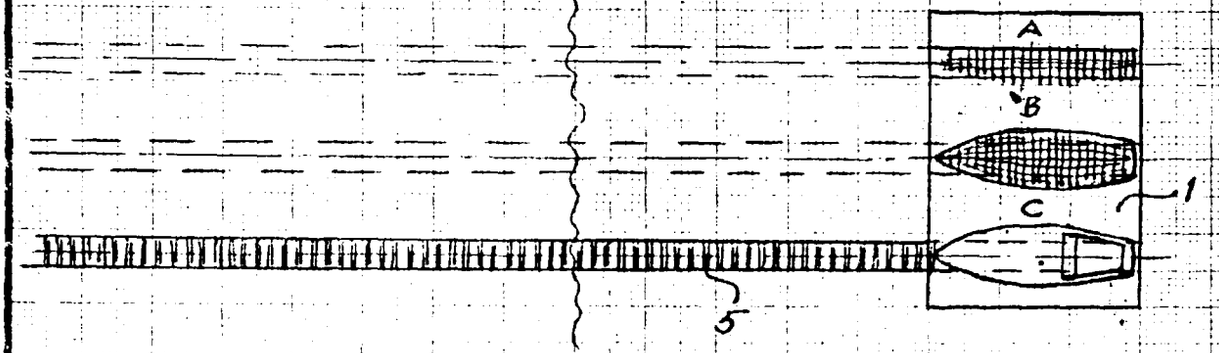
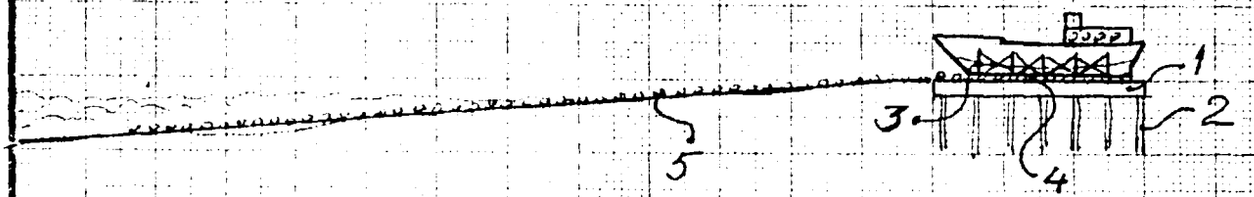


FIG 1 Skala 1:1000



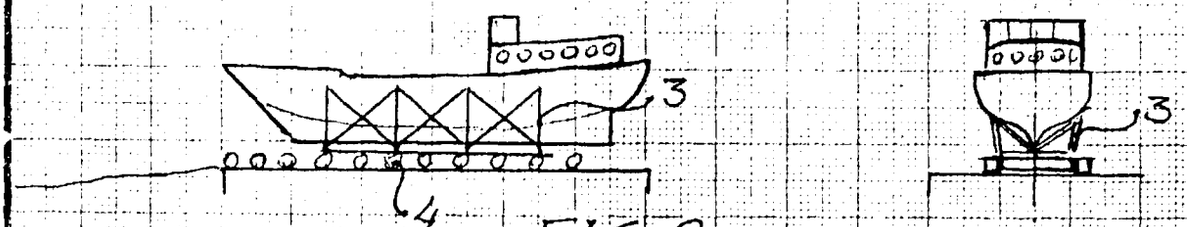


FIG 2

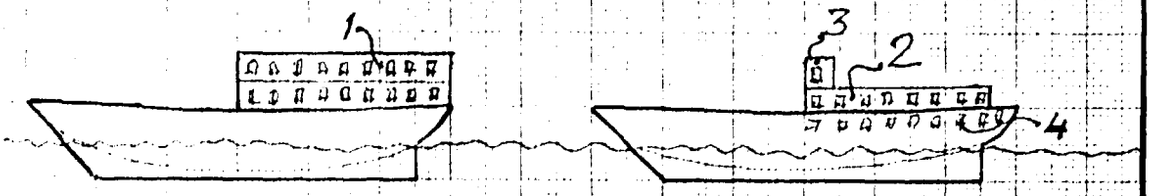


FIG 3

build a too big deck houses:

a. It can encourage to store too much cargo and passengers in the deck house, and that will endanger the boat stability.

b. The big deck house will catch wind, water, that makes the boat difficult to manouvre.

c. There should be a deck gang way all around the railing to enable the handling hawsers and rescuing material to improve the security of the boat.

Suggestions.

Make the deck house as low as possible (Fig. 3.2) and make extra cabins for passengers below deck. The captain bridge (3) can be made higher than the deck house to improve the all around sight. This type of boat may be slightly more expensive since the hull will contain cabins, but the security will be greatly improved.

If there is any further interest in this matter, we will look deeper into the problems and give advice accordingly.

10. CSF - UPT Program.

The Departemen Perindustrian has a technical extension program which aims to give service to the entrepreneurs in the field. This includes technical advisors (extension technicians or TPL, and common service facilities CSF or UPT. A CSF-UPT is a service workshop placed

in the centre of a cluster aimed to service the cluster with common or special needs. At present these workshops are equipped and runned by the government. In a CSF-UPT there is a manager to take economical and technical responsibilities and operators to operate the machines. There are claims that the program does not suit the needs and that the service is under-utilized.

We have looked into this problem to find the reason why, and how to overcome the obstacles. The task is difficult and there are many different sides of the matter.

a. A general distrust between the private sector and the government (which is completely normal) hinders an easy going relation.

b. The CSF management has not got sufficient funds for running the workshop in a competitive manner.

c. The operators are not able to solve the practical problems and service the entrepreneur.

d. The machines are not selected due to the needs of the cluster, or a repetition of what is already available in the cluster.

What is the reason for these obstacles?

e. The aim of the project was not properly clarified before the project started.

f. The officers selected to manage and run a workshop do not have the necessary qualifications

of running a service workshop.

g. Too little funds were located for software and operators to reach enough quality in the work.

h. Too little funds were located for running costs of the workshops (working capital does hardly exist) and the necessary immediate needs have to be covered by the entrepreneur.

Regarding distrust, economy and employment we can only give advice, and we have done so. To understand the needs of the entrepreneurs we have made extensive interviews in the clusters, LIK Sidoarjo and Ngingas Waru.

Result:

In LIK Sidoarjo the need is clear to pinpoint much due to that it is more basic. Few machines are available in the cluster. The industries are also similar which means that they need the same type of equipment. We specified a machinery list for the metal CSF as follows. The machines marked with (i) is already purchased and installed.

1 Copy milling machine.
1 Sheet metal shear 2000 x 3 mm
1 Sheet metal nibbling machine 1000 mm
1 Manual box & pan folding machine 1000 x 2 mm (i)
1 Lathe machine Ø 600 x 2000 mm (i)
1 Exenter press 20 tons
1 Mobile crane 1 ton (i)
1 Hardening kiln 50 litres, 900% (i)
1 Manual Press 5 tons

2 Polishing machines 3 Hp
1 Bulging Lathe Ø 300 mm
1 Sheet edge rolling machine
1 Arc welding unit 400 Amp
1 Radial Drilling machine 600 x Ø 50 mm
1 Milling machine medium universal
1 Plastic injection moulding machine

To find the reasons for the low utilizations of the Waru Ngingas UPT, we have made a brief interview among some 15 entrepreneurs. The target was to find what general problems the entrepreneur faces in his daily work. The questions regarded raw material availability, raw material price and supplier, size of industry and sale, production problems, economical status and future perspective. Out of these findings we could also see what service he needs to run his enterprise efficiently.

Regarding service needed in his production can be analized as follows:

Since the facilities in the village is very good regarding general machines, it is therefore more important to supply for more special needs. At many industries pressing operations is the main works and is done by lever presses. The pressing force is the limit in these machines, which means limit in size and weight of the pressed products. It is therefore essential to have presses in the UPT that can be used by all the members of the community. Many industries are engaged in manufacture of steel brackets, bolts and similar items for the building industry. A threading machine at the UPT would be a great support to these manufacturers. Many entrepreneurs produce parts for bicycles, motorcycles and cars, which

are often electroplated. The store room is big enough for an electroplating unit preferably for zink, crome and nickel. The tanks and some of the equipment can be locally made, to reduce the price. Additionally to this surface treatment unit there should be a drum grinder and paint spraying unit with compressor.

List of proposed machines for UPT Waru Ngingas.

1 Exentric press 15 tons
1 Hydraulic press 150 tons
1 Threading machine max 1" thread
1 Electroplating unit for crome, zink and nickel (i)
1 Drum grinder Ø 600 x 600 mm electric powered
1 Paint spraying unit with 200 lt/min air compressor.

11. TPL - the field technical advisor.

The basic idea of the TPL is very good. They are the government field advisors, available in the field when the entrepreneurs need help. The practical introduction of the TPL has been difficult, and the practical result of their presence is small. To improve this advisory program drastically the only solution is to bring more competence to the field by upgrading the TPLs by real industrial training and to comply more senior engineering staff. This senior engineers could be situated in each district office, caring and guiding the TPL in his work. He should also go into the field whenever needed to deal with more difficult problems. At present there are 260 TPLs in East Java but few of them have any practical experience from the industry. The problem is simply that to compete with the private sec-

tor about the workforce, the salaries must also be the same.

12. Recommended future actions to Departemen Perindustrian central and local administrations and other bodies concerned.

We feel that there must be a limitation in the present program due to limited resources in funds and personnell, to achieve a better result in the activities. We base our recommendations on the present set up of personnell and availability of funds, but certain improvements must be reached in order to succeed with the following recommended work.

1. Technical advices in selected sectors.

a. There are sectors where we have greater possibility of progress. Where we will reach more entrepreneurs and have a greater influence. This is very important in view of the BIPIK's limited capacity. We find the following sectors in East Java receptible of technical advices: Ceramic, suitcase, leather tanning, brass-aluminium casting, furniture, shoe making and blacksmithing. In these sectors, often referred to as basic industries, we wish to increase our activities.

b. We wish to support the "New projects possibilities program" but with emphasize of the sectors described in (a). It doesn't mean that we can not support general new projects, but we feel that it will take unreasonable efforts if it is not in connection with

our work in the specific sectors.

c. Training of officers, co-operative members and entrepreneurs.

BIPIK must have the role as organizer of training in technical, managerial and economical matters, and should specially care for the technical training preferably related to the selected sectors. We can initiate courses and training programs but BIPIK must take the responsibility of co-ordinating such training with all bodies concerned. We should be prepared to have lectures and demonstrations within their knowledge mainly technically but can not act as an executor.

d. The information centre.

The information centre is of special interest for entrepreneurial development. UNIDO can provide literature in specific subjects relating to developing countries. We can also assist in selection of books locally availableto well suit the needs in the selected sectors. This is very important for the efficiency of an information centre, but still we have not been consulted and we feel that we interfere by offering our support. Efforts must also be made to get the clients to the information centre, otherwise it will just be a copy of the Kanwil library that is very idle.

e. Marketing role of UNIDO.

UNIDO is too limited in marketing support to the entrepreneurs, and that problem tends often to overshadow all other problems. UNIDO can and should act on the basic level, how to increase sale, get products more known, etc., but our personnell is too limited and can not manage the present situation. We need a specialist posted in our province working specially with marketing problems.

f. Support to the co-operatives.

The co-operatives are closely involved in entrepreneurial problems in the clusters. Often it is a good way to reach many entrepreneurs via the co-operatives. Unfortunately the co-operative members seem to have the right to government support in advance of the other entrepreneurs. In a cluster where active members are few, it causes disturbances. We wish to get means of reaching the whole community to give them the greatest effect of our work. UNIDO has no ways of interacting in this matter. We feel that the rules of the co-operations does not fit these production units well, and a greater independence from the government would be an improvement to attract more members of the clusters. If well organized the co-operatives are an excellent media via which BIPIK/UNIDO can work.

g. Technical advices to the entrepreneurs.

Advice to individual entrepreneurs can be done, but preferably it should gain the commu-

nity. The competition situation in the clusters is hard and therefore advices should mainly be given collectively by circulars, lectures or practical showings at the UPT or in the co-operative meeting hall. BIPIK members should join UNIDO so they can follow up what is done and care for the future relations with the entrepreneurs.

2. UPT Program and Pilot projects.

To improve the present UPT program we recommend the following:

a. Studies of the clusters.

To have a proper ground for decision taking, studies in the production centres (clusters) should be carried out before any further hardware investments are done.

b. To make a workshop fully utilized a lot of costs are not considered. For a small workshop in Indonesia we judge the cost for a workshop to be divided in three equal parts, for a five year period. Of course this balance varies greatly due to type of industry and must be seen as approximate.

I. Cost of personnell
II. Cost of consumerable goods.
III. Investment in machinery.

In the present situation only III is

cared for, but not in an economical manner.

I. Cost of personnell.

To get qualified to the UPT workshops is an expensive affair, since the government must compete about the workforce available on the open market with the private enterprises. The UPT must also compete with the private workshops in their services, which means that they can not manage with less qualified personell. We can contribute with training of operators, but we feel that the services given must be more basic, to enable BIPIK/UNIDO to upgrade the operators, than what is now intended. Production from the UPT should not compete with the cluster but give service of their special needs. General/standard set ups of UPTs should be avoided. A formula for employment should be introduced and UNIDO can assist in this matter.

II. Cost of consumerable goods.

As consumerable goods can be mentioned: raw materials, handtools, tools for machineries, petrol, chemicals etc. This matter is left more or less without attention, and without these essentials the workshop can not run. The main problem for an entrepreneur when he approaches the UPT about a work, is that no raw materials are available and he is adviced to go to Surabaya to buy the material.

That is an expensive affair for him and he is likely to go to any of his friends in the cluster who can help him with both material and machining. UNIDO can assist in selection of such raw material, but it must be classified that money should be allocated for this purpose in the budget. This is also the reason we recommend that the services from the UPT should be limited to the preliminary needs of the cluster, otherwise the costs will run out of control.

III. Investment of machinery.

This is the part best cared for in the UPT program. We have been involved in selection of these machines and they will work well in the future. More consultations between the entrepreneurs and government officers are called for, to make the UPTs better suit the needs. We think that entrepreneurs could be more directly involved and responsible of the selection. At present the machines selected by the government officers are overpriced and not up to quality or functions of the needs. This hampers the functions of the UPT and quickly drains the budget. The source of entrepreneurial knowledge is mainly not utilized. We want to advice but have limited means of persuading in this matter.

c. Workshop Designs.

UNIDO can continue the support of Workshop

Design, Much improvements can be done here, since the workshop rooms are often not well planned and will create problems once in production. The locating of the UPT workshops should be done with greater care in the future, centrally in the cluster to be easily available to as many entrepreneurs as possible. The ground for these UPTs placed in centre of the clusters will be more expensive than in margins, but it will pay in the long run.

d. Running instructions.

Running instructions and other advices how to run and maintain the machineries should be a natural task of BIPIK/UNIDO as well as all other technical advices needed to run the UPT workshops in a proper manner.

e. Pilot projects.

Pilot projects regarding new techniques, production methodes can be encouraged by BIPIK/UNIDO. Here we think that we can achieve the greatest impact on the entrepreneurs and it will help many. A pilot project should be a unit which can easily be copied by other entrepreneurs using local available techniques, raw materials and skills. If this goal can not be reached the pilot project will have a limited effect. In the case of East Java we can mention the pilot project in casting, were we first built a furnace for melting non ferrous metals and continued by trying better techniques for casting. It is important that a

pilot project is geared to a certain community that can take the responsibility of running and maintaining of the unit. The government should not be involved in that matter. A correct formula for purchasing, erection and running these pilot productions should be established, and UNIDO can assist in that matter. We suggest that they will be runned under the guidance of the entrepreneurs formed in kelompoks, co-operations or other bodies.

13. Subcontracting program.

Subcontracting projects are not one small industry projects but involve just as much the big and medium scale industries. For that reason we wish to put sub contracting under a special chapter. We believe that subcontracting intermediation works by a body must be done with special care to be successful. For the entrepreneurs to give out themselves or their production ideas certain performance of this body is required. We call this body a subcontracting office.

1. The subcontracting office must be neutral and not have any economical links with either individual companies or with the government.

2. When collecting information about companies and their production ideas, this information must be confidential to avoid mistrust.

3. The intermediation service should be commission free, in order to treat the clients equally re-

gardless of their economical situation and to avoid an interfering competition. The funds must be enough for the salaries as well as facilities to avoid any transaction interference from the staff and to enable the office to act in a neutral manner, not via contacts, but via mass media and circulars.

4. The office can mediate between the two parties in settling differences but can not involve itself in the agreements or as a part there of.

5. The main function of the office should be to encourage entrepreneurs to bring their ideas forward, to suggest selection of suitable partners and to act as a mediator between them to reach a sub-contracting agreement. To make the forming of such office possible, we feel that there must be a mixture of personnell from different sectors, to reach a kind of self control on the activity. Such people should come from Industrial Department, private sector or international bodies. The funding, which is important for the decision taking should be condition free is suggested to be a mix of governmental-international fundings. Governing of such office is also suggested to be condition free and therefore not to be governed by local authorities, but directly under Industrial Department Jakarta. It should be noticed that this is not a pure small industrial project but involves as well the big industry and the efforts from the office must be equally divided.

Up to now the contacts between big and small industry is generally taken without any outside support. We believe that a good acting sub-contracting office can have a tremendous effect on the industrial development of East Java. Based on the existing experience from the BIPIK Bapak-angkat program we think that a good continuation can follow by creating this independent sub-contracting office.

Surabaya, 3 December 1984

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UNIDO