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AN EX-POST EVALUATION OF CRUMB RUBBER FACTORIES IN INDONESIA

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MINISTRY OF OVERSEAS DEVELOPMENT
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PREFACE

Each year the Overseas Development Administration (ODA) commissions a number of ex-post evaluation studies with two aims in mind; firstly, to assess the effectiveness of its aid activities and secondly, to learn lessons for improving the effectiveness of future aid activities.

This evaluation is one such study.

Evaluation studies are undertaken by individuals or by teams especially recruited for their particular knowledge with regard to the subject under study. Sometimes these teams will include personnel from ODA (increasingly teams are a mix of ODA and external personnel).

In all cases the reports and conclusions are attributable to the authors, who are finally responsible for their contents, and not to ODA.

Evaluation Unit
Manpower and Evaluation Department

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LIST OF ABBREVIATIONS with notes on raw materials and products

1. Rubber

SR synthetic rubber

NR natural rubber: all of the following are natural rubbers:-

RSS ribbed smoked sheet; sometimes known as conventional rubber, and graded RSS1, 2, 3, 4, 5 downward

CR crumb rubber, intended to replace RSS in the rubber market; initiated by Malaysia and subsequently followed by Indonesia, Thailand, Sri Lanka etc

SMR Standard Malaysian Rubber. This is crumb rubber (CR) and is graded SMR 5, 10, 20 etc downward. Usually fetches the top price for CR over other CRs

SIR Standard Indonesian Rubber. This is crumb rubber (CR), graded (downward) SIR 5L, 5, 10, 20, 35, 50. This type of rubber was introduced, following the Malaysian example, to replace RSS and to fetch higher prices than RSS. SIR now accounts for 40% of Indonesian rubber exports, but SIR prices have always been lower than the price of RSS1.

CL Concentrated or centrifuged latex

Rubber Products - At least 25 grades of natural rubber (NR) are marketed in Indonesia. These include 5 grades of RSS, 4 or SIR, 3 of Thin Pale Crepe, 3 of Brown Crepe, 3 of Blanket Crepe, 2 of Cuttings, as well as CL, Cream Latex and others. Probably all of these except SIR could be called conventional rubbers or traditional rubbers. CR is often called technically specified rubber. There are other types of CR (such as the chemico-mechanical types processed with castor oil) which are not mentioned in this report.

Raw Materials - These are (1) field latex, 80% of the total; (2) cup lump, 20% of the total, and (3) tree lace, less than 1% of the total rubber. The proportion of field latex can be increased up to about 94% by having a second collection per day but this is expensive.

Field latex is the white liquid which is tapped from the rubber tree in the morning hours into a cup from which it is collected at midday and sent after weighing immediately to the factory for coagulation. It can be adulterated with rain, added water, dust, twigs, flies etc.

Cup lump is the field latex which has dripped into the collecting cup during the remaining hours of the day and night after collection and coagulates in the cup overnight to form a hard lump in the bottom of the cup. This is collected in the morning before the tree is freshly tapped. It can be contaminated probably to a greater extent than the liquid latex as just mentioned because it is longer in the cup.

Tree lace is field latex which has coagulated overnight on the tree along the path of the drip into the collecting cup. It too is ripped off in the morning before the tree is tapped. It forms a tiny part of the total raw material.

2. Institutions, organisations etc

ODM Ministry of Overseas Development

EPS Economic Planning Staff (within ODM)

SEADD South East Asia Development Division

TPI Tropical Products Institute

IBRD International Bank for Reconstruction and Development (ie the World Bank)

IDA International Development Agency

RRIM Rubber Research Institute of Malaysia

BULOG Badan Urusan Logistik, which translates as Board of Management of Logistics

PNP Perusahaan Negara Perkebunan, roughly translates as National Organisation of Estates, or State Enterprise of Estates. There are about 30 of these numbered from 1 to 30, hence PNPII, PNPIII etc as in this report. Each PNP is responsible for a number of estates; the number varies, as does the size of each estate, and the types of product. Many of the PNPs have been recently transferred, in part, to the private sector under the title PTP, in an attempt to attract new capital. The State however still retains the majority share.

AN EX-POST EVALUATION OF CRUMB RUBBER FACTORIES IN INDONESIA

TERMS OF REFERENCE

This study was commissioned by the Ministry of Overseas Development (ODM). It was carried out by G Flynn of the Tropical Products Institute in conjunction with the Government of Indonesia and with the assistance of counterpart officers appointed by the Government.

The terms of reference were "To carry out an evaluation of the ODA-financed Indonesia crumb rubber project in order to compare the actual results and up-dated forecasts with those envisaged at the original time of appraisal. The evaluation should be carried out embodying social cost benefit techniques but a commercial study may also be undertaken".

The principal questions which the ex-post evaluation seeks to answer are (1) has the project been a success or failure and (2) what were the reasons for success or failure? Within this context the Ministry is particularly concerned to have answers to specific questions such as:-

1. During the implementation phase, how the building of the factories and the out turn costs compared with the original appraisal.

2. During the running phase, how the operation of the factory compared with the appraisal.

3. What benefits were achieved in terms of the price and quality of the product compared with the appraisal.

4. In the future, how the expected rates of return compare with the appraisal.

5. The appropriateness of the technology chosen, the consideration of alternative technology, the feasibility of the use of more labour-intensive technologies with insignificant loss of benefit.

6. The scale of operations and its appropriateness.

7. Optimum siting of plant in relation to the location of rubber trees.

8. The supply of raw materials.

9. The markets for products.

10. Effects of the project on rural development, employment, income distribution etc.

It is clear that a study of considerable scope and depth was intended and it was perhaps inevitable that not all of the expectations could be realised. Moreover, a basic assumption during the formulation of the project was that the existing RSS facilities (which the crumb rubber factories were intended to replace) had in fact been replaced. In the event this was not so, and RSS plant was still being used. The objective of the evaluation therefore needed to be changed from a straightforward NPV estimation of crumb rubber factories only to the "contribution approach" which would look at both RSS plant and CR plant in juxtaposition. However, the fieldwork for the project was not geared to this end.

SUMMARY AND COMMENTS

1. The project

Crumb rubber (CR) was introduced into the rubber industry in Indonesia in a two phase programme. In the first phase most of the British Aid was spent to establish ten CR factories in the private sector in conjunction with the establishment of ten CR factories by the French Government in 1968-69[1]. The second phase was designed to introduce CR factories to the public sector, to the state-owned PNPs.[2] It is this second phase which is evaluated here, and no account has been taken of the first phase.

Several stages were envisaged for this second-phase project and many PNPs were surveyed. Three PNPs were selected for the first stage. Further developments saw the entry of other PNPs to the programme while some of those already in opted out. Finally it was decided that in the first stage (and possibly the only stage) of the project five PNPs should receive eight factories. This was later modified to seven factories when two of them were telescoped into one bigger one. The five PNPs were PNPII, to receive two factories, PNPIII one factory (originally two), PNPX one factory, PNPXI two factories and PNPXXVI one factory.

Five of the aid-established factories were visited in Indonesia in December 1974 and January 1975. These were Tanjung Garbus and Basilam at PNPII in North Sumatra, Membang Muda at PNPIII in North Sumatra, Sukamaju at PNPXI in West Java, and Kalirejo at PNPXXVI in East Java. Location maps are to be found in the chapters dealing with each factory. Counterpart officers were assigned to the author by the Indonesian Government for each factory visit. An itinerary is appended.

2. The aims of the project

These second-phase crumb rubber factories were to extend the first-phase programme from the private sector into the public sector of the economy and to continue the aims of the first phase, namely to re-constitute and upgrade

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References listed at the end of the report are superscripted thus [1] in the text

the Indonesian rubber industry, to make its products more acceptable on the world market and by marketing higher grade products to earn a premium for them over the old products. More specifically the aims[2] of this second-phase project were (1) to replace traditional processing facilities which were in no case less than 30 years old, (2) to satisfy the expected demands of the market which would increasingly require the production of technically specified rubbers, ie crumb rubbers; (3) to process good quality latex and cup lump in crumb rubber factories and any residue in existing traditional facilities which would also serve as standby equipment and (4) to produce mostly high grade SIR5H or 5H (light) from field latex and SIR5H or 5M from cup lump.

3. The outcome

None of the expectations for this second-phase project were realised for reasons which neither the Indonesian nor British Governments could have foreseen at the time. Some of the aims of the first-phase programme were realised. These are only briefly introduced here as a means of gauging the second-phase performance.

Two of these second-phase factories have been closed down and will be re-located. The remainder, with one exception, are working well below capacity so that only 45 per cent of the total installed capacity is now utilised. The five factories visited contribute less than 1 per cent of total Indonesian rubber exports and a little more than 2 per cent of crumb rubber exports. They have contributed practically nothing toward upgrading the quality of products of the rubber industry up to the present although they might well have made a major contribution toward quality improvement if they had been installed in the smallholder sector. The traditional facilities have not been replaced as expected, rather they have maintained a prominent role as processing units. The technically specified rubbers have not yet superseded the traditional rubbers in world demand although in Indonesia they now lead as a percentage of total exports. The fourth objective of processing mostly high grade CR from field latex has not been achieved because demand for crumb rubber made from good quality latex has been poor. The expectation that SIR5 could be made from cup lump has not been realised at all and can only be described as naive.

In total this description of the outcome is very gloomy, but this gloom is dispelled in part by analysis. The project as it turns out was launched just ahead of a very bad period for Western economies, a period which probably slowed the working out of project expectations and this evaluation may in any case have been attempted prematurely. In the circumstances only an attempted evaluation of past performance is possible but not all of the required answers are available. The future remains as obscure as ever and the question of success or failure of this project must still remain an open one.

Three major reasons for the outcome are identified:- firstly, continuing market preference for RSS1 over crumb rubber coupled with the failure of producers to recognise the difficulties of marketing a new product; secondly, price interaction between RSS and CR; and thirdly, the depressed state of world economies and the oil price explosion in 1973-74 resulting in a motor-industry slump and a fall in the demand for rubber.

The project has been faced therefore with the unexpected outcome of higher prices for RSS than for CR, processing costs for RSS equal or possibly lower than for CR and equal raw material costs. It is assumed initially that CR plant would replace existing RSS plant. In fact there has been continuing use of RSS plant, sometimes with partial new equipment, alongside CR plant. Given the actual cost and product price situation it can be argued that the investment in new CR plant operating alongside existing RSS plant was not economic. Moreover, since the original assumption that investment costs for new RSS plant would be higher than for new CR plant is doubtful it can also be argued that investment in new CR plant as an alternative to RSS plant where no processing facilities existed was uneconomic.

However, the questions which remain unanswered could turn this assessment into one at least of marginal success. These relate to possible benefit flows from (1) improvements made to smallholder rubber in the past and those intended in pending projects and (2) other political and economic gains as yet unidentified. At the same time it should be pointed out that these benefits might be offset by others foregone in the smallholder sector and/or with other types of project such as palm oil, tea, cocoa, and sugar.

Above all the success of the project must depend on what happens to crumb rubber in the future. It is obviously making inroads into the natural rubber market and may one day exceed RSS in both price and quantity. The final project evaluation may have to wait at least until trends become more firmly established.

4. Onshore costs and project implementation

All of the factories built were satisfactorily set up and commissioned in 1 year with the exception of Kalirejo. In this case a new factory building was needed and was completed satisfactorily in 18 months in a fairly remote location. Some delay in starting this factory may have been due to the withdrawal of PNPXVIII from the Aid programme and the substitution of PNPXXVI. The other four factories were housed, as was expected in estimates,(1) in existing buildings requiring modification. The estimates(1) of these onshore or local costs were £38,000 per plant. This compares with the realised figures of £13,000 for Basilam, £34,000 for Sukamaju, £42,000 for Tanjung Garbus and a very high £91,000 at Membang Muda. Unfortunately details of the costs are not available, and therefore inflation effects cannot be observed. These costs were borne by the Indonesian Government.

5. Offshore costs

Investigation in this area proved to be very unsatisfactory for technical reasons. Part of the problem was that Indonesian figures are not itemised and may include other expenditures which would explain discrepancies between estimates and actual expenditure. The estimates indicate that a total of £463,128 was earmarked for the project and the details as known are given on page 2 .

6. Choice of technology

There was considerable controversy about the adequacy of the equipment chosen for this project, and therefore the question looked at here was whether better choices could have been made at the time. The answer given here is 'no', with a qualification that a more careful examination could have been made of performance in first-phase factories and elsewhere before proceeding with the second phase. Such controversies about the best technology are quite common and are frequently never resolved.

7. Crumb rubber processing

The process is still relatively new and many improvements can be made. The critical areas are fuel consumption, drying of rubber, and packing. In view of the very high world prices for oil, economies in domestic oil usage are desirable, especially since border prices for diesel oil are now more than twice domestic prices. There appears to be some confusion as to which type of oil to use in diesel engines and for driers. This problem should be studied more carefully. In the case of rubber drying the principles of drying seem to be inadequately understood. An expert in drying techniques could probably indicate many areas where economies could be achieved.

8. Technology levels

It became apparent that the technological demands made by the CR equipment on the work force were greater than could be handled with ease, even after four years. In some cases the opinion was voiced that a lower level of technology, at least at some points in the process line, eg manual control of driers, would be preferable in view of the capability to the work force available. One cannot agree that a lower level would be advisable: rather greater efforts should be made to ensure adequate and continuing training.

9. Spares

The availability of spares, the quality of those carried and the quantity which should be carried by any enterprise are three questions which ought to receive more attention.

10. Packing

Packing costs have turned out to be a major concern in costs. Timber has had to be imported over long distances for this purpose, at a time when there was a thriving export market for tropical timbers. Again this aspect ought to have received more attention. The problem of construction of crates could be a serious one. The recommendations for crate making as laid out in the official circular(4) are not being applied, and even these are now improved on by research in Malaysia. Alternative methods of packing ought to be investigated including containerisation and the use of materials other than timber which is now very expensive in the world market.

11. Industrial extension services

One of the more general problems encountered is the relatively low level of technological expertise in certain areas. This is more acute in remote regions where mechanical skills and knowledge of the metallurgical requirements for particular purposes are scarce, and the maintenance problem involves despatching machinery up to hundreds of miles for repairs. Industrial extension services involving travelling experts, resident instructors, 'summer schools' and technical schools in the local towns are becoming increasingly necessary as industrialisation proceeds. Further aspects of this are the holding of seminars at a higher level, the encouragement of free discussion between technologists in the public and private sectors as well as the collection and dissemination of empirical knowledge throughout Indonesia.

12. Other TA projects

An earlier TA project on rubber in Indonesia was concerned with the introduction of and establishment of quality control laboratories for crumb rubber(5). This project was obviously fundamental to the success of the CR factory project and still plays a continuing and vitally important role.

CHAPTER 1

OUTLINE OF THE PROJECT

1. The aims of the crumb rubber (CR) programme

Prior to 1969 the quality of Indonesian rubber was very low compared with rubber from other countries, especially Malaysia. Only ribbed smoked sheet (RSS)1 could be said to be comparable. The quality of smallholder rubber was especially low, the highest grade in this sector usually being RSS3. Only conventional rubber was produced in those days although Malaysia was already exporting CR in volume. Processing facilities (smoke houses etc) in Indonesia were old and in poor condition. The economic condition of the country itself, at least up to 1968, was very poor but by 1969 had begun to improve and of course economic conditions in the western world were much better than now.

In 1969 the government of the day decided that the rubber industry should be rejuvenated and put on a sound footing. To do this it was felt that new ways of processing should be introduced rather than that technologically obsolete equipment should be improved and after seeing the Guthrie-Pullen equipment (Chapter 4) it was decided that the new process should be the Guthrie-Pullen crumb rubber process.

In 1965 Malaysia had started to export crumb rubber in volume and by 1969 they had a 4 year start over Indonesia. The Malaysian experience had shown that the new product improved quality, that the market was now accepting it and higher revenues could be earned with it. Because of the poor state of the industry in Indonesia, the generally low level of the economy and the 4 year lead which Malaysia had now gained it was decided to introduce once again the concept of the 'crash programme' in order to overcome these handicaps. The 'crash programme' in order to overcome these handicaps. The 'crash programme' has been a favourite development technique in Indonesia. About 8 to 10 million people were engaged in the industry and this was a very important consideration. It was decided that the industry should be made a source of secure employment and of further employment

opportunities. In the smallholder sector the industry was a family concern and it was important that this sector should be improved and protected. An intrinsic part of this programme was that local entrepreneurs should be given every encouragement.

In 1969 rubber was still Indonesia's most important commodity with foreign exchange earnings higher than those from oil. The feeling was that even more foreign exchange could be earned by exporting more rubber in the form of crumb rubber, which was expected to earn a premium over the traditional RSS rubbers.

Finally, by following the Malaysian example in producing CR, Indonesia would be able to meet consumer requirements and therefore Indonesian rubber would become more attractive on the world market.

In summary therefore the aims of the CR programme were:-

(1) to upgrade quality
(2) to make the rubber industry a source of secure and more employment
(3) to encourage local entrepreneurs
(4) to earn more foreign exchange by exporting more rubber at a premium over RSS rubbers.
(5) to give consumer satisfaction.

2. The first phase of the CR programme

The programme was launched in two separate phases. Firstly in 1969 in the private sector 20 factories were installed: 10 Promoci plants given by France and 10 Guthrie-Pullen plants given by the United Kingdom[1]. Prior to this the private sector had been asked by government to come into the crumb rubber industry but they were reluctant to do so.

The first 20 Aid-financed factories really pushed the private sector into the industry. This had very important psychological and social effects. It is admitted that some of the initial plants were not successful but this was seen as a possibility at the time and accepted as a necessary cost of development. It was also a necessary part of the project to encourage indigenous entrepreneurs.

Indonesia is satisfied that the conservative approach should not have been followed in this case and that the 'crash programme' was absolutely necessary in order to cut into the vicious circle of underdevelopment.

3. The second phase of the CR programme

After this initial success in building confidence some government-owned estates (PNPs) wanted to enter the industry and made approaches through the Department of Agriculture. This gave rise to the second phase of Aid with which we are now concerned here.

Two or more stages of implementation within the second phase were envisaged, the first stage to involve those PNPs immediately suitable for CR plants, while other PNPs would be chosen later. The Ministry of Overseas Development (ODM) requested a preliminary survey of PNPs I, II, III, IV, X, XI and XVIII and as a result of this survey PNPs III, X and XI were selected as immediately suitable(2). PNPs I and XVIII would be included in the second stage while PNPs II and IV were excluded for the time being on the grounds that the Dutch and IDA respectively were currently providing technical assistance or appraisal missions. Dutch involvement in PNPII eventually terminated and PNPII was then brought into the first stage. At that point the recommendations for CR plant stood as follows: PNPII, two CR plants of 300 and 100 tons per months capacity; PNPIII, two plants of 200 tons (later amended to one of 400 tons); PNPX one 300 ton plant; and PNPXI two plants of 200 and 100 tons.

Further developments followed during which PNPs XII, XIII and possibly others were considered. These together with PNPs I and XVIII eventually withdrew their applications because of the high interest rates which the Indonesian government proposed to charge. PNPXXVI was then brought into the scheme. The final arrangement, then, for the first (and now possibly the only) stage of the project was for PNPs II, III, X and XI to receive CR plants as outlined above, and for PNP XXVI to receive one 200 ton plant.

4. Aims of the second phase project

Presumably the aims of the CR programme in the private sector were to apply also to this second phase. Yet while a general analysis of the first phase of the CR programme may be possible, it is difficult to apply such analysis to this second phase of the project. Part of the justification for this project[2] argued that, (1) the new factories would replace traditional facilities which were in no case less than 30 years old; (2) the demands of the market would increasingly require the production of technically specified rubbers and therefore traditional facilities would be ruled out; (3) the good quality latex and cup lump would be processed in the crumb rubber factories and the small residue, if relevant, would be processed in traditional facilities which would also serve as standby equipment; (4) production would be almost all of high grade SIR5H or 5H (light) from field latex and SIR5H or 5M from cup lump.

In the event none of these expectations were realised for reasons which neither the Indonesian nor British governments could have foreseen at the time.

5. Fieldwork

For the purpose of this ex-post evaluation it was agreed that five of the installed factories would be studied. Those eventually decided on by the Indonesian government were Tanjung Garbus and Basilam at PNPII in North Sumatra, Membang Muda at PNPIII in North Sumatra, Sukamaju at PNPXI in West Java and Kalirejo at PNP XXVI in East Java. These five were visited by the writer between the 14 December 1974 and the 2 February 1975, accompanied by a counterpart officer assigned for each visit by the Indonesian government. A detailed itinerary is appended.

CHAPTER 2

THE OUTCOME

1. Factory performance: contribution to the rubber industry

In the light of the assumption made it must come as a surprise and disappointment that RSS has retained a price advantage thereby destroying one of the appraisal assumptions, and that it maintained a significant though decreasing share of the export market throughout the period 1970 to 1974. Crumb rubber has played a secondary role in terms of price although its share of exports has been increasing as the following table (with Figures 1 and 2) illustrates:-

RSS and CR as percentage of total rubber exports Indonesia 1970-1974

	RSS			CR			TOTAL NR
	tonnes ('000)	% of total	US$/kg	tonnes ('000)	% of total	US$/kg	tonnes ('000)
1970	346	42	33	33	4	30	827
1971	282	35	30	126	16	24	804
1972	216	27	29	292	36	20	801
1973	224	25	50	361	40	41	892
1974(1)	184	23	72	367	45	50	808

Source: Exports 1970-1974 Bank of Indonesia
Footnote: (1) Last quarter estimated

The contribution of the second-phase crumb rubber factories during this period was notsignificant. In the years 1972 and 1973 for example the five factories which were visited only produced 7,077 and 7,094 tons, a little over 2 per cent of CR exports and less than 1 per cent of total rubber exports in both years. The number of PNP owned CR factories in Indonesia starting with four in 1971 number no more than a dozen today while the total number of CR factories grew from 14 in 1969 to 85 in 1973

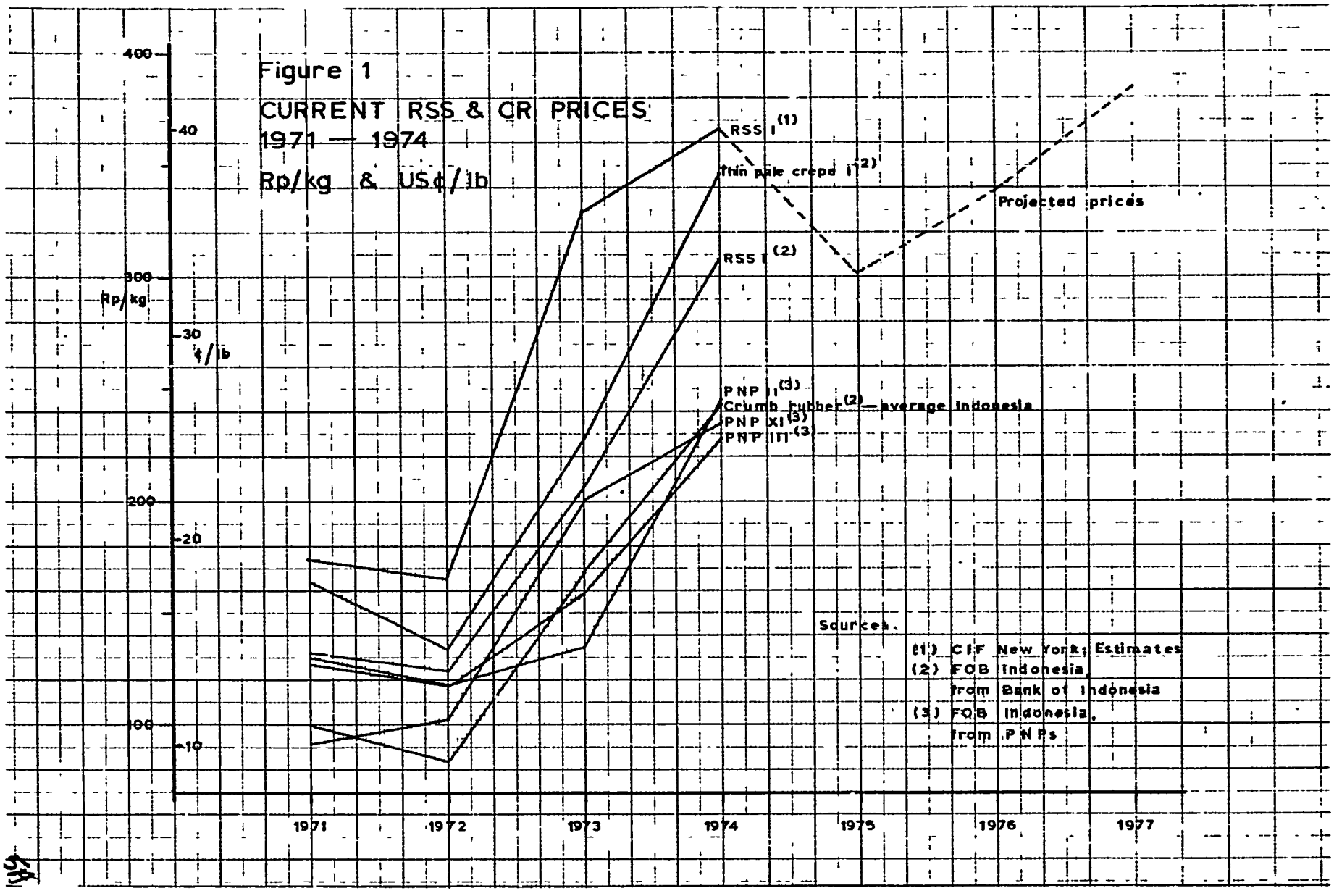
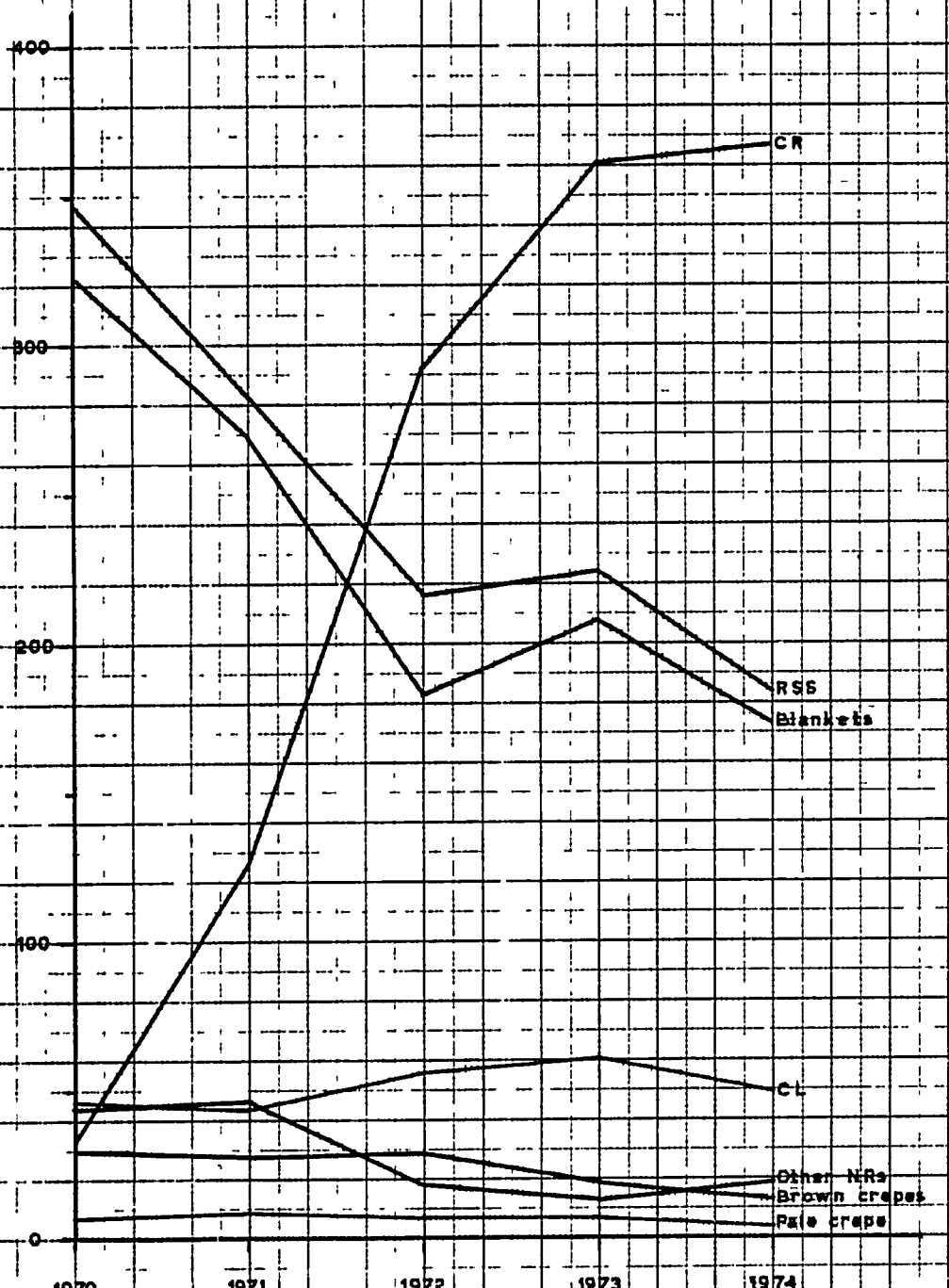


Figure 1
CURRENT RSS & CR PRICES
1971 — 1974
Rp/kg & US¢/lb
400
300
200
100
Rp/kg
40
30
20
10
¢/lb
RSS I (1)
Thin pale crepe I (2)
RSS I (2)
Projected prices
PNP II (3)
Crumb rubber (2) — average Indonesia
PNP XI (3)
PNP III (3)
1971
1972
1973
1974
1975
1976
1977
Sources.
(1) CIF New York; Estimates
(2) FOB Indonesia,
from Bank of Indonesia
(3) FOB Indonesia,
from PNPs

Figure 2

RUBBER EXPORTS — INDONESIA, 1970 - 1974

By type ('000 tonnes)



Source: Exports 1970 — 1974, Bank of Indonesia

and others have been added since then.

2. Factory performance: capacity utilised

The five factories visited have experienced varied and relatively poor performances in terms of utilised capacity. Basilam (PNPII) operated at about 50 per cent of capacity in 1971, about 90 per cent in 1972, dropping to 25 per cent in 1974. The factory ceased to operate in September of that year because of mechanical failures and lack of spares. It will now be re-located at Tanjung Garbus in line with new location policies at PNPII. Tanjung Garbus (PNPII) increased production over the period from 50 to 65 then to 78 per cent of capacity. Membang Muda (PNPIII) has cut production down to 25 per cent of capacity although formerly it was able to achieve a performance between 50 and 70 per cent. Sukamaju (PNPXI) fluctuated between 50 and 65 per cent, the policy objective for 1975 being fixed at 50 per cent. Kalirejo (PNPXXVI) started trial runs in July 1973 and went into production in January 1974. It operates at 25 per cent of capacity. One factory not visited at Tenjoresmi (PNPII) has closed down and will be re-located, while another at PNPX is said to be operating reasonably well.

In summary therefore only 45 per cent of the installed capacity of 1,600 tons is utilised. In some cases the new CR factories have on occasion been operating as standby facilities while the 30 year old traditional facilities have continued in use, some after partial re-equipment. This destroys another of the appraisal assumptions that the new CR factories would replace the old 'obsolete' plant.

3. Factory performance: running costs

The original appraisal assumed that running costs would be higher for RSS than for CR and would be increasing because of the age of the equipment. In fact the outcome is not quite like that. Running costs for both types of equipment exhibit considerable regional and inter-year variation. The following figures for CR illustrate this:-

Crumb rubber processing and packing costs 1971-1974 Rp/kg

		1971	1972	1973	1974
PNPII	Tanjung Garbus	8.4	7.3	18.9	14.9
PNPII	Basilam	10.9	12.3	16.3	n/a
PNPIII	Membang Muda	n/a	n/a	19.3	21.1
PNPXI	Sukamaju	7.0	14.6	8.4	19.2
PNPXVVI	Kalirejo	-	-	-	20.5

The principal factors in this variation are (1) remoteness which would account for higher costs in Basilam and Membang Muda, (2) maintenance costs which are not applied equally every year and account for some of the yearly variations, but, most of all, the costs of (3) fuel oil and (4) timber for packing crates. The enormous increase in costs which applied to most PNPs in 1973 is almost entirely due to the increased cost of oil while packing costs take up about a third of the total annually. The packing costs factor in particular ought to have received far greater attention in the original appraisal.

The following processing and packing costs are available for RSS (Rp/kg):-

		1971	1972	1973	1974	1975
PNPII	Tanjung Garbus	n/a	n/a	n/a	n/a	n/a
PNPIII	Bandar Pulau	n/a	n/a	8.89	11.23	18.86
PNPIII	Rantau Prapat	n/a	n/a	14.77	11.94	16.92
PNPIII	Aek Nabara	n/a	n/a	19.79	18.98	20.14
PNPXI	Sukamaju	8.0	6.7	7.7	10.4	n/a

Again the regional variation is evident but any significant difference from CR costs is absent. Packing costs in this case are not great since timber is not used, but wood in large quantities is used for fuel. Part of this fuel would be suitable for other uses and the costs of all timber have been markedly increasing. Unfortunately a suitable border price is not available. A factor of 2.0 would not be unreasonable but even after

making this adjustment the appraisal assumption of higher RSS costs does not stand up. It would be fair however to argue that the movement in oil prices which so dramatically affected CR costs could not reasonably have been foreseen.

4. Factory performance: quality of product

The SIR quality grading system was introduced into Indonesia under another Technical Assistance (TA) project[5] proved very successful. However, it is generally agreed that a second stage of more intensive application of this system should now begin.

The crumb rubber project as a whole has upgraded total rubber quality and greatly increased the acceptance of Indonesia's rubber on the world market. Within the CR grades there has been an upward shift in quality. At an early stage in the programme the majority of cup lump made SIR 35 and SIR 50 grades only. Today the SIR 35 grade has disappeared and the majority now makes SIR20 grade and in some cases on estates SIR10 grade is reached. Figure 2 on page 8 (e) shows the movements of the major types of rubber marketed. The impact of the crumb rubber programme can be clearly seen. If one ignores CL and Pale Crepe which are good quality rubbers in fairly steady production, it is clear that the other grades RSS, Blankets, Brown Crepes, Flat Bark, Cuttings and so on, have taken a significant downturn as these have been absorbed into the SIR grades. With the exception of RSS most of these lower quality grades have been processed from smallholder rubber, 'bamboo' rubbers, in other words very inferior materials, in the first-phase CR factories.

Here again the second-phase CR factories cannot make any great claims to improving quality, except insofar as (1) they have managed by experience to improve their own CR grades and (2) in some cases such as Membang Muda and Sukamaju they have processed local smallholder rubber. In fact, with their potential for producing good quality raw materials, a much better performance could reasonably be expected in some cases. More to the point the second-phase factories, if they had followed the first-phase factories into the smallholder sector, could have enhanced the quality improvement

illustrated in Figure 2 still more, so this is a contribution foregone.

Rubber manufacturers have accepted CR from any source with reserve and in fact the top CR grades SIR5 and 5L made from field latex have been far less in demand than SIR 20 and lower grades, made from cup lump. As a result field latex in Indonesia has been released to other products, concentrated latex (CL), RSS1, and Thin Pale Crepe. This destroys another of the basic assumptions of the project that the new CR factories would process the the best raw materials into high quality products and has meant amongst other things that CR equipment more suited to latex processing has had to cope with more demanding cup lump. As for cup lump it was, of course, a mistake to assume that it could be processed into the SIR 5 grades. The best that can be expected for it is SIR 10 and very careful harvesting and processing is required to achieve this. More usually it makes SIR 20 and below. The comparison between rubber grades should be seen roughly as follows:

Raw Material	CR	RSS1	Crepe	Blankets
Field latex	5,5L	1	Pale 1	
Field latex	10	2	Pale 2	
Cup lump	10	2-3	Brown 1	
Cup lump	20	3-4	Brown 2	
Cup lump	50	5	Brown 3	4

In simple terms these grades are all destined mostly for the tyre industry, while concentrated latex moves into the foam rubber and surgical goods industries where a high degree of cleanliness and quality is required. This is traditionally a French trade in Indonesia and usually has first preference over other rubbers. The market for CL and also for Pale Crepe is, however, limited and cannot absorb all the available raw material. The surplus latex will move to RSS or CR depending on which is the more profitable. Up to the present RSS has been the leading commodity, because, it is believed, of consumer inertia which is explained as follows: manufacturers' materials reception facilities have been geared to receiving RSS and a change-over to CR reception equipment is usually not made until the question of replacement arises. Many in the Western economies have now made this change, having been assured of the quality, consistency, and reliability

of the new CR product. Eastern bloc countries are still operating with the old equipment and this pattern, which is expected to continue, has been a strong factor in retarding the change-over to CR.

5. Causes of the unexpected outcome

There are perhaps three major causes of the turn about:- firstly, continuing market preference for RSS1 over CR coupled with the failure of producers to recognise the difficulties of marketing a new product; secondly, price interaction between RSS and CR; and thirdly, the depressed state of world economies following on the oil price explosion in 1973-74, resulting in a motor-industry slump and a fall in the demand for rubber.

5.1 Market preference for RSS

The table on page 6 and Figure 2 seem to illustrate a dramatic changeover to crumb rubber, but in fact rubber manufacturers as stated already have exhibited considerable inertia in acceptance of CR especially of the top grades, which might seem to indicate that they do not want first quality raw materials. One must remember also that Malaysian crumb rubbers had been marketed since 1965 and the entry barriers had by 1971 been largely broken down by them. The progress made by CR in Indonesia may be seen therefore as a 'catching up' process and to some extent it justifies the 'crash programme' technique. The rate of expansion however does not seem to match the expectancy of the original appraisal for the second-phase factories.

5.2 Price interaction between RSS and CR

It is perhaps of greater significance that the introduction of crumb rubber to the world market probably brought about some important changes in RSS marketing conditions with some feed-back effects on CR marketing. The shortening of supply of raw materials available for RSS as a result of processing CR coupled with changing production and processing costs has brought about new supply conditions for RSS resulting in a leftward shift of the RSS supply curve followed by a movement upward along the demand curve to higher price positions. This may explain in part the much

greater price increases achieved by RSS in comparison with CR.(The table on page 5, which relates only to the Indonesian situation, shows a price increase for RSS of 118% as against the CR increase of 66% from 1970 to 1974.) If this hypothesis is accepted then it would be unfair to compare CR prices with the new high RSS prices. It would be more correct to compare them with whatever RSS prices might have been if CR had not been introduced to the world market.

5.3 Fall in rubber demand

With such a differential in Indonesian rubber prices it would be logical to expect an increased interest in crumb rubbers which after all were supposed to be better rubbers. However, the oil price increase which initially affected the motor industry in 1973-74 intervened with disastrous effects on the demand for rubber and a shift to the left in its demand curve.

After more normal conditions returned and especially in late 1975 with the upturn in the US economy the expected interest in crumb rubber began to appear with increased demand and upward moving prices. It remains to be seen how far this trend will continue.

6. Ex-post evaluation: the past

The original appraisal assumed that the new CR factories would become the principal processing units and that existing RSS plant if used at all would be employed in a standby role. This did not happen.

The question to be asnwered is whether the added investment in new CR factories added anything to the country's revenue, and therefore the new plant must be compared with the RSS plant which was to be replaced. Three situations arise, firstly, where PNPs continued to use old RSS plant without re-equipment as well as the new CR plant, secondly where PNPs used partially re-equipped RSS plant as well as new CR plant, and thirdly where no RSS plant existed and new CR plant was installed. In all three situations RSS prices up to the present have been higher than CR prices (Figure 1 Table 1), processing costs have been about the same or possibly less for RSS in some plants (tables on page 10) and raw material costs are equal. Therefore in

the first two of the above situations, where RSS plant has been written off and where new investment in RSS plant is very low, then clearly the added investment in new CR plant alongside the existing RSS plant has been a failure. It would have been better to invest in new RSS plant, since opportunities have been foregone and revenue lost in not processing RSS. In the third situation the original appraisal assumed that investment costs in new RSS plant would be higher than in new CR plant. This is unlikely since expensive driers and diesel engines would not be required in RSS plant as they are in CR plant, and the costs of smoke houses for RSS rubber would no more than balance these. Therefore also in the third situation it can be argued that these second-phase factories have been a failure up to the present.

One must however modify these assessments in the light of any benefit flows from improvements and increased value added to smallholder rubber at PNPIII and PNPXI, but this would require a more detailed field study. There were in addition other expected political and economic benefit flows at the time of the investment. These could possibly now be identified. They would however have to be assessed in relation to other benefits which might have been obtained if the capital input had been used for other projects, for example, involving palm oil, cocoa, sugar, etc. If positive streams of benefits from the various sources can be identified for the then CR project the assessment of the project could well turn from a clear failure to one of at least marginal success and possibly more. Obviously the question must remain open until other questions have been answered.

6.1 Ex-post evaluation: the future

The question of success or failure of this second-phase CR project has evolved and will continue to evolve around the market behavious of natural rubber (NR) as a whole and the prices of RSS and CR in particular. A clear answer may not be possible therefore for some time.

The control price of NR is the price of synthetic rubber (SR) which sets the ceiling for NR prices except in periods of extraordinary commodity behaviour such as that induced by the oil price increases in 1973-74. Opinion in the rubber trade suggests that the NR price ought logically to

be just under SR price, on the reasoning that if a large gap appears between SR and NR prices then it would pay rubber manufacturers to substitute the cheaper rubber for the dearer one, since this is technically feasible over a wide part of the spectrum of rubber usage.

Applying this principle to RSS and CR then theoretically the RSS price should climb to this expected position just below SR price. Crumb rubber should theoretically follow (at a slower rate if past history is a guide) to equate eventually with the RSS price. However, there is a lack of information about the end uses of the various CR and RSS grades and their degree of substitutability, and this study was not formulated to include an in-depth market research, which might have thrown light on these points.

Also as before one has to modify the seeming prospects for CR with reference to developments in RSS technology and the possible introduction of newer technology and products in the future. While the rubber trade expects NR prices to climb towards SR prices this expectation is paralleled by another which visualises the NR market share as climbing from the present 30-32 per cent up to 40, possibly 42 per cent of the total rubber market. Increasing quantities of NR will therefore slow down the rate of closure of the SR-NR price gap and force the NR suppliers into a search for further production economies. It is felt that further economies in SR production will be difficult to achieve.

This continuing stability of the market for RSS (despite dire predictions) and the increasing cost of wood for fuel and other processing factors has stimulated improvements such as steam drying and other cost saving and quality improving devices which may increase the competitiveness of RSS and prevent a complete change-over to CR. One can realistically then see (as happens in many industries) both technologies enduring side by side in the same industry, often complementing each other, as is possible with both of these, and having to face the introduction of newer technologies and products (eg powdered rubbers) in the near future. Indeed it was somewhat naive to assume at the outset that old technologies would immediately or ever give way to new, and the evaluation in the future may not be of straightforward "either-or", "with-without" situations. It would seem

inevitable that in the long run situation the evaluation would have to be within the framework of the PNP with its much longer life-cycle and its necessity for flexibility in manipulation of the resources at its disposal. PNP overheads are spread in many different directions over several commodities. The input of management (and often labour and transport) for example, is constantly switching from one employment within the PNP to another so that it is virtually impossible to isolate the costs of any one factory.

This scenario is completely different from that in which the first-phase factories operate, where a CR factory produces a single product, is not integrated with its raw material source and buys its materials from hundreds of smallholders with greater elasticity of supply response to price changes.

Table 1

Current and Constant (1971) Rubber Prices (Rp/kg)

		Actual 1971	1972	1973	1974
(1) Natural rubber cif New York	(a)	173.8	164.7	329.4	366.0
	(b)	173.8	149.6	262.4	241.8
(2) RSS 1 fob Jakarta	(a)	131.6	124.1	206.7	307.9
	(b)	131.6	112.7	165.2	203.4
(3) Crumb rubber fob Jakarta	(a)	99.6	83.8	168.5	242.8
	(b)	99.6	76.1	134.3	160.4
(4) Tanjung Garbus and Basilam	(a)	130.3	117.9	135.0	245.2
	(b)	130.3	107.1	107.6	162.0
(5) Membang Muda	(a)	127.0	117.6	158.8	228.4
	(b)	127.0	106.9	126.5	150.9
(6) Sukamaju	(a)	92.1	102.6	201.3	235.5
	(b)	92.1	93.2	160.4	155.6
(7) Kalirejo	(a)	-	-	285.1	241.3
	(b)	-	-	227.2	159.4
(8) Centrifuged latex fob Jakarta	(a)	93.1	92.7	123.1	181.2
	(b)	93.1	84.2	98.1	119.7
(9) Thin pale crepe fob Jakarta	(a)	163.5	133.6	228.3	346.9
	(b)	163.5	121.3	181.9	229.2

Sources: (1) RSS 1 spot New York,
(2), (3), (8), (9) Bank of Indonesia.
(4), (5), (6), (7) FOB prices obtained by author from PNP.

Footnote: (a) Current market prices
(b) Constant 1971 prices

CHAPTER 3

ONSHORE AND OFFSHORE COSTS

1. Onshore costs

It was allowed in estimates[2] that only very approximate figures for local cost requirements could be made. These would in any case be borne by the Indonesian Government or the PNPs, and in consequence the estimates devote little space to them. The only figure available was one of £38,000 given by the consultants for a 300 ton plant in the small-holder sector in the first phase of the project. The IDA financed estates were able to reduce local costs substantially by making maximum use of existing buildings and facilities and it was expected that similar savings could be made for the ODM financed factories.

Four of the factories visited were in fact housed in existing buildings which had to be modified and the onshore costs given for these are:- Basilam (PNPII) £13,000; Sukamaju (PNPXI) £34,000; Tanjung Garbus (PNPII) £42,000; and Membang Muda (PNPIII) £91,000. The figures may reflect the degree of modification, inflation, and in the case of Membang Muda especially, remoteness of location.

The fifth factory visited - Kalirejo (PNP XXVI) was housed in completely new and impressive buildings at a reported cost of £63,816 in a remote location.

2. Implementation of the project

The first four factories (of those visited) were set up and commissioned successfully in one year, a very satisfactory performance, given the local conditions and the difficulties of getting equipment off the docks at that time. The new buildings at Kalirejo were completed in 18 months which is also quite good in a remote location. A little difficulty was experienced here with part of the equipment, the drier, which was damaged in transit, but repairs were successfully executed on site.

3. Offshore costs

Comparison of estimates and actual costs is very difficult for various reasons. Many changes in estimates were made as PNPs entered and left the programme. Estimates state at one point that £298,000 was recommended for PNPs III, X and XI, and that the expected entry of PNP II would bring this amount up to £400,000. A further £63,500 was later recommended for PNP XXVI and submissions were to be made to the Projects Committee for additional offshore funds if implementation studies indicated that these appeared desirable, presumably for other PNPs.

Actual offshore costs as reported in Indonesia differ, substantially in some cases, from detailed costs extracted from ODM files,(3) as follows:-

PNP	Plant	Size tons/month	Estimates £	Actuals £
II	Tanjung Garbus	300	67,738	76,150
II	Basilam	100	35,353	43,214
III	Membang Muda	400	101,696	303,430
X		300	61,441	n/a
XI	Sukamaju	200	54,827	67,962
XI	Tenjoresmi	100	35,353	n/a
XXVI	Kalirejo	300	63,500	104,342
	Erection, commissioning etc		10,080	n/a
	Freight and insurance		22,448	n/a
	Crown Agents fees		10,692	n/a
		TOTAL	463,128	n/a

The plant eventually installed at Sukamaju was a 300 ton plant and at Kalirejo 200 tons.

The factories at PNPX and Tenjoresmi were not visited. The actuals probably include erection, freight and fees etc. Inflation may have been responsible for part of the revealed difference especially in the case of Kalirejo where plant was installed more than a year after the other four. It is unlikely however that inflation accounts for all of the difference. Detailed accounts

for actuals are not available but it seems probable that the figures include expenditure by the Indonesians themselves, possibly for equipment not listed in the original CR requirements.

CHAPTER 4

PROCESSING EQUIPMENT

1. Outline of the process

The objective is to present to rubber manufacturers a natural rubber (NR) which will compete with synthetic rubber (SR) in form and quality. Hence a bale or block of rubber of the same size and shape as the SR bale and of comparable quality is produced. This technically specified rubber is processed in 3 stages:-

(1) preparation of the raw material
(2) drying, and
(3) packing

The third stage is practically the same whatever equipment is used. The second stage is also reasonably standard although there are many arguments about the varying merits of particular types of drier. It is the first stage which is most controversial. Guthrie-Pullen use a coagulum saw and a granulator to break down latex in preparation for the drier, and a granulator, pelletiser and possibly an extruder to deal with cup lump. Other processors use creping mills, rollers, shredders and hammermills to do the same job and claim to do it better, especially if the raw material is dirty, as it most certainly is when coming from smallholders.

2. Choice of equipment

The writer is not in a position from a brief contact with the industry to decide whose equipment is best for crumb rubber processing although certain indications emerge and will be outlined. The important questions are whether the equipment is adequate or not and whether better choices could have been made initially.

In terms of the best choice of equipment there was actually very little experience available. The crumb rubber industry even in 1975 is a very young industry barely 10 years old, still struggling to establish itself in world markets, still suffering from teething troubles and growing pains. No

textbooks were available on CR processing when this project was initiated apart from literature issued by the various interested companies and by the RRI in Malaysia. The position is largely the same today.

3. The dialogue about equipment

It has been suggested that the machinery manufacturers Guthrie-Pullen firstly used Indonesia to develop their machinery and secondly did not use the best equipment available at the time.

To the first criticism Guthrie-Pullen answer quite frankly: yes, they have used their opportunities in Indonesia to improve their lines and why not? It has been to Indonesia's advantage that they did so, and other companies have done likewise for example Promoci, GEC, Harrisons and Crosfield and others. Only Guthrie are now left in the field and this they claim points to their success. They claim also that Indonesia benefitted from experience which the firm gained in Malaysia where the first generation of equipment went into operation. The second generation of equipment in Indonesia was an improvement on the first and even the most recently established factories included improvements on the first ones. Today Guthrie-Pullen offer a third generation of equipment showing advancement on the earlier types and they foresee a time when possibly this new range will be improved upon. One must agree that this is a reasonable argument and developments have followed a normal evolutionary path based on experience. The firm would have been subjected to even greater criticism if it had not done this.

A similar evolution occurred at the RRI in Malaysia where CR started in the early '60s. In this case however the RRI claim that their processing methods are better than Guthrie's. They certainly have a number of good ideas which Indonesia might fruitfully look at, but the Guthrie-Pullen equipment is usually contrasted, not with the RRI method, but with that of the French company Promoci, whose equipment was installed under French Aid in 10 factories in the private sector.

No comparative technological study of these different processing lines has ever been done but most of the expert opinion seems to agree that the Promoci preparation method involving hammermills and creping machines is superior to the Guthrie line. Opinions about the drying stage are less decided but

the weight of opinion seems to favour the Guthrie drier. The packing stage is similar in both cases.

Again most expert opinion would agree that the Guthrie line is very suitable for processing field latex, which is relatively easy to process, but cup lump, scrap and other materials which may contain dirt require hammermills for cleaning and cutting, and blending is also recommended. The RRI in Malaysia have given this controversial subject much thought and development and have come up with what they consider to be a big improvement on all other methods. However such developed systems were not available when the choice of technology had to be made in Indonesia.

The Guthrie equipment is also said to be more suitable for estate rubber processing than for smallholder rubber processing. Estate materials are expected to be better and the majority of the material is in any case latex whereas smallholder rubber is cup lump, 'bamboo' rubber, scrap and other materials which are often adulterated and very difficult to process. All this is undoubtedly true, but most of the latex processing has ceased for the time being and the PNPs have now to rely on the less suitable equipment.

It is claimed for the Guthrie line that it is neat and simple and in fact Guthrie themselves say that simplicity was one of their aims in design. They were introducing a new industry to a region where the level of technology and the level of development were low and therefore decided that simplicity was essential. In view of the low level of technology encountered 5 years later one could say this attitude was commendable. On the other hand one could say against it that the level of technology has remained low and has not increased and seems unlikely to do so.

The PNPs were not and with one or two notable exceptions still are not, prepared to develop or modify the machinery which they were given to their own special requirements and conditions. There is no reason why they should not do so and it would have been particularly desirable in the critical initial phase when troubles were most likely to appear. Their attitude is in sharp contrast to that of the re-millers in the private sector who have made a wide range of alterations, adaptations, innovations, and introductions and who are generally considered to be very successful in business.

4. Conclusion

One can best summarise the arguments as follows:-

(1) initially the best choice of technology was not obvious, and in any case two kinds of equipment Promoci and Guthrie were put in during the first phase of the Aid programme by two different Aid donors, the UK and France.

(2) at the start of the second phase more careful study could have been made of factories already operating, and adjustments made as a result.

(3) greater responsibility and initiative could have been assumed by the Aid recipients for seeing that the optimum use was made of the resources and developments and modifications made where necessary.

CHAPTER 5

TANJUNG GARBUS AND BASILAM FACTORIES AT PNPII

1. Introduction

PNPII is responsible for 11 estates which are located in 3 groups east, south-west and north-west of Medan in North Sumatra (See Map 1). The PNP headquarters are at Tanjung Morawa about 25 kilometres east of Medan and the 2 factories it received are located at Tanjung Garbus about 15 km east of headquarters and at Basilam about 110 km to the north-west. PNPII came late into the Aid programme. It seems that originally Dutch assistance was to be given but this fell through for some reason.

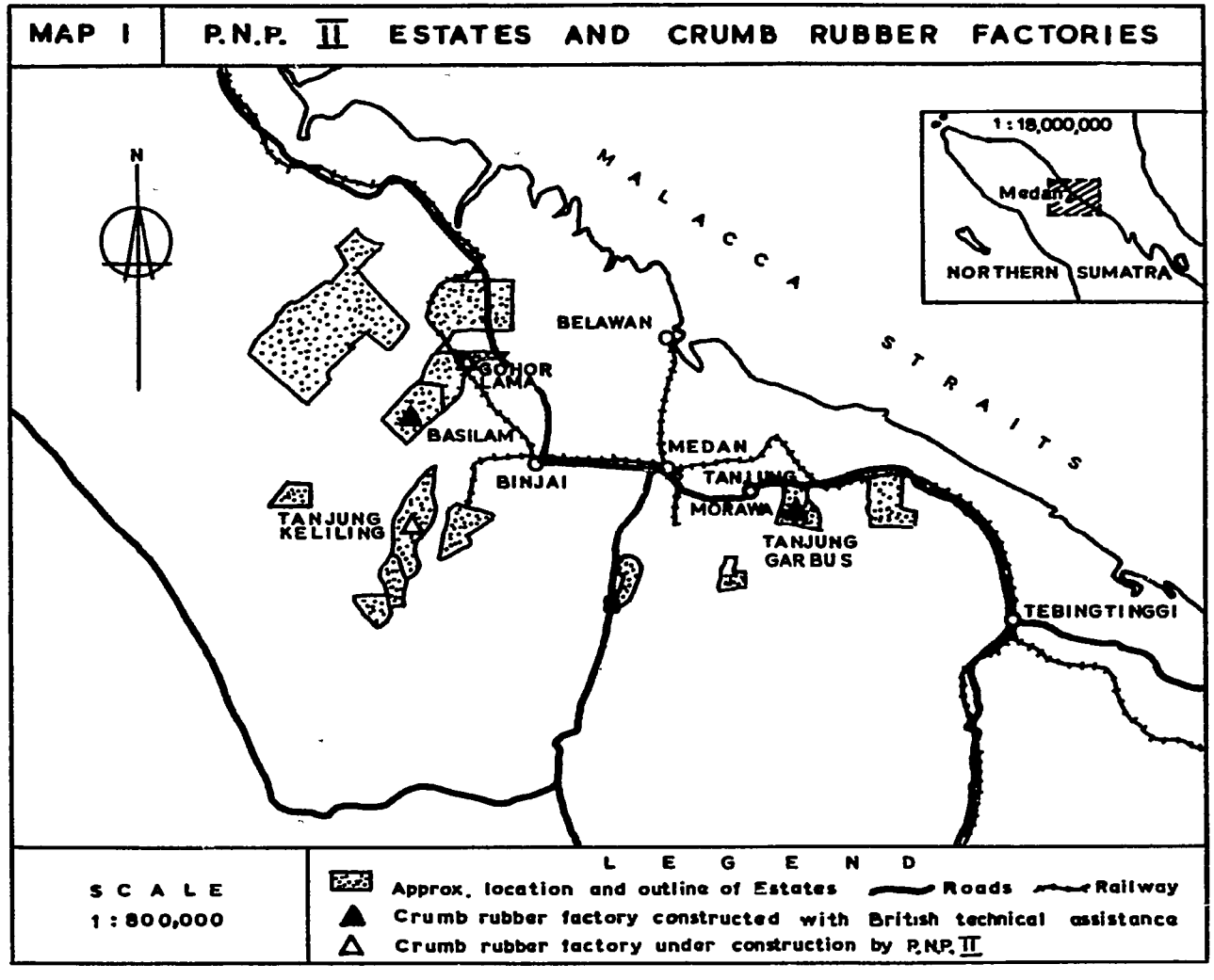
2. Implementation

None of the staff originally involved in the project remained at PNPII and consequently no first hand information about the implementation of the project was available. It seems that the PNP itself had no say in choosing the locations, the size of plant or the type of equipment. This was all done from Jakarta.

The feasibility study for this PNP submitted by Kumpulan Guthrie Pullen recommended 6 crumb rubber factories at 6 different estates with capacity scaling up from an initial 300 tons per month in 1970 to a total of 1,900 tons per month in 1979, construction, expansion and siting to be phased over 4 years, 2 plants in 1970, 2 in 1971, 1 in 1972 and 1 in 1973.

Only 2 factories were actually installed under British Aid, with capacities of 300 tons per month at Tanjung Garbus and 100 tons at Basilam, both in 1971. The intention was to install further PNPII financed capacity at other sites but these are only now under construction at Gohor Lam and Tanjung Keliling.

Establishment of the 2 factories was completed satisfactorily in one year despite the difficulties encountered in getting machinery and equipment off the docks in Belawan, and Guthrie Pullen are to be complimented on their performance in commissioning all of the plants visited in very good time.


MAP I
P.N.P. II ESTATES AND CRUMB RUBBER FACTORIES
N
MALACCA STRAITS
1 : 18,000,000
Medan
NORTHERN SUMATRA
BELAWAN
GOHOR LAMA
BASILAM
BINJAI
MEDAN
TANJUNG MORAWA
TANJUNG KELILING
TANJUNG GARBUS
TEBINGTINGGI
SCALE
1 : 800,000
LEGEND
Approx. location and outline of Estates
Roads
Railway
Crumb rubber factory constructed with British technical assistance
Crumb rubber factory under construction by P.N.P. II

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The factories were housed in 2 existing buildings which had to be modified, as was assumed in the ODM estimates would happen. The costs of these modifications were Rp 44,784,000 (£42,277) for Tanjung Garbus and Rp 13,847,000 (£13,072) for Basilam compared with £38,000 assumed for a 300 ton plant in the smallholder sector.

Both buildings with their outbuildings and grounds still have the appearance of being well-maintained. See Plates 1, 2 and 3.

Offshore costs for machinery and equipment were £76,150 for Tanjung Garbus and £43,214 for Basilam, compared with estimated figures of £67,738 and £35,353.

3. Running costs

PNPII produces rubber mainly but has considerable oil palm resources as well as some other crops. Costing therefore is complicated, and made even more so by the fact that about 15 grades of rubber are produced. This means that the PNP keeps open a large number of options for its field latex which can be diverted into producing SIR, RSS, Pale Crepe, Block Rubber or Concentrated Latex. The aim is to optimise the firm's (PNP's) performance over the whole range of its interests. Each estate has different production costs and different combinations of these estates can be sending their latex and cup lump to the CR factory at different times so that the real cost of raw materials could be above the PNP average which is used here. The allocation of PNP overheads to each estate and to each factory is also a complex operation and not a uniform one among PNPs. In some cases the estate manager for example is also the factory manager and allocates his time between them. This is also true of labour. In most cases there is now one manager for both estate and factory where formerly there were two. The correct allocation of overheads is in no case known. This would require an in-depth study which was not possible in the circumstances.

Unit processing and packing costs (Rp/kg border/prices) are as follows:-

	1971	1972	1973	1974
Tanjung Garbus	8.4	7.3	18.9	14.9
Basilam	10.9	12.3	16.3	n/a

Packing costs are between 25 and 40 per cent of the total annually. The extraordinary jump in costs between 1972 and 1973 is due to the oil price increases in late 1973. Higher unit costs would be incurred at Basilam firstly because of its remoteness and perhaps also because of the smaller scale of production.

4. Production and sales performance

There is some difficulty in dividing the production and sales figures as supplied between each factory, but the pattern appears to be as follows ('000 kg):-

Tanjung Garbus		1971	1972	1973	1974
1.	Production	1,543	2,324	1,481	2,884
2.	Stocks b/f	-	330	400	-
3.	Total	1,543	2,654	1,881	2,884
4.	Sales	1,213	2,254	1,881	2,839
5.	Stocks c/f	300	400	-	45

Basilam		1971	1972	1973	1974
1.	Production	683	486	1,148	285
2.	Stocks b/f	-	146	160	-
3.	Total	683	632	1,308	285
4.	Sales	537	472	1,308	281
5.	Stocks c/f	146	160	-	4

In each case the pattern is a rising and falling one probably reflecting changes in market demand. The performance at Tanjung Garbus is the better of the two with up to 80 per cent of capacity eventually utilised while Basilam ran into maintenance problems in the third quarter of 1974 and ceased operations as explained in more detail below. It will not be reopened as a crumb rubber factory. Instead the equipment will be moved to Tanjung Garbus to fit in with a new location policy at PNPII (See Map 1).

5. Machinery and equipment at Tanjung Garbus

Two lines of equipment are installed at Tanjung Garbus, 1 line to process field latex and the other to process cup lump. Both lines are complete and are in a very good state of maintenance. Plates 4, 5 and 6 illustrate this. Chapter 4 outlines the processing stages, and discusses the choice of equipment. A latex processing line consists of coagulating tanks, washing tanks, saws (either manual or motorised) to cut the coagulum into lumps, conveyors, reducers, a drier, a press for making blocks of rubber and a weighing machine. A cup lump line is similar except that coagulating tanks are not necessary since the material has already coagulated overnight in the field.

No complaints were made about the commissioning of the plant except that Guthrie-Pullen were not there to do the job. Guthrie-Pullen deny this. Management also claimed that the latex processing line never reached the full working capacity of 300 tons. Guthrie-Pullen admit that the latex line capacity would be a little below the cup lump line because of differences in densities and initial moisture content, but that their plants in Malaysia (both lines) have achieved well over the stated capacity. PNPII management stated the capacity as 300 tons per month of 25 days at 24 hours per day or 600 hours per month, while Guthrie-Pullen stated capacity as 300 tons per month of 26 days at 22 hours per day a total of 572 hours per month. This might account for some of the discrepancy in capacity. The estate management however said that there were times when they had surplus latex which had to be diverted into other products.

There were complaints about the Guthrie-Pullen equipment but some of these tended to be contradictory. On the one hand it was said that maintenance was not a serious problem and that only preventive maintenance was being carried out while at the same time it was claimed that maintenance costs were very high, up to Rp 5 million every year, but these do not show up in costs. They would be more typical of the whole PNP.

Again it was claimed that spare parts were not available when required but on enquiry with the machinery agents it was learned that orders for parts are never placed with them. It was learned elsewhere that it is more typical for PNPII to shop around for spare parts throughout South-East Asia, and

to buy through a subsidiary company set up by them, the result being that they get cheap spares but spares of inferior quality which lead to further damage to the machinery. It was admitted that spares coming from England would need to be ordered one year in advance and that over the last year or so there was even greater difficulty arising out of the three-day week in England.

Processing equipment is discussed in Chapter 4. Specific complaints made at PNPII are as follows. Granulator nuts and bolts require checking virtually every hour and replacement too frequently. Knives require sharpening very often probably because the metal is too soft. Pelletizer die-plates are constantly jamming and skidding and causing stoppages, and too frequently it is necessary to feed by hand. Sharpening at too frequent intervals is needed and again this indicates too soft a metal. These knives and plates incidentally are some of the spares they shop around for.

The most serious complaint was the high consumption of fuel oil. This is used for the diesel generator sets and for the autodriers, ie the rubber driers. According to PNPII the same fuel, Solar, domestically supplied is used for both diesels and driers. Dorman Diesels, the engine suppliers in Stafford, recommend High Speed Diesel Oil for their diesel engines which they say is available in Indonesia. If the lower grade industrial oil, which is cheaper and used for driers, is used in the diesels then corrosive effects will more quickly wear away pistons and liners and in fact PNPII did have these troubles at both factories and in the case of Basilam this was one of the reasons for total stoppage. The performance of the generator is also of course lowered with resultant loss in power for motors. During the writer's visit one of the diesels had been dismantled and sent to workshops in Medan for annual overhaul, and management were complaining of a lack of local expertise in mechanics and metal skills for carrying out even normal maintenance.

Around the problem of high fuel consumption in the autodriers there are many interrelated causes. Fuel consumption is probably high anyway but the normal procedures for reducing consumption to the minimum and achieving optimum performance are not applied. In fact these problems were evident again and again elsewhere, indicating a low level of drying expertise in Indonesia. The problems detailed here therefore are common to the other factories also in greater or lesser degree.

In the first instance the latex feeding to the drier was not allowed to drip dry enough of its moisture before feeding to the drier. The RRI in Malaysia are now recommending a buffer stage before feeding so that this surface water can run off. This buffer stage could be for as much as a few hours if necessary and there is some interest in a new system of air-drying, similar to smoked drying for RSS, which could lead to some economies and possibly more labour-intensive systems. At any rate in those factories which are operating below capacity and not under a time pressure buffer drying could be useful for reducing the initial drying need.

Secondly the conveyance system after granulating and pelletising is such that the rubber particles or pellets stick together and their moisture-holding capacity is thereby increased. A suggestion again from RRI is to use a solids pump to separate the pellets.

Thirdly it was found by using a dip-stick that the bed-depth feeding into the drier varied from 6 to 8 inches whereas a 10 inch bed is recommended for full capacity. There must inevitably be an overuse of fuel in the circumstances.

Fourthly the heat-retainers (rubber flaps, or aluminium ones preferably) at the entrances and exits of the autodriers are poorly maintained and a lot of heat is lost. This loss in airflow control could represent a loss of up to 15 per cent in heating efficiency.

Similarly a saving of some 3-5 per cent could be made by covering the floor under the driers with asbestos sheeting to prevent heat-loss through the concrete floor.

Better maintenance of the interior cladding of the sides and roof of the driers would also help. The sides of the driers specially seemed to be unusually hot.

Complaints were made about the nozzles on the oil burners to the effect that these were difficult to maintain, fuel flow was difficult to control, and spares were difficult to come by. This latter is related to the whole

problem of carrying spares. It is not enough to expect to get off-the-shelf spares. In Indonesian conditions at least a year's supply of nozzles ought to be carried and there is a lot to be said for carrying two years' supply of critical spares such as these.

In addition to the above problems fuel consumption is a function of the type of fuel used. Little attempt seems to have been made to determine whether they are getting the right fuel or not, whether there are variations in its quality or whether other types of fuel might not be more suitable. There has also been little attempt to find out whether the fuel has been adulterated.

Fuel consumption is therefore a complex problem and it might be wise to have a drying expert look into it.

6. Machinery and equipment at Basilam

The manager at Basilam was away on leave when this visit took place and the field manager deputised. The factory had ceased processing rubber on the 28 August 1974 because of two important mechanical failures. Firstly bearings in the electric motor driving the baling press gave way. Baling takes place after drying and is essential before packing in the crate. A failure in baling therefore effectively stops all processing. No spares were available since Basilam is not allowed by headquarters to carry them, but headquarters had not supplied spares up to the end of 1974.

The second failure was of pistons and linings in the diesel generator. Again no spares were available and the engine had to be transferred to workshops in Medan 90 kilometres away for overhaul and repair. This failure, as mentioned above, was probably due to usage of the wrong fuel.

Raw material (cup lump) ready for processing when the stoppage occurred was still lying around waiting for transport to Gohor Lama where the creping machine was out of order. So things seemed disorganised at the time. However since the rubber market had fallen off there was no real incentive for improving organisation in a hurry and PNPII was taking the opportunity to revise its location policy. The Basilam factory will now be moved to Tanjung Garbus and its raw material will be fed to the new plant under construction at Gohor Lama (See Map 1), convenient to rail transport.

Apart from the breakdowns mentioned and the cobwebs and superficial spots of rust the machinery and equipment at Basilan was in good working order. Conveyors needed some patching but in general there would appear to be nothing wrong that could not be put right with a good clean-up and an oil can plus spares for the affected machinery. Plates 7, 8, 9 and 10 convey an impression of the state of things. The machinery was in fact very well set up in an old building which was difficult to adjust to the new layout.

The same complaints were made here as at Tanjung Garbus namely:- granulator and pelletiser expensive to maintain, drier not reaching stated capacity and using a lot of fuel, and spares difficult to get. The drier had been stripped down and was awaiting a routine maintenance overhaul at the time of the visit and it was possible to see clearly the evidence of lack of proper production control. The whole inner sides of the drier and its trays were covered with particles of blackened burned rubber (See Plate 9) which had not been emptied out of the trays at the unloading base and were then tipped on to the ground underneath or otherwise stuck to metal members. The problem of how to keep these areas clean was solved at other PNPs where there seemed to be more innovative ability.

7. Packing

Packing, which accounts for about a third of factory costs, is not quite so serious a problem at PNPII as elsewhere. The operation is contracted out although it is performed on the factory floor as part of the whole process. The crates, which are very expensive (See Appendix A), are reasonably well made in comparison with some others but contain enough flaws to increase the possibility of claims for damages instead of decreasing it as the system was intended to do. When some of the crates were examined at the harbour only 25 miles away already some of the slats were cracked, some of the metal binding strips had snapped and some nails had sprung. These things indicate 3 faults at least (a) poor structure, (b) weak timber and (c) packing of bales before the rubber had stabilised after pressing.

Damage in handling is of course the obvious result and regrets are expressed in this connection that rail rolling stock although suitable for other rubbers is not able to take the SIR crates. Road transport is more awkward and more expensive. Plans to modernise the rail system in North Sumatra are progressing very slowly.

8. Location of plant

This question was not adequately studied. However, it does seem that there has been a changing emphasis on the importance of the various location factors since the original choices were made. In particular improving transport and roads has enhanced the attractions of central areas and remote locations such as Basilam can now be abandoned. The attempts now in progress to make a road into Basilam means that liquid latex will be more easily transported out to Gohor Lama whereas previously this was not possible.

The PNP policy is now to supply each of its 3 groups of estates with a centrally located plant. It is also diversifying into oil palm and it is not clear that this has adequately been taken into account in its location policy.

However the location problem ought to be seen in the wider context of the region as a whole, involving other PNPs, private estates and smallholders, and this has not been done.

9. Rural development

This project at PNPII was not in any way integrated with rural development in the area. There is no smallholder rubber bought in and there seems to be little effort to encourage the production of smallholder rubber which all goes to the re-millers ie private processors. The project does little to promote employment since only about 7 people are employed per shift. These are mostly unskilled workers who double as estate workers when things are slack. The project however is making unsatisfied demands on the mechanical and metallurgical expertise of the locality and these types of demand could increase as other factories are put into the area, particularly in the vicinity of Tanjung Garbus.

CHAPTER 6

MEMBANG MUDA FACTORY AT PNPIII

1. Introduction

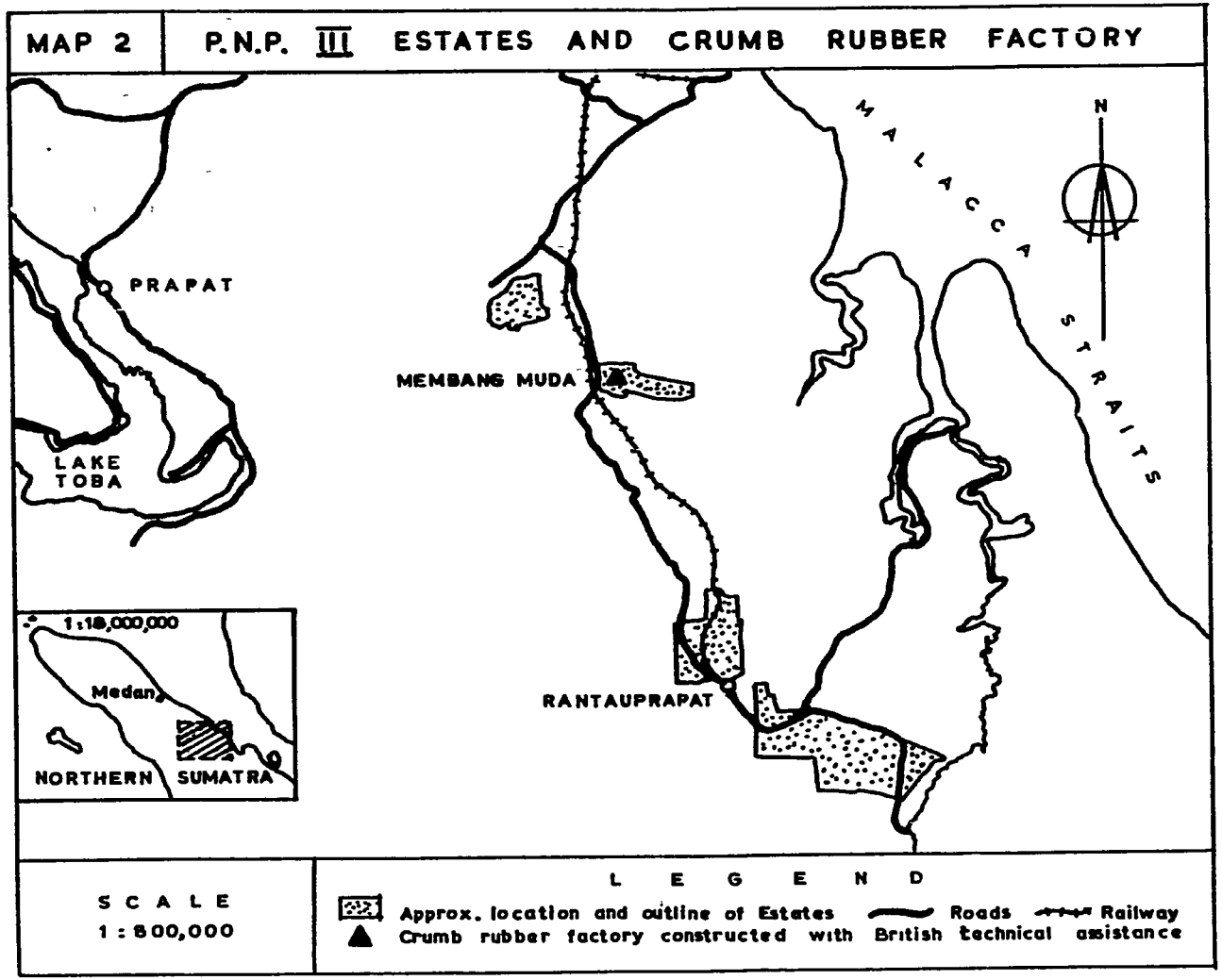
The crumb rubber factory at Membang Muda is located about 210 kilometres south of Medan in North Sumatra (See Map 2). It is served by rail and road which are both in poor condition. Rail services in particular inhibit the prospects for containerisation which are now proposed by the chief technologist at PNPIII, Mr Alisati.

2. Implementation

None of the officials who were involved in the initial negotiations and in the implementation of the project are now at PNPIII, so it was not possible to get the story at first hand. The management here, as at PNPII, had no say in choice of equipment, size of plant or location of plant. All of this was imposed on them from Jakarta. Management now, with hindsight, say they did not need a crumb rubber factory until 1973 and if they had had a choice they would not have chosen Guthrie-Pullen equipment. They would have chosen the Harrisons and Crosfield process.

It seems that originally 2 plants of 100 and 200 tons per month capacity were intended for 2 different sites but they were given instead one 400 ton per month plant located at Membang Muda.

The factory was commissioned satisfactorily in 1 year and went into production in 1971. An existing building was used and this had to be modified. Capital costs for this were given as £91.357 which seems unusually high when compared with the other factories (see Chapter 3). Details of the costs are not available, but the remoteness of the area and perhaps the extent of the modifications explains the high figure which is to be compared with the estimates(1) figure of £38,000. All buildings are very well maintained.


MAP 2
P.N.P. III ESTATES AND CRUMB RUBBER FACTORY
PRAPAT
LAKE TOBA
MEMBANG MUDA
RANTAUPRAPAT
MALACCA STRAITS
N
1:18,000,000
Medan
NORTHERN SUMATRA
SCALE
1 : 800,000
LEGEND
Approx. location and outline of Estates
Roads
Railway
Crumb rubber factory constructed with British technical assistance

Offshore costs of £303,000 are given for machinery and equipment and this figure seems exceptionally high compared with the other factories (See Chapter 3). Once again detailed costs are not available. The original estimate of costs given by Kumpulan Guthrie-Pullen for 2 plants totalling 300 tons per month was £94,000.

3. Running costs

The aim set for this factory was to process field latex into SIR5 and 5L in order to get the best returns from these high grades. Cup lump would also be processed together with smallholder rubber and other estate rubber which would be bought in. Details of these outside purchases so far as they are known are given below. Processing and packing costs for 1973 and 1974 are 19.3 and 21.1 Rp per kg (border prices). Packing here also takes about a third of the total unit cost.

Despite the high aims set, the demand for the top SIR grades has never been good, and as a result there has been pressure here as elsewhere to divert latex into other outlets, principally concentrated latex, which had one or two good years but is now falling off again. The uncertainty and the shifting markets have made decision-making very difficult and a policy of diversification is now becoming popular. PNPIII is now aiming at something like a 50-50 diversification between rubber and palm oil with some diversification also within the range of rubber products. To this end a concentrated latex plant has been installed beside the crumb rubber factory. RSS facilities were already available.

4. Production and sales

The production and sales figures ('000 kg) are as follows:-

	1971	1972	1973	1974
Production	2,215	2,233	3,333	1,254
Bought-in (from smallholders etc)		200	236	419
Stocks b/f		639	906	1,562
Total	2,415	3,072	4,475	3,235
Sales	1,776	2,168	2,913	3,234
Stocks c/f	639	906	1,562	

Production ran at just under 50 per cent of capacity in the early years and rose practically to 70 per cent in 1973 only to fall back again as the demand for rubber collapsed in 1974.

5. Machinery and equipment at Membang Muda

Two lines of equipment are installed, one for latex processing and one for cup lump. The latex line of tanks, conveyor and granulator are not now used since the market for the high latex grades has fallen off. The equipment however is in very good condition and can be easily brought into production if demand improves. All of the working equipment was in good repair was in good repair but the same kinds of criticisms about the equipment were made here as at PNPII. These are as follows: firstly the pelletiser capacity was found to be below the stated capacity, but how this was actually measured is not clear. The die-plates needed servicing after 600 hours instead of 1,000 hours as stated, and the problems of skidding and jamming were encountered here, with the result that hand-feeding was often necessary. Secondly the granulator nuts and bolts neededfrequent repair and replacement.

Thirdly the autodrier gave many problems. These are very similar to those encountered at PNPII and the same recommendations about drying principles apply here also. In this case fuel consumption was also high and for the same reasons, although maintenance was much better. They had for example devised a system of cleaning with silicone while the drier was in operation. This reduced the time of five days normally needed per month for full maintenance, and throughput as a result was increased by 10 per cent, it was claimed. Still capacity never reached the stated 400 tons; the highest they had achieved was 380 tons for 30 days and 470 tons for 40 days. Again conclusive figures were not given for this assertion and indeed measurement with the dip-stick showed that, at that point in time at least, the full depth of 10 inches was not being maintained at feed-in.

Exhaust gases from the burner in this model of drier were now channelled downward into underground flues and the chimney formerly used had been removed, this preventing the possibility of further damage to the inside

of the roof. An increase in capacity was also claimed.

The automatic control had been broken now for 2 years and the workshops in Medan were not able to fix it, but they preferred manual control anyway.

The problem of repair skills was evident here also. Very little local expertise was available, and heavy repair work certainly could not be done locally and had to be sent over 200 kilometres to Medan. Even there not all jobs could be done.

At this factory there seemed to be more initiative and technological innovation around the drier problems than at PNPII but this did not extend to diesel generator-sets. The Dale Dorman type were installed here any many problems were experienced. At at PNPII these were a function of the interacting policies on fuel usage and the ordering of spare parts. They complained that once they had to close down because spares for the generator had not arrived. Enquiries at Dorman Diesels Ltd in Stafford revealed that no orders for spares had been received, and that the problems of failures of pistons, cylinders and valves were probably the result of using the wrong type of fuel. It had also been found that valve replacements had been bought locally, probably in Singapore, that these were not stellite-faced, ie hard-faced valves and in one case a valve had broken and caused serious damage to one piston and cylinder lining. This brought about an immediate shut-down and since spares were not carried at the factory repairs took a long time.

PNPIII maintained that they had great difficulty in getting spares, especially bearings, pistons, cylinders, radiators and dynamos. During the writer's visit, one engine had in fact been stripped down, its batteries left uncharged and its pistons and dynamos sent off to Medan. It seem certain that the difficulty in getting spares is related to the general habit of not carrying spares, and agents of United Kingdom firms are not willing to carry stocks when orders are going elsewhere. Consequently off-the-shelf spares are seldom available and the waiting time is up to 1 year.

6. Packing

Packing is done here in the same way as elsewhere. Crates are very expensive and there is an active interest, maintained by the chief technologist, Mr Alisati, in promoting containerisation, which will be very dependent on railway rolling-stock and harbour facilities. The crates are made locally but the timber travels a long way and the labour input is not great and therefore not of much local importance as a source of employment. There have been no reports of breakages to crates but this, it was said, should be checked at the Joint Marketing Office in Medan. As mentioned in talking about PNPII packing, crates were examined in godowns at the harbour and did in fact show signs of some damage. The communications procedure here of course shows that there is inadequate feed-back of information. This institutional weakness was met time and again in other spheres.

7. Location of plant and rural development

These appear to be interrelated at Membang Muda. Again the problems were not studies in depth. Originally 2 factories were intended at different estates, but it is very likely that the road and rail services near Membang Muda were decisive as well as the requirement by government that smallholder rubber also be purchased. The location problem was of course more complex and involved considerations such as the continuing access to concentrated latex facilities at PNPV. Only a superficial account of the story could be extracted and this does not provide fully satisfactory answers.

The Membang Muda factory will, it seems, be asked to play an even more important role in rural development. It has now become the focus for a World Bank project in the area similar to FLDA projects for smallholders in Malaysia.

CHAPTER 7

SUKAMAJU FACTORY AT PNPXI

1. Introduction

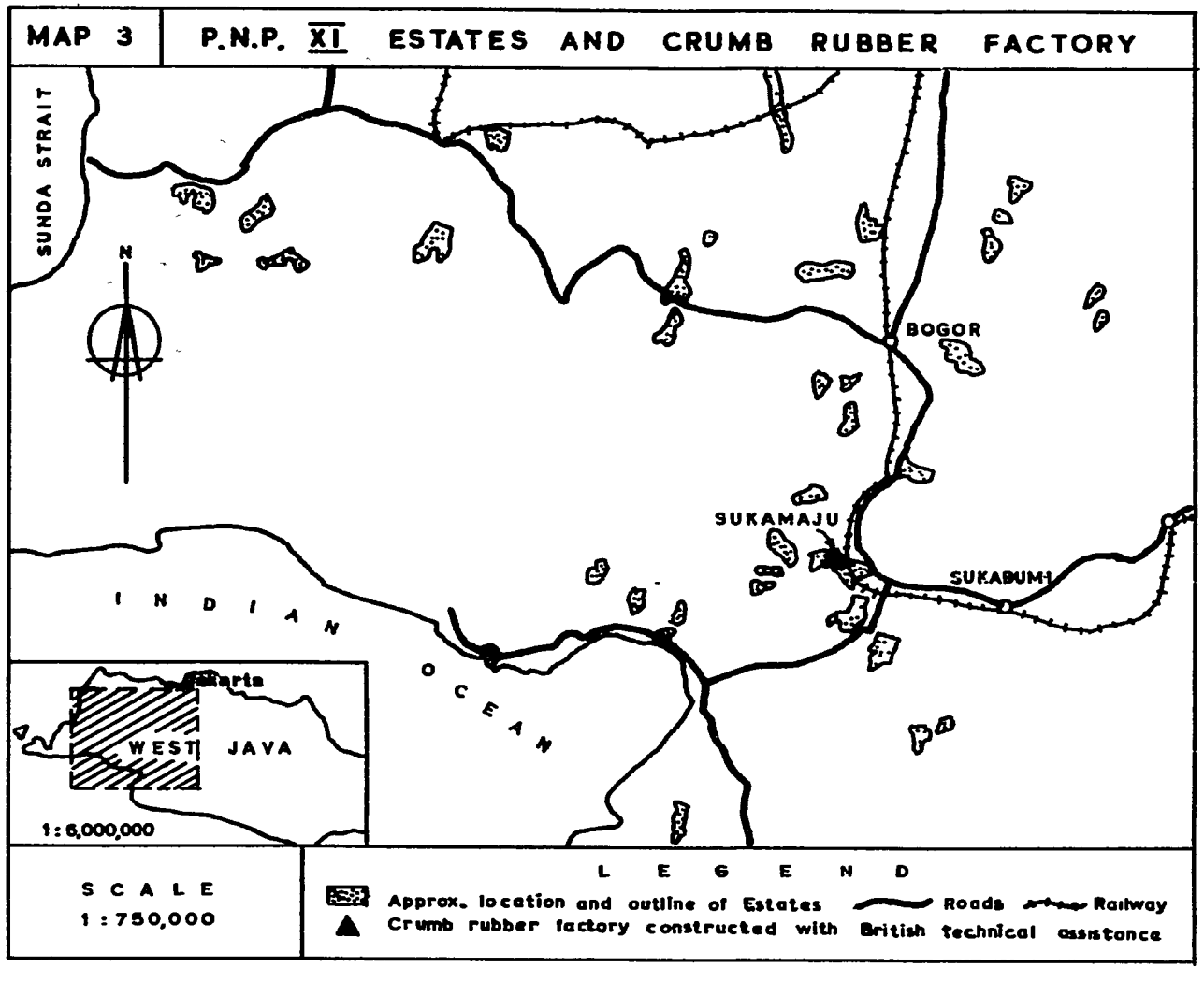
This factory is located on Sukamaju estate in West Java (See Map 3). It comes under the aegis of PNPXI which has responsibility for 22 estates and whose headquarters are in Jakarta. PNPXI has a major interest in rubber production although other commodities such as tea, cocoa, palm oil and gutta percha are also produced. (Gutta percha is the subject of another TA project carried out prior to this rubber study and reported separately).

Here as elsewhere the PNP had no choice in type of equipment, scale of plant or location. It seems that 3 factories were allocated to PNPXI although no documentation has come to light which authenticates this. One factory of 300 tons per month capacity was put in at Sukamaju, another of 100 ton capacity at Tenjoresmi and a 200 ton plant intended for Ruminkang was never built. It is not known how much money was earmarked for Ruminkang or what happened to it. The factory at Tenjoresmi operated for a short time but has now been closed down as a result of the fall-off in demand for rubber. It is now intended to re-locate the factory at Sukamaju, where it can be easily accomodated in the existing building and where routine maintenance can be carried out conveniently. This factory was not visited: only the Sukamaju factory was visited at this PNP.

PNPXI is now in the process of taking a fresh look at its rubber production and location of plant policies. In general their management techniques and performance were very impressive.

2. Implementation

The Sukamaju plant was installed and commissioned in one year and went into production in 1971. This phase seems to have gone smoothly here as elsewhere. The plant was installed in a building formerly used for tea. Costs of modification were £34,226 (See Chapter 3) which compares with estimates[1] of £38,000 for a 300 ton plant in the smallholder sector.


MAP 3
P.N.P. XI ESTATES AND CRUMB RUBBER FACTORY
SUNDA STRAIT
N
BOGOR
SUKAMAJU
SUKABUMI
INDIAN OCEAN
Jakarta
WEST JAVA
1:6,000,000
SCALE
1:750,000
LEGEND
Approx. location and outline of Estates
Roads
Railway
Crumb rubber factory constructed with British technical assistance

The general appearance of the grounds at the factory is excellent (See Plate 11). The building itself is of structural steel with a galvanised iron roof showing many sheets perforated with rust. This has been caused in part by tea acids but has been accelerated by formic acids used in making coagulum. It is typical of the standard of management here that they are trying out other materials to cope with this problem and a possibility they have come up with is hardflex, a plastic material. Galvanised sheeting has to be replaced every 4 years.

Offshore costs of plant and equipment were £67,962 which compares favourably with the other factories (See Chapter 3) although the available estimates figure is £54,827.

3. Running costs

The fall in demand for crumb rubber has affected production at PNPXI just as it did elsewhere. As mentioned, one factory has been closed, one has not been built, plans for expansion have been delayed, and the Sukamaju factory is now working at just over 50 per cent of capacity. Rates of return have therefore been vitally affected by this turn of events. A policy of diversification is now being adopted. Other products such as RSS rubbers will be continued and concentrated latex may be given greater attention with an eye to the expected increase in domestic demand for this product, a demand which will come from manufacturers within the West Java region itself.

The complications about costing arise here more than elsewhere since PNPXI administers many more estates, 22 in all, as well as more commodities and products, with varying production cycles, different climatic backgrounds (upland and lowland) and different terms of trade. This may be the reason why a CDC engineer has calculated (reported to writer by PNPXI) that the break-even capacity for a crumb rubber factory in West Java is 600 tons per month and not 300 as in the present case. If this were found to be true it would lend weight to the argument made in Chapter 2 for evaluation to be carried out in the context of the performance of each PNP and not of each factory.

Unit processing and packing costs (Rp/kg, border prices) are as follows:-

1971 - 7.0; 1972 - 14.6; 1973 - 8.4; 1974 - 19.2

4. Production and sales

The following production and sales pattern ('000 kg) emerges for this plant of 300 tons per month capacity:-

	1971	1972	1973	1974
Production	1,634	2,199	2,240	2,275
Stocks b/f	-	337	202	259
Total	1,634	2,536	2,442	2,534
Sales	1,297	2,334	2,183	2,300
Stocks o/f	337	202	259	234

No smallholder rubber has been processed up to the present but the factory will be expected to play a new role in an expanded rubber programme for the region.

5. Machinery and equipment at Sukamaju

Two lines of Guthrie-Pullen equipment were installed, 1 for latex and 1 for cup lump processing. The latex line was taken out of production in September 1974 because of the poor demand for the higher grades of SIR, but the equipment is in very good order. Its maintenance is included in the normal maintenance routine for the working equipment, and it is intended to include the Tenjoresmi plant in this routine until it can go into production again. This is just another aspect of the considerable versatility and adaptability shown by the management here in contrast to other places. In fact the Sukamaju factory with 1 or 2 minor reservations can be said to be very well operated.

Criticisms of the Guthrie-Pullen equipment at this plant have been the same as elsewhere with the one difference that something positive has been done to correct the shortcomings. The management has not looked upon the

equipment as something unalterable or non-expendable just because it was Aid-financed and they have been quick to modify or discard the machinery where necessary. This kind of innovative initiative has not been present to the same marked degree elsewhere.

The Guthrie-Pullen pre-drying equipment consisted of washing tanks, conveyors, granulator, pelletiser and, in this factory, an extruder. This is the stage which, as mentioned in the preceding section, has been changed. The cup lump is now hand sawn smaller, more convenient blocks and fed through 5 creeping machines installed in series before going through the granulator and into the drier. A hammermill would be considered necessary for cup lump arriving from smallholders in order to remove dirt and adulterating material but it is not necessary here where the cup lump arrives clean from estates.

The Guthrie-Pullen pelletiser was discarded because of maintenance and capacity problems similar to those found elsewhere. The extruder was discarded because it reduced the quality and plasticity of the rubber so that sometimes not even SIR50 grade could be got from raw material which was expected in some cases to reach SIR10 and at least SIR20. This was one of the first instances where Guthrie-Pullen used an extruder which they have now developed even further; they claim very high performances for it (Chapter 4). The disused pelletiser and granulator were still on the factory floor in very good condition. No attempt had been made to sell them although it seemed highly unlikely that they would ever be used again.

The problems involving autodriers were also similar to those elsewhere but seemed to give far less concern. The strongest criticism was that only 90 per cent of stated capacity had ever been reached, principally, it was said, because maintenance problems of cleaning and oiling required that the plant be shut down. The stoppage time had however been reduced to a minimum. Once a week trays were removed and replaced with clean ones, and the accumulation of rubber under the drier removed. Some difference in capacity had been found between latex processing, which yielded 7.5 tons per day, and cup lump, where a capacity of 10 tons per day was achieved.

The reason for the difference was known to be the water content of the coagulum. This had been partly corrected by the introduction of the creping machinery but other techniques (See Chapter 4) were not employed.

Guthrie-Pullen had made some improvement at the feed end of the drier by dividing the feed area with a central directing board, which achieved only partial success. As elsewhere the dip-stick showed that maximum bed-depth was not being maintained although temperature and timing were set for maximum performance.

Control of airflow could be improved here. Hot air was blasting out of both ends of the drier because the retaining flaps (rubber in this case) had been worn and distorted with the heat. They are replaced every 3 months. Aluminium ones may be better.

Generally the management showed more familiarity with drying technology. They were aware for example of the differences arising out of day and night variations in ambient temperature but had not yet measured these differences. Here as elsewhere it is felt that a drying technologist could provide many economies.

6. Packing

A great deal more trouble is taken with packing here as with everything else, yet packing remains one of the great worries and one of the highest of processing costs. In the first instance rubber is left longer in the buffer trays after drying to cool inside and out so that greater uniformity in size and density can be achieved when the rubber is pressed into bales. The bale itself is allowed to continue the cooling process but in spite of this small differences in size still occur. Thicker bales have to be forced into crates with the possibility of springing nails and boards if the crate is not well made.

A two-stage packing process has been adopted to try to avoid this. Firstly the newly-pressed bale is wrapped in its plastic sheet and its grading strip attached. Then it is packed in a crate and left for a couple of days. Secondly it is re-packed in other crates and prepared for transport. In this

way any further movement or adjustment (expansion for example; this material is elastic) within the bale is avoided, or so it is claimed. Also more selective packing is possible with some upgrading of the occasional bale which has turned out well in colour and quality.

However, much of this good work is brought to nothing by the condition of the crate itself. Many crates were examined and in general they were found to be well-constructed and closer to the recommended structures than those found elsewhere.

But enough faults were found to make eventual damage and resulting claims certain. In many cases boards were not uniform in thickness, nor uniform in thickness or width within the board itself. Different types of wood were used within the crate and sometimes the weakest board was put in the most critical structural position. Nails too were not driven home and in some cases they had split the board, which would then come apart under pressure.

As at the other factories these crates are made locally, with timber brought in this case from South Sumatra. The Sukamaju management could usefully exercise more quality control at this stage. When the crates were examined on arrival at Tanjung Priok it was found that already while still in the trucks, many boards were warped and sprung and the metal binding strips had in some cases come off. Questions to the godown staff elicited the fact that this was a common occurrence and that they themselves had to carry out the necessary repairs before shipping. Information and costs had been fed back to PNPXI but there had been no improvement and the feed-back had now ceased. Costs are added to godown charges.

7. Quality control

An opportunity was afforded at this factory to examine in more detail one section of the quality control system which was introduced in Indonesia as a result of TA(5). One encountered the general feeling that the implementation stage had been successful but that considerable improvement was still needed in a second phase which had now been entered.

At the factory laboratory the following is the procedure. For each crate 3 analyses are needed from 3 randomly selected bales. Then 100 grammes are taken from these and blended. Then 10 grammes of the blend are analysed for dirt content which takes 9 hours, 5 grammes for ash content (4 hrs), 5 grammes for volatile matter and moisture content (3 hrs), and 25 grammes for plasticity (0.5 hrs). Then a 'mean + 3' standard deviation is calculated and the results are sent to the Commercial Laboratory at Bogor which is one of the 7 central laboratories set up under the TA scheme. A certificate of quality is issued. Copies of this go to PNPXI headquarters, the factory office, the Joint Marketing Office, which is responsible for sales, and to the buyer. The factory has so far not had any rejections although some were reported at the other factories during the early days of processing.

8. Location of plant and rural development

Once again much information under these headings could have been collected if time permitted. From the little available it would appear that plant location was logical, but the changing emphasis of location factors has now made changes necessary, and, as was found at PNPII, the time is now opportune when one factory is closed down for a re-appraisal of location policy. The Tenjoresmi plant, now in a remote location on the south coast where it was expected to provide employment, will be relocated in the Sukamaju factory where economies of management, finance, transport etc can be achieved. This is a move within the context of location of several plants within the PNP.

It is also hoped in the future to give the Sukamaju factory a role similar to that intended for Membang Muda. It will cater for smallholder rubber which has not so far been purchased by the factory, in a government scheme sponsored by the World Bank to promote smallholder rubber in the region. At present about 200 smallholders sell poor quality rubber in the local town of Cibadak and there are other purchasing centres in the region as well. In all probably several hundred will eventually benefit from the CR factory.

There appears to be little spin-off from the CR project to the rural area in which it is located. Dissemination of skills such as tapping and truck repair, as well as providing a limited amount of labour opportunities, seem to be the main contributions at the moment. The local villages are largely individually isolated rice-growing communities, mostly unaffected by the plantations which often completely surround their villages, and not much attention is given to rubber growing.

CHAPTER 8

KALIREJO FACTORY AT PNPXXVI

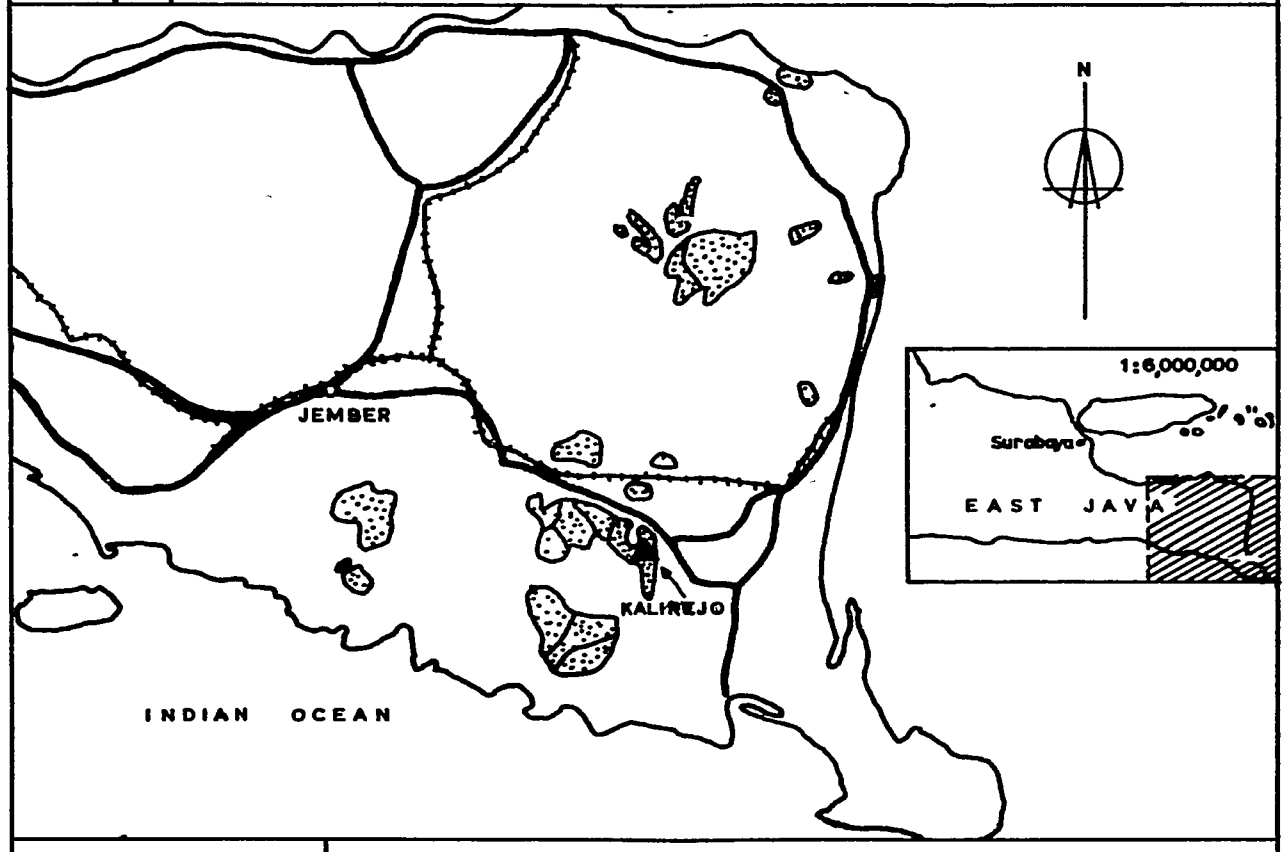
1. Introduction

PNPXXVI has its estates in East Java and its headquarters at Jember where one of the commercial laboratories for quality control in rubber is also located. The crumb rubber factory allocated to PNPXXVI is located on Kalirejo estate, which is remote (see Map 4), in terms of its exports from Surabaya, 7 hours journey away by road. As a result there are a number of special problems which management has to face in this region. Surabaya itself is off the shipping routes for rubber and ships making the trip to Surabaya do so only when there are worthwile volumes to be handled. Unfortunately rubber production in East Java is on a small scale compared with North Sumatra and shippable volumes are available only at long intervals. Buying agents make purchases at even less frequent intervals, which gives rise to high godown charges and critical cash flow problems. The problem would not be lessened by making a rail or road journey to Jakarta some 600 miles away. The conditions of shipping are not much better at Jakarta, which itself has shipping problems.

2. Implementation

The low level of rubber production in East Java is reflected in the lack of economies of scale of plant. Size of plant at Kalirejo was a highly controversial point when the first discussions took place between the management, the British Embassy, Guthrie-Pullen and the Indonesian Government. Management were very reluctant to take the 300 ton plant which was recommended, wanting instead a 100 ton plant. A compromise at 200 tons was finally reached. Similarly the management did not want to take Guthrie-Pullen equipment but in the end were obliged to do so because of the usual requirement of tying capital aid. In relation to the provision of capital aid it was also argued that one company should be responsible for all the equipment and the PNP management again reluctantly agreed that this might be a good thing, although obviously they had their reservations.

MAP 4 P.N.P. XXVI ESTATES AND CRUMB RUBBER FACTORY



SCALE
1 : 750,000

LEGEND

Approx. location and outline of Estates — Roads — Railway

Crumb rubber factory constructed with British technical assistance

A new factory building and ancilliary laboratories and generator rooms were necessary at this site. The buildings were completed in 18 months in July 1973, which is very good for a remote area. Cost is given at £63,816 compared with estimates(1) of £38,000 for a modified building.

Machinery and equipment costs are given as £104,342, which is very high for a 200 ton plant (see Chapter 3). Details of the costs are not available.

The general appearance and condition of these fine buildings and the lay-out and maintenance of the grounds is excellent. Plates 12 and 13 convey the impression outside and inside.

3. Running costs, production and sales

Production began in July 1973 but the remainder of the year was really taken up with trial runs and establishing marketing channels. In view of the shipping difficulties and the long intervals between sales large stocks had to be carried through 1973 and 1974. The factory has been trying to work towards a proper production function in the context of its regional problems and the state of the world demand for rubber and in fact it is too early yet to recognise an emerging pattern of production.

Latex processing has been discontinued and the latex has been diverted into the concentrated latex market for the time being. Only cup lump is now processed and this is only about 6-10 per cent of the PNP total rubber production. The usual 80-20 per cent latex to cup lump ratio does not apply here since a double collection of latex is practised daily and this reduces the amount of cup lump.

Only 1974 processing and packing costs are available. These are Rp 130.45 per kg for raw materials and Rp 20.57 per kg (border prices). Production and sales are as follows:-

		1973	1974
1	Production	289.5	525.8
2	Stocks b/f	-	199.5
3	Total	289.5	725.3
4	Sales	90.0	337.2
5	Stocks c/f	199.5	388.1

4. Machinery and equipment at Kalirejo

Two lines of equipment, one for latex and one for cup lump, were installed and there is still sufficient floorspace left over to double capacity when required. Plate 13 illustrates. The latex line is no longer used because of the state of the market. This equipment is however in excellent condition as is the working equipment. One of the autodriers had been damaged in transit but effective repairs were carried out on site.

Criticisms of the equipment were the same here as elsewhere. The pelletiser in particular seemed to give a lot of trouble and had to be fed by hand all the time. This in fact was a difficult job. One had to force the material into it before the material was gripped, when it should in fact feed in without difficulty. Capacity as a result was very much affected and if the plant were working at full capacity the pelletiser would have to be replaced.

The driers were not as drastically criticised here as elsewhere although there was some adverse comment about fuel consumption and maintenance. The autodriers here, being of later manufacture, seemed to be rather better designed than the others seen, although of course they were newer and had not been subjected to the same level of wear and tear. Both ends of the airflow passage were here fitted with aluminium metal flaps to retain the airflow. Other driers had rubber flaps which became distorted and burnt in time. Lagging between side panels and roof panels of the drier was still in perfect condition. Exhaust fumes were taken out through underground flues.

It is still very likely however that a drying technologist could provide further economies here. Management themselves professed a preference for the unidrier which they said would be more appropriate for their people. The autodrier was suited to more highly trained people.

One of the greatest needs was said by management to be local suppliers and makers of spares. At present their greatest requirement was for nuts and bolts, and knives for the granulator and pelletiser. But, they said, the knowledge of metallurgy and the types of metals suitable for various purposes as well as metal skills were very low in the region.

They also felt there should be more cross-checking and discussion of processing problems and of machinery and equipment with other PNPs. Work studies of performance elsewhere ought to be carried out, they said, and the best methods arising out of the study applied in each factory.

5. Packing

Packing is a very serious problem at Kalirejo. A special problem here, not found elsewhere, is the plastic material used for each bale. Elsewhere a sheet of thin plastic is used to wrap the bale, but in this case a plastic bag is used and the bale is put into it. Complaints have been received from rubber manufacturers about this bag. In the manufacturing process it seems that the bale plus its wrapping is placed in the melting pot and the wrapping melts with the rubber. This plastic bag however does not do this and bales have to be stripped by hand,and the market acceptability of the rubber is thereby reduced considerably. A search is now being made for a plastic with the correct specifications.

The other major problem is the cost of crating. Although timber is grown widely in the region much of it is conserved for hydrological control and timber for crates has to be imported all the way from Kalimantan at enormous cost. Some thought has been given to looking for alternative packing methods but as yet no research programme has been launched. Containerisation has been talked about here as in North Sumatra but the same difficulties are present, namely, poor harbour facilities, lack of suitable railway rolling stock and loading and unloading facilities.

As elsewhere the design and construction of the crate, made locally under contract, is faulty and the recommended methods(4) are not observed faithfully. The positioning of boards, their number, the number and positioning of metal binding strips have not been carefully done in all cases although many of the crates are well made (See Plate 14). Timbers in many cases are not of even thickness or width throughout their length and are often of different kinds and strengths. Nails not driven home properly, split boards and protruding metal edges are fairly common faults.

Also in the harbour godowns at Surabaya one observed RSS and SIR stored side by side. The RSS bale is a notorious generator of dust and in the observed cases the gre-white dust was penetrating the SIR crates. The possibility of the dust actually getting through the plastic wrapping into the rubber is very remote but once again an opportunity is provided to buyers for downgrading their prices or making subsequent claims against dust content.

The crating problem does not end there however. In East Java a 75 lb bale is used whereas a 33.3 kg (73 lb) bale is used elsewhere. The size of the crate fo 30 bales is therefore bigger than elsewhere with some effect on shipping costs. Seemingly the smaller crate is more convenient. This size problem is however aggravated by the palleting problem. In East Java the forklift trucks used are of English, German, Japanese and also possibly Dutch and Australian origin. They are all of different sizes and have different thicknesses of fork, up to 3 inches in some cases. This means that the pallet space under the crate must be at least 3 inches whereas 2.5 inches sufficies elsewhere. More shipping space is therefore lost and costs increase accordingly. Management were aware of this and were looking for solutions but the writer and counterpart officer were very surprised to find many pallets which were 4 inches thick which is totally unnecessary and reflects a lack of quality control. Damage is also know to be caused when the forks of lifting trucks strike the edges of pallets and overturn them. This damage could be avoided by better carpentering techniques such as arris edges or bevelled edges on the pallet boards.

6. Conclusion

Management at Kalirejo were fully aware of the problems they faced and were constantly appraising the project in terms of a 'go/no-go' decision. They were fully aware of the need to increase production and put the factory on a full working schedule. They were however very worried about the market prospects. To make matters worse buyers of rubber had preconceived ideas about the quality of East Java rubber and always wanted to purchase it at a lower price than from elsewhere.

The volume of rubber in the region would have to be increased or otherwise they would have to consider switching away from the crop altogether and concentrating on the other regional crops, ie tobacco, cocoa, coffee and sugar.

Some factory economies could be gained if off-cuts, scrap and other materials could be processed but the dirt-content of this material would first of all have to be surveyed and it might be necessary to wait until the quality of rubber throughout the region has been upgraded. There is no smallholder rubber in the region so the factory does not have to worry about its role in that direction.

Obviously the timing of the project in East Java has been unfortunate for them and they were not able to overcome their problems before the slump of mid-1974 hit them. But even so they may still be doing better than their neighbours at PNPXXIII who had to close down their factory.

APPENDIX A

REFERENCES

1. Projects Committee: Crumb rubber plants for Indonesia Note by East Asia Department PC(69)11

2. Projects Committee: Crumb rubber plants for Indonesia Note by East Asia Department PC(69)38

3. ODM Files MS 235/218/01 A, B, C, and ANNEXE

4. Crumb Rubber Secretariat: Standard Indonesian Rubber, Bulletin No 2, Ministry of Trade, Jakarta

5. Barnay J A: General Report (at termination of contract) Jan 1972-June 1973.

APPENDIX B

VISUAL AIDS

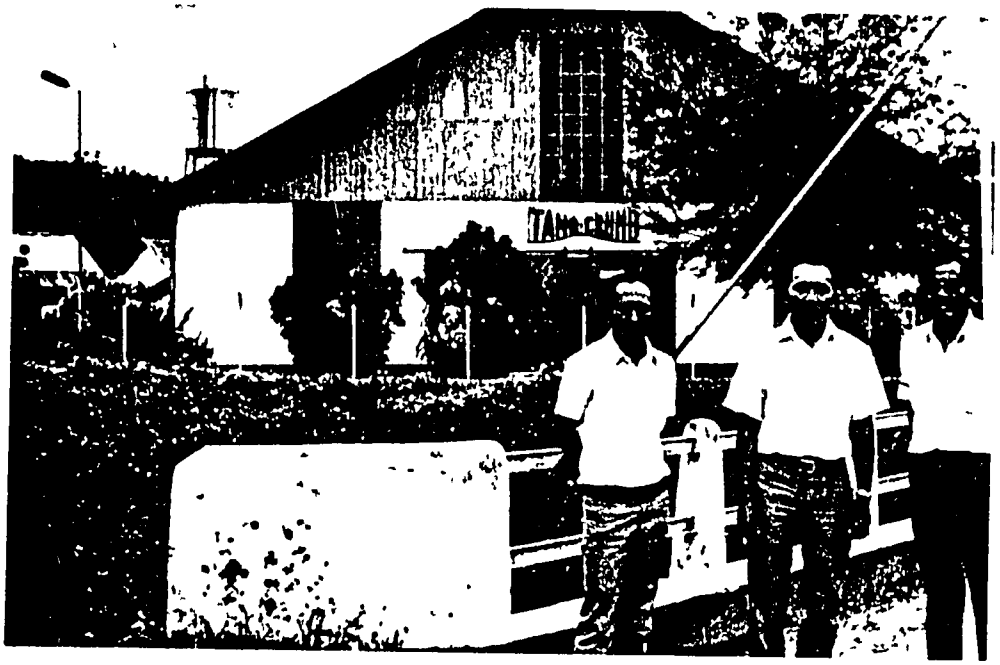


PLATE 1 TANJUNG GARBUS factory frontal view with officials left to right Mr Rivei, Mr Tobing and Mr Soesilardjo. 'TAMO-CRUMB' is the adopted trade name of the product.

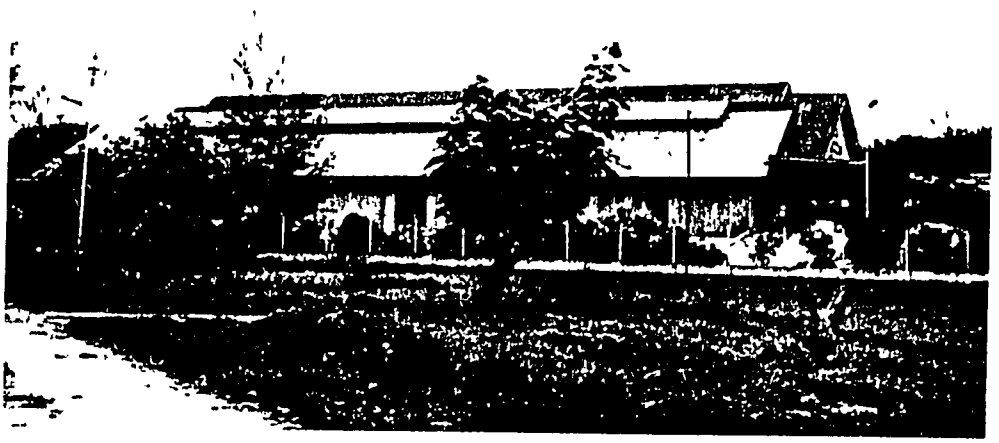


PLATE 2 TANJUNG GARBUS factory showing well maintained buildings and grounds

PLATE 3 BASILAM factory illustrating the well kept grounds and building, although production ceased.

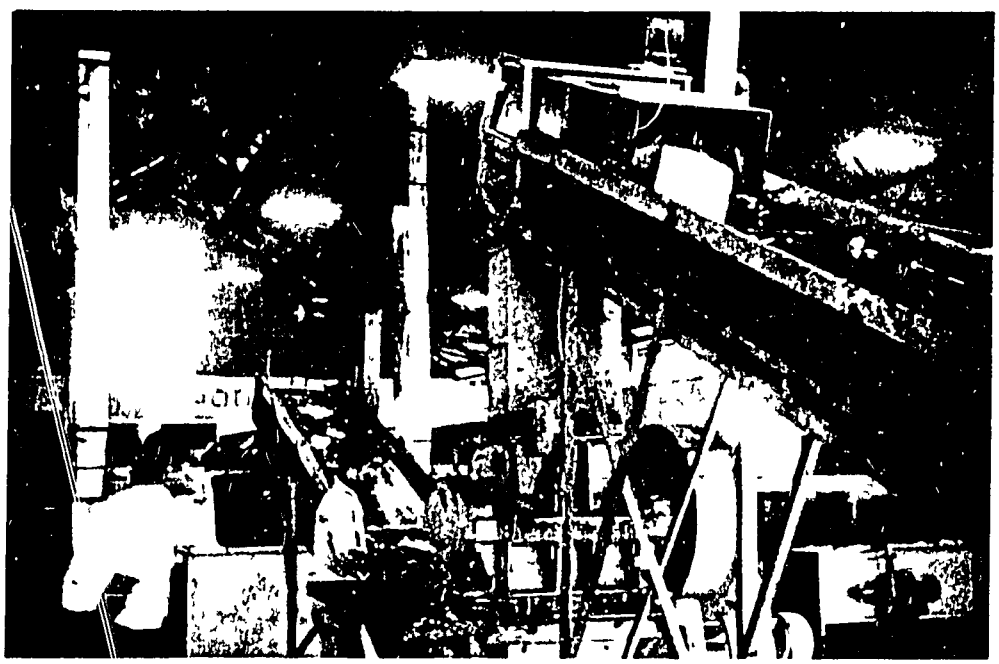


PLATE 4 LATEX processing at TANJUNG GARBUS. A latex block about to enter granulator before going to drier. Machinery obviously in good repair

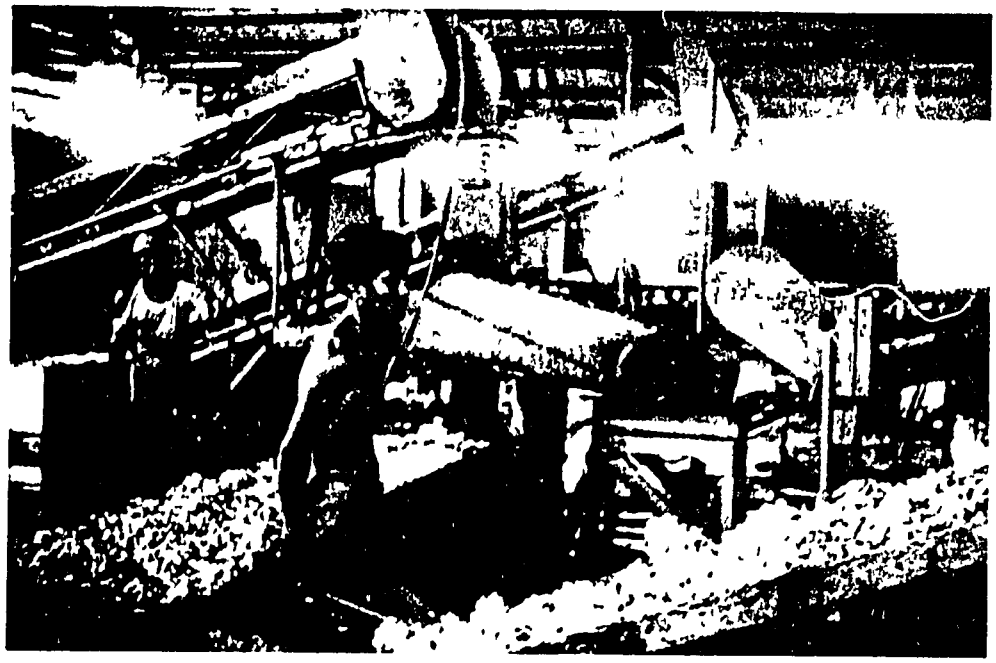


PLATE 5 CUP LUMP processing at TANJUNG GARBUS. Granulator, wash-tank and conveyors in good working order. The process is capital-intensive

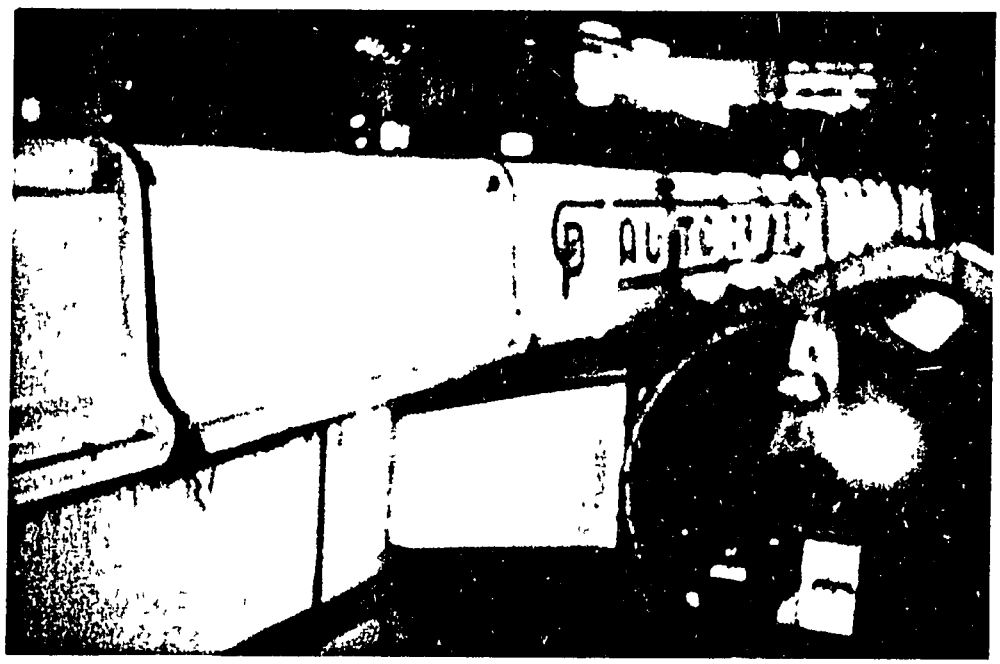


PLATE 6 The Guthrie-Pullen autodrier with heater on right feeding hot air into the side of the drier. Rubber moves in trays through the drier from left to right. Note deteriorating cladding between panels

PLATE 7 Idle equipment at BASILAM; coagulating tanks left, conveyors in background. Condition obviously good.

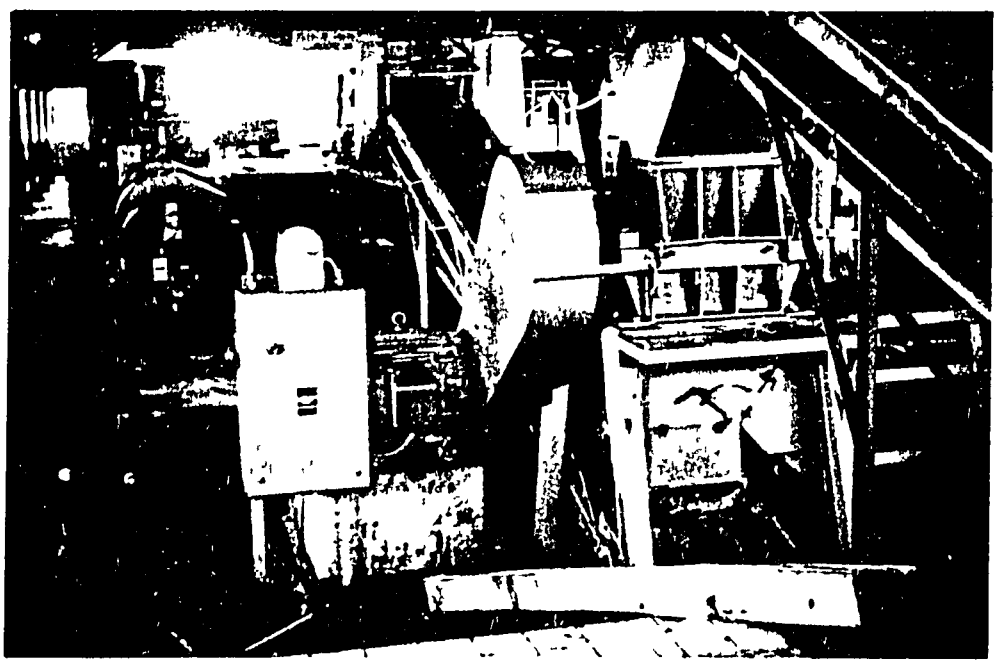


PLATE 8 More idle equipment at BASILAM also in good condition; granulator, conveyor and drier stripped down (background)

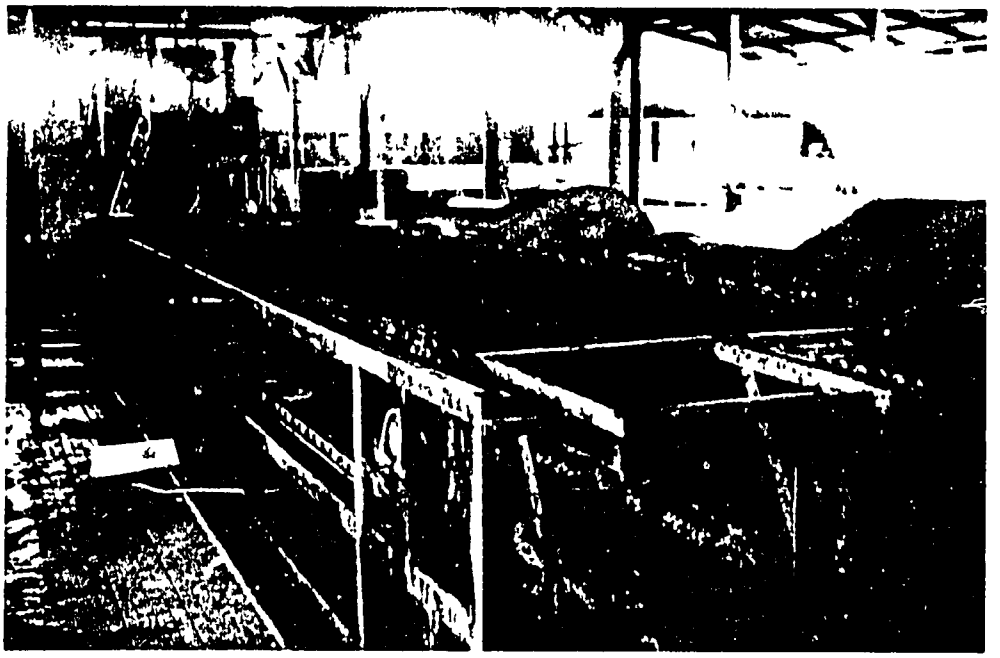


PLATE 9 Autodrier at BASILAM stripped down for maintenance showing accumulations of blackened rubber on floor and along metal structure

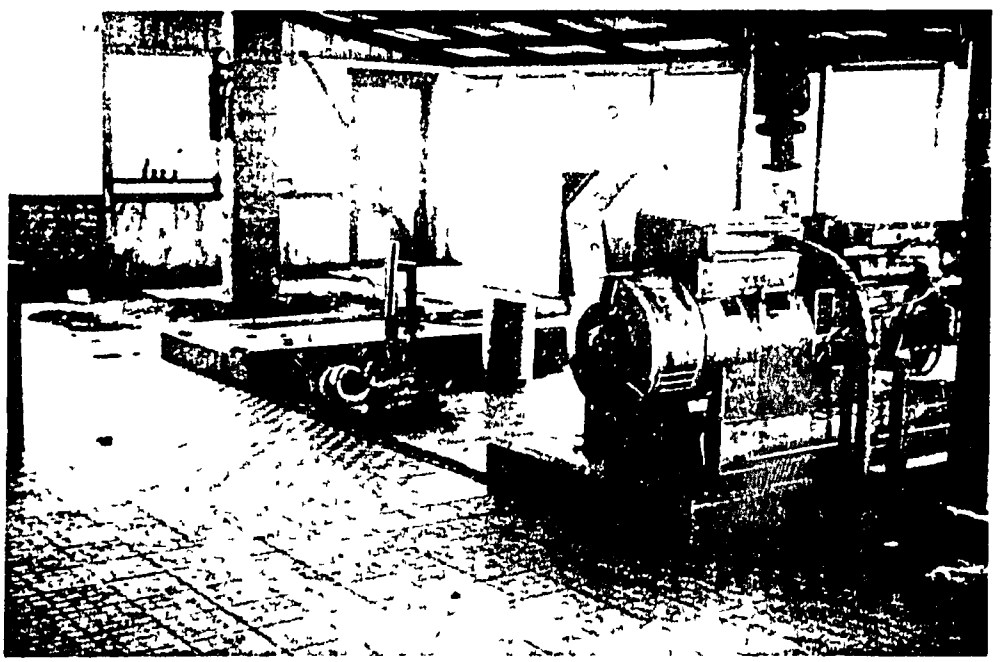


PLATE 10 Diesel generator room at BASILAM showing well set-up foundations for engines and well kept appearance. One engine removed for overhaul (see Chapter 3)

PLATE 11 SUKAMAJU factory, very well maintained old building modified for crumb rubber processing

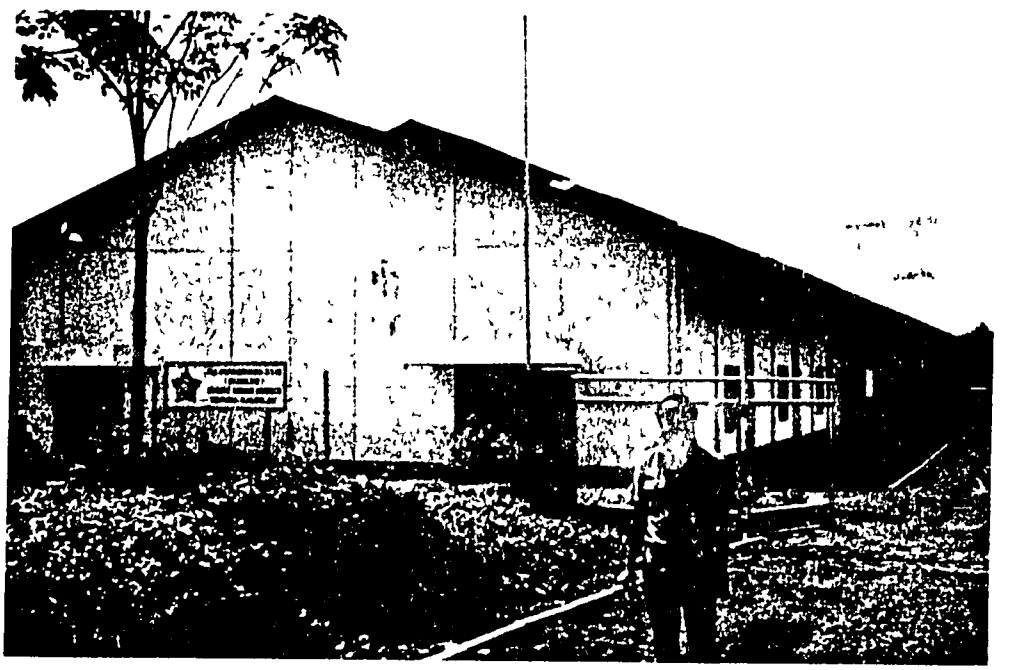


PLATE 12 Exterior view of the new factory at KALIREJO with Mr D A Nasution, Head of Laboratory. This is an excellent building and well maintained

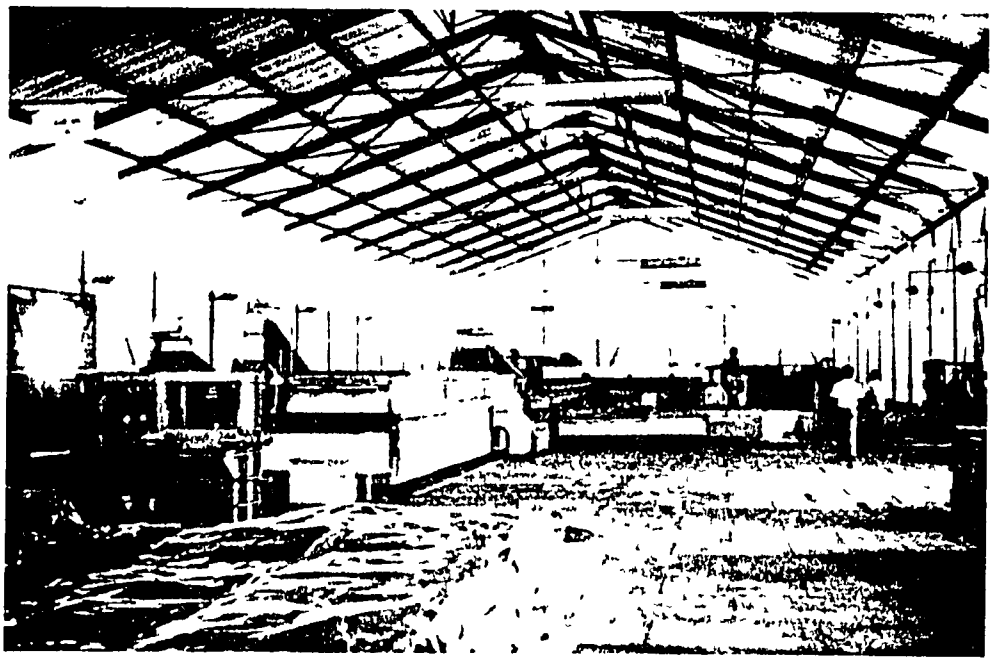


PLATE 13 KALIREJO factory interior view showing driers on left excess floor-space on right. Plastic-wrapped bales foreground ready for crating

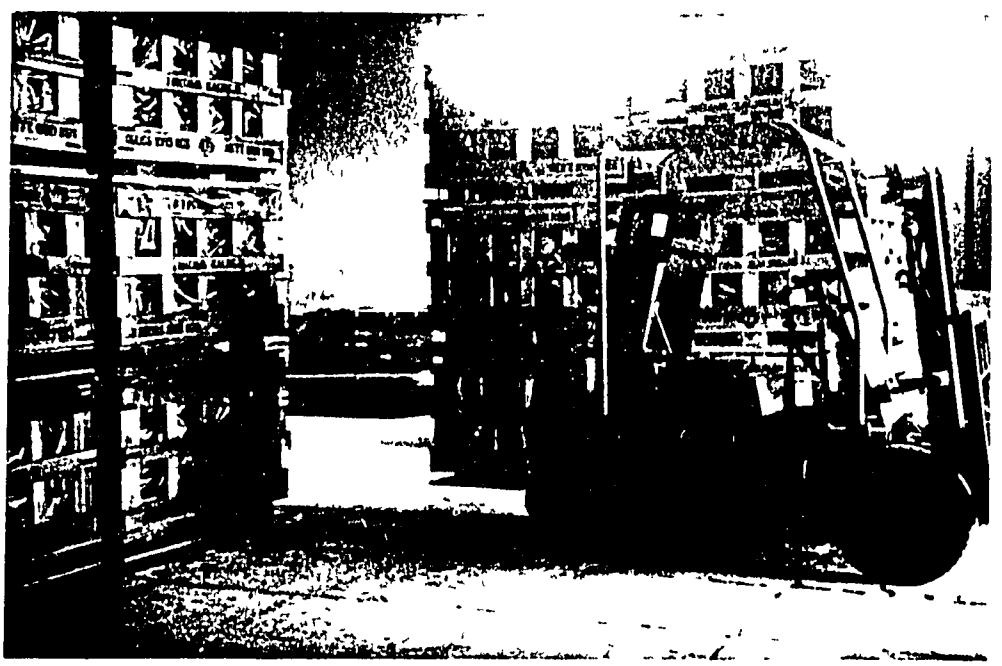


PLATE 14 Palleted crates of SIR rubber at KALIREJO ready for transport to port. General appearance good but note very wide pallet and two-way palleting only. (see Chapter 6).

APPENDIX C

ITINERARY AND CONTACTS

Saturday 14 December 1974	am	Visit to Penyelidikan Ekonomi Dan Masyarakat, Fakultas Ekonomi, University of Indonesia, Jalan Salemba Raya 4, Jakarta Dr S B Joedono, Director Moh. Arsjad Anwar SE, MBA, Deputy Director
		Visit to KPB Perkebunan Djabar-Sumsel, Jalan Let. Jend. S Parman 73, Jakarta. Mr R S Kartadjoemena, Managing Director Mr F L J Andries
	pm	Visit to HKU-PNP, Jalan Let. Jend. S Parman 73, Jakarta. Mr Karmawan
Monday 16 December	am	Visit to P T SIRA, Jakarta Mr Abdul Madjid, Vice-President
		Visit to PTP XI Mr Anang Musa, First Director
	pm	Visit to British Embassy Mr B A Mitchell, First Secretary (Aid) Mr R C Huxley, Third Secretary (Aid)
		Visit to Planning Bureau, Department of Agriculture, Jalan Imam Bonjol 29, Jakarta Mr Hendro Soewarno, Deputy Director
Tuesday 17 December	am	Visit to World Bank, Jalan Wahid Hasyim 100-102, Jakarta. Dr B S Gray, Director Dr Dieter Elz, Senior Economist
	pm	Visit to Commonwealth Development Corporation, Jalan Asem 1, Kemang, Jakarta Mr Adrian Kerwood, Resident Representative

Wednesday 18 December	am	Visit to P T Panca Niaga, CTC Building, Jalan Kramat Raya 94-96, Jakarta. Mr Ramlan
Thursday 19 December	am	Meeting at British Embassy with:- Mr B A Mitchell, First Secretary (Aid) Mr Karmawan, BKU-PNP
Friday 20 December	am	Fly Jakarta to Medan
		Visit to BKU-PNP, Jalan Teuku Daud, Medan Mr Firman, Director Mr Z Arifin Idris, Senior Staff, Technical Dept Mr G Soesilardjo, Mechanical Engineer Mr T A Fuad, Public Relations Office Mr Harahab, Public Relations Officer for PNP II.
	pm	Visit to PNP II, Tanjung Morawa, with counterpart officer Mr Harahab. Mr L M Siahaan, General Manager Mr Syarifudin Siregar, Production Manager Mr S Pulungan, Commercial Manager Mr Suprapto, Chief, Technical Department Mr Rivei, Technical Manager
Saturday 21 December	am pm	Visit to Crumb Rubber Factory, Tanjung Garbus Estate, with counterpart officers Mr Soesilardjo and Mr Rivei. Ir. S L Tobing, Administrator
Monday 23 December	am pm	Visit to Crumb Rubber Factory, Basilam Estate with counterpart officer Mr Soesilardjo. Mr Tengku Zainal Abidin Hasman, Field Manager
Thursday 26 December	am	Visit to PNP II, Tanjung Morawa, with counterpart officer Mr Harabab Mr L M Siahaan, General Manager Mr S Pulungan, Commercial Manager Mr Nasution, Secretary Mr Baharuddin Siregar, Chief Accountant

Thursday 26 December	pm	Visit to Estate Crops Research Institute, Medan with counterpart officer, Mr Harabab Mr Hardjito, Head of Technology Mr Arnott, FAO Project Team Mr Salgado, Rubber Technologist FAO Project Team
Friday 27 December	am	Visit to PNP II, Tanjung Morawa Mr Baharuddin Siregar, Chief Accountant
		Visit to British Consulate, Jalan Imam Bonjol 18, Medan Mr Tony Lee, Commercial Officer
	pm	Visit to KPB-PNP I-IX Sumut-Aceh, Jalan Balai Kota 8, Medan, with counterpart officer Mr Harabab Mr M Siregar
		Visit to Tanjung Keliling Estate Mr Harabab, Manager
Saturday 28 December	am	Visit to KPB-PNP I-IX, P M K L Negara - DTI, Belawan, with counterpart officer Mr Soesilardjo. Mr R A Daroesman, Director
		Visit to British Consulate, Jalan Imam Bonjol 18, Medan Mr G R Webb, Consul Mr Tony Lee, Commercial Officer
	pm	Visit to PNP II, Tanjung Morawa Mr L M Siahaan, General Manager Mr Baharuddin Siregar

Monday 30 December	am	Travel by road to Membang Muda with counterpart officer Mr Alisati Siregar
		Visit to Crumb Rubber Factory, P T CITA, at Tebing Tingi Mr Low Wie Min, Manager
	pm	Visit to Crumb Rubber Factory, Membang Muda Mr K M N Astrokusumo, Manager Mr H Siahaan, Chief of Administration Mr D Sipahutar, Chief Engineer
Tuesday 31 December	am	Conclusion of visit to Membang Muda
	pm	Return by road with counterpart officer to Medan
Thursday 2 January 1975	am	Visit to PNP III, Medan with counterpart officer Mr Alisati Siregar Mr O b Siahaan, General Director Mr Koesmihadi, Production Manager Mr Djoharuddin, Control Department Mr B Jamali, Assistant Head, Finance Department
		Visit to KPB-PNP I-IX Sumut-Aceh, Jalan Balai Kota 8, with counterpart officer Dr P Ritonga, Director
	pm	Visit to P T Techindo Imports, Jalan Let. Jend. Suprapto 308P, Medan, with counterpart officer Mr P Otton, Manager Mr Min Jasmin, Manager, Engineering Department
Friday 3 January	am	Visit to PNP III, Medan with counterpart officer Mr Alisati Siregar Mr O B Siahaan, General Director Mr Koesmihadi, Production Manager Mr B Jamali, Assistant Head, Finance Department
	pm	Visit to Estate Crops Research Institute, Medan with counterpart officer Mr Hardjito, Head of Technology

Saturday 4 January	am	Visit to HKU-PNP, Jalan Teuku Daud, Medan with counterpart officer Mr Alisati Siregar Mr Z Arifin Asis, Senior Staff, Technical Department Mr Soesilardjo, Mechanical Engineer
		Visit to P L T A Asahan, Jalan Dr Cipto No 16, Medan, with counterpart officer Mr Sinagar, Manager
	pm	Visit to British Consulate, Jalan Iman Bonjol 18, Medan Mr G R Webb, Consul
		Visit to Pertamina, Medan Mr Imam Syukri Aminy, Sales Inspector
Monday 6 January	am	Visit to P T P P London Sumatra Indonesia, Jalan Jend. A. Yani 2, Medan Mr E Edwards McKinnon, Director
		Visit to P T Etoo Pacific, Jalan Jend. A. Yani 2, Medan Mr Wilcox
		Visit to British Consulate, Jalan Imam Bonjol 18, Medan Mr G R Webb, Consul
	pm	Fly Medan to Surabaya Met by counterpart officer:- Ir Soewondo Kartokoesoemo, Production Inspector, HKU-PNP Wilayah IV, Jalan Sikatan 1, Surabaja
Tuesday 7 January	am	Visit to HKU-PNP Wilayah V, Jalan Sikatan 1, Surabaja, with counterpart officer Ir. Soewondo Kartokoesoemo
	pm	Visit to Tanjunk Perak with counterpart officer

Wednesday 8 January	am	Travel by road with counterpart officer to Jember and Kalirejo Estate
	pm	Visit to PNP XXVI, Jalan Imam Bonjol 3, Jember Mr R P Moh, Saifoellah, Production Director Ir. Sawarno, Chief Agronomist
		Visit to Estate Crops Research Institute, Jalan Moh. Seruji 2, Jember with counterpart officer Mr Nano Priatro, Coffee Agronomist
		Visit to Kalirejo Crumb Rubber Factory with Mr Soewondo, Mr Saifoellah and Mr Sawarno Mr D A Nasution, Head of Laboratory
Thursday 9 January–Saturday 11 January		Kalirejo Estate with counterpart officer
Saturday 11 January	am	Travel to Kota, Bali with counterpart officer
Tuesday 14 January	pm	Fly Denpassar to Jakarta
Wednesday 15 January	am	Visit to PTP XI Mr Soeratin Soeboer, Production Manager Mr Soesanto, Financial Manager
	pm	Visit to British Embassy
Thursday 16 January	am pm	Visit to PTP XI Mr Soesanto, Financial Manager
Friday 17 January	am–pm	Visit to PTP XI Mr Soesanto, Financial Manager
Saturday 18 January	am	Visit to PTP XI Mr Soesanto, Financial Manager
	pm	Visit to K P B P Djabar-Sumsel Mr F L J Andries

Monday 20 January	am	Travel by road to Sukamadju Estate, West Java Mr I Hamim, Estate Manager Mr R Tatang Sumarna, Factory Manager Mr Adja Yashin, Chief of Laboratory
Tuesday 21 January	am-pm	Sukamadju Estate
Wednesday 22 January	-	Courtesy visit to Cipitir Estate
	am-pm	Return by road to Jakarta
Thursday 23 January	am	Visit to Paterson Simons & Co (Asia) Ltd 26 Jalan Gondangdia Lama, Jakarta Mr O Baudert, General Manager
	pm	Visit to British Embassy, Jakarta Mr P J Torry, Second Secretary (Commercial)
Friday 24 January	am	British Embassy, Jakarta
	pm	Visit to Hong Kong and Shanghai Banking Corporation, Jalan Gajah Mada 18, Jakarta Mr Thomas Welsh, Manager
Saturday 25 January		Visit to PTP XI Mr Soesanto, Financial Manager
Monday 27 January	am	Visit to Directorate Standardisation and Quality Control, Department of Trade, CTC Building, Jalan Kramat Raya 94-96, Jakarta Dr Kamarulzaman Algamar, Director
	pm	Visit to Bulog, Jalan Teuku Umar 10-12, Jakarta Mr Beda Amang Mr Sumati

Tuesday 28 January	am	Visit to BULOG, Jalan Teuku Umar 10-12, Jakarta Mr Sanjoto, Chief, Foreign Procurement Mr Sumati Mr Mursid Mr Bedu Amang
	pm	Visit to Forest Products Standardisation Division, Direktorat Jenderal Kehutanan, Jalan Salemba Raya 16, Jakarta Mr Mat Noer Anwar
Wednesday 29 January	am	British Embassy, Jakarta Mr R C Huxley, Third Secretary (Aid) Dr Brian Grimwood, TPI
		Visit to Central Statistics Bureau, Jalan Dr Sutomo No 8, Jakarta
Thursday 30 January		Visit to Department of Trade, Jalan Abdomois 87, Jakarta Mr Gultom
Friday 31 January	am	Final courtesy visits to: 1. PTP XI 2. BKU-PNP 3. British Embassy
	pm	Visit with Dr B Grimwood to Paterson Simons & Co (Asia) Ltd, 26 Jalan Gondangdia Lama, Jakarta for meeting with: 1. Mr P de Jong, Commercial Director, Kumpulan Guthrie SDN BHD, Wisma Damansara, PO Box 2516, Kuala Lumpur, Malaysia 2. Mr J Ward, Paterson Simons & Co (Asia) Ltd 3. Mr P Otton, P T Techindo Imports, Medan
Saturday 1 February	am pm	Visit to Tanjunk Priok with counterpart officer Mr F L J Andries

Sunday 2 February	am-pm	Fly Jakarta to Kuala Lumpur
Monday 3 February	am	Visit to British High Commission, Wisma Damansara, Jalan Semantan, Kuala Lumpur Mr J D Massingham, First Secretary (Aid) Mr M J Sexton, Second Secretary (Aid)
		Visit to Kumpulan Guthrie SDN BHD, Wisma Damansara, Jalan Semantan, Kuala Lumpur Mr P McGovern, Management Services Division
Tuesday 4 February	am	Visit to Malaysian Rubber Development Corporation Berhad, 91 Jalan Campbell, Kuala Lumpur Mr Khoo Bong Lee, Marketing Manager
		Visit to Rubber Research Institute of Malaysia, Jalan Ampang, Kuala Lumpur Mr Chang Wai Pong, Technology Department
Wednesday 5 February		Visit to Kumpulan Guthrie SDN BHD, Wisma Damansara, Jalan Semantan, Kuala Lumpur Mr P McGovern Mr Siah Chee Way Mr N G Chee Tee
		Visit to British High Commission Mr M J Sexton
Thursday 6 February		Fly Kuala Lumpur, Bangkok
Friday 7 February		Visit to SEADD, British Embassy, Bangkok Mr B Hudson, Head of Development Division Mr Geoffrey Sumner, Economist Dr B Grimwood, TPI
Saturday 8 February - Sunday 9 February		Fly Bangkok-London