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National Science Council of Sri Lanka
47/5, Daitland Place
Colombo 7.

25 August, 1975

The Minister of Industries & Scientific Affairs,
Ministry of Industries & Scientific Affairs,
43, Sri Jinaratana Road,
Colombo 2.

Dear Sir:

PANEL FOR VEGETABLE & ANIMAL OILS AND FATS, LEATHER & RUBBER, WOOD,
PAPER & PULP IN SRI LANKA

I have pleasure in presenting to you the report of the Panel set up by you for a study of the industrial sector, relating to Vegetable & Animal Oils and Fats, Leather and Rubber, Wood, Paper and Pulp in Sri Lanka.

Our Panel was very wide in scope, and as such, no doubt, you will excuse us for the unavoidable delay in presenting our report to you. I would like to thank all the members of the Panel for the co-operation they extended to me in doing this study. Special mention must be made of the tremendous amount of work put into this study by Mrs. Marina de Silva, Scientific Officer of the National Science Council, who was the Secretary to the Panel and without whose effort, the study would not have been possible.

Yours sincerely,

G.C.N. Jayasuriya

(Dr. G.C.N. Jayasuriya)

Chairman,

Panel for Vegetable & Animal Oils and Fats,
Leather & Rubber, Wood, Paper and Pulp in Sri Lanka.

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II. TERMS OF REFERENCE

1. Collate, examine and analyse existing data with a view to identifying available and potentially available resources which in the light of existing and future national demand and where appropriate international and the most appropriate technology, can form the basis for establishment of viable industrial projects.
 - ii. Formulate specific proposals for the establishment of such industrial projects.
 - iii. Examine existing industries, their manufacturing capacities, by-products and industrial wastes and make recommendations for process improvements, increasing manufacturing capacity, further manufacture of by-products, utilisation of waste and safe disposal of effluent.
 - iv. Examine current and proposed research and development programmes, identify gaps and make recommendations to ensure that such future research and development efforts are based on agreed national priorities.
 - v. Make recommendation in regard to the institutional framework necessary for the achievement of these objectives.

I I. MEMBERSHIP AND TERMS OF REFERENCE

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APPOINTED MEMBERS

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III. THE FRAMEWORK

Accepting that the scope of the Terms of Reference were extensive and did not allow for a depth study in each area, to be carried out within the time allotted for the submission of its report, the Panel limited its deliberations to Sections (iii), (iv) & (v) of the Terms of Reference only. The Panel recommends that each sector be studied separately, and comprehensive report on each be prepared.

i. Scope

Five separate sectors comprising both the private and public sector were considered in this report. They are (i) the Oils & Fats Industry, (ii) the Leather Industry, (iii) the Rubber Industry, (iv) Paper & Pulp (v) Wood.

ii. Methodology

Source of Information - The principal sources of information used in the preparation of this report were:

- (a) Published reports and papers
- (b) Unpublished papers and statistical data supplied by members of the Panel.
- (c) A representative series of interviews and discussions.

iii. Format

The body of the report comprises detailed sectoral reports for each area studied. The recommendations specific or particular to each of these areas are included in these reports. Part VI (ii) deals exclusively with research and development, in general, but attention has also been given to specific problems in the different industrial sectors studied. Part V of the report carries the general observations and recommendations made by the Panel.

iv. Limitations

The recommendations offered in this report have been based on selective information as it was not possible to obtain total representation for each sector studied. The report is therefore only indicative in its approach, and does not attempt to formulate a specific action programme. It is hoped that follow up action on this report will however lead to an indepth study of each sector on which a more detailed action programme can be formulated.

Plant & Machinery -- In all the industrial sectors studied, the Panel noted that the plant and machinery was often outdated and in a state of disrepair. Although some maintenance was being done, this was often inadequate. Recommendations pertaining to the immediate rectification of this situation have been made with reference to the fact that in the total productivity of an enterprise, one important factor is the progressive decline or improvement in the plant and machinery used.

Research and Development has merited special attention and one chapter of the report deals with this area. The Panel noted that the facilities for R & D within these industrial sectors, both public sector and private sector, were inadequate. Remedial action has been suggested. General observations relate to the entire sector are included.

IV. SUMMARY

The Panel deliberations were confined to five major industrial sectors.

(1) Fats & Oils, (2) Leather, (3) Rubber, (4) Pulp & Paper, (5) Wood products.

Four of these areas were studied in detail, viz. (1) Fats & Oils, (2) Leather, (3) Rubber, (4) Pulp & Paper. As the 5th sector, wood, has been studied intensively by a separate committee, the Panel agreed that duplication of effort should be avoided and therefore mention could be made of this study. The data obtained could be used when the Panel made its general recommendations.

In its study, the Panel decided to stress on those areas where programmes or projects are already identified or have been started, even if to a limited extent. In the present context, limited resources are a major constraint to the achievement of even the minimal productivity level in most of the projects which are underway. It would therefore be extremely inadvisable to spray these limited resources over a number of new and unproven projects and the Panel therefore strongly recommends that any extra resources should be made available as supplementary inputs to those projects already in operation.

The Panel's deliberations therefore focussed on specific areas within the sectors which they considered merited greater attention. Special attention was given to identifying the constraints which currently operated, and in the general recommendations, measures have been suggested by which these constraints could be minimised.

Raw Materials - The raw material position was examined in depth and areas where the possibility of substitution for imported items was given serious consideration. One of the major limitations, the Panel noted, was that of maintaining regular and adequate supplies of a high quality local substitutes. Some measures by which this situation could be remedied have been suggested.

7. OBSERVATIONS AND RECOMMENDATIONS

i. General Observations and Recommendations

The following observations and recommendations are relevant to the entire sector studied. The Panel stresses however that attention should also be given to the specific recommendations made in each sectoral report.

RAW MATERIALS

The economic viability of any manufacturing activity is determined to a large extent by the price and availability of the raw material used. Purchase strategies must necessarily be geared to profit making if the enterprise is to be successful.

In the sectors studied, the Panel noted

- that a primary cause of short-fall in production was the lack of the raw materials - both imported and locally produced.
- that raw material costs were inordinately high.
- that there was a serious lack of market information which had adversely affected production costs.

The Panel also noted that

- in general, the local raw materials were inadequate in quantity and/or quality.
- regular supplies could not easily be obtained, and even more, managements practices showed an inability to change with abnormal variations. This precluded the possibility of raw materials being purchased at glut-seasons or when prices were competitive. Costs were therefore unusually high.

- local materials when used as substitutes for an imported item, often did not meet the minimum specified standard. However, in some sectors, local substitutes had been used with a measure of success.
- the difficulties of obtaining adequate and regular supplies of imported raw materials was aggravated by the prevailing foreign exchange situation.
- in certain sectors - e.g. oils and fats, the lack of a Market Intelligence Unit seriously affected the establishment of an effective export marketing policy. Many of the State Industrial Sector Corporations had often to make forward contracts without adequate futuristic market information.
- inter-establishment competition for the limited raw material supplies further aggravated the position. This was particularly evidenced in the strategies employed for obtaining local raw materials.

RECOMMENDATIONS

The Panel, recognising these limitations recommends:

- the setting up of a Market Intelligence Unit, to service those establishments that could profit by the development of a productive purchasing policy for its raw material requirements.
- that, as these industries depend heavily on local agro-based raw materials, the production of which now falls within the purview of several different Ministries, an Inter-ministerial Specialist Panel be

appointed to make an in-depth study of the prevailing situation, and suggest measures by which a system of co-ordination between the different government agencies which supply raw materials to the public sector industrial manufacturing corporations could be established.

overall the Panel recommends that corrective measures should be planned and translated into action to meet the very real problems regarding adequate and regular supplied of local raw materials.

PLANT AND MACHINERY

The Panel noted that :

in general the plant and machinery in the sector studied was old, technologically obsolete, and sometimes even in a state of disrepair. This was particularly so in the Oils and Fats Corporation at B.C.C., in the Leather Corporation and in all the private sector units engaged in the manufacture of rubber goods.

the problem of plant maintenance was serious in the sector studied. Although workshop facilities were generally adequate, spare parts were difficult to obtain. This was a direct consequence of the limited foreign exchange allocation allowed. In cases where spares had been fabricated locally, it was usual to find that the raw material used was scrap and the fabricated part did not measure up to requisite specifications. As a result, these repair operations could only be considered temporary or make-shift.

RECOMMENDATIONS

The need for proper maintenance of plant and machinery cannot be over-emphasized. Noting that these problems could be minimized if spare parts could be obtained without unnecessary delay, this Panel recommends

- that each exporting industrial corporation be allowed to utilize its C.R.A. for obtaining the spares and equipment necessary for the regular maintenance of plant and machinery. To facilitate quick action, the ultimate responsibility on such decisions should be vested with the Head of each Corporation.
- that immediate action be taken to replace obsolete plant, particularly those units which were not in commission in the public sector manufacturing corporations.
- that as inordinate delays in the processing of import licences, etc. invariably result in either air freighting of spares involving additional foreign exchange and adds to the escalation of cost, foreign exchange resources should be deployed in a more equitable manner on the basis of block allocation per industry. This would permit more flexibility, eliminating red tape, and would help to maximise on plant capacities, and above all, effect savings on foreign exchange itself.

QUALITY CONTROL

Observing that quality controls operating in these industrial sectors was inadequate, the Panel emphasises that it must not be overlooked that the consumer is an important factor in the production-sales-process. Consumer needs and consumer satisfaction are therefore important aspects, which merit the consideration by the management of any industrial manufacturing unit.

In the sectors studied, the Panel noted that -

- although there were significant price-increase in locally produced items, there were no improvements in either the quality or durability of these products.
- the substituted raw materials used were often of poor quality and that no quality controls were operative.
- the quality of the finished product was poor.

RECOMMENDATIONS

This Panel therefore recommends that -

- greater attention be given to quality control of both the substitute raw materials used in the production process, as well as to the processed products itself.

PRODUCTION PROCESS

Although the Panel did not extend its deliberations to a thorough study of the production processes involved, it was noted that the cost of production in all the sectors studied had increased greatly. These rising costs have been attributed to -

- the difficulty of obtaining foreign exchange
- the increased costs arising from the imposition of FECS for all imported items.
- the rising costs of all inputs, particularly labour and services

RECOMMENDATIONS

The Panel therefore recommends that -

- the foreign exchange allocation system and the imposition of FECS be critically examined in the light of the prevailing conditions of the manufacturing industrial sector.

WASTES AND EFFLUENTS

Waste and effluent disposal did not present serious problems in two of the sectors studied viz. Wood, Oils and Fats. In the Leather Industry, wastes are discharged directly into the surroundings and constitute a serious pollution problem. The Paper Industry discharges its effluents into the surrounding waterways and this has already created some problems at Valaichchenae. Work on the proposed new mill to be located near Rajangana in the North Central Province has been delayed partly as a result of attempts to relocate the siting of the mill so that the problems arising from effluent discharge could be minimised.

RECOMMENDATIONS

Noting that indiscriminate waste and effluent disposal could create serious problems in the long-term, the Panel recommends

- that serious attention be given to this problem by all industrial concerns.

Recognising that the problems of waste and effluent discharge are specific to each industry, the Panel also recommends that

- specialist Panels be appointed to study the problem in each particular industry
- each industrial concern formulate a long-term R & D programme for the use or disposal of wastes and effluents.

ii. Research and Development

" Research, development and design are an essential basis for the prosperity of a company or a nation"

INTRODUCTION

The object of industrial research is geared to the innovative process, i.e. to the establishment of the properties of a new material or to a new technique on which the development of a new product will be based. To achieve this objective is the task of the industrial scientists engaged in research. It is an erroneous belief that the work of an industrial research scientist is aimed at making the 'new' or startling 'discovery' that will revolutionize the industry. It would be more accurate to describe the industrial research workers efforts as an attempt to put the discoveries of others to the use of the company or organization, for which he works. To do this, an industrial research worker must -

- keep in touch with the whole of the advancing body of knowledge in the field. Such activity will serve as a bridge with the wider technological scene ; it will increase the number and lead time of new technological possibilities and will generate an appreciation of the relevance of any new investments which are being contemplated.
- take proper steps, to make immediate use of a discovery made anywhere by anybody which will directly affect the industry with which he is associated.

Within the broad continuum of activity that leads from 'invention' to 'innovation' there are three broadly identifiable areas, viz. (i) research (ii) design (iii) development.

* H.S. McLeod in "Management of Research Development and Design in Industry" Cover Press (1964) p. 253

Each in itself is a distinctive and discrete activity. The first stage 'research' ends in the laboratory with the intermediate product, knowledge or information - The second stage 'design' - leads from the laboratory to the pilot plant and the third stage - 'development', which is the most expensive but which could also be the most wasteful in terms of financial resource utilization, is the evolution from pilot-plant to commercial production plant.

In an industrial unit, these three areas of activity may well overlap. However, an overall strategy for a research and development effort in such an unit should -

- provide for development of new or improved products, which can be marketed in the near term.
- provide a long-term research programme which is aimed at the creation of a sound basis of scientific knowledge in the field. Such programmes will generate innovation and will contribute to both the development of new and better products and to the country's fund of scientific knowledge.

It must be stressed however that the level of productivity of any R & D Unit is dependant on many factors, e.g.

- adequate numbers of trained personnel
- the provision of adequate facilities and equipment
- Managerial liaison

In the translation of research results into economic use, the weakest link in the chain of activity, from research through to production, is the innovative and diffusion stage. These are problems which are directly related to marketing and administration. If success from any R & D projects is to be achieved, it is

therefore important that a close liaison between the management and the R & D unit be fostered and a direct two-way communication channel between them be established. The management must, firstly identify and accept the need for a specific R & D programme. This need must be conveyed to the R & D unit, which in turn will convey its results to the management for translation into action.

The financial commitment is an important factor in any R & D programme. It is stressed here, that adequate financial resources are necessary if R & D is to show positive results, e.g. the cost of maintaining an R & D worker at full productivity in the Sri Lanka context, varies between Rs. 35,000 - Rs. 50,000/= p.a.

OBSERVATIONS.

The R & D activities of Sri Lanka's industrial sector fall broadly into the following categories.

I. Research on raw materials

Investigations are directed to

- a. the use of local substitute for imported raw materials or intermediate products
- b. the improvement of the quality of the local substitute

II. Improvements on the finished products

III. Improvements or modification of plant

In the sectors examined the Panel noted

- the lack of, or limited facilities for research and experimental development in both public sector and private sector industry

- the lack of adequately trained personnel to undertake research and experimental development. Most R & D units were handled by a single trained officer, who usually was assigned other duties as well.

Overall the Panel noted

- that while some areas requiring research and/or development were identified, many of the existing units were not equipped to handle such projects. Some ad hoc problems were tackled, but no long term research programmes were formulated.
- that in most R & D units, priorities were rightly directed towards development work. In some units, laboratory studies on problems which had been identified by the unit had commenced and sometimes been completed. However, some of these could not be taken up to the production stage due to lack of equipment, e.g. (1) glue - production from hide wastes; (2) the use of textile mill wastes and rags in paper and pulp production.
- that the Workshop facilities provided were adequate for maintenance, but were not equipped to facilitate the fabrication of complicated machinery or precision parts.
- that the managements were not always sympathetic to, and often did not even understand the need for developing R & D units within the industry
- that lack of funds (local and foreign) was one of the major limiting factors for an expansion programme of the R & D units.

Nature of R & D programmes within the industrial concerns

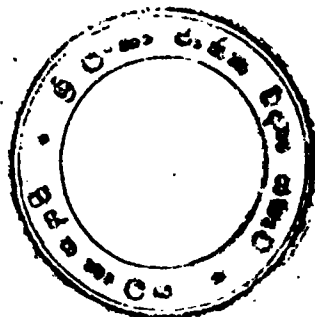
The Panel recognising that many of these industries were set up as 'turn-key' projects, where a direct technology transfer was effective, accepted that for the most part, the R & D carried out in these units, would be development projects. Current R & D programmes are in the main, concerned with the development of local substitute raw material or 'intermediate' products in the manufacturing process, e.g. a current research project in the Plywood Corporation was aimed at replacing urea-formaldehyde resins with a substitute rubber-based product.

In the Leather Corporation, research has been directed towards the development of a glue from hide wastes. Experimental scale extractions of tannin from local materials viz. wattle and tea wastes have also been carried out and the first series of experiments on the extraction of caesin from skim-milk have been successfully completed. Other investigation centre on the development of adhesives for the footwear industry on reinforcement material for shoes and on the manufacture of leather board.

Communication Gap

The Panel also noted the lack of communication which existed between the different industrial sectors with respect to research and development. A consequence of this isolation was that often auxilliary products which were produced by one unit and which could potentially be used by others, were not fully utilized. In a project for the manufacture of hardboard currently being studied by a Technical Panel of the Ceylon Plywood Corporation, two necessary raw-materials are parafin wax and aluminium sulphate. It is possible that these materials are required by other industries as well.

The projected requirements of these and other such inputs should be assessed and form the basic development project data for long-term R & D projects.



RECOMMENDATIONS

The Panel recommends therefore

- the immediate setting up of a Technical Information Intelligence Unit attached to the Ministry of Industries and Scientific Affairs.

It is suggested that a senior scientist with experience in industry or industrial research be appointed to head this unit. Initially, this appointee could be assisted by different working committees, appointed by the Minister, who would examine current and further R & D projects in the different industrial sectors. For the beginning, the five Panels appointed to report on Industrial Sector could continue to function and service the T.I.I.U.

The Panel believes that this is one way in which a regular exchange of information on current R & D projects can be effected. Such information can be sought or channelled through the Head of the unit, assisted by a small secretarial staff. The Panel suggests that the appointee be based on the Ministry, as detailed information on the industrial sector is already available in the statistics branch of this Ministry. Moreover, both private sector and public sector industries are in direct contact with the Ministry.

- that the R & D units in the public sector industrial corporations be expanded.
- that the feasibility of working on collaborative projects between these R & D units and state sponsored R & D organizations viz. CISER, ICB and INRD (National Engineering Research and Development Centre) be examined in greater depth.

while accepting that an R & D programme must increase or at least maintain an overall profitability, the Panel emphasizes that the success of the programme depends on the ability and efforts of the research scientists and recommends that necessary steps should be taken to recruit and retain high calibre research scientists for all R & D units, .e.g. providing facilities for job satisfaction.

the setting up of an Instrumentation Centre in Sri Lanka and recommends that a proposal which had been submitted earlier be re-examined. Although no major problems pertaining to instrumentation were identified, such a Centre could profitably service these and other public and private sector industrial R & D units.

iii. Raw Materials

The economic success of any manufacturing activity is largely dependent on its raw material inputs. This, if inadequate either in quality or quantity adversely affects both the quality of the finished product and the economic viability of the operation.

In the sectors studied, which were all agro based industries, the major raw material inputs, are necessarily renewable resources. The provision of regular and adequate supplies becomes therefore a part of the nation wide agricultural programme, but stress is made here, of the importance for the inclusion of those new plant resources, in this overall programme.

The Panel has identified

- areas in which indigenous agricultural raw materials can be utilized as substitutes for imported materials.
- areas where new materials not hitherto utilized can form the inputs for new development in each sector.

The Panel cautions however, that such projects will only be successful if regular and adequate supplies of these materials can be assured.

The Fats and Oils Industry

As far back as 1967, in a report to the Government of Ceylon, Dr. H.G.R. Roddy, Regional Advisor (oils & fats) to the ECAFE, commented that "in Ceylon no attention seems to have been paid to the development of new sources of oil"*.

* Roddy, Dr. H.G.R. (1967) Report on the Technical Reorganization of the Ceylon Oils and Fats Corporation and the Development of Oils and Fats Industry in Ceylon; Bangkok U.N. Economic Commission for Asia and the Far East - p. 1

later, the situation anticipated by Dr. Reddy, who feared that "if adequate steps are not taken immediately for the development of non traditional sources of oil, the country may face an oil-crisis" * seems to be a possible reality.

It is imperative therefore that steps be taken to rectify this position. The Panel noted that although some steps had been taken to rectify this position, the measures taken were still inadequate.

Raw materials currently used

The raw materials currently been used for oil-expressing are copra, polkudu, gingelly (sesame) and ground nut, of which copra, gingelly and ground nut give excellent vegetable oils. Up to date, the extraction of industrial oils from local raw materials has been limited, for a number of reasons, among them being the recurring break-downs in plant and machinery, and shortages of or difficulties in obtaining local raw materials.

The sectoral report draws attention to the fact that "there is a serious lack of oil-bearing materials which have restricted oil-milling activities". However, in the context of the current economic situation, it is appropriate for the industry to break into newer areas of oil-extraction and the Panel therefore recommends that steps be taken to improve the raw material supply position.

The following areas, which have been identified both by this and earlier Panels, merit further attention and a follow up action programme.

Rice Bran Oil

The oil content varies from 15 - 22 per cent. The development of a rice-bran oil industry will greatly enhance the utilization of a waste product of the rice-milling industry. Currently

* / op. cit. p.1

60,000 tons of rice-bran are produced annually, which has an oil-potential of 9,000 - 10,000 tons per annum.

Oil Palm

The development of an oil-palm industry will obviate the necessity for the importation of palm-oil and palm-kernal oil, and will help to reduce tallow-imports. Problems relate to adequate of supply.

Rubber Seed Oil is an excellent semi-drying industrial oil.

The acreage of rubber currently under cultivation is estimated to have a potential of 10,000 tons per annum. Although some part of this potential is currently being exploited, the development of a really viable industry hinges on the collection of seed.

Problems arise because (i) the seed is seasonal and moreover (ii) the seed must be dried immediately if hydrolysis of the oil is to be prevented.

Cotton Seed Oil

This gives a good semi drying industrial oil, but problems related to de-linting of the seed, which requires specialized machinery.

Other possible sources of edible and industrial oils are -

- i. Cashew - (Cashew nut shell liquid (NSL))
- ii. Passion-fruit seed oil

Other areas identified for further work are listed below:

- i. The Manioc (Cassava) leaf when shade or sun dried for specific periods, is a high-protein material which is suitable for feed manufacture.

Problems relate to collection and transport.

- ii. Fish Meal - Local fish meal which is priced at Rs. 4,000/- per ton contains only 37-40% protein as against the imported fish meal which has a protein content of 67 per cent.

This is one area which merits further work, with regard to the up-grading of quality.

Pulp and Paper Industry - The raw materials currently used in this industry are Rice Straw, Waste Paper and Wood Pulp. Some potential new raw materials for this industry are: Kenaf, Sun-hemp and Sesbania grandiflora (Katuru murunga).
(Vide. Sectoral Report)

Saw mill wastes, textiles, mill wastes and rags are also a potential raw material source for the pulp and paper industry. These raw materials have been dealt with in some detail in the Sectoral Report (p. 54)

Leather Industry

The raw materials used in the leather industry are

- i. Raw hides and skins
- ii. Wattle extract
- iii. Chrome tanning salts
- iv. Pure chemicals such as acids, alkalis and salts
- v. Animal oils and fats
- vi. Dye-stuff and pigments
- vii. Synthetic binders
- viii. Synthetic tannins
- ix. Nitrocellulose lacquers

Raw hides and skins which are the basic raw materials in this industry are available locally. Practically, all other raw materials, the more important of which are Wattle (Limosa) extract, chrome tanning salts, basic chemicals, animal oils and fats, synthetic tannins, dyestuffs, pigments, synthetic binders and nitrocellulose lacquers have to be imported.

Possibilities for substitution of imported components with local material

- (i) The manufacture of Wattle extract from local Acacia decurrens and the extraction of tannin from tea wastes; the development of rubber binders and adhesives. The manufacture of fat liquering oils from locally available unsaturated oils such as rubber seed oil and shark liver oil and the substitution of part of the vegetable tannins with waste from paper industry, e.g. sulphite

cellulose (lignin sulphonic acid).

A project for glue production and a project for the extraction of tannin from wattle, have already reached pilot plant stage. The other projects are still in the experimental stage and require further work and support if they are to be economically exploited.

Rubber Industry

In the rubber industry about 65 per cent of the raw material used is natural rubber which presents no problems of supply.

Of the other ingredients used :

- (i) Stearic Acid [(0-4 p.h.r (parts per hundred rubber))] which was imported into the country till very recently, has now been replaced with the mixed fatty acids supplied by the Fats & Oils Corporation.

Local Kaolin and Silica have also been substituted for the imported cheap fillers. However these ingredients have not always matched up to the required quality.

The other ingredients, Sulphur, Carbon Black, Accelerators, Antioxidants, Zinc Oxide, Tackifiers, Softeners, Pigments used in the manufacture of rubber goods at present have so far not been replaced with local substitutes.

Research work carried out at C.I.S.I.R. has shown that Kokum resin available locally is a good substitute for the imported Tackifiers.

Softeners used in the rubber industry consist normally of coal tar, pine tar and pitch. It is likely that some by-products of the Petroleum Corporation can replace imported softeners.

Styrene-Butadiene Resin, which is imported is used extensively in the footwear industry as a re-inforcing filler. Cyclised natural rubber has been used for this purpose before the above resin was manufactured commercially. It might be worthwhile to look into economics of using cyclised rubber again.

1. The Oils and Fats Industry - Ceylon Oils & Fats Corporation

Commercial Production Processes include:

- use of expeller equipment for the production of Coconut oil and oil cake from copra and expelling oil from other oil bearing seeds
- the solvent extraction of the above oil cake and of the purchased peonac and other oil cakes
- the splitting of oils into fatty acids and glycerine
- the production of refined and de-odourized oils
- the production of animal feed in compounded form from oil free cake and imported/local grains, animal proteins, minerals and vitamins.

1. Existing demand for the manufactured products

1.1 Coconut oils (raw & processed) and copra

Export for the 6 months period January to June in 1970 the total export of coconut products were as follows:

Crude coconut oil (cwt) 394,049 - Value Rs. 40,548,521
- Processed Oil (cwt) 115,100 - Value Rs. 11,577,602
- Copra (tons) 3,052 - Value Rs. 4,578,902

Production figures for 1972 were as follows :

Export - (tons)
Coconut Oil - 68,900
Copra - 17,200
Desiccated coconut - 521,150
Fresh nuts - 8.6 million
Estimated but equivalent - 1018.6 million

(Source: Coconut Development Authority:
Annual Report 1972)

Price

The price of coconut oil, which was a premium priced oil, up to the end of 1970, has fallen continuously from the beginning of 1971. By 1972, coconut oil had become the cheapest vegetable oil on the world market. But, by 1974 unprecedented price levels were recorded - as high as £ 600 per ton.

1.2 Fatty acid and glycerine

Fatty Acids

Expert reports have indicated that there is a market for good quality fatty acid in Japan, United States and United Kingdom. The demand for coconut oil fatty acid averaged about 5% p.a. in U.S. and West Europe till 1973. Price varied between £110 - £210 per ton. Current price £250 per ton.

The demand for natural fatty acids has increased substantially due to diminishing synthetic fatty acid manufacture which was caused by the fuel crisis. There is in addition a very high demand for fatty acid from traditional buyers.

Glycerine

The projected plans for glycerine production were originally based on the post World War II shortage of glycerine on the world market. However, by the time the plant was completed, synthetic glycerine was on the market, with a consequent lowered demand for the natural glycerine. Natural glycerine, however, can find a market in United States and Europe, now.

1.3 Provender

Operations of the Corporation have been concentrated almost exclusively on the production of animal feeds, as indicated in Table I. The production of 67,700 tons obtained in 1972 represents a 25% increase over 1971 figures and even this production did not meet the demand prevailing at that time. The situation was since changed primarily due to rising feed costs and the demand has dropped to the region of 50,000 tons per year.

TABLE I

/Production (Nearest Ton)*

	1965 03.31	1966 03.31	1967 03.31	1968 03.31	1969 03.31	1970 03.31	1971 03.31	1971 03.31	1972 03.31
Cosnut Oil (white) Industrial & refined, de- odorised gingelly oil	11,747	1,871	1,759	1,300	1,805	1,252	1,173	480	1,502
Fatty acid		179	-	350	1,523	695	1,057	1,864	1,868
Glycerine				42	160	74	126	248	235
Provender	16,930	23,810	29,234	34,329	44,472	51,240	48,839	52,607	67,691

* Source: Oils & Fats Corporation - Annual Report 1972

TABLE II

Picture of Operation for 1973 & 1974 *

Product	Programmed Production		Actual Production	
	1973	1974	1973	1974
1. Provender (tons)	90,000	54,000 poultry 5,000 cattle 500 pig 59,500 total	52,728	39,690 poultry 2,934 cattle 384 pig 43,016 total
2. a) Fatty Acid	3,500	3,500	1,400	1,212
b) Glycerine (tons)	400	400	230	120
3. Oils (tons)	4,900	4,000	1,046	220**

* Source: Records of the Oils & Fats Corporation

** Only 5% of programmed production achieved - This was because only the Batch Solvent Extraction Plant was used.

Demand figures for Oil, Fatty Acid & Glycerine & Animal Feed

Local consumption

Oil

Household consumption of coconut oil - 5.9 bottles/year per person. Industrial consumption of coconut oil - 10,000 tons.

Animal Feed

The present output of the Corporation is 3,500 tons per month, which is sufficient to satisfy the existing demand pattern.

Fatty Acid and Glycerine

The total amount of Glycerine produced is exported.

Export Possibility for excess production

1971 ADB report: a 1973 report of IEC - BD expert and a local expert and the more recent report of Dr. Michael Schneider, Vegetable Oil Industrialist, UNOA have stressed the need for improving existing price conditions and the market for coconut fatty acids and pure glycerine. The Schneider report sets the price relations between coconut oil and fatty acid as 1:1:2. It is expected that the difference in price between coconut/oil on one hand and fatty acids and glycerine on the other will remain at about U.S. \$300 per ton.

Glycerine Present production of crude glycerine and soap-lyc
glycerine 1,500 tons per year
The total quantity is exported.

F.B. At present, only crude glycerine is produced. It has been recommended that efforts be made to export the distilled glycerine as the difference in price between crude and distilled glycerine has averaged £ 200 per ton. Current price - £ 500 per ton.

CONSTRAINTS

The present conditions of the plant and equipment used for the former have resulted in the slowing down of the entire operation.

of the complex. The continuous solvent extraction plant is not in operation; the only plant now operating being the batch solvent extractor which has a capacity of 18 tons/day. The total output for the period January - December 1974, was only 220 tons. The scarcity of raw materials has therefore not been the key factor in the lowered output from this sector. However, the economic viability of operation (2) has been greatly impaired by the slowing down of operation (1). The primary raw material is coconut oil (white and industrial), which could be produced in adequate quantities if the milling units were working at full capacity. In operation (3), 92% of the total cost of operation is expended on raw materials - approximately 33% of which is the foreign exchange component.

RAW MATERIALS

Raw materials can be broadly classified into 3 main types.

- i. Local seasonal raw materials - i.e. ponnaç, maize, coconut oil and gingelly.
- ii. Imported raw materials
 - Fish/Meat meal - 8%
 - Bone meal
 - Vitamins/Minerals/Phosphate
- iii. Agro-industrial waste products
 - viz. Rice bran, Wheat bran

The cost of the imported components which is approximately 33% of the total expenditure. The availability depends only on the foreign exchange position. Current prices of those items (see Table III) are considerably less than the average for 1974.

TABLE III *

Item cost	Current price (£) /ton	Average for 1974 (£)/ton	Price of local substitution (Rs.)/ton
Herring meal 7.2%	153	221	-
Fish meal 6%	140	212	-
Meat & Bone meal 50%	98	97	-
Ground Nut cake 54%	93	107	2220
Soya bean meal	75	97	-
Maize	53	65	-
Bi Calcium Phosphate (Bone meal substitute)	116	120	-

* Source: Cooper Nutrition Products Ltd. - Price Lists

Raw materials

Operation I

Milling item	Quantity (tons)/month	Current price Rs./ton	Price (fluctuation between 1967/68 - 1971) Rs./ton
Desiccated coconut	When available only	-	675 - 1,000
Pol-kudu	400	550	300 - 325*
Gingelly	400	2,500	1,000 - 4,000
Coconut Poonac	1,600	500	300 - 225**
Copra	1,500	1,000	2,400 in July, 1974

* 1967/60 - a price of Rs. 450/- was recorded

** 1400 in early 1974

Operation II

Fatty Acid and Glycerine Manufacture

Basic raw materials - Coconut oil - (White and Industrial)

There is a 100 per cent availability of this raw material in the country, the high quality of which makes it possible to convert this into a high grade derivative. Price was unfavourable in August 1974 at Rs. 4,000/- per ton.

As distilled Glycerine commands a higher price than crude glycerine, it has been recommended (c.f. Schneider's report 1974) that the crude glycerine be distilled before export.

Operation III

Local component	Quantity tons/month	Current price Rs.	Price fluctuation 1967/68/71 (Rs.)
Poonac	1500	300	300 - 225
Wheat/Rice bran	600	WB 585 RB 450-250	71- B-310 RB 280

Foreign component

Foreign component	Quantity	Current price Rs.	Price fluctuation 1957/58/74 (Rs.)
Fish meal	8%	4700/=	1400 -) 5200 -)
Di Calcium Phosphate	1%	4000/=	700 -) 1400 -) 2200
Vitamin Premixes	5 lbs./ton	8/=	3/50 - 5/50 - 8/=

Operational I and II have no foreign exchange component.

Operational III - Total expenditure on raw materials Rs. 45 m.

Foreign Exchange Component £ 4m. sterling

(15m. Rs.)

Foreign Exchange Comprises approximately 33%
of the Total

ii. Machinery/Equipment

Continuous Extraction Plant (A 2):

This is a Bamag-Manning, Multi-stage solvent circulation system with an installed capacity of 120 tons of prepared coconut poonac/day. Poonac with oil content varying from 10-20% and moisture upto 10% could be used in this Plant. The oil is of good commercial quality but used in Fatty Acid production. The extracted meal is of good quality with protein upto 23%. This Plant could also be used for Polludu Poonac, Soya Bean, Gingelly Cake and Groundnut cake. This Plant has been shut down for repairs since October 1, 73 due to high solvent loss, which should be ideally not more than 7 gallons/ton of input. The Plant is about 22 years old.

The process of extraction involves washing the oil bearing material with solvent (hexane) to obtain a mixture of oil and solvent called 'Miscella'. The 'Miscella' is distilled to give oil and the solvent recovered. The wet meal is passed through the desolventizer to obtain extracted meal.

There are 3 main areas which have caused excessive solvent loss viz:

- (i) Distillation Units
- (ii) Desolventizer
- (iii) Refrigeration and Solvent recovery system/Inadequate Condenser Capacity

A complete overhaul of these Units will yield far better results than hitherto obtained. The efficient working of this Plant could provide 1500 - 2000 tons of oil/year for the Fatty Acid Complex and this oil is at present purchased at high prices. Further the extracted meals have a higher protein content due to extraction of oil. When the extractor is not working, poonac is sent to the provender through a by-pass chute.

Batch Solvent Extraction Plant:

- (a) Expellers (E2)- There are 3 Frits Miller Low Pressure Expellers with an installed capacity of 40 tons each, but are now worked at 30 tons each. Copra, Polludu, Gingelly and Groundnut are materials which give good results with the Expellers. The oils, except Polludu Oil are excellent for edible purposes while the cakes which usually

come in 20-25% oil could be solvent extracted in A 2 or E 3. These Units have been regularly worked, subject to availability of oil bearing materials but the chief problem is the heavy wear and tear on the cage bars and worms of the expellers. This is particularly so when Gingelly Seed is crushed since this contains excessive amounts of sand. To a lesser degree, the pressing of Polkadu also brings about wear and tear. Spare cage bars are manufactured locally by Messrs. Nugaluma Engineering Works and orders have been placed for same. Wasted worms have to be built up in our workshops or new worms ordered. The incorporation of a vibrator sieving device into the feeding stream will eliminate this problem of wear and tear to a great degree. A decorticator for shelling groundnut and rubber seed is also useful in the process line. The main constraint in using this Plant is availability of material.

(b) Extractor (E3) - This Plant was renovated in 1972 and performs satisfactorily when in use. However, there are three factors to be considered:

- (i) Low throughput - 26 tons/day. of expeller copra cake;
- (ii) Tedious process operations;
- (iii) Heavy steam consumption

Here too, solvent loss makes operations uneconomical.

Fatty Acid Complex (BCD)

The oils produced in E2, E3 and A2 could be split into their respective Fatty Acids in the splitting Plant B, distilled in Plant D and the diluted solution of Glycerine (sweet water) concentrated in Plant C. The reaction takes place with steam at high temperatures and pressure.

(a) Fat Splitting (B): This is done in the tower which is lined with stainless steel and spot-welded. This has given rise to problems of corrosion and has caused regular shut-downs. Replacement is recommended but the tower should be of clad-steel. The cost is estimated at about U.S. \$ 3,000. The present Plant has a capacity of 17 tons of oil/day. The average degree of Split is about 87% but this could be increased to 93-94%. The valves and controls of this Plant are functioning satisfactorily.

- (b) Glycerine Concentration Plant (C): The sweet water (8-10% glycerine) obtained in 'B' Plant is conveyed to the 'C' Plant for concentration upto 88% crude glycerol. It is chemically treated in this Plant to remove most impurities, neutralised and then concentrated. The Plant is in fairly good condition but operations depend entirely on the operation of Plant 'B'. Plant capacity is 1.2 tons/day of 88% glycerol. The crude glycerol can be converted to pure glycerine and exported at almost twice the price.
- (c) Fatty Acid Distillation Plant (D): Crude Fatty Acids obtained in Plant 'B' are distilled to give White Distilled Coconut Fatty Acids in Plant 'D'. The process is carried out under vacuum and controlled temperatures. One of the basic qualities of a good acid is colour and hence temperature is an important aspect.

Four Centres have been responsible for production stoppages - viz:

- (1) High pressure boiler defects;
- (2) Vacuum failure;
- (3) Re-cycling due to colour variations;
- (4) Defects in the heating coils of the distillation stills.

Maintenance work is carried out as and when necessary and it is important that the Plant works continuously. The capacity of the Plant is 12 tons/day of distilled fatty acid, but a major set back is the non-availability of oil at reasonable prices. The fatty acid complex should be ideally fed with Industrial Coconut Oil from Poona or Polkudu while White Coconut Oil should be available for export. Hence the dependence on A2 and E3 oil is obvious.

Refinery (F): The oils obtained from expelling are mainly edible oils, barring a few exceptions. The refinery is used to wash, refine and deodorize these oils. White Coconut Oil is generally suitable for domestic use without much after treatment and this is much the same for Gingelly or Ground Oils. For special purposes however, oils may be refined and deodorized.

Industrial oil is generally washed prior to use in fatty splitting. It could also be refined but the high content of free fatty acid (F.F.A.) results in high process loss, and thus makes the operation an uneconomic

one. The refinery is in a good condition and has a capacity of 30 tons/day but has, at the best of times, been operated at 30 tons/month of deodorized oil.

Provender (G): This is the main centre of operations in the Factory and was originally intended to utilize extracted meals from the Solvent Extraction Plants as base materials. It is also probably the only plant now in operation in the island to meet the demands of the poultry industry. The plant essentially consists of a series of bins for storing raw materials, grinders to provide fine material for mixing, three mixers for mixing feeds and four bagging points for finished products. The entire complex is connected by a system of elevators and conveyors.

The original capacity of the plant has increased from 36,000 tons/year to 60,000 tons/year in 1971 and finally to 90,000 tons/year in 1972. However, this target cannot be kept for the following reasons:

- i) World wide and local shortage of materials such as Fish Meal/^{meat meal}Maize and Podnac and resultant high costs of same.
- ii) High cost of materials due to imposition of FEIECs etc. which keeps feed costs out of proportion to selling prices.
- iii) Competition between the human food industry and provender.
- iv) Diminishing demand for feeds due to high costs of feeds.

The mixing of food itself does not present any problems but it is advisable to instal at least two more grinders to increase the output of ground materials. It is also essential that the utilization of substitutes such as sorghum, manioc, gingolly and groundnut meals, rubber seed meals and leaf meals, be intensified to maintain reasonable levels of production.

OBSERVATIONS AND RECOMMENDATIONS

General Observations

In order to assess the impact of the Corporation's activities, it is necessary that the role of the Corporation be further clarified. Basically, the Corlon Oils & Fats Corporation was established for the purpose of milling oil, extracting residual oils, converting of these oils into oleo chemicals and the utilisation of the extracted meals, only as an adjunct to oil milling operations, for the manufacture

of provender feeds. Through the years of its existence, however, the role of the Corporation as a oil miller has declined primarily due to its decrepit machinery and some extent to the shortage of oil bearing materials. The state of dis-repair of the continuous extraction plant has reduced the extraction capacity from 125 tons a day to only 25 tons a day, and hence, over the past few years, unextracted coconut meal has formed the basis of provender operations. This is both uneconomical due to the waste of oil, and further had degraded to some extent, the quality of animal feeds. The scheme of repairs envisaged in the near future is aimed at re-establishing Corporation once again in its original role of oil miller. In respect of manufacture of Oleo Chemicals, the Corporation has reached a stage of Fatty Acids and Crude Glycerine manufacture, but more development in this field is necessary since the margin of foreign exchange earnings is greater when coconut oil is further upgraded into more specialised products.

It is in the field of compounded feed manufacture that the Corporation is fully involved since this is the commitment that it has to meet to sustain highly sophisticated animal husbandry programmes. It is also in this sphere of activity that the Corporation does not make profits at the present moment. The primary reason for this set-back is mainly the lack of availability of raw materials at prices which makes provender operations economically feasible. Raw materials costs alone account for as much as 92% of the total cost, and hence the purchase strategy of the Corporation has to be geared to a profit making basis. The position is further aggravated by competition, for the same raw materials by human food agencies. However, the Corporation has a duty and a service to perform in the interest of animal husbandry sectors and in the fulfilment of this service has to depend on Government Subsidies.

The World prices of many raw materials control the economic viability of the Corporation activities, for e.g., coconut oil price determine the prices of fatty acids in the World Market, and prices of animal protein, control to a great extent, prices of animal feeds. In this regard, the Corporation has virtually no control over rising prices, unless the manufacture of such raw materials is developed, more than it is now, within the island. The Corporation also leans heavily on the local agro-based industries for many of its raw materials and these industries fall within the purview of different Ministries.

The lack of co-ordination has been noted among these Organizations

and this has adversely effected raw material prices which the Corporation has to pay in order to sustain its production programmes.

There is also a serious lack of market information, especially of our export products, the results of which is that the Corporation seldom or never gets the best price for its products. This has, in the past, led the Corporation into forward contracts without any information on future tendencies in these markets. Fundamentally, the Corporation exports should be tied up with foreign collaboration but it has never been able to achieve this, primarily due to our limited outputs. The proposed fatty acid expansion programme would eventually lead to such an understanding and would considerably improve exports both in respect of volume as well as prices.

RECOMMENDATIONS

- There is an urgent need for the replacement of the Corporation's Oil Milling equipment, which would enable diversification of products, and also achieve profitability in operations.
- The production of fatty acids could be further extended to fractionation into different fatty acids and this would ensure higher prices for individual fatty acids. The refining of glycerine is now an absolute necessity considering the high value added over crude glycerine, which is now exported. This would also lead to an import substitution programme, thereby saving foreign exchange.
- It is imperative that a system of co-ordination be established between the different Government Agencies which supply raw materials to the Corporation. This should preferably be established at Ministry level in order to avoid unilateral decision making specially in regard to prices.
- The serious lack of oil bearing materials which has hitherto restricted oil milling activities has to be looked into and new crops such as Palm should be introduced on a commercial scale. Even the current programmes for materials such as Gingelly and Groundnut do not provide sufficient quantities for the Corporation's purposes, since these materials are channelled for human food, or exported as whole seed. Such

exports should not be allowed since it is always preferable to export oil while retaining the meal for local use.

- There is no Research and Development Division as a unit in the Corporation and most of the development work originates in the course of routine duties. It is now opportune to inaugurate such a scheme, possibly utilising already available talent so that the development programmes of the Corporation could be reviewed from time to time.
- Re-vitalize the Continuous Solvent Extraction Plant to obtain all residual oils and upgraded meals from oil bearing materials.
- Increase milling capacity by installing two low pressure expellers
- Replace the fat splitting tower with one of clad-steel.
- Commence the distillation of glycerine.
- Intensify the purchase of oil bearing materials and local provender raw materials.
- Re-enter the local and foreign oil markets.

Government of Sri Lanka (Ceylon) Successor to the
Business Undertakings of British Ceylon Corporation
Limited and its Subsidiaries - British Ceylon Milling
Co., Ltd., Orient Co. (Ceylon) Ltd. and Ceylon Extraction
Co. Ltd.

The Business Undertakings of British Ceylon Corporation Ltd. and its subsidiaries viz. British Ceylon Milling Co. Ltd., Orient Co. (Ceylon) Ltd. and Ceylon Extraction Co. Ltd. were vested in the Government, by Order gazetted on 25th February 1972.

The establishment comes under the purview of the Ministry of Plantation Industries, and is under the direction of the Coconut Development Authority.

The Corporation besides being the leading exporter of coconut oil in the country has also the objective of stabilizing copra prices through its purchasing activities. The Corporation also undertakes the milling of coconut oil. It possess the largest oil mill in the island, with the largest oil storage facilities, which include a direct pipe line to the port of Colombo.

Production

The major products of this Corporation are Coconut Oil, Ponnac, animal feed, oil refinery products like 'Cooks joy' and 'Cocolanka' toileterics and disinfectants.

Raw Materials

The major raw material used by the Corporation is copra - for oil milling. This is readily available. In general there is no marked scarcity of raw materials for provender manufacture, although certain items e.g. maize, & fish meal are not always readily available. Flour sweepings and mixed rice are usually available from the Food Commissioner's Department at concessionary rates.

However, the production of talcum powder and disinfectants was affected by restrictions in the importation of raw materials.

Plant and Machinery

The solvent extraction plant is now 20 yrs. old and needs continuing attention and repair. The efficiency of the plant which had an original rated capacity of 100 tons per day has dropped considerably being now in the region of 30-40 tons per day.

It has not been possible to effect the necessary repairs successfully for want of replacement items, and suitable raw materials for the local fabrication of some of the components.

Production of oil was also affected, to some extent by the fact that replacement spares for the oil mill were not available. A proposal to replace some of the old expellers with a modern single press expeller has been approved.

Workshop and Engineering facilities

Engineering services were hindered by the non-availability of essential machinery in 1972; a lathe and milling machine were purchased for the Workshop - other essential items, e.g. Boilers are also urgently required.

Utilization of wastes

The waste from the soap factory has some potential as a raw material for the manufacture of glycerine. A proposal to setup a glycerine recovery plant has been accepted.

Quality Control

The need for a Quality Control and Development Division, is strongly felt, particularly in the soap and provender departments.

Research and Development

No facilities are available for research and development, although some studies e.g. manufacture of glycerine from soap wastes, have been completed with a degree of success

SECTION

iii. The Leather Industry

BACKGROUND INFORMATION

Manufacturing activities of the Ceylon Leather Industry can be classified into three main categories.

- Manufacture of Leather
- Manufacture of Footwear
- Manufacture of Leather Goods

Manufacture of Leather

Ceylon Leather Products Corporation Tannery is the largest unit in Sri Lanka for the manufacture of leather and has a rated capacity of 1,250,00 sq.ft. of Chrome Upper Leather and 400,000 lbs. of Vegetable Tanned Leather per annum. These two sections are operating at approximately 115-120% and 90% of rated capacities respectively. In addition to this, Messrs. Indo-Ceylon Leather Company Ltd., produces approximately 720,000 sq.ft. per annum of Chrome Upper Leather under the control of Ceylon Leather Products Corporation.

Indo-Ceylon Leather Co., also Chrome tans approximately 90,000 goat-skins per annum and produces some Vegetable tanned leather.

There are twelve other private sector tanneries which specialise in the production of semi-processed vegetable tanned leather from cow hides and goat skins. These are mainly for export.

Manufacture of Footwear

Ceylon Leather Products Corporation factory has an annual capacity of 336,000 pairs. This constitutes about 50% of leather footwear and 5% of all footwear manufactured in Sri Lanka. (See Z. Kotasck & E.R.B. Chelliah- Leather Manufacture in Ceylon - Leather Expo-72). The rest of the footwear manufactured in Sri Lanka is produced by four other large scale manufacturers and a very large number of small scale manufacturers.

Manufacture of Leather Goods

Ceylon Leather Products Corporation's unit produces approximately Rs. 3,000,000 worth of leather goods per year. This is about 75% of all leather goods manufactured in the country.

EXISTING DEMANDS

(for the manufactured products)

(a) Local consumption

1,500,000 sq.ft. chrome leather per annum

500,000 lbs. vegetable tanned leather per annum

(b) Export possibility for total excess production

Total excess production of both the above types of leather have been exported in the past. The demand for our leather in the export markets is much greater than our production.

EXISTING PLANT CAPACITY

Production capacity

2,000,000 sq.ft. Chrome leather per annum

2,000,000 lbs. Vegetable leather per annum

Degree of utilisation

115%

80 - 90%

Possibility for expansion of existing capacity (Proposals if any)

Working of a second shift at Ceylon Leather Products Corporation Tannery to increase the capacity by 750,000 sq.ft. per annum is under consideration. (Planning Ministry stage at present). Capital cost approximately Rs. 1.2×10^6 .

Expansion of existing facilities for the tanning and finishing of goatskins should be considered.

Justification if any, for establishing new plant/machinery

Increased production of Chrome leather will increase the quantities available for export.

RAW MATERIALS

(a) Nature of raw material

i. Raw hides and skins

ii. Wattle extract

iii. Chrome tanning salts

iv. Pure chemicals such as acids, alkalis and salts

- v. Animal oils and fats
- vi. Dyestuffs and pigments
- vii. Synthetic binders
- viii. Synthetic tannings
- ix. N/C Lacquers

Tanning Industry

Raw hides and skins which are the basic raw materials in this industry are available locally. Practically, all other raw materials, the more important of which are Wattle (Mimosa) extract, Chrome tanning salts, basic chemicals, animal oils and fats, synthetic tannings, dyestuffs, pigments, synthetic binders and M/C lacquers have to be imported.

Footwear and Leather goods Industries

Here again, the basic raw material, leather, is manufactured locally, but a large variety of other raw materials and equipment such as shoe lasts, reinforcement materials, cements, thread, fittings, etc., are imported.

(b) Proportion of local/foreign components

50/50 including FECS for imported raw materials for the tanning industry.

(c) Adequacy of local supply

Adequate in quantity but not in quality (See D.J.P. Silva and J. Skoch - Quality of raw hides in relation to leather manufacture - Leather Expo-72)

(d) Regularity of supply (e.g. seasonal etc.)

Satisfactory

(e) Possibilities for substitution of imported components with local material

Manufacture of Wattle extract from local acacia decurrents and extraction of tannin from tea wastes, development of rubber binders and adhesives, Manufacture of fat liquoring oils from locally available unsaturated oils such as rubber seed oil and shark liver oil. Substitution of part of the vegetable tannings with waste from paper industry, e.g. sulphite cellulose. (ligum sulphoric acid)

- (f) Problems associated with storage, transport, deterioration, etc.
Unsatisfactory storage facilities used by the butchers and collectors of raw hides.

Machinery and Equipment

Difficulties are related to the maintenance of plant and in obtaining spare parts

Problems relating to production line

No major problems

Wastes and Effluents

Wastes include

- (a) Non tanned hides wastes
- (b) Leather wastes

Tannery effluents contains acidic alkaline solutions along with certain toxic substances such as Cr.

Methods of waste disposal adopted

Dumping at the back yard and discharge into river.

RESEARCH AND EXPERIMENTAL DEVELOPMENT

Outlined below are some of the more important projects that are already undertaken by the Ceylon Leather Products Corporation or are potentially feasible. The majority of these are in the field of import substitution and waste utilisation.

(a) Glue Project

This has reached the stage of small scale production. It is now required to design and install a more sophisticated and large scale plant to manufacture glue from all the non-tanned tannery wastes available in the country. The wastes available at present are sufficient to produce approximately 400 M.tons of glue annually.

(b) Wattle Extract Project

Experimental scale extractions and tanning of leather from such extracts have been successfully carried out at the Ceylon Leather Products Corporation. Assistance was sought from the CISIR for the preparation of a technical report and officers of the CISIR were associated in the preparation of the report.

The detailed working drawing of the main piece of equipment i.e. leaching vats, were also made available by the Ceylon Institute of Scientific & Industrial Research. Planning Ministry approval has been obtained for the setting up of a small scale plant. Further development of this project required the setting up of apparatus for evaporation under reduced pressure and assistance is required in this connection. Production of tanning extract from locally available Accacia docurrens bark is ^{of} vital importance to this industry as approximately 500 tons of this material at U.S. \$ 400 per ton has to be imported annually.

(c) Extraction of Tanning from tea wastes

Experimental work carried out has shown encouraging results. This could supplement the Wattle Extract Industry. We understand that the annual availability of tea waste runs into a few million pounds.

(d) Extraction of Casein from skin milk

Experiments have been successful and the first lot of casein is ready.

(e) Adhesives for footwear industry

Cements based on synthetic rubber (Neoprene) are used extensively in the adhesion of various components of footwear. Some of this is manufactured locally. Possibilities of developing an equivalent cement, based on natural rubber are being explored in collaboration with Rubber Research Institute of Ceylon. It is hoped that an adhesive will be developed for use in lighter types of footwear such as sandals and slippers at the first stage.

(f) Reinforcement material for shoes, e.g. toe puffs, stiffeners

Investigations into the possibility of manufacturing these materials are under way. Assistance in this connection is welcome.

(g) Manufacture of Leather Board

Successful experiments have been carried out in this field. The main hurdle is the fabrication of a pulverising machine.

(h) Other possible areas of development

Manufacture of fat liquoring oils such as sulphated neats foot oil, sulphated rubber seed oils and sulphated cod oil. /

Quality control of finished products

Major problem is the lack of laboratory equipment.

CONSTRAINTS

- Absence of regular and dependable supplies of rubber soling materials for the shoe factory.
- Shortage of foreign exchange made available for the import of essential raw materials, accessories and spare parts.
- Delays caused by Governmental procedures and regulations
- Lack of agencies and institutions with adequate knowhow to help in our development projects.
- Poor quality of our basic raw material i.e. raw hides and skins (see D.J.P. Silva & J. Skooh - Quality of raw hides in relation to leather manufacture - Leather Expo- 72)

OBSERVATIONS AND RECOMMENDATIONS

General Observation

Approximately 360,000 raw cow hides and 300,000 raw goat skins are available annually in Sri Lanka. In the case of cow hides, approximately one third of the raw material is processed into a completely finished leather. The balance quantity is processed into a semi-tanned state and exported, mainly to the United Kingdom. In the case of goat skins, almost 95% of the raw material is converted to a semi-processed state and exported. Although the quality of leather produced in the two mechanized plants in the island is acceptable in the world markets, a major proportion of the basic raw material i.e. hides and skins are still processed only to an intermediate state.

Per capita production of Shoes in Sri Lanka is in the region of 0.6 pairs per annum; which is considerably lower than the world average which is approximately 0.9 per annum. Of the amount produced, approximately 10% have leather uppers. Even if the per capita consumption of leather shoes in this country is not expected to increase sharply in the near future, the potential for increasing production for export is tremendous.

The production of leather goods (other than footwear) in Sri Lanka is negligible.

The quality of raw hides and skins in this country is rather poor. This ironically, is mainly due to faults such as brand marks, flay outs and putrefaction damage which are man made. Other defects are due to tick marks, scratches etc. which are caused by unsatisfactory methods of animal husbandry.

RECOMMENDATIONS

Concerted efforts should be made by the Ministries of Agriculture and Industries & Scientific Affairs to improve the quality of raw hides and skins in the country. It is recommended that this problem be tackled in the following order.

1. Eradication of man made defects caused after slaughter.

- Damage due to bad preservation. This would require only the education of the personnel concerned and could be achieved by creating an awareness about the loss caused by wasteful practices to themselves as well as to the country.
- Eradication of flay cuts. This can be achieved only by proper supervision, offers of incentives, and education of personnel. Further developments can be achieved by setting up of modern abattoirs which I believe are included in development programmes of the Meat Board.

2. Eradication of man made defects: slaughter. Complete ban on branding. Branding if considered essential for the purpose of identification of cattle, should be done only on the checks or thighs of cattle, i.e. in those sections of the skin where hide is least.

3. Eradication of other defects.

- These defects of which tick bites are the most damaging, should also interest Veterinians, as the presence of such parasites affects the health of the animal, as well as milk production.

The tanning industry (leather manufacture) should be ultimately developed to a point at which all the raw hides and skins available in the country are processed into finished leather. This will have to be achieved by a phased programme for increasing the capacities of tanneries equipped for this purpose and by the progressive banning of exports of raw hides and skins, and semi-processed leather. Footwear and leather goods manufacturing industries have to be developed to increase production in order to absorb as much as possible of the finished leather referred to above. Export markets must also be found for these products. The importance of this is clearly illustrated by the following figures. Foreign Exchange value of an average cow hide exported in the form of:

- Semi-processed hides	Rs. 20.00
- Finished leather	Rs. 60.00
- Manufactured leather goods	Rs. 200.00

iv. Paper and Pulp Industry

Introduction

The demand for all types of paper and board in Sri Lanka was estimated to be in the region of 67000 tons per annum in 1974, although as a consequence of various restrictions imposed on the usage of paper, this demand was reduced to 50,000 tons per annum. The demand for paper is anticipated to rise to about 87,000 tons per annum by 1976, and to be in the region of 120,000 tons per annum by 1980.

Current Production

The installed capacity of the Valaichchanai Mill, which is now in production is 22,500 tons per annum. With the commissioning of the second mill, in 1976, at Embilipitiya which is expected to have a rated capacity of 15,000 tons per annum, the total manufacturing capacity installed in the country would amount to only 37,500 tons per annum, meeting only 40 per cent of the estimated demand for 1976. To meet this gap between supply and demand, and to reach self-sufficiency, therefore a considerable increase in the production of paper and board is required.

Current Proposals

- Proposals to meet this increasing demand include:
- A. Process improvements to existing plant and machinery.
 - B. The establishment of a third mill, which will have a rated capacity in the region of 90,000 tons per annum.

These proposals have twin objectives:

- (i) achieving of national self sufficiency of paper and board.
- (ii) earning of foreign exchange by the export of industrial paper and paper board.

A. Process Improvements

Three stage process - improvement programme has been planned, which is based on making simple modifications to existing plants and equipments.

Stage I - Bleach pulp production will be increased from 7,500 - 10,500 tons per annum

Stage II- The production capacity of the No 2 machine, will be increased from 12,600 tons - 13,000 tons per annum.

Stage III- A second bleach pulp line will be provided, so that the bleach pulp capacity will be increased by 4,500 tons per annum.

These improvements will reduce the foreign exchange component in the cost of paper manufacture, as indigenously produced pulp could replace imported wood pulp.

These improvements will allow for:

- (i) flexibility in the use of different indigenous raw materials
- (ii) the ultimate replacement of imported wood pulp with local long fibre substitutes.

B. The establishment of a third mill

It has been proposed a third mill be established, for the manufacture of kraft/^{grade} papers, newsprint and corrugating medium and liner board. This mill is designed for integrated production, allowing for the maximum use of diverse raw materials. It will also allow for efficient chemical recovery and a reduction in the capital costs of service facilities. e.g. water, steam and power. The more efficient use of these services, will then be made possible.

Raw materials

The raw materials currently being used in the manufacture of pulp and paper in Sri Lanka are:

- (i) Rice-straw - This is readily available, and is the principal local raw material for pulp production in Sri Lanka.

In 1972, the total quantity of straw purchased by the Corporation was 24,122 tons. Of this amount 15,445 tons were consumed in 1972. In 1973, the total quantity of straw purchased by the Corporation was 16,814 tons. Of this amount 17,048 tons were consumed in 1973. In 1974, the total quantity of straw purchased by the Corporation was 12,536 tons. Of this amount 19,548 tons were consumed in 1974.

With the commissioning of the second mill it is anticipated that the requirement of this raw material will increase considerably.

- (ii) Waste Paper

This is a good source of local fibre material for Sri Lanka. The present consumption of waste paper is about 10,000 tons. This figure is expected to rise to 20,000 tons after the 3rd mill goes into production.

- (iii) Long-fibred wood pulp (imported)

In 1971, the Corporation's requirement of 6,250 tons of long-fibred wood pulp was imported at a cost of Rs. 2.2 million in foreign exchange. In 1974, 5,376 tons were imported at a cost of 18.2 million in foreign exchange.

Potential new local raw materials

Experiments in the use of other substitute local raw materials, e.g. Konaf, Sun Hemp and Sesbania grandiflora have been conducted.

- (i) Konaf appears to be an excellent long fibre substitute and could gain commercial importance in Sri Lanka. The Corporation has already requested the State Plantation Corporation to cultivate Konaf on a commercial scale, and experimental cultivations have been started in the Corporation's Farm - at Punanai. With the establishment of the third mill, a Konaf requirement of 62,000 tons per annum is anticipated. This could be met from a plantation of 20,500 acres.
- (ii) Sun hemp - It is a potential source of raw material for Sri Lanka's pulp and paper industry. Sun hemp pulp has been used with a degree of success in India, for the manufacture of Fine high grade tissues. Mill trials have been carried out successfully at Valaichchenai. It is now proposed that 15,000 acres of Sun hemp be cultivated by small farmers.

(iii) Sesbania grandiflora (Katuru murunga)

Sesbania pulpwood, is one of the pulpwoods of importance which could be used in the pulp and paper industry. The Corporation together with Department of Agriculture has organised a programme for the cultivation of this crop of which it is estimated 6,000 acres could be required.

Agricultural Residues

A potential raw material source for the pulp and paper industry in Sri Lanka are agricultural and other waste products.

Saw Mill Wastes

This is a potential raw material source, which has not yet been adequately exploited. Supplies could be obtained directly through the Plywoods Corporation.

(iv) Textile mill wastes and rags

These could be used in the manufacture of speciality grade papers. However, the utilization of these waste material would require installation of suitable equipment.

Utilization of Wastes

The paper industry consumes its own wastes e.g. waste paper. The present mill at Valachchenai currently uses 10,000 tons of waste paper per annum. With the proposed improvements to the Valachchenai Mill, and after the setting up of the third mill, it is expected that the usage of waste paper will increase to 20,000 tons per annum.

Disposal of Effluents

Valachchenai : The present method of effluent discharge at the existing mill in Valachchenai presents no serious problem. Effluents are kept to a minimum by re-cycling the waste water in a closed system. In the newer No. 2 machine, a sedimentation type save-all, has been installed, which will allow the recovery of the binds (fibre) as well as the chemical additives.

Pulp mill effluents are discharged into the Puthaveli aru through which they empty into the Valachchenai lagoon and are eventually discharged into the Indian Ocean.

Abilipitiya

The effluents which primarily contain biodegradable organic material in solution, will be discharged into the right bank canal below the Kachchagala Tank. This is likely to present some problems, as it is possible that pollution of drinking and irrigation water may result. A Recovery Plant and save all will be installed and it hoped that this will reduce the quantum of effluent discharged and the Walawe ganga. However this problem will require further study after the mill goes in production.

Rajangan

It has been proposed to install the third mill in the Rajangan area. The original proposal envisaged that effluents would be discharged into both the left & right bank irrigation channels which lead from the reservoir. There is however a strong possibility that these effluents, will pollute these channels, and it has therefore now been decided to re-site the mill.

Effluent Treatments

In the last few years the paper industry has concentrated on the development of techniques for the recovery of materials discharged with the effluents. The new techniques involve the use of waste water treatment plants. These techniques have improved the overall efficiency in the operation of the pulp and paper mill, by the recycling of fibrous materials and chemicals.

v. Rubber Industry

INTRODUCTION

In Sri Lanka 301 m. lbs. of natural Rubber was produced in 1974, of which 283.1 m.lbs. was exported. The balance used locally goes mainly into the production of

- (1) Tyres and tubes
- (2) re-treading of tyres

These consume about 80% of the total amount of rubber. The balance goes into the production of rubber foot wear and other miscellaneous items like dipped rubber goods, hosing, toys, foam mattresses etc.

In the rubber industry raw rubber constitutes about 65% of the ingredients used. The other ingredients being

Carbon black	45 - 50 phr (parts per hundred rubber)
Zinc Oxide	2 - 10 phr
Stearic acid	0 - 4 phr
Accelerators	1 - 3 phr
Antioxidants	0 - 3 phr
Sulphur	1 - 50 phr
Softeners	5 phr
Others	variable

Of these items Carbon Black, Sulphur, Zinc Oxide, Accelerators, Antioxidants, have to be imported.

Stearic acid which was imported till recent times has now been substituted by the Fatty acids of the Oils & Fats Corporation. Locally available fillers like kaolin and silica are also being used widely now.

Comments:

The manufacturers we interviewed were of the opinion that there are unnecessary delays in obtaining the import licences for imported ingredients. Due to this limitation, these manufacturers found it difficult to make any forward planning programmes. We also found that manufacturers import these ingredients in small quantities for which they often have to pay a surcharge. With our suggestion that there should be a central place for importing and distribution of these ingredients to overcome this problem, they agreed in principle, but also expressed some doubts as to the efficiency that could be expected from such a system. We feel however that the establishment of such a central organisation would save the country some foreign exchange.

The manufacturers expressed their dissatisfaction with regard to the quality of supply and price of the local raw materials (Rubber excluded). To cite an example the local kaolin has a high moisture content which can substantially degrade the quality of the finished product. We suggest therefore that a degree of attention be given to the improvement of the quality of these local substitutes. Supply of these local ingredients was often found to be irregular. For stream-lining production it is essential that the supply of all ingredients should be regular. It is therefore recommended that some unit be vested with the responsibility of studying the availability and adequacy of all local raw material supplied and make this information available to the industrialists. Unprecedented price fluctuation within the area has also been a major problem.

New possible areas of investigation

- (1) Manufacture of cyclised rubber can be used as a basic ingredient in the paint industry and as a re-enforcing filler in the foot wear industry.

- (2) Use of the locally available Resin, Kokum as a tackifier in the Rubber Industry. Laboratory trials on this have been carried out successfully at the C.I.S.I.R.
- (3) Use of Ebonite to make hard rubber articles like conduits and pipes (instead of PVC) and Fan-blades. Laboratory trials have already been carried out at the C.I.S.I.R.
- (4) A study of the economic feasibility of manufacturing chlorinated rubber. Many expert reports are available on this.
- (5) Manufacture of Latex - Carbon Black - Masterbatches for export. Incorporating Carbon Black into dry rubber in rubber compounding is done on a two roll-mill or in an internal mixer. This process is high-energy/consuming because mechanical breaking of rubber molecules is involved. In developed countries, where synthetic rubber is used Carbon Black is normally introduced to rubber at the latex stage, instead of at the dry rubber stage, thus saving a considerable amount of energy. With Natural Rubber this is not practical industrially, because rubber estates are situated miles away from the Carbon Black manufacturing concern. Investigations carried out at the C.I.S.I.R. have shown that introducing Carbon Black into Natural Rubber at the latex stage is both practically possible and economically feasible. This is therefore a possible line for the exploitation and development.
- (6) Possible use of the by-products of the Petroleum Corporation e.g. pitch, as softeners in the Rubber Industry.
- (7) Fundamental research in Rubber chemistry and technology with a view of modifying natural rubber to widen its scope in industrial applications. Manufacture of thermoplastic rubber derivative, investigations on rubber blends high temperature vulcanisation of rubber are some areas to be looked into.

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Colombo 7.

Mr. E.S. Wijewardena
Chairman,
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Secodura.

ANNEXURE I

List of Institutions Visited

Ceylon Oils and Fats Corporation - Seoduwala

British Ceylon Corporation - Mulsdorf

Bata Shoe Co. Ltd - Airport Road - Ratmalana

Elasto Ltd - Elpitiya Road - Bentota

Sinwa's Ltd - Dohiwala

Richard Pieris & Co. Ltd - Nawinna

ANNEXURE II

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