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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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UNITED NATIONS INDUSTRIAL
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EVALUATION SURVEY OF THE VEGETABLE OIL INDUSTRY 1/

SAMOA

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Project findings and recommendations

Terminal report prepared for the
Government of Samoa

000031

by

P. V. K. Young
(edible oil technology consultant)
UNIDO Expert

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CONTENTS

SUMMARY.

The coconut palm is the prime source of edible oils in West Samoa but its yield of copra is poor by international standards. Land surveys indicate that it is unlikely that the coconut planted acreage can be extended significantly. Improvements in output must therefore come from the planting of higher yielding hybrids, towards which a programme has been started, improved husbandry and improved nut collection. Motivation and training of the village grower is needed and can perhaps be achieved by studying methods used in those countries producing higher yields. The situation with the other principal crop, cocoa, is similar.

Because of the fluctuation of copra production, the recently begun copra mill project which is due on stream in the second half of 1960 may in its first years have unutilised capacity. It is suggested that this capacity be used for obtaining cocoa butter from cocoa beans.

To obtain maximum value from the coconut palm, it is recommended that a marketing study be carried out and that the information so obtained be used to develop certain products and derivatives in West Samoa. Apart from optimising revenue the other principal aim of this scheme is to produce, by fellowship training in developed and developing countries, West Samoans with the fullest possible knowledge of the markets and technologies for this crop.

Currently copra and cocoa account for 90% of West Samoan exports indicating the country's degree of dependence upon these crops. A measure of diversification could be obtained by planting oil palm.

Recent Malaysian experience and development with the latter crop has underlined its importance as one of the world's leading vegetable oils. It has the added advantage to the country of origin of being marketable in several forms, which can be produced in that country using relatively simple technology. Thus both employment and skills are increased. It is believed therefore that very careful consideration should be given to the possibility of establishing an oil palm industry rather than only a plantation/oil mill.

The country's communications and industrial support systems are developing well. A greater awareness of technical conditions and specifications in the developed trading world is needed for Samoa to be able to compete for export markets. Visits of experts from developed or other developing countries should be used to transmit such knowledge to the local management.

The itemised recommendations resulting from the visit are given on pages 24 - 26.

2) Introduction

2.1) Project Background

The first Consultation Meeting on the Vegetable Oils and Fats Industry was held in Madrid from 12 to 16 December 1977. It was attended by over 130 participants representing governments, industry and labour, from 50 countries. In addition, over 20 representatives of international and regional organisations also attended.

This consultation meeting, convened by UNIDO in pursuance of the Lima Declaration and Plan of Action and General Assembly Resolution 3362, is part of its efforts to promote co-operation in raising the overall level of industrial production in developing countries. The meeting made a series of follow-up recommendations relating, inter alia, to global policy for increased international and technical co-operation between the developed and the developing countries and among the developing countries themselves, and for specific follow-up action both short-term and long-term. Bearing in mind the continuing nature of the system of consultations, a second consultation meeting will be convened to examine the implementation of these recommendations.

One of the main conclusions reached by this consultation meeting was that there could still be room for increasing the share of tropical oils within the total oils and fats consumed in developed countries, and that this could offer opportunities to exporting developing countries to increase their share of the markets of developed countries.

As a first follow-up to the recommendations of the First UNIDO Consultation Meeting in this sector and in order to create the basis for practical and appropriate vegetable oil industry development in countries with a potential in this sector, UNIDO has decided to carry out - through expert services - evaluation studies of the potential of the vegetable oil industries sector in a selected number of developing countries. This evaluation country study is to assess and evaluate the existing situation in the countries to be covered with regard to the availability and utilisation of oil-bearing materials including the raw material potential, the domestic market situation (present demand) in vegetable oils and protein cakes/meal and the present status of the vegetable oil industry.

In fulfilment of the above decision the author's visit to West Samoa was arranged and took place from 20 November to 4 December 1978. It had been agreed during the briefing period in Vienna that the study should also take note of the position in West Samoa regarding animal fats and fish oils, both of which are used for edible purposes and could have an influence on future processing decisions concerning vegetable oils.

2.2) <u>Acknowledgements</u>.

During the visit the writer was based in the Department of Economic Development in Apia and would like to express his thanks in particular to the staff of that Department for the considerable help given in carrying out the project. Similarly thanks are due to the many other people in Government and other organisations who helped with facts and opinions, and to the staff of the UNDP office in Suva, Fiji, for the briefing prior to the visit.

A list of those people principally involved in discussions in Apia is given in Appendix 1.

2.3) Government Policy.

Relevant information on land areas, ownership and fertility is given in Appendix 2 and on export/import figures and copra production in Appendix 3.

These figures highlight the importance of customary or family land (2.2) and that only half the available land has cropping potential (2.3). They also show the importance of copra and cocoa for export earnings. These two crops accounted for 75% of export income in 1976 and 90% in 1977. The variability of copra production is clearly indicated in Appendix 3.2 and the imbalance of exports and imports can be seen in 3.3.

In consequence of these facts West Samoan government policy is

- to improve rural production,
- to implement a village development programme,
- to develop the island of Savai'i,
- to foster schemes and industries which will replace imports or have export potential,
- to provide employment for the local population.

These aims must therefore be borne in mind when considering recommendations for the edible oil industry in the country.

2.4) Western Samoa Trust Estates Corporation (WSTEC).

WSTEC was established in 1956 to take over the New Zealand Reparation Estates. It is run as a Government owned commercial organisation

with current land holdings of approximately 24000 hectares on Upolu and Savai'i. The land is used for coconut and cocoa plantations and beef and dairy cattle.

Other WSTEC interests are:-

- a soap factory including a small copra crushing mill used to supply coconut oil for the soap,
- a stem timber factory including preserving equipment,
- the operation of the pig and poultry feed mill due to start operations in January 1979,
- a projected broiler unit,
- a projected abbatoir/meat processing plant.

3) Findings.

3.1) Vegetable Oils.

3.1.1 Coconut

As can be seen in Appendix 3.2 the production of copra is very variable. The reason for these fluctuations can be broadly seperated according to long and short term effects.

Long term - senility of trees

Jensen and Wissen (1)

Area and Age Distribution of Coconuts

Age	Hectares
More than 50 years old. Partly under planted and mixed with younger trees.	18,800
12 - 50 years old (most productive)	11,000
Less than 12 years old.	20,800
Total	50,600

The yield of old trees falls off and that of young trees builds up. There is an intervening period during the replacement of the old trees in which a production minimum is to be expected. The Government's policy is currently not to extend coconut plantings but to replant 2000 to 2400 hectares per year. It seems likely that the minimum period has been reached.

- bad husbandry

The quality of plantations ranges from the high standard of the WSTEC holdings to some very poor village areas. Heavy undergrowth and rotting stems are ideal growth conditions for pests and hinder nut collection.

- changing to other crops

Appendix 3.1 shows the growth in the taro crop at the same time as the copra and cocoa yields in 1976 dropped. It is possible that the two are related by the concentration of village labour on taro to the detriment of coconut/cocoa.

Short term - low nut collection

Low nut collection in a particular year can be due to short term changes in labour utilisation and weather or price fluctuations, as mentioned below.

- price changes

Price changes will naturally produce a change of emphasis where an alternative is available. However the Cocoa and Copra Boards operate a price stabilisation scheme (3) which considerably evens out the peaks and troughs of price fluctuations.

- weather

Bad weather (drought) affects the yield the following year. Equally, prolonged rain makes the job of nut collecting and drying more difficult.

- food shortage

Jensen and Wissen (1) estimate the average consumption of mature nuts for food to be 0.5 nuts/capita/year, but also state that in times of shortage of staple foods the number of green drinking nuts consumed will increase. If for this reason a further 0.5 nuts/person/year were consumed for 6 months, there would be a drop of about 2750 tons of copra some six months later.

The coconut yield is of great importance to the West Samoan economy and consequently it is imperative that the above factors, and no doubt others, should be quantified so that predictions can be made with some certainty, and corrective measures applied to increase yields.

Hybridisation

Jensen and Wissen (1) estimate the net yield of copra to be 630 lbs per acre (716 Kg/hectare). A hybridisation scheme was started with the planting of Malayan Dwarf seed nuts in 1977. These are to be crossed with pollen from either a local or an imported "tall". The first commercial seed nuts from this scheme cannot be expected before 1989/1990. The alternative of importing hybrid seed nuts would be a costly operation and hazardous from a disease/pest point of view.

Copra Mill Project

Samoa Coconut Products Ltd (SCPL), in which the West Samoan government is the principal shareholder with WSTEC holding the balance of the shares, has been set up to administer the Copra Mill Project.
The foregoing discussion on coconut/copra availability has a bearing on the copra mill utilisation. Table 1 compares copra production figures estimated by Jensen and Wissen and by the Asian Development Bank (ADB) mission reporting in November 1977 (2).

Table 1

Copra Production Forecasts

Year	Expected Copra Production (Metric tons) Jensen and Wissen (1)	ADB Mission (2)
1979	19400	
1980	21200	
1981	23000	
1982	24500	
1983	27100	
1984	28200	18900
1985	28900	
1986	29200	
1987	29400	
1988	29300	
1989	29200	
1990	29000	21000

From the discussions held during the visit the ADB figure seems the more probable.

The mill has a planned capacity (2) of 73 tons/day of copra which is equivalent to 18,250 tons/year on a 5 days/week and 50 weeks/year basis. It is not known if the figure of 73 tons/day is a rated figure or one allowing for a less than 100% operating efficiency. It is the writer's opinion that the mill is correctly sized; however in bad years such as 1973, 1976 and probably 1978, there will be some spare capacity. Anticipated production is 46 tons/day of coconut oil and 24 tons/day of copra meal pellets (on the above basis, 11500 and 6000 tons/year respectively). Of this initially only some

500 tons/year of meal will be used in the animal feed mill. The balance of the meal and virtually all the coconut oil must be exported.

Konsultants Proses, a Malaysian consulting company with considerable experience of palm oil and palm kernel mills, has been chosen for the project engineering. A company of mill management consultants are to be employed for a period of three years commencing probably late in 1979. The mill is scheduled for commissioning in June 1980.

Coconut Products

Coconut Oil

West Samoan copra is of high (Grade1) quality therefore, given correct mill operation, the oil and meal should also be of high quality. The mill management consultants will be responsible for setting quality standards and quality control procedures. It is strongly recommended that the "Codex Alimentarius International Standard for Edible Coconut Oil" should be adopted. This standard was at step 5 of the Codex procedure following the December 1977 Codex meeting. Two points of detail are worthy of mention on coconut oil quality. First that the process material should be free from contact with all copper or copper bearing alloys such that the copper content of the oil should be 0.2 parts per million (ppm) maximum (Codex states 0.4 ppm max.), and second that the oil should contain no copra dust (fines).

By-products (meal, coir, desiccated coconut, coconut cream, shell charcoal/activated carbon, timber)

Coir (mattress fibre) used to be produced by Samoa Tropical Products Ltd. (STPL). Production ceased when the company could not obtain a market for the product.

Desiccated Coconut also formerly produced by STPL but production

ceased following bacteriological problems with the product in New Zealand.

Coconut Cream is currently being produced by STPL with a healthy export market to Australia and New Zealand as well as home sales. It is hoped to improve the yield of cream following work being carried out by Tropical Products Institute (TPI) London, and to export to U.S.A. For expansion STPL would need new plant and a new factory. At present no bacteriological control checks are carried out on the product. These should be instituted as soon as possible.

Shell Charcoal is also the subject of investigative work by TPI (London). There is no major production of this by-product at present.

Timber is finding use for fence posts, roof shingles and other purposes, but only the fringe of this major problem has so far been touched.

Marketing

The importance of the products of the coconut palm to West Samoa requires that a positive effort should be made to extract the maximum benefit from these products for the economy. The markets will not come to Samoa and it is not wise to depend upon brokers and agents. It is therefore proposed that a three stage plan be put into operation to optimise the financial return from the coconut palm.

1. Engage a coconut marketing expert to examine world markets for coconut products and derivatives of those products e.g. activated carbon from shell charcoal, fireproof rubberised coir for crash-padding. The anticipated period of the study would be one year. The coconut oil and meal part of the study should be completed before the start-up of the copra mill, so that full value can be obtained for these products from the beginning.

2. Carry out feasibility studies on those products and derivatives shown by the market study to be the most promising.
3. Train two West Samoans by means of fellowships, one in marketing and the other in the technology of coconut products. These two people should work closely together with a knowledge of what is possible in West Samoa and be permitted and prepared to spend up to six months per year abroad, keeping up to date. In a commercial organisation they would be the marketing and technical managers or directors.

The object of the exercise is to investigate, to apply and, finally, to keep up to date with market and technological trends.

3.1.2 Cocoa (4)

The cocoa crop is suffering from very much the same problems as coconut - low yielding planting material, high usage in the villages (ca 400 tons per annum), weather, disease (black pod) and poor husbandry.

Currently about 4800 hectares is planted with cocoa and the Government's target is 24000 hectares. The yield/hectare (average) is about 380 kgs and on WSTEC land about 640 Kgs. The Government aims to improve the average yield to the current WSTEC figure. Replanting is planned with a higher yielding hybrid variety which will take about 10 to 12 years to prepare. In the meantime replanting will be carried out with selected seeds from the WSTEC seed garden. The suggestion is made that the spare capacity of the copra mill in bad years of coconut production could be utilised for processing cocoa beans for the production of cocoa butter and a cocoa meal. In the processing of cocoa the beans after cleaning are roasted to develop flavour and aroma, then cooled and cracked. The shells are

winnowed away leaving the nib which can then be further treated, (broken, cooked and pressed) in the same equipment as is used for copra. The nib contains approximately 50% of cocoa butter, which is used for chocolate manufacture, and for which there should be no market problem. If required by the customer a bland cocoa butter can be produced by omitting the roasting step. This is the most likely saleable product because cocoa butter is today usually refined prior to use for chocolate. The cake from the pressing operation contains about 8% of cocoa butter and is usually solvent extracted for removal of most of this fat for the final production of cocoa powder. The cake would be sold to chocolate/cocoa powder manufacturers. It is understood that a cocoa processing expert has been requested by the Government of West Samoa. It is recommended that the advice of this expert should be sought on this subject. It is further recommended that, when the copra mill crushing plant is discussed with the plant manufacturers, information and budget prices should be obtained on additional equipment needed for the processing of cocoa beans.

3.1.3 Oil Palm

There has been interest in the possibility of growing the oil palm in West Samoa at least since 1972. However, it is understood that, while a number of opinions have been obtained, no feasibility study has been carried out.

Two principal factors now make the subject of more urgent interest:-

- the remarkable advances made with this crop in Malaysia, including the further processing of the oil by fractionation and refining,
- the start-up of a 2000 hectare oil palm plantation and mill in

the Solomon Islands on the Guadalcanal Plain.

The latter has taken the form of a joint venture company, Solomon Islands Plantations Ltd., between the Solomon Islands government and the Commonwealth Development Corporation (CDC). The CDC is a British Government organisation set up to invest on a commercial basis in development projects with, in general, a regard to their development value to the country concerned. Apart from the Solomons project the Corporation has set up in East Asia and the Pacific Islands similar oil palm organisations in Sabah (2), Malaysia (1), Sarawak (1) and Papua New Guinea (1). It is understood that the Solomon Islands venture is commercially successful and that a further 1300 hectares are currently being planted with oil palm. The Solomon Islands land tenure system has certain similarities to the western Samoan village customary land. A Samoan plantation could either be sited on WSTEC land or on land leased from the villages who could be given shares in the newly formed company and who could supply most of the labour requirements of the plantation and mill.

An oil palm plantation in west Samoa would serve to diversify agricultural production but it would also use land which would probably otherwise be used for other crops. It should therefore provide either a higher profit or have other advantages, e.g. increased employment and technology, than the alternative crops.

Malaysian experience has shown that the export market is not restricted to the crude palm oil but is to be found also in the crude fractionated products, stearin (melting point 46 to 54°C) and olein (cloud point less than 10°C), and in the refined palm oil, palm stearin and palm olein. The crude oil and crude fractions are sold mainly to Europe, and the refined products to India, the Middle East, Australia and

the U.S.A. The stearin is used as a substitute for hydrogenated oils and in soap production, and the olein is used as a cooking/frying oil and as a substitute for soyabean and rapeseed oils at times when the latter oil types are high in price. For a large part of the edible oils and fats market the fact that palm olein is lower in polyunsaturated fatty acid content than soyabean oil is of no consequence.

For the above reasons the writer is of the opinion that a simple pre-feasibility study which was concerned only with the growth of the oil palm tree could be misleading, and that what is in fact required is a full feasibility study to examine the subject in three parts

a) the economic feasibility of the cultivation of the oil palm and production of crude palm oil in West Samoa.

b) (a) above taken in conjunction with a fractionation plant such that the products would be crude palm oil, palm stearin and palm olein.

c) (a) and (b) with a refinery which would permit the sale of
   - crude palm oil, palm stearin, palm olein,
   - deacidified and bleached palm oil, palm stearin, palm olein,
   - fully refined (edible) palm oil, palm stearin, palm olein.

(c)provides for wider market adaptability with greater employment opportunity and the development of technological "know how" in West Samoa. A refinery opens up further possibilities which will be expanded upon later in this report.

The kernels from the palm fruit can be sold as such but would probably yield a higher profit if they were crushed in the copra mill to yield palm kernel oil and palm kernel meal. Palm kernel oil belongs to

the same group of oils, the "lauric acid" group, as coconut oil and has almost identical uses both for edible and technical (soaps) purposes. The meal, like copra meal, is an animal feed component. The yields from a 2000 hectares plantation at maturity would be of the order of 8,000 to 12,000 tons palm oil per year

ca 800 tons palm kernel oil per year

ca 800 tons palm kernel meal per year.

In the nine month period of January to September 1976 the Solomon Islands 2000 hectares produced 9056 tonnes of palm oil.

3.1.4 Maize

Maize is currently being imported as a constituent of the feed to be produced by the new feed mill which will commence production in January 1979. Although not considered by animal health experts to be an essential component of the feed, nevertheless growth and health of the animal/bird are improved when maize is incorporated because of its linoleic acid content.

It is worthy of consideration that, if it is decided to incorporate maize in the meal in the long term, the maize should be grown in Samoa.

One estimate given to the writer of the maize required for animal/poultry feed was 1200 tons in 1979 and 3900 tons in 1988. The average yield of maize in 1966 was 2.4 tons per hectare, thus about 2000 hectares of land would be needed to satisfy requirements at the end of the 1980's. The maize germ contains 50 to 55% of maize oil which is of considerable value as a cooking oil and margarine component, because it contains approximately 50% of the polyunsaturated fatty acid, linoleic acid. An inducement therefore for the growing of maize would be the local production of at least sufficient maize

oil to satisfy the local market. For this purpose the germ would be first separated from the corn, then crushed to release the oil and the combined meal used for cattle/poultry feed while the oil must be refined for human consumption.

Before a decision is made on growing maize in Samoa, advice must be taken on the variety of the crop which would be most suited to conditions in the country with particular reference to resistance to diseases such as rust.

3.2) Animal Fats.

At the present time it is estimated that there are some 26,000 head of cattle in West Samoa, consisting of about 3,000 dairy cows and 23,000 beef steers. The government's policy is to achieve self-sufficiency in cattle for the country. A figure given to the writer for this target is 65,000 head. It is however anticipated that the current programme will achieve a figure of about 50,000 head by 1988. There is currently under discussion in West Samoa a WSTAC proposal for a national abbatoir and meat processing plant. New Zealand, under their Bilateral Aid Programme, have agreed to supply an expert to examine the proposal.

From the 1977 Customs Department figures it was noted that about 600 tons of fats were imported that year under the headings of "Unrendered fats (bovine), tallow" and "other prepared edible fats, imitation lard". Probably two thirds (400 tons) of this total was either beef dripping for use in Samoa for the production of bread and biscuits, or tallow for soap production.

It is strongly recommended that the projected abbatoir/meat processing plant should be extended by the addition of a small rendering plant to obtain as much beef dripping and tallow from the carcasses as possible. The quality of the fats obtained should be easily equal

to that currently imported. The production, which could be expected to be about 50 tons per year in 1979 rising to 100 tons plus in 1988, would obviously be an import substitute and would provide a small measure of independence of imported supplies.

3.3) Fish Oils.

From conversations in Apia and Fiji it appears most unlikely that the fishing industry will in the foreseeable future catch enough to warrant the installation of a fish oil extraction plant with its essential adjunct, if the oil is to be used for human consumption, an hydrogenation plant.

3.4) Imports.

The Customs Department introduced a new records system for the 1977 figures. Those for 1976 were not available during the visit. 1974 and 1975 data are included in the following table where they can be related to the 1977 figures.

The figures given below are for oils and fats and edible fat-containing products and the quantities have been converted into tons for the sake of simplicity.

Table 3

Product Class	1977		1975	1974
	Tons	Value $ S	Tons	Tons
- Fixed Vegetable Oils, fluid or solid, crude, refined or purified	125.0	42,778	52.2	380.7
- Pig fat unrendered	0.2	610	-	-
- Unrendered fats (bovine), tallow	302.6	153,623	-	-
- Animal stearin, lard	5.3	2,477	-	-
- Other animal oils and fats	0.6	746	-	-
- Hardened animal or vegetable oils	1.9	4,435	-	-
- Other prepared edible fats, imitation lard	278.7	185,378	-	-
- Butter	257.4	261,809	212.9	174.8
- Margarine	13.1	14,167	10.0	10.3
- Pastry, biscuits, cakes	111.5	123,710	232.6	183.4

Blanks indicate that no relatable figures are available.

Assuming that the "unrendered fats (bovine), tallow" is totally tallow, that half the butter market could be captured by a locally produced margarine, that margarine contains 80% fat, and that the "pastry, biscuits, cakes" recipes contain an average of 10% fat, then the market in Samoa for home-produced oils and fats in whatever form in 1977 was 839 tons.

The range of processed fat-containing foods currently being produced in West Samoa includes bread, biscuits, cakes, pies, pastries, hamburgers, doughnuts, snack foods, ice cream and topping and filling

creams for biscuits and cakes. The oils and fats used for these products are listed below - all are imported.

Beef Dripping

Refined deodorised soyabean oil

Refined deodorised coconut oil

Refined deodorised palm olein

Refined deodorised palm oil

Refined deodorised beef olein

Butter

Butterfat

Cake margarine

Proprietory shortenings (100% fat products)

Proprietory synthetic cream whipping agent

3.5) Retail Prices of Edible Oils and Fats.

In Table 3 below are set out for comparison the price, source and packaging of butter and other domestic oils and fats.

Table 3

Product	Source	Packaging	Oil/Fat Component	Price bS $
Butter	N.Zealand	Wrapped	Butter	0.70/1b
Margarine 1	USA	Wrapped	All vegetable	0.55/1b
Margarine 2	USA	Plastic tub	All vegetable	1.05/1b
Margarine 3	N.Zealand	Plastic tub	P.U.F.A.	0.90/1b
Spread	USA	Plastic tub	Maize oil	0.92/1b
Shortening 1	USA	Tin	Hydrogenated vegetable oil	1.35/1b
Shortening 2	N.Zealand	Plastic tub	Hydrogenated beef olein	0.78/1b
Beef dripping	N.Zealand	Wrapped	Beef dripping	0.56/1b
Cooking Oil 1	USA	Bottle	Groundnut oil	3.45/litre
Cooking Oil 2	USA	Bottle	Soyabean Cottonseed oils	2.11/litre
Cooking Oil 3	Australia	Bottle	Maize oil	2.95/litre

Notes on Table 3:-

- All vegetable indicates that the fat blend contains no animal or marine oils or fats.
- P.U.F.A. stands for high in polyunsatureted fatty acids. Such producta are reputed to be of advantage for lowering the blood cholesterol level and are more expensive because of the use of higher priced oils such as maize oil.
- Internationally, margarine must contain not less than 80% fat. Any product with a lower fat level may not be called margarine and is, in the U.K., U.S.A., Australia and New Zealand, called a "Spread". The usual fat content of such a spread is normally 40% and it is sold for dietary purposes.

3.6) Refining and Margarine/Shortening Production.

In his report on West Samoa Copra Processing Project of December 1976, Mr.P.C.Catanaoan proposed that a small (2 tons per 8 hour day) batch refinery should be considered to produce a refined, deodorised cooking oil from coconut oil. In the experience of the writer, such a unit would be too small to be economically viable, the minimum capacity for such a plant being about 50 tons per week.

The feasibility of a refinery in West Samoa is changed when considered together with the oil palm proposals in section 3.1.3. of this report. The most remunerative marketing of palm oil would probably involve the refining of some 25% or 2500 tons/annum of the total palm oil yield. The refining of other oils e.g. palm kernel, coconut, tallow and perhaps maize, could then be carried out in the same plant as the palm oil. These latter refined oils would be primarily for use inside West Samoa, either on their own or blended to produce the margarines and shortenings presently imported. The margarines and

shortenings can be produced via the same equipment and, if fractionation equipment was installed as postulated in 3.1.3. above, from locally produced oils and fats. A unit of 1 ton/hour nominal capacity would produce about 20 tons/week of day work only of retail and industrial products. The advantages of the installation are

- import substitution and home market development
- export trade
- employment opportunities
- technology transfer.

It is considered that the feasibility of this suggestion should be investigated as part of the palm oil feasibility study.

3.7) Infrastructure.

The government of West Samoa has a programme of infrastructural improvement the continuation of which is described in the 1979 Budget Statement (5). The programme involves the extension of the main and access road systems in line with the plans for rural development of Savai'i in particular. Funding for these projects is being supplied by the World Bank, West German Aid Authorities, the European Development Fund and the Australian and New Zealand Aid programmes.

The extension of electrical power will be provided by the progressive introduction of small hydroelectric schemes which are being funded initially by the European Development Bank and probably by the Asian Development Bank.

The European Development Bank is also providing a soft term loan for an earth satellite station to improve international telecommunications with West Samoa, and a programme for the installation of telephone kiosks around the country is in operation.

Similarly the government has in hand plans to improve water and sewage facilities.

From the above brief discussion it can be seen that the West Samoan infrastructure should not hinder the country's development but rather should be a considerable factor in its furtherance.

4) Recommendations.

The following recommendations are made based on the findings of the visit and bearing in mind the objectives of the West Samoan government. The recommendations have been allotted high, medium and low priorities. High priority status is given to those projects which should be initiated as soon as possible and certainly before the end of 1979. Medium priorities are to a large extent consequent upon the high priorities.

It is considered that expert assistance from outside West Samoa will be needed for all the recommendations except 4.1.1, 4.2.3, 4.2.5, 4.2.6.

4.1) High Priority.

4.1.1 The effect of the various factors affecting coconut and copra yields should be investigated and consequent measures adopted for their improvement.

4.1.2 A market study of coconut products and derivatives should be carried out. The coconut oil and meal part of the study should be completed before the start-up of the copra mill.

4.1.3 The budget cost of additional plant in the copra mill for the processing of cocoa beans should be obtained from the plant manufacturers, and the advice of the cocoa processing expert taken on the market for cocoa butter, cocoa meal and cocoa powder, and the process to obtain a saleable product.

4.1.4 Studies should be initiated into the feasibility of growing maize and oil palm in West Samoa, with comparisons of the financial return per hectare with coconut, cocoa, banana and taro on the same land. The oil palm study must include Case(A) - oil palm plantation and mill; Case (B) - Case(A) plus palm oil fractionation; Case(C) - Case(B) plus refining of a portion of the palm oil and fractionated products, and in all three cases any benefits to be derived from

the crushing of the palm kernels in the copra mill.

4.1.5 The addition of a rendering plant to obtain beef dripping and tallow from the carcasses after the proposed abbatoir and meat processing plants should be considered in the feasibility study.

4.1.6 A technical assistant is needed as a long term appointment to help with Food Processing. Facets of this job requiring particular attention are assistance to small commercial enterprises, bacteriological quality control methods and standards, and import/export specifications.

4.2) Medium Priority.

4.2.1 An agricultural plan should be formulated based on the results of the studies on the factors affecting coconut/copra yield and the feasibility of growing maize and oil palm in West Samoa.

4.2.2 A study should be carried out on the feasibility of producing those coconut products and derivatives shown by the market study to be worthy of consideration.

4.2.3 The proposed Integrated Coconut Processing Scheme should be given form by the development of Samoa Coconut Products Ltd. (SCPL) to include the processing of by-products with the copra mill. The resultant organisation will be able to optimise profits by production flexibility and improve quality standards to meet world market demands.

4.2.4 Two West Samoans should be granted fellowships in (a) the marketing and (b) the technology of coconut products, by-products and derivatives with a training period of two years. During and following the training they should form an important part of the management team of SCPL.

4.2.5 It is recommended that a "parent" organisation should be responsible for funding the operations of the farmers on the one hand and the coconut processing unit on the other. Such an organisation would be primarily financial, for example, the Development

Bank of West Samoa. It would include the Copra Board for copra price stabilisation but would also finance yield improvement schemes. The capital reserves for the latter and for financing new plant or facilities for the processing unit would be established from the operating margins of the farmers and the processing unit. Additionally the funding organisation could export or import copra as yield and mill conditions demanded.

4.2.6 An interdepartmental Government development coordinating committee should be set up for the purpose of:-

- agreeing priorities of projects, responsibility for projects, monitoring progress of projects.
- communication and dissemination of information
- cohesion of effort.

4.3) Low Priority.

4.3.1 If the growing of oil palm in West Samoa with attendant refinery is found to be a commercial proposition, studies should be carried out to determine the home and export market potential for retail and industrial margarines, shortenings and cooking oils, and the feasibility of manufacturing these products in West Samoa.

5) References.

(1) Coconut Production in Western Samoa, B.B.Jensen and H.L.van Wissen, November 1978.

(2) Appraisal of the Coconut Oil Mill Project in West Samoa Prepared for the Asian Development Bank, November 1977.

(3) Annual Reports of the Copra and Cocoa Board of West Samoa for 1976, and the monthly reports for September 1978.

(4) Report on the Cocoa Industry of Western Samoa, D.H.Murray 1973

(5) The 1979 budget Statement (West Samoa), 14th November 1978.

(6) Consultant's Report on West Samoa Copra Processing Project, P.C.Catanaoan, December 1976.

APPENDIX I

WEST SAMOAN CONTACTS

Department of Economic Development

Director	Mr Hans Kruse
Deputy Director	Mr Epa Tuoti
Economic Planning Adviser (UNOTC)	Dr Te'o Ian Fairbairn
Associate Economist (UNOTC)	Mr Jan de Kok
Voluntary Service Assistant	Mr Barry Coates

Treasury Department

Financial Secretary (UNOTC)	Mr Alistair Hutchison
Assistant to the Financial Secretary	Mr T. Scanlan

Department of Agriculture

Director	Mr Tauilili Uili Meredith
Chief Agricultural Officer	Mr John Hellesoe
Planning/Marketing Adviser/ Team Leader (FAO)	Mr Werner Schreckenberg
Animal Health Officer/Team Leader (FAO)	Mr David Brown
Coconut Agronomist (FAO)	Mr Robert Leather
Agricultural Entomologist (FAO)	Mr Terence Bourke

Cocoa and Copra Board of West Samoa

Secretary	Mr Herman Thomsen

Commonwealth Fund for Technical Cooperation

Food Technologist assigned to Department of Agriculture	Mr Clive Pedrana

West Samoa Trust Estates Corporation

Assistant General Manager	Mr Sefo Ioane
Research and Development Manager	Mr Ai'i Pili
Production Manager	Mr W. Wong

Appendix 2 — Statistical Information

2.1 Land Area/Population (1976)

	Land Area (Hectares)	Population (1976)
Upolu	110,000	110,000
Savai'i	170,000	42,000
Total	280,000	152,000

2.2 Land Ownership (1)

	Hectares	%
"Customary" land (families)	216,700	77.4
Government	28,800	10.3
W.S.T.E.C.	24,100	8.6
Freehold	10,400	3.7

2.3 Agricultural Areas (2)

Fertility:	High to Moderate	60,000 hectares
	Moderate to Low	44,000 "
	Low	176,000 "
Land with cropping potential		139,200 "
Coconut Planted Area		48,000 "

2.4 Monetary Exchange Rate (U.N. Fixed Rate: 1/11/78)

1 U.S. Dollar = 0.712 West Samoan Tala (W.S.$)

(1) Source: "Investment in West Samoa", Dept. of Economic Development, January 1978, adjusted for Government/WSTEC exchange 1978.

(2) Source: Asian Development Bank, "Appraisal of the Coconut Oil Mill Project in West Samoa", November 1977.

APPENDIX 3

3.1 Principal Exports (F.O.B.) Extracted from 1979 Budget Statement

Period	Copra		Cocoa		Bananas		Taro etc	
	Tons '000	WS$ '000	Tons	WS$ '000	Cases '000	WS$ '000	Cases '000	WS$ '000
1974	12.3	4658	1816	1872	51.7	127	90.7	318
1975	19.4	2612	1459	1180	18.9	53	19.9	95
1976	11.8	1894	1644	2229	52.8	145	77.3	363
1977	18.7	4871	2571	6043	13.4	52	62.0	360
1977 (Jan-Sept)	14	3984	1439	3817	12	46	39	220
1978 (Jan-Sept)	10	2518	758	1648	11	34	86	799.

3.2 Copra Production for Export, 1964 to September 1978

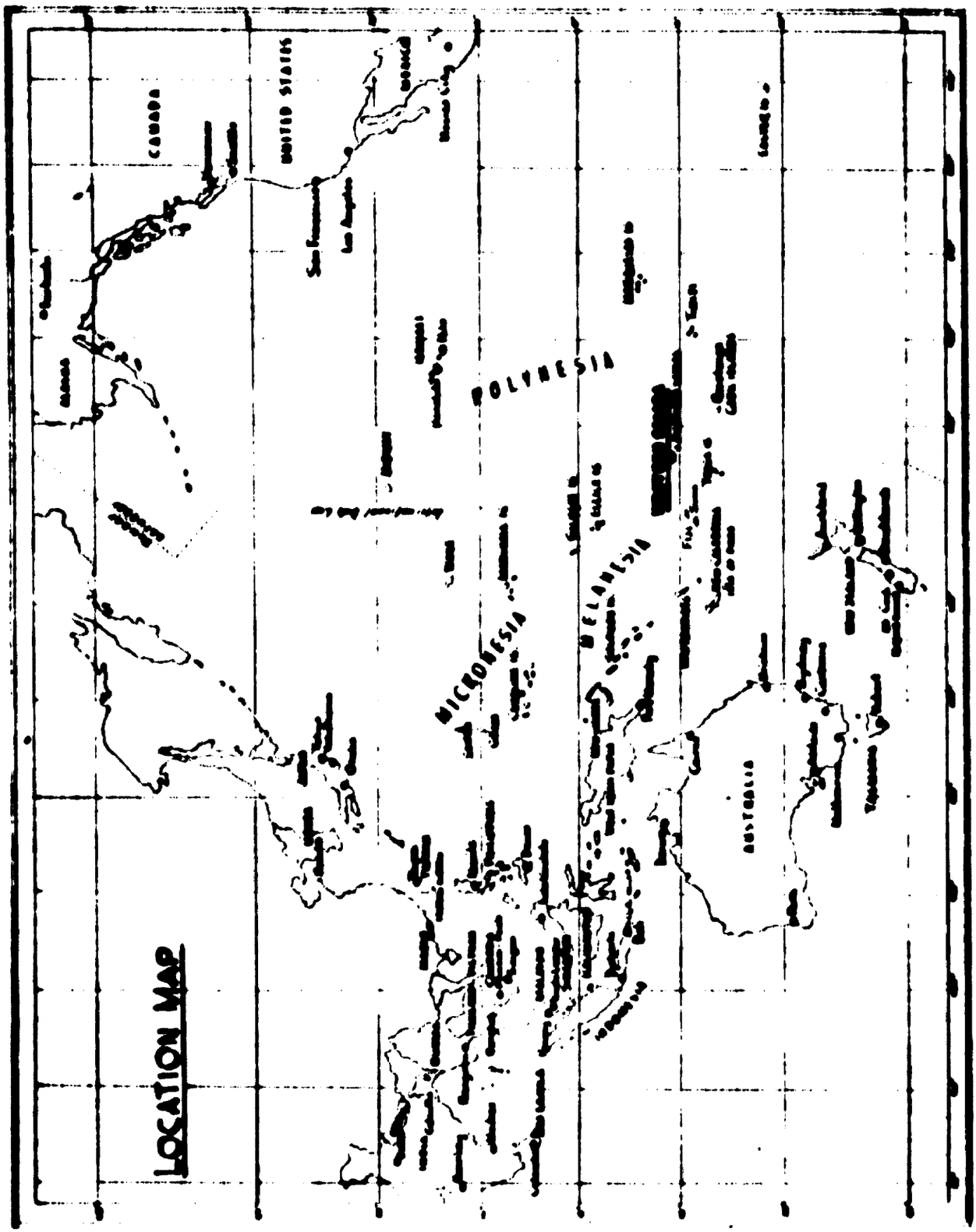
(In thousand long tons)

Period	Production	Period	Production	Period	Production
1964	15.7	1971	16.6	Jan-Sept 1971	12.5
1965	13.1	1972	18.0	Jan-Sept 1972	13.2
1966	13.0	1973	14.0	Jan-Sept 1973	11.2
1967	7.9	1974	17.7	Jan-Sept 1974	12.7
1968	13.2	1975	15.4	Jan-Sept 1975	11.4
1969	13.5	1976	13.5	Jan-Sept 1976	9.4
1970	11.0	1977	16.9	Jan-Sept 1977	13.0
(1964-1970) Annual Average	12.5	(1971-1977) Annual Average	16.0	Jan-Sept 1978	10.4

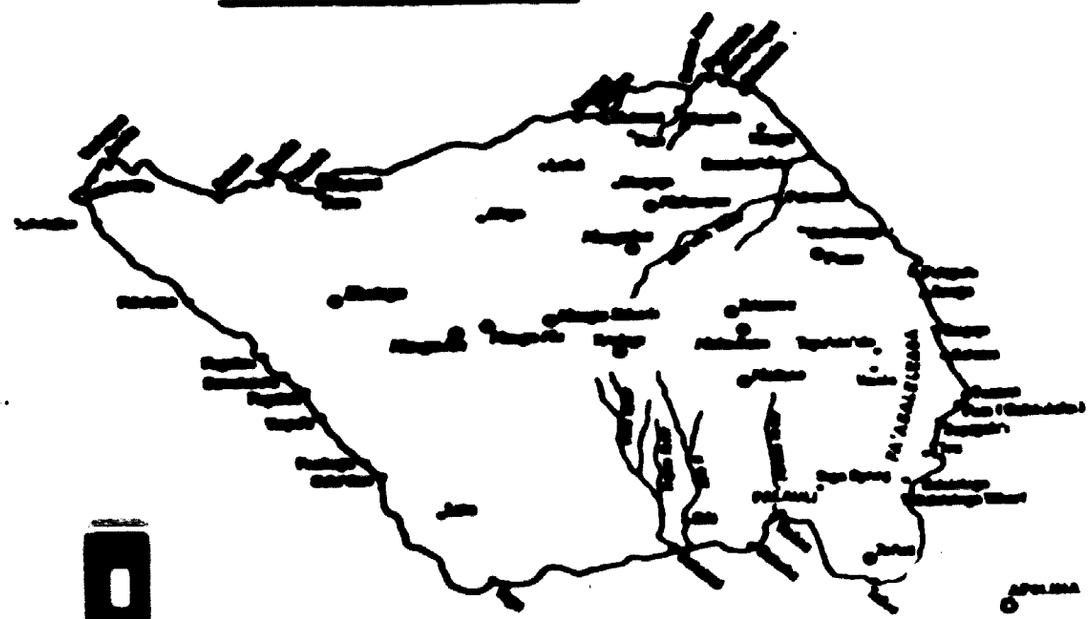
Source: Copra Board, Secretary's Monthly Report, September 1978

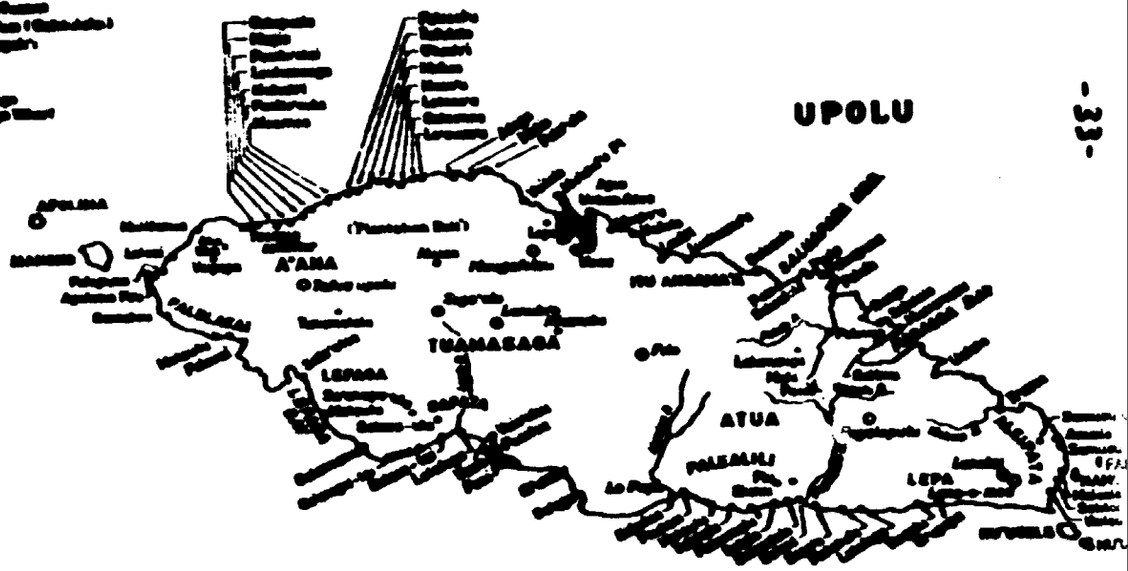
3.3 Imports (CIF)/Exports (FOB)
Extracted from 1979 Budget Statement
('000 Tala)

Year	Exports	Imports
1973	4001	14,433
1974	7672	15,909
1975	4540	23.160
1976	5349	23,627
1977	11,647	34,192


LOCATION MAP
CANADA
UNITED STATES
San Francisco
Los Angeles
POLYNESIA
MICRONESIA
MELANESIA
AUSTRALIA

COUNTRY MAP





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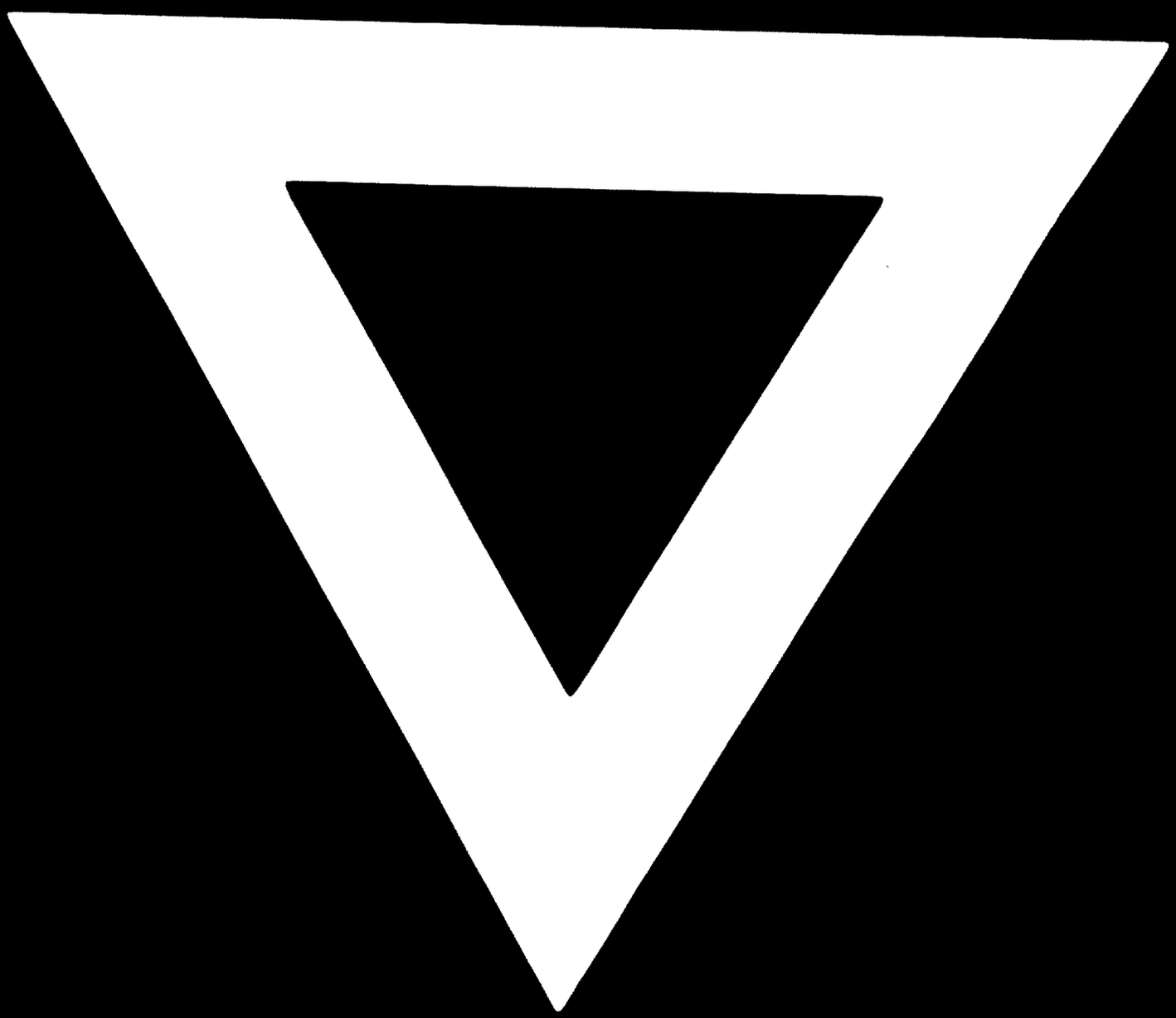

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