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06883

Distr.
RESTRICTED
UNIDO/IS.76/5
7 January 1976
Original: ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

COMMERCIAL FEASIBILITY STUDY OF TANNERY PROJECT*

FIJI

IS/FIJ/75/010

Mission report

by

David Winters, leather industry consultant

Prepared for the Government of Fiji on behalf of the
United Nations Industrial Development Organization,
for the
United Nations Development Programme

*This report has been reproduced without formal editing.

id. 76-064

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N.B.

Per the purpose of this report Exchange Rate have been used as quoted in Fiji Times of 23/10/75.

1 Fiji Dollar ($F) = 1.1620 US$
1 $F = 0.5637 £ Stg.
1 $F = 2.968 D.M.

A study to evaluate the commercial viability of a Tannery in Fiji

I SUMMARY

Based on an appraisal of two previous studies in this sector, and his own data, the consultant has drawn up some estimates of capital and production costs for a Tannery. It is felt that a new Fiji tannery should only process the available domestic material, i.e. some 65 hides per day. The earlier studies envisaged processing 200 hides per day with the bulk being imported from International markets, but the consultant thinks such proposals unrealistic and fraught with danger.

In compiling the capital and production costs, where possible, the estimates have been built up from primary actual data (see Chapter III, the Notes and Annexes I-IV). The consultant feels that even at the low input suggested it would still not be possible to process more than 1/3 rd into a finished form for a local market, the balance being exported semi-processed (Wet Blue). The tannery would however have a capacity in most areas of 300-400 Hides per day.

Given an efficient management the consultant suggests that with UNDP assistance a project could be formulated which would not loose money. However the returns would be small. It is suggested that with a UNDP Input of some 200,000 US$ for machinery and a Fijian fixed capital of 322,000 $F and working capital of 90,000 $F after the years it would be possible to expect a return of some 4,8% on the Total Fijian Capital.

Gradual increases in production could be expected as more fiji hides become available and as the local market expands and at that point in time where a 50% increase in production and sales is expected it could be expected that the return (on an increased capital) would be some 12.4%. The consultant hesitates to put a time scale to such an expansion but under pressure would suggest that 10-15 years may be needed to reach that point.

It may also be pertinent to note that the effective capital cost per job opportunity is 16,515 $F. (Ignoring U.N.D.P. monies).

II INTRODUCTION

A. The basic purpose of this mission was to assess the current situation in the country regarding the prospects for the development of the leather and leather utilization sectors taking due account of two previous studies relative to this field of activity. Based on the above, and the consultants own input the commercial feasibility of a tannery project was to be detailed.

If such a tannery were found to be viable the consultant was to advise on the implementation of the project.

B. The two previous studies had widely differing views as to logical patterns by which Fiji should enter the leather sector.

(i) The earliest proposal which resulted in the proposal for project DP/FIJ/71/506 was elaborated by E.KNEW, was accepted in principle by UNDP in 1971 called for the development of a leather centre. Such centre was to include activities in the field of research and training in the leather and footwear sectors together with economic studies within the sector.

Coupled with this "Leather Centre" was to be a commercial tannery, funded and operated by the private sector. This plan necessitated the erection of three buildings viz:-

1. Admin. offices and Laboratory
2. Pilot Tannery
3. Commercial Tannery

The project would have required five international experts and was said to have an input of 200 hides per day. To overcome the fact that Fiji only produces 60 odd hides a day the "Knew" proposal assumed that the hide deficit would be made up by importing hides from other South Pacific Islands and from New Zealand and Australia.

This project was not implemented for a multitude of reasons, the major considerations however were:-

(a) the late implementation of the abbatoir project (which was to be related with the tannery project) - (now to be operational April/May 76);

(b) inability to satisfy public health authorities as to the tannery effluent (should no longer cause problem as the sewer is connected to the abbatoir);

(c) unwillingness in some quarters to accept that Fiji could successfully import hides from Australia and New Zealand, process them and export finished leather and products on world markets;

(d) private investors were not prepared to invest in the proposed commercial tannery.

(ii) The second proposal was that made by J. W. Parkinson and contained in his report and redrafted project document dated 5/11/74. Parkinson suggested that the Knew approach was uneconomic and contained too much overlapping between the different facets of the project. To overcome this he suggested that UNDP support be sought to erect and operate a Pilot Plant Tannery. Suchpilot plant would be large enough so that at a later date it could be operated commercially but in the initial stage Parkinson suggested that inplant training would be the major activity. He felt that within the proposed project duration of three years sufficient training could be accomplished so that a fully operational, staffed, tannery would be available for full exploitation at the termination of the project. Parkinson further suggested that Knew was over optimistic in expecting to export finished leather and finished leather goods and that a more realistic approach wqs to attempt to produce semi-finished leather (wet blue) for which large markets exist and lower levels of production expertise are required. Although Parkinson drafted a project document to cater for his suggested revisions he did not detail operating costs of the throughput of the tannery.

C. The present mission was to reappraise the whole situation with special reference to the commercial viability of a tannery operation in Fiji. To this end, David Winters, a U.K. Consultant was engaged on a two month assignment and was to be at the Duty Station from 10/10/75 to 23/11/75.

III FINDINGS OF THE MISSION

Following a brief review of the files relating to the project at the Ministry of Commerce, Industry and Co-operatives, discussions with other ministries and departments and visits to six abbatoirs to evaluate hide quality and a visit to the recently formed shoe manufacturing company the consultant considers the situation is as follows:-

A. Availability of Raw Material

As there is no internal usage of hides one may suggest that the number exported = number produced (ignore losses). Thus exports have been:- (Source: relevant "Trade Reports").

	Number	Value $F	Market by Volume
1970	17,017	45,812	(93% to Hong Kong)
1971	15,131	35,867	(94% " ")
1972	12,321	42,369	(92% " ")
1973	14,110	45,217	(98% " ")
1974 *	14,704	(Production data * supplied by MAFF)	

The figures do not show any trends which would suggest a fast growth rate of Hides and the average for the five years is 14,657 Hides per annum.

No goat and sheep skins currently come on to the market but if a tannery was constructed and could offer up to 2 or 3$F per skin there is little doubt that some of reported kill of 30,000 would find their way to the tannery.

B. Local Markets

(1) Substitution of Current Leather Imports

The import statistics for leather include some partly leather and synthetic items and it is thus not clear what amount of pure leather is imported. The consultant feels that imports are of the order of 40,000 $F per annum which would represent some 66,666 sq. ft.of leather per annum. Most of this could be produced by a local tannery.

(2) Substitution of Synthetic in local sandal Manufacture

Due to non availability of leather most of the sandals manufactured in Fiji are produced with mainly plastic materials - although some have leather insoles. It may be assumed that with a variety of coloured leather locally available much of this production will revert to leather. Currently Fijian sandal production is running at approximately 200 pairs per day - using perhaps 150 ft for uppers and 200 ft for insoles daily (i.e. some 80,000 ft per annum). As the major producer of sandals is only one year old its aim of doubling current production in the next few years seems realistic and thus one may have a potential market of some 160,000 feet leather per annum in the not too distant future.

(3) Substitution of Imported Leather Footwear

No closed upper shoes are produced in Fiji but with leather available this sector could slowly be entered. It has been said that due to the Fiji climate closed shoes are not suitable but this is disproved if one views the current footwear habits of the Urban Fijian. As in most countries the possession of a pair of closed shoes is a prestige or social necessity and the current high rate of migration to urban areas is likely to load to increased closed footwear demands in future.

Imports of Footwear with leather uppers 851-021 (Sandals and closed shoes) (Source relevant 'Trade Reports').

	Pairs	Value $F	$F Pair
1970	135,334	346,453	2.56
1971	176,756	468,412	2.66
1972	189,726	473,355	2.49
1973	193,486	590,593	3.05

N.B. It must be emphasized that the closed shoe is a more complex manufacture than sandals and the substitution of these closed shoe imports is a longer term project whereas sandals may easily and quickly be substituted.

C. Input data for tannery costings

As the consultant does not feel it realistic to suggest that Fiji imports Hides from International markets, processes and re-exports the FINISHED products as the international markets (Fijian disability is lack of expertise plus relatively high labour costs). It is suggested that only the local material shown to be available at III A is considered (65 Hides day).

With regard to product it is assumed that 1/3 of leather is finished (sole, insole, upper and lining) this would approximate to the items at III B (1) and (2) which are the obvious primary markets which could expect to be quickly penetrated. The consultant agrees with Parkinson that the balance should be exported as Wet Blue (large market available).

Similiarly the consultant agrees with Parkinson that the Training and Development and Commercial production should be integrated and only one operational unit erected.

D. Estimated Tannery Capital & Production Costs

In the following pages the consultant has outlined the probable situation. The consultant has estimated production and qualities consistent to that which could be achieved with 2-3 years of the operation commencing. As may be seen the return on investment is minimal with:-

Total Capital

	Government		UNDP
Fixed Capital -	322,898 $F	+	191,812 US$
Working Capital-	90,000 $F		(Machinery only)
	412,898		

Annual Production Costs and Sales Receipts (Year 2)

Sales	224,923 $F
Cost of Production	204,932
Trading Margin	19,991 $F

% Return on Fijian Capital (412,898 $) = 4.84%

This 4.84% return appears abysmally low - lower perhaps than development bank and similar sources would loan money. However if the tannery operated officiently it could have a catalytic effect on shoe and leather goods manufacturers and significant reductions in imports could accrue.

It may be asked. 'If that is the result after two years what will the situation be in 5 and10 years after commencing the project '?

The consultant would not like to commit himself on the situation regarding time scale as this depends on when and how some commercial expertise is injected into the project and what level of business acumen is available. It is easily possible, using the 2nd year estimates as a base, to suggest what would result from a 50% increase in production (same proportions). This shows that working capital would increase by 45,000 $F and the major figures would be:-

Fixed Capital	=	322,898 $F
Working Capital	=	135,000 $F
		457,898 $F
Sales	=	337,384 $F
Production Cost	=	280,650 $F
		56,734 $F
% Return on Fijian Capital	=	12,39%

As may be seen the financial returns of a tannery may not initially be high. How much weight needs to be given to the economic and financial effect the establishment of a tannery would have on developments in the leather utilizing sector is debatable. Certainly a Fiji Tannery, apparently marginaly viable itself, should catalyse the infant Fiji Footwear industry and could also promote activity in the Leather Goods sector. The consultant does not believe these developments are capable of being quantified.

B. Centre for Leather Training, Development and Promotion SUVA

Estimates of Capital & Production Costs & Basic Data

Basic Data

Raw Material Consumption

65 Fiji Hides daily (at 7.5 cents lb delivered)
for 230 days p.a. @ 36 lbs each = 14950 hides
= $F40,365
Plus 10% Buying expenses = 4,037
$F44,402

Raw Material (Grain) cost = 8.25 Fiji Cents sq.ft.
(See Notes 1, 2 and 11)

Yield Leather:-

14,950 Hides { 9967 Hides to Wet Blue @ 36 ft = 358,812 sq.ft. p.a.
{ 4983 Hides to finish @ 36 ft = 179,388 sq.ft. p.a.
{ plus splits at 20% of Finished = 35,878 sq.ft. p.a.

(See Note 3)

Yield Cash:-

Wet Blue	358,812 ft @ 28.91 Fiji Cents	= 103,733 $F
Finished Leather	179,388 ft @ 60.32 Fiji Cents	= 108,206
Splits	35,878 ft @ 36.19 Fiji Cents	= 12,984
		224,923 $F

(See Note 11)

Fixed Capital Estimates (Project or Investment Capital)

Item	Data Source	UNDP Contribution in US$	Fiji Govt in F$
Roadway and Fencing	Estimate		10,000
Buildings	See Note 4		240,000
Machinery and spares	See Annex II and Note 5	166,812	
Laboratory	Estimate	10,000	5,000
Maintenance Shop	Estimate	10,000	
Erection of M/C	See Note 6		2,760
Installation of Services	Estimate		5,000
Effluent cost at Site	See Annex IV		20,000
Effluent contribution to Municipality	" " "		20,000
Vehicles		5,000	
Furniture			5,000
Contingencies at 5%			15,138
		191,812 US$	322,898 F$

Working Capital

Raw Hides	- 1 month	3,700
Chemical Stocks	- 6 months	25,895
Work in progress/Finished Stock	- 3 months	56,231
Other		4,174
Total Working Capital		90,000 F$

Estimated Annual Production Costs (2nd Year)

	Fiji $	Fiji $	Fiji $
Fixed Costs			
Land & building - lease		3,000	
Depreciation Buildings at 4%	10,400		
Plant & M/c at 10%	18,681		
Vehicles at 20%	1,000	30,081	
Building & Site Maintenance at 1%		2,600	
Plant Maintenance at 2%		3,736	
Management (See Note 12)		13,225	
Insurance at 0.2% on Bldg & M/c		853	53,495
Variable Costs			
Hides			44,402
Other			
Effluent annual charge (Estimate)		10,000	
Chemicals (See Annex II and Note 10)		51,790	
Labour (See Note 14)		27,931	
Electricity (See Note 9)		2,344	
Fuel Oil (See Note 9)		4,680	
Office & other expenses (See Note 13)		10,290	107,035
Annual Production Costs			$ FIJI 204,932

IV Advice regarding implementation of a commercial tannery project

The consultants terms of reference instruct him ' if the study shows the project to be viable, advise the government on measures which need to be taken to implement the commercial project' however as may be seen from earlier chapters of this report the tannery is likely to be of very marginal commercial viability and governments decision as to whether to proceed or not with such a project will doubtless be based more on social and economic aspects than on commercial grounds. The 'spin offs', which in this case, could be a boost for the newly founded footwear industry and the possibility of a tourist orientated leather goods industry being developed could well override the actual tannery operation in economic significance. Notwithstanding the uncertainty of whether or not the tannery should be considered viable it is felt expedient to give some outline notes which may be applicable if the Government of Fiji decide to implement a Tannery project.

A/ Accepting that a tannery would need to export some part of its production and that the international leather industry is very competetive it appears essential that the tanning organisation must be given full commercial freedom once the implant training scheme is underway. To achieve maximum efficiency it is suggested that the commercial tannery project be in 3 phases.

Phase I

The implementation of the Implant training project should be a joint UNDP/UNIDO/Fiji Ministry of Commerce, Industry & Cooperation (M.I.C.C.). operation.

This phase would cover the project activities items 1-15 as outlined on pages 5, 6 of the Draft Project Document drawn up by Parkinson.

During this period any Hides, Skins or leather processed could be in effect processed on a contractual basis on behalf of the Fiji Meat Industry Board (F.M.I.B.).

Thus there would be a 2 tier organisation with UNDP/MICC providing equipment and covering initial costs of the project and its inplant training with the F.M.I.B. having some of its Hides processed at realistic cost levels.

(Would avoid F.M.I.B. having to bear the losses inevitable in first year or two of tannery operation).

Phase II

Would be initiated at such time as it appeared that the whole operation was becoming nearly viable and at this time the F.M.I.B. would take over the responsibilities of the M.I.C.C. and operate the tannery from the commercial aspect, taking over responsibility for all local staff and operating costs.

(This phase should be entered while UNIDO/UNDP assistance is available).

Phase III

As for long term commercial exploitation the F.M.I.B. may not have the flexibility to take full advantage of the situation and it is suggested that when the tannery operation is proven successful it may be advantageous to lease the manufacturing facilities to private entrepreneurs who could be expected to maximise the commercial exploitation of the tannery. By leasing the facilities the F.M.I.B. (on behalf of the Fiji Government) could ensure that the tanneries activities were controlled and harnessed to ensure maximum economic benefit to the country. (UNDP/UNIDO would not be involved in this phase).

iv/ In the event that the Government of Fiji decides to proceed with a tannery project (notwithstanding the small return on capital), the consultant would draft a new project document to acknowledge the suggested alterations to the previous project documents.

Note: Although the consultant is not over-optimistic as to the financial returns one may expect from a Government/UNDP project, he does feel that if capital and expertise were offered from a neighbouring country under a joint venture project, it is possible that a more attractive proposition may follow especially if the joint venture partner has at his disposal a supply of raw hides or skins. If such an approach was received offering capital and expertise as well as raw material, it would allow the tannery to operate to higher capacity - thus with more economic production costs it may prove possible to enter the international markets rather than depend on limited domestic markets.

V Notes (data sources, assumptions and manipulations)

(1) This outline feasibility study is based on the assumption that 2/3rds of the tanneries product will be in the "Wet Blue" semi-processed form for export and the balance fully finished for Fijian and other Southern Pacific Territories for sandal, shoe and leather goods manufacture.

The calculations, refer to corrected grain upper leather, which could be expected to form the bulk of the production. Other leathers would require different processing but the cost of chemicals and labour would not be significantly different.

(2) The 65 Hides, suggested as the daily input, approximate to the actual availability of Fijian hides according to Ministry of Agriculture, Fisheries and Forests data for 1974. (See Annex I).

The average weight of 36 lbs in salted condition is also supplied by Ministry of Agriculture, Fisheries and Forests.

A price of six cents/lb is currently (22/10/75) being paid by the exporter Yon Tong for goods delivered to Suva or other port and could therefore be considered a basic "delivered factory price".

However as some 50% of the tanneries expected input would be from the new abbatoir where it is expected that flaying standards will be far superior to standards at existing slaughter sites. It would be advisable to pay a premium according to quality gradings. This may reach 50% in value of 50% of the hides and thus would raise average actual hide prices to 7.5 cents/lb (8.25% when 10% buying expenses added).(with FMIB receiving 9.0 cents for its abbator hides).

The 10% buying expenses would cover monthly visits by the tannery to arrange purchase and delivery with the dispersed abbatoirs and any cost for freight and preservatives.

(3) As there is no documented proven relationship between weight of Fijian Hides and leather produced it was necessary to calculate as in Annex I. It should however be noted that there is no relationship between the salted weight of Fijian Hides and the wet salted weights referred to in Annex I which relate to a South American country. The relationships Weight of Live Animal: wet of salted hide: area of leather, should however prove reasonable for Fijian bovine animals.

(4) Although the suggested tannery will only have an initial thruput of some 65 Hides per day it will have facilities and capacity (except drums) for some 300-400 Hides per day (which may be utilised at a later stage) it may therefore be expedient to allow the building to be of such size as would be required for 300 Hides per day.

If we employ the coefficients quoted by Villa * we would expect

$$\frac{\text{Square ft leather P.A.}}{\text{ft}^2 \text{ Floor space}} = 1000$$

Thus for 300 Hides per day processed $\frac{1}{3}$ to wet blue and $\frac{2}{3}$ Finished with 20% splits we should obtain:-

200 x 36 ft (Finished)	=	5400 ft daily
100 x 36 ft x 0.33 (wet Blue Factor)	=	1800 " "
100 x 36 ft x 0.20 (splits)	=	1080 " "
		8280 daily = 1,904,400 ft. leather p.a.

* 'The Interrelationships between parametres of the Leather Industry. J.A.V .a UNIDO Vienna D/WG 79/6.

. . floor space required = $\frac{1,001,400}{1,000}$ = 1,001 M^2 = 20,401 sq ft floor space

Say 20,000 sq. ft. floor space

Although the Public Works Department quote figures of some 25F$ per square feet most private architects quote figures of 10-12 $F per square feet for a suitable tannery building and it is therefore felt that 12$F should be acceptable (such figure includes architects fees and supply to building of basic services).

(5) The machinery list is not definative - a large variety of differing machines from various manufacturers may all do the same task but at very different thruput rates and capital costs.

For durability and ease of operation it is recommended that A I Reconditioned machines be employed rather than new machines. The quotes obtained by the consultant see Annex II were of machines available in August 1975. The selection at any given time will be varied according to current availability - however the consultant believes that by seeking tenders from up to 4 and 5 manufacturers and reconditioning specialists it will be possible to obtain better machineries in some cases, than quoted in Annex II and the Non-Expendable Item ref 42 of Project Document DP/FIJ/71/506(PD) of 190,000 US$ should be sufficient to purchase a full set of machinery at 1975 prices IF TOP GRADE RECONDITIONED MACHINES ARE ACCEPTABLE with sufficient spares (15% of machine cost). Certain items mainly wooden could be best produced in Fiji at a cost of F$5000.

(6) The consultant would suggest that expert expatriate advice be available for the installation of the machinery as well as the adjustment and commissioning of the plant. A qualified fitter from the major machinery supplier could be obtained by substituting three man months of post 11.02 in the P.D. (Leather Technologist) under the UNDP Contribution.

Such an expert working with a gang of five local staff should suitably install and set up the machines at local cost of 5 persons x 12 weeks x 40 hours x 1.15$F = 2760$F.

(7) At this stage of the process it is assumed that 2/3 rds of the Hides would only need draining and measuring prior to exportation. The balance would be split and the splits processed separately. For simplicity however it may be assumed that they are processed in a similar fashion to the grains and only 1 costing will be necessitated for the leathers going forward to finishing.

(8) To obtain a 'standard finished footage' it is necessary to employ a ratio for the semi finished material to equate it to fully finished. It is internationally assumed that Wet Blue is 0.33 of the 'Work' of fully finished leather. Thus for many purposes we may assume that the tanneries annual <u>effective footage</u> will be:-

9967 Wet Blue hides at 36 ft x 0.33	=	118408
4983 Finished hides at 36 ft	=	179388
Splits (20% of Finished)	=	35878
		333674 sq.ft.p.a.
or		31,011 M^2 p.a.

(9) It is noted from Villa that Electric Consumption is:-

$$\frac{\text{K.W.H.}}{\text{M}^2 \text{ leather p.a.}} = 1.8$$

thus (see 8 above) $\frac{\text{Units p.a.}}{31,011} = 1.8$ i.e.

Electricity consumed per year = 55819 units
Costed @ 4.2 cent per unit = 2344 $F p.a.

Kg of Boiler Fuel is normally similar to electricity units consumed. However allowing for the high ambient temperature in Fiji this apparent 55.8 Metric tons per annum could well be reduced by 30% to 39 Metric tons per annum at a local cost of $F120 per ton (mobil oil).

(10) Chemical costs, where possible, have been based on CIF quote from I.C.I. in Suva. Where no quote was available the european price was taken and 120$F allowed per ton for freight.

In the case of finishing materials it is not possible to quote actual finishing costs as the pigments employed vary greatly in cost. However assuming a percentage of the production is to be natural and a large volume in white or tan (cheaper pigments) the overall cost of the pigments and binder should not exceed 12 Stg per thousand square feet (i.e. 21.29 F$). Therefore for finishing materials alone the 215 thousand square feet will cost 4577 $F.

(11) The suggested selling prices were obtained thus:-

Finished Leather Value

In Europe, September 1975, quoted prices of leathers

FOB were -

Indian	- Corrected Grain Black	- 32 NP Stg sq.ft.
Argentine	- " " "	- 36 " " " "
European	- Full "	- 50 " " " "

A brief survey of Fijian Bovine animals and hides would suggest a quality between Indian and Argentine i.e. 34 NP Stg sq.ft. i.e. 60.32 Fiji Cents.

Splits are normally reckoned to obtain some 60% of the price of a finished grain leather.

Wet Blue

Wet Blue can be assumed to have achieved $\frac{1}{2}$ rd of the added value of the fully finished leather. However, in this respect the basic Fiji Hide cost is well below world levels and one would suggest that the figure of 8.25 Fiji Cents sq. ft. is still under its true level if utilised for local production i.e. 13.2 Fiji Cents ft. (Double the six cents + 10% now being paid). Therefore total added value for fully finished leather is:- 47.12 F Cents ft.

Therefore 1/3 rd added value:-	15.71	" "
Therefore effective price of Wet blue should be	28.91	" "

(12) Management

Allowance is made for:-

1 Manager/Technologist @ 4500F$ p.a. + 15% overhead	= 5175
2 Assistants @ 3500 F$ p.a. + 15% overheads	= 8050
	13225 $F

(13) Clerical/Office Expenses

Allowance is made for :-

1 Typist/Telephonist @ 2000 F$ + 15% overheads	= 2,300
1 Accounts Clerk @ 2600 F$ p.a. + 15% overheads	= 2,900
General Office Expenses and Transport	5,000
	10,290 $F

(14) Labour - It is universally accepted that for an efficient tannery operation.

Footage of Leather / man hours = 16

Therefore the Effective footage, of the proposed tannery 333674 ft will require some 20,855 hours p.a.

or 90.7 hours daily

i.e. 11.33 persons x 8 hours

However owing to the small thruput and lack of experienced personnel it would not be realistic to expect to reach this level of efficiency and it could be expected that 20 persons would be a more realistic labour force in the initial years.

If one assumes that the work force is divided evenly between skilled and unskilled labour, and allowing 0.80 $F and 0.52 $F the effective hourly rate would be 0.66 $F hourly and annual costs:-

0.66$F x 20 x 8 hrs x 230 day + 15% overheads = 27931$F

(15) Total employees would be Management 3

Clerical 2

Labour 20

25

Effective cost per job opportunity = 16,516 $F

ANNEX I

Estimation of Size of Available Fijian Hides (based on 1974)

	Reported Dressed weight of Fiji Registered Kill (1) NUMBER	AV WEIGHT	Estimated average live weight (2)	Estimated Wet Salted weight of Hide (3)	Estimated Footage per hide (4)	Estimated Footage available	Percentage of Total available footage
Bulls	1087	238 Kgs	433 Kgs	24 Kg	39.3	42719	8
Working Bullocks	3648	292 Kgs	531 Kgs	30 Kg	48.1	175469	33%
Steers	4724	211 Kgs	384 Kgs	21 Kg	34.9	164868	31%
Cows	5245	162 Kgs	295 Kgs	16½Kg	28.3	148433	28%
Total	14704	216Kgs	392 Kgs	-	36.15	531489	

(1) Data obtained from P.V.O. of Fiji Ministry of Agriculture, Fisheries and Forests
(2) Secretary of Fiji Meat Board suggests dressed wt. = 55% of Live wt.
(3) Employing the relationship between Weight of Live Animal/wt of wet salted hide published graphically in Cuerecon (Argentina)
(4) Employing the relationship between Wet Salted Hide wt/footage leather published in Cuerecon (Argentina)

Wet Salt Wt. = 0.68 Footage - 2. 72

ANNEX II

Major Plant Requirement - 6½ Hides days

Process	Equipment	Weight of M/C Tons	% Utilised	No. Reqd	Unit Cost FOB US$	Total Cost FOB US$
A. Weigh	Platform scales 2M x 1½M	0.5		1	600	600*
B. Soak	2/3 Sunken concrete pit 2.5Mx1.7Mx1.3M		50	2	Covered in building cost	
C. Drum	2.4x2.4M Drum					
D. Lime	2 and 4RPM	4	50	2	7,350	14,700
E. Flesh	Fleshing M/C 2.1MRecord as Turner 375 or similar	5.7	10	1	11,000	11,000
F. Split	Turner No 35 - 1.447M Record. orsimilar	4.2	25	1	15,435	15,435
G. Wash/delime Bate/pickle tan	2.4Mx2.4M Drum 8RPM	4	50	2	7,000	14,000
H. Neutralise/ Retan/Dye/ Fat Liquor	2.4x1.2M Drum	4	50	2	6,000	12,000
I. Samm/Set	as Turner 646 or 156 or heavier Setting M/C 1.8M	4.3	15	1	11,460	11,460

ANNEX II (Cont.)

Process	Equipment	Weight of M/C Tons	% Utilised	No. Reqd.	Unit Cost FOB US$	Total Cost FOB US$
J. Shave	as Turner 156 or similar 0.6M Re-conditioned	3.2	25	1	11,340	11,340
K. Dry	24 Frame Toggle at Paste Unit	1.5		1	6,300	6,300
L. Stake	Turner 377 or similar	2.0	25	1	4,147	4,147
M. Buff	as Lightning Buffer 379	2.5	25	1	12,075	12,075
	as Turner 371 overshot	1.0	25	1	1,100	1,100
N. Dust	as Turner 358	1.0	12	1	2,100	2,100
O. Spray	Portable compressor • 3 guns • Pads	0.25	25	1 set	420	420
P. Plate	as Gloria type 328 Plating and embossing M/C x 2.0M • 4 plates or hydraulic Press	5.4	25	1	4,200	4,200 *
Q. Measure	Pinwheel type 155	1.1	10	1	5,397	5,397
R. Boiler	Package type as MKIV Demipac Auto	2		1	11.000	11.000*

ITEMS MARKED * = ESTIMATES ALL OTHER PRICES FROM QUOTES OF 8/75

TOTAL		137,271	US$
Spare parts - say 15% of M/C	-	20,591	
Small Items		5,000	
TOTAL F.O.B.		162,865	
Freight at 70US$ Ton + 21% on 46.6 M Ton	-	3,947	
Total Landed M/C + Spares	-	166,812	US$
Beams, Horses, box carts, Spray booths etc to be fabricated in Fiji. Say	-	5,000	$ Fiji

ANNEX III

Outline Process and Water and Chemical Requirement (See Note 10)

Operation	Plant Ref Annex II	CORRECTED GRAIN Chemicals and base weights Daily Inputs	UPPER LEATHER Daily Water Usage Litres	Annual Chem. consumption M.Ton	Cost per M Ton $FCIF	Annual Cost F$
Weigh	A	1064 Kg				
Soak	B	Pit 400% Twice	8512			
"	C	Drum 100% Water	1064			
		0.01% Sodium Solid Hypochlorite		0.025	2.50 Kg CIF	62
Weigh	A	1477 Kg (Soaked Weight)				
Lime	D	200% Water	2954			
		3% Lime		10.2	180	1836
		3% Sulphide		10.2	350	3570
		4% Salt		13.6	110	1496
Flesh Round Trim	E	on Table/Horse				
Weigh	A	1625 Kg (Lime Weight)				
Wash	G	150% Water Twice	4875			
Delime	"	70% Water	1137			
		2% Sodium Bisulphite		7.48	400	2992
Bate	"	0.3% Pancreatic Bate		1.12	378	423
Pickle	"	70% Water	1137			
		1.2% Sulphuric Acid		4.49	400	1796
		6% Common Salt		22.4	110	2464
		0.5% Formic Acid		1.87	297	555
Tan	"	12.0% Self Basifying Chrome Powder		44.85	460	20631

ANNEX III (Cont.)

SEE NOTE (7)

Samm	I					(35325)
Split	F					
Shave	J					
Weigh	A	379 Kg (Shaved Weight)				
Wash	H	200% Water Twice	758			
Neutralize	'	100% Water	379			
		1% Calcium Formate		0.88	340	299
		0.25% Sodium Bicarbonate		0.22	160	35
Wash	'	200% Water Twice	758			
Dye	'	70% Water	265			
		1% Dye		0.88	3000	2640
Retan	'	4% Syntan/Resin		3.49	820	2862
		4% Mimosa		3.49	386	1347
		1% Oil		0.88	650	572
F/L	'	100% Water	379			
		4% Oil		3.49	650	2268
		2% Filler		1.74	450	783
Rinse	'	200% Water	758			
Samm	I					46.631 $F
Set	I		22976 Litres			
Dry	K		or 5061 Gallons Daily @ 0.5$ 1000 gal =			5828F
			or 1104 x 10^3 gallon per annum			

Condition - Stake (L) - Buff (M) - Redry (Poles) then Finish:-
Plate (P) - Buff Grain (M) - Dust (N) - Impregnate (O) - Plate
Rebuff (M) - Dust (N) - Pad Coat - Spray Coat Twice (O)
Plate/Emboss (P) - Spray Top (O) - measure (Q)

Finishing Material	4577 $F
Total	51700 $F

ANNEX IV

Effluent Disposal

The consultant has not surveyed the tannery site, indeed is not qualified for such task, and the following outline of proposed on-site effluent treatment prior to entry to the existing sewage system laid to the new abbatoir is therefore somewhat academic as it is not known whether gravity or pumps would apply at which stage.

To those unfamiliar with the current proposal for a tannery it should be noted that the proposed throughput of the tannery is only some 1/3rd of that proposed in earlier schemes with concomitant reductions in effluent volume.

Thus the General Specifications would be :-

Production 65 Hides per day (1/3 rd finished, 2/3 rd wet blue)

Effluent 22 976 Litres daily (see Annex III) but say 30 cu metres

BOD (5 day) 3,600 mg/L * (2)
Suspended Salida 10,000 mg/L * (2)

Treatment
Mix and Flow Balancing
Sedimentation
High Rate Biological Filtration
Sedimentation

---

(2) * This is appreciately higher than actually expected with a water usage of 20 Litres water per kg soaked Hide. See ENVIRONMENTAL CONSIDERATIONS IN THE LEATHER PRODUCING INDUSTRY. VOL II MITIGATING MEASURES UNIDO/IID 337/ADD I /1975/RESTRICTED.

Mix and Flow Balance Tank or Well

This must hold one days flow of liquor = 30 M^3. i.e. (3.17M x 3.17M x 3.0M deep or similar). Sedimentation undesirable, therefore regular hand plunging necessary - central bottom take off pipe desirable. Forward pumping rate of 1.25 M^3/hr.

Sedimentation

Horizontal flow Tanks with a retention of 6 hrs would require a volume of 7.5 M^3 (say 4M x 1M x 2M effective depth). The Tank bottom should slope from 2.5M at inlet to 2M at outlet end.

Two such Tanks should be required to allow regular desludging of tanks.

(BOD should be reduced by 25% to 2700 mg/L (2))
(5.5 " " " " 60% to 4000 mg/L)

High Rate Biological Filter

The total B.O.D. load is now 30M^3 x 2.7 Kg/M^3 = 81 Kg

With a loading of 2 Kg BOD/M^3/day the requirement is for 40 M^3 of filter medium i.e. if 3 M deep need filter surface area of 13.3M^2. To ensure sufficient wetting it may prove necessary to recirculate up to 4:1 of unfiltered effluent therefore a pump of capacity of 6.0 M^3/H necessitiated.

This filter bed may be economically filled with graded stones in a tower, the retaining walls perhaps of concrete or other strong carasion resistant material.

Sedimentation

The Humus solids produced during filtration may be removed in a pair of horizontal flow tanks dimensioned as in the earlier sedimentation process.

Quality of Final Effluent to Sewer

BOD to be reduced by 70% (2) i.e. from 2700 to 810mg/L
55 " " " " 90% " " 4000 to 400mg/L

Further economic/technical possibility

To further improve the quality of the efflient it may be desirable to treat the Lime and 1st Peline wash waters (which may have appreciable sulphide concentrations) to a catalytic process (see P175 (2)) using manganous sulphate. As only 5.4 M^3 would require treatment the cost may be low compared to the benefit of being able to offer an much improved and safer effluent.

Total Excavations, etc.

Mix & Flows	- 30M^3	
Sedimentation	- 15M^3	
High Rate Filter		40M^3 graded filter.
Sedimentation	15M^3	

Capital Cost Estimate

Due to the shortness of assigment no firm estimate has been obtained, however it must be realised that the volumes involved are small even though the pollutants present may be high in the RAW effluent. The excavations of 60 M^3 should only cost some 312 $
and the gradedmedia
472 $

Therefore the capital estimate of $20,000 should prove sufficient to cover easily the necessary walls pipes and pumps as well as the small catalytic oxidation system which only needs to be an old boiler or similar

PWD quote:- Graded Media - 9$ Cu yd = 11.8 $ M^3
Handed Excavation - 4$ " " = 5.2 $ M^3
M/C " 0.5$ " " = 0.6 $ M^3

Contribution to Municipality

Capital

With a final effluent to sewer of $30M^3$ @ 810 mg/L we would have a daily BOD Load of 24.3 kg i.e. 53.6 lbs

As it is understood that the PWD suggest capital contribution = $210 per 1.02 lbs B.O.D. this should require 11,035 $ (20,000 $ allowed in estimate)

Annual Charge

This is understood to be at 18 cents per 1000 gals or $810 pa.

Total Annual Cost of Effluent Treatment

In addition to the payment of:- to the municipality it is expected that one worker would be kept almost permanently employed attending the effluent plant, desludging the tanks, removing fleshings and trimmings etc. say:-	$ 210 p.a. $2 000 p.a.
additionally transport may be required twice weekly to remove raw & lime trimmings and machine fleshings say 100 Trips = $800:-	$2 000 p.a.
	$4 210

(compare with $10,000 in estimate Chapt III)

ANNEX "

TRADE STATISTICS AND INFORMATION - SOUTH PACIFIC

Abstract from Statistical Bulletin No. 5 -
Overseas Trade 1973 - South Pacific Commission.

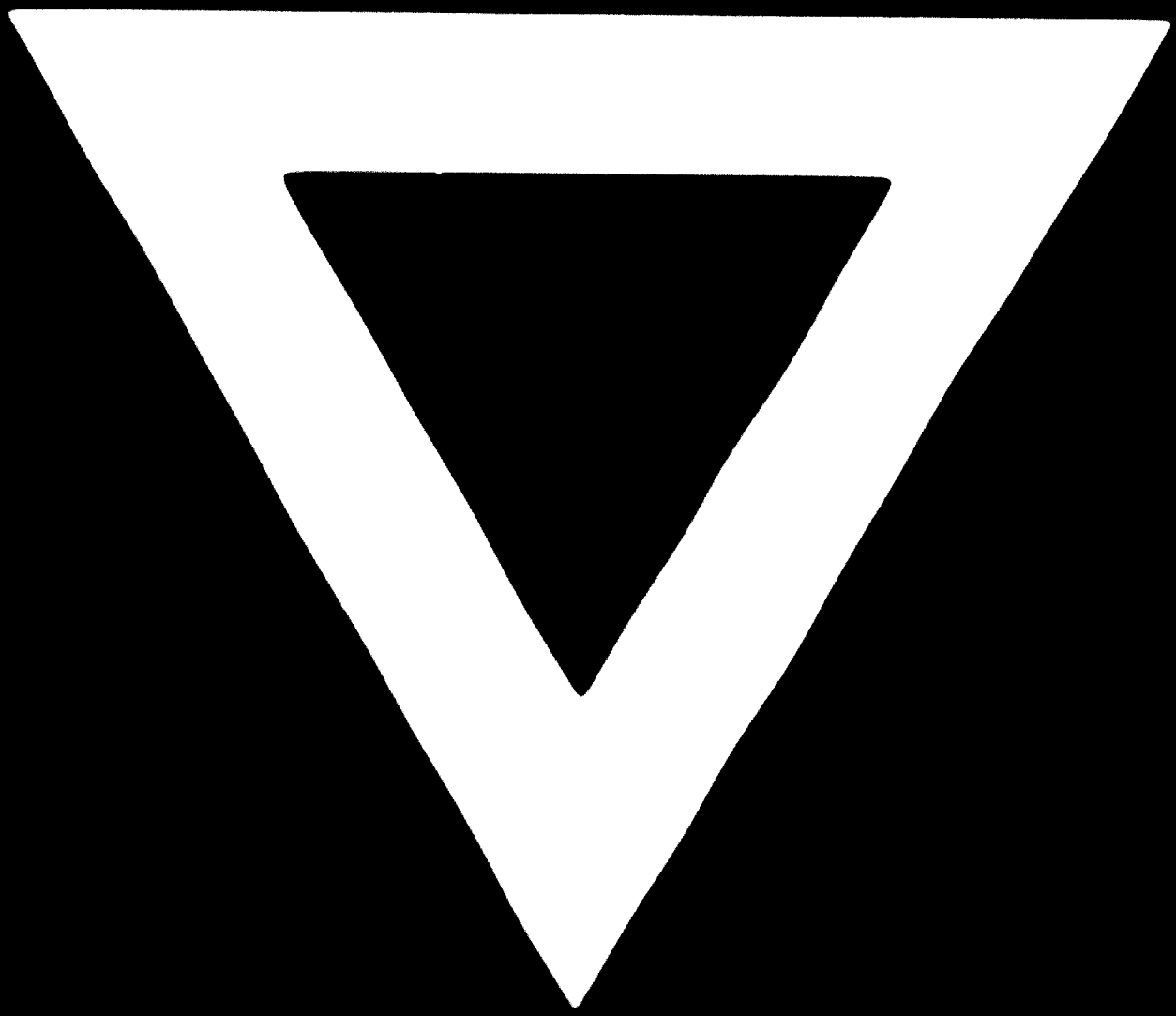
Country	Population in '000	Units of Currency	IMPORT LEATHER AND LEATHER ARTICLES CAT 61					IMPORT ALL [illegible] CAT 8				
			1969	1970	1971	1972	1973	1969	1970	1971	1972	1973
American Samoa	27	US$'000		12	11	31			69	69	[illegible]	
Solomon Isles	160	$'000	2	2	7	3		32	37	21	[illegible]	
Cook Islds	21	NZ$'000	5	3				30	47			
Gilbert & Ellice	54	A$'000				4	4				5	9
Guam	85	US$'000				32					972	
New Hebrides	78	[illegible]F00,000		5	5	10			57	71	90	
Niue Isle	5	NZ$'000		0	0	0	-		5	7	6	4
Norfolk Isle	2	A$ 000	0	0	1			25	23	34	3[illegible]	
New Caledonia	101	[illegible]F00,000	49	78	113	113	80	1107	731	1556	[illegible]	1[illegible]
Papua New Guinea	2184	A$ '000	74	64	82	74		722	1034	1190	[illegible]	
French Polynesia	119	CFP 00,000	29	35	36	55		665	633	899	[illegible]	
Tonga	77	T$'000	2	2	3	3		47	60	47	65	
Western Samoa	146	WS$'000	4	6	5	8		45	73	76	89	
F I J I	535	F$'000		79	88	105	73	534	654	767	816	

CURRENCY VALUES OF ABOVE UNITS

Equivalent to 1 Aust $

	$F	$NZ	$T	$US	$W/S	PCF.	FIM
1968	.97	1.00	1.00	1.12	0.80	100	100
1969	.97	1.00	1.00	1.12	"	104	"
1970	.97	1.00	1.00	1.12	"	111	"
1971	.97	1.00	1.00	1.12	"	111	"
1972	1.00	1.00	1.00	1.16	"	111	"
1973	1.13	1.05	1.00	1.28	0.88	116	102

[redacted]



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