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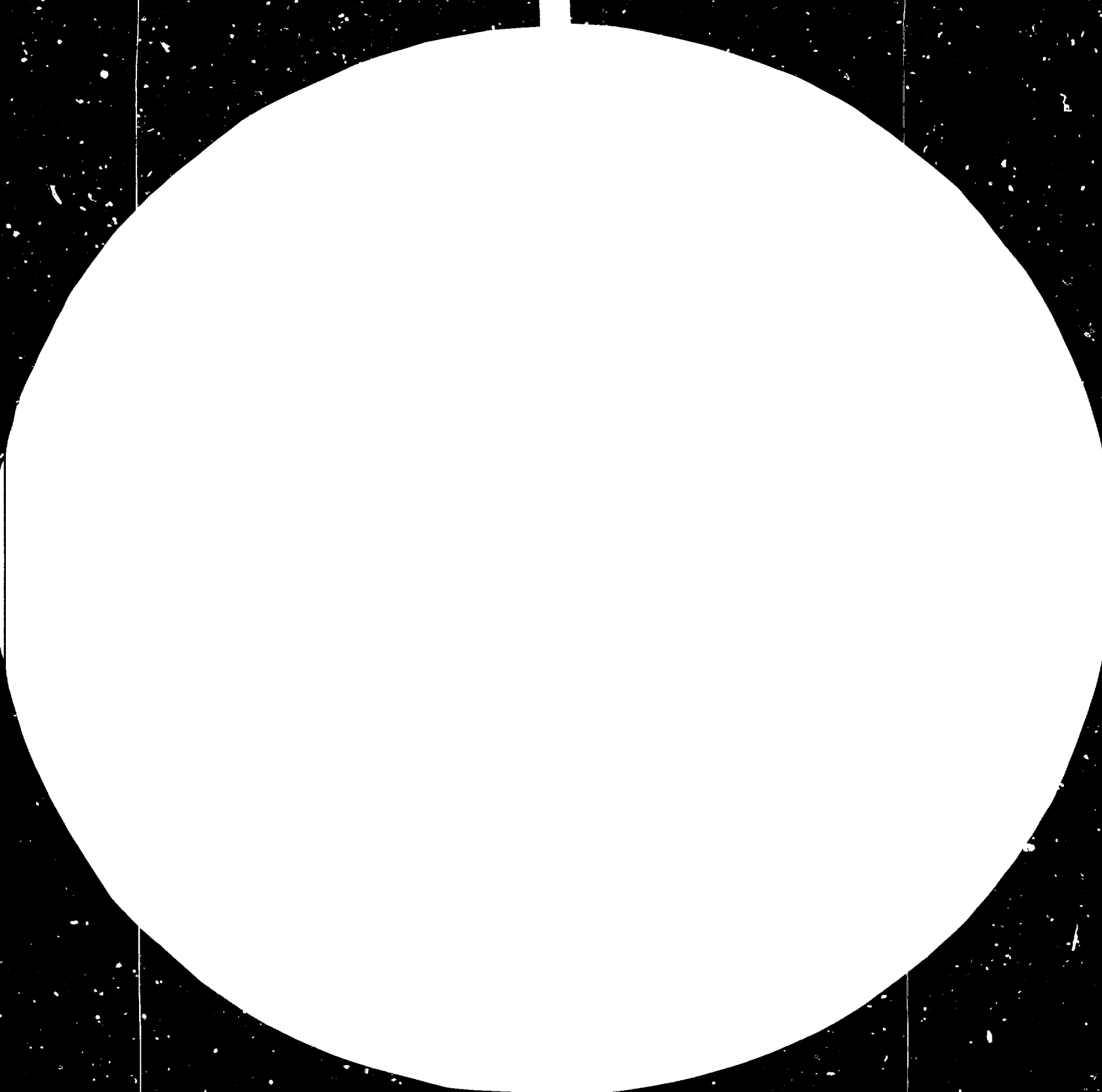

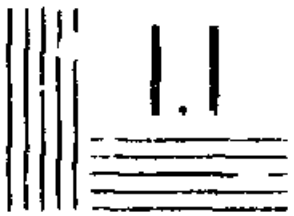

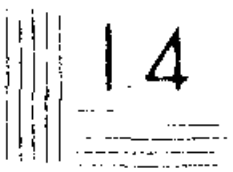

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Zambia.

MODERNIZATION AND EXPANSION OF MWINILUNGA CANNERY

FEASIBILITY STUDY**

US/GLO/81/120

ZAMBIA

Prepared for the Government of Zambia
by the United Nations Industrial Development Organization

Based on the work of John A. Paterson, C.A.,
and Gregory D. Wooster, Chemical Engineer
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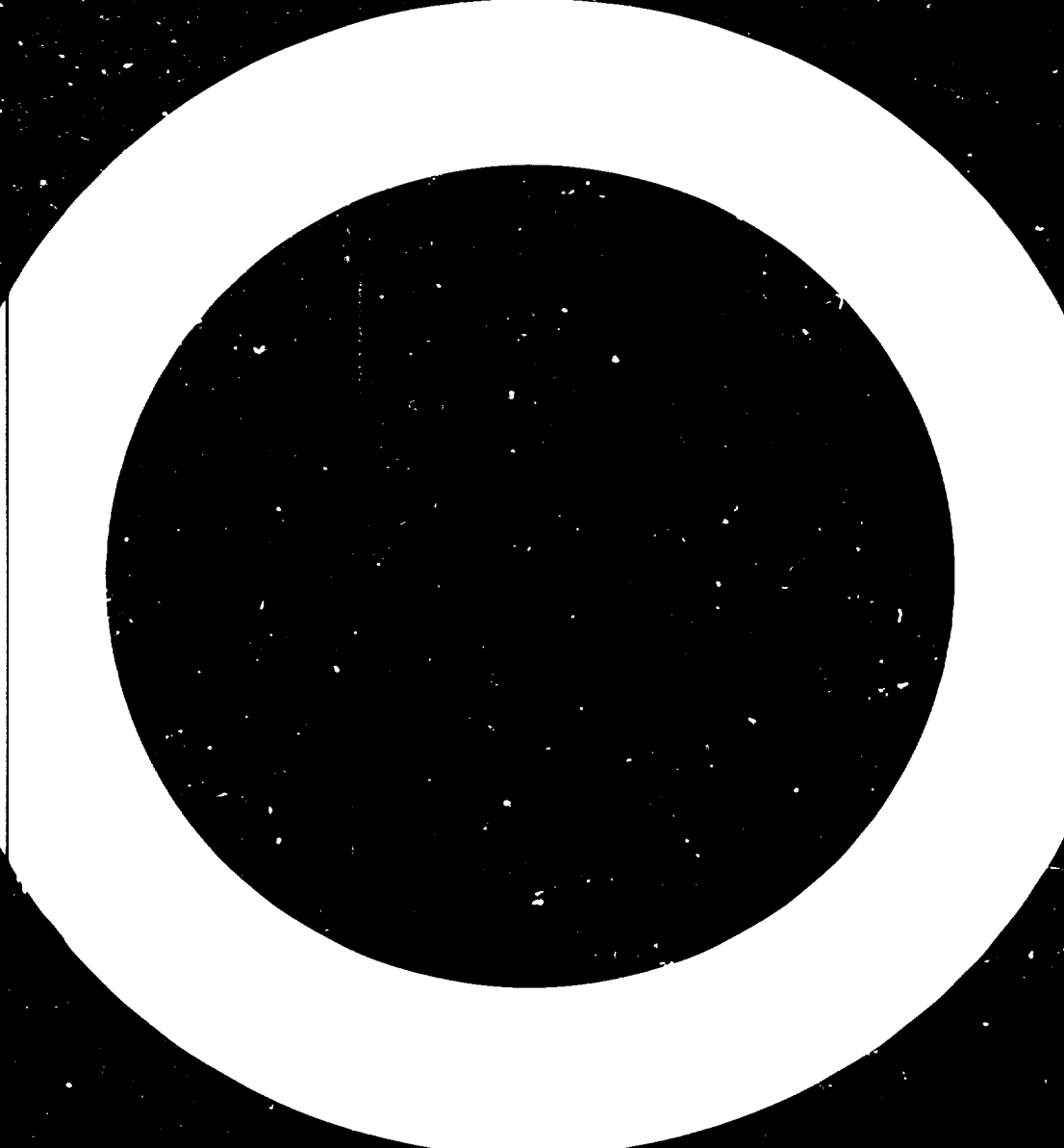
Purpose of study

To determine the feasibility, based on past and present experience, of investment in the Mwinilunga Cannery, of Rucom Industries Limited, Zambia, in order to establish a modernised and expanded, properly organised and administered, and adequately financed, manufacturing and distributing unit, capable of earning a reasonable return on assets employed.



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Schedules, statements and diagrams

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1 The currency of the Republic of Zambia is Kwacha (1 Kwacha = 100 ngwee), and in abbreviated form is written ZK.

2 The rate of exchange used throughout the study is ZK 1 = US$ .82 (US$ 1 = ZK 1.22)

3 Metric weights are used throughout the study, 1 ton = 1000 Kilograms.

4 Cans per case - pineapple and guava - 24 cans of 440 grams each
tomato - 40 cans of 243 grams each

5 Negative values are shown within parenthesis or prefaced with the negative sign -.

CHAPTER I - Executive Summary

1. Project background and history (Chapter II)

The project promoter is Rucom Industries Limited, Lusaka, Zambia, a wholly-owned subsidiary company of the Industrial Development Corporation Limited, itself wholly State-owned.

Pineapple is second only to maize, Zambia's staple food, in the commercial agricultural economy of the Province. The Mwinilunga pineapple Cannery is the largest industry in Mwinilunga District and the second largest industry (a copper mine is the largest) in Northwestern Province. The Cannery has been in operation since 1971 but has never earned a profit. If it were to be closed a suitable alternative market for all of the pineapple could not be provided. Repairs only to the existing equipment will not solve the problems of profitability which are associated with low output.

Reference to the need to modernize the Cannery is made in the Third National Plan of the Government of the Republic of Zambia, and the project meets the object of the Operation Food Programme 1980-1990.

Orientation is positively towards raw material - pineapple of very high quality is already grown in abundance, and guavas to a much lesser extent.

It is planned to export where possible to neighbouring countries, in order to earn much-needed foreign currency.

Planned recoveries of fruit are greater, and losses less than presently experienced and would flow from more modern equipment and more efficient management.

The forecast calls for the production and sale of 30,000 cases of pineapple products, 3,000 cases of guava slices and 480 cases of tomato puree in the first full year of expansion, increasing to 42,000 cases of pineapple products, 5,000 cases of guava slices and 2,000 cases of tomato puree in the third year - and then remaining at this level for some years.

Production and sales in year 3 -

Product	Production and sales		Unit price[1]		Net sales value[2]	
	Export cases	Domestic cases	Export ZK/case	Domestic ZK/case	ZK '000	
Pineappe						
Rings	2,000	11,000	16.00	38.85	388	
Chunks	2,000	11,000	16.00	38.85	388	
Juice	1,000	15,000	16.00	38.40	496	
						1,272
Guava		5,000		34.91		145
Tomato		2,000		60.00		100
Total cases	49,000		Total net sales			1,517

[1] Unit price includes sales tax

[2] Net Sales Value excludes sales tax of ZK 287,550.

2. Market and plant capacity (Chapter III)

During the 4 years, April 1979 to March, 1983, 62,400 cases of pineapple products were produced and sold by the Cannery. During that period production varied from 11,191 to 19,382 cases per year. In all of these years all production was sold and there were periods in every year when products were in demand but unavailable. The Cannery's products are not distributed throughout the country. Two companies based in Ndola together produce approximately 18,000 cases of pineapple products annually - mostly jam, but also chunks. Neither firm cans rings or juice.

Two approaches were used to estimate the present size of the domestic market for canned pineapple products. Present annual demand is estimated to be 47,000 to 48,000 cases. The demand for canned guava slices is estimated at 5,000 cases per year and for tomato puree, which is presently not produced in Zambia, in excess of 20,000 cases.

While detailed statistics of consumption in neighbouring countries are also not available, information has been gleaned from conversations with manufacturers and wholesalers. It would seem that the market for canned pineapple products in Zimbabwe increases each year by 10 - 15% and is presently 30,000 cases, and that two-thirds of this market demand is met by imports.

The production programme is based on anticipated sales and the seasonal availability of raw materials (fruit). Full production in year 3 utilizes 70% of overall plant capacity.

3. Materials and inputs (Chapter I.)

The basic raw material required is pineapple, and the Smooth Cayenne variety is grown in large quantities throughout the Mwinilunga District. It is estimated that in the District and close to the Cannery, existing plantations of guava yield some 65 tons of fruit - sufficient for 5,000 cases. Because soil and climatic conditions in Mwinilunga are conducive to the growing of tomatoes, it is planned to include the processing of this fruit in the overall Cannery programme. Initially, production will be small and confined to the canning of a puree for which a very excellent market exists. A programme to promote their growing by local farmers will require to be introduced. Sugar is available in sufficient quantities to meet production requirements. Cans are purchased within Zambia, although they may also be imported directly from the Republic of South Africa, at less cost. The locally manufactured cans are made from imported tin plate, and foreign currency is the critical factor governing their availability - whether purchased locally, or imported directly. Labels and cartons are available on the local market, and supplies are adequate.

Annual requirements of raw materials at full production - year 3

	kg	Number	ZK
Pineapple	999,600		99,960
Guava	66,693		7,000
Tomato	125,000		37,500
			144,460
Sugar	5,216		3,650
Cans: 440 g		1,151,030	379,839
243 g		97,958	23,704
Labels		1,248,988	89,302
Cartons		50,001	58,076
			554,571
Total			699,031
US$ (ZK 1 - US$ .82)			573,205

4. Location and site (Chapter V)

The existing location of the Cannery was chosen since pineapples were already grown in very significant quantities in the Mwinilunga District prior to its establishment.

Location	- between 11° and 12° south and between 24° and 25° east, on the borders of Zaire to the north and Angola to the east. Altitude between 1300 and 1500 meters.
Distance, by road from Lusaka	- 900 kilometers, and approximately 40 hours.
Average rainfall	- 1377 millimetres. (highest in the country), between September and April.
Administration	- Mwinilunga is the administrative centre for the District with local government offices, a police station, a post office, a government rest house, a secondary school and a number of shops. The nearest reliable garage and machine workshops are located in Chingola, 450 kilometres from Mwinilunga, and the nearest banking and diesel and petrol services in Solwezi, 300 kilometres from Mwinilunga. Electricity is generally constant and reliable.
Communication	- No telephone system exists, but plans for a system have been made. Communication between the Cannery and Lusaka is by radio, which during the rains is difficult, due to interference of lightening.

Roads	- From Lusaka to Solwezi 600 kilometres and from Solwezi to Mwinilunga 300 kilometres; 230 kilometres beyond Solwezi are tarred; tarring of the final 70 kilometres to Mwinilunga, presently in very poor condition, where average speeds cannot exceed 60 kilometres per hour in the dry season, and 10 kilometres per hour after heavy rain, is planned to be completed by 1985.
Rail	- None, throughout the entire Northwestern Province; nearest railhead in Zambia is at Chingola, 450 kilometres east. The railhead at Mutshatsha 150 kilometres to the north, in Zaire, is presently unusable.
Airfield	- A grass strip exists for light aircraft. By air, the distance from Lusaka is some 650 kilometres.
Pineapple growing area	- The major area is centred around Ikelenge, 60 kilometres north of Mwinilunga; other areas exist 60 kilometres north-east, 100 kilometres east and 40 kilometres west of Mwinilunga.

The actual site of the Cannery is 6 kilometres from Mwinilunga, alongside the West Lunga River, which carries water throughout the year; the Cannery operates its own water supply.

5. Project engineering (Chapter VI)

The most appropriate technology for the scale of operation of the Cannery and the labour resources available is semi-automatic machinery having capacities of 1 to 2 tons per hour. New equipment replaces almost all existing equipment. Specialised equipment for pineapple processing is required. Machinery for juice processing and can make-up and seaming is available from different suppliers. Other equipment required includes machinery for a small workshop, quality control laboratory equipment and vehicles. Detailed lists of all equipment have been prepared and proforma invoices obtained from suppliers.

The expansion programme calls for construction of a new storage warehouse, a can make-up room and a small cold store as well as modifications and repairs to the existing plant. Detailed descriptions of the civil works have been prepared, preliminary plans for construction have been drawn up and contractors' estimates of construction costs obtained.

The total estimate of cost for new equipment and civil engineering works is ZK 748,000.

6. Plant organization and overhead costs (Chapter VII)

The Rucom Head Office in Lusaka deals with administration and selling while the Cannery itself is concerned with collection of fruit, its processing, canning and distribution to Lusaka.

Fixed overhead costs are -

	ZK '000
Cannery	209
Head Office	203
Depreciation	124
Financial charges	134
	670
US$ '000	550

7. Manpower (Chapter VIII)

The labour force is unskilled, and at full production some 90 workers are required. Annual direct labour cost is ZK 33,120 (US$ 27,158). Staff will consist of 1 Cannery Manager and 17 others. Annual cost is ZK 100,000 (US$ 82,000).

8. Implementation scheduling (Chapter IX)

Project implementation requires one year from the decision to invest. The project achieves full capacity in year 3, when sources of supply of raw material are fully developed.

In order that implementation be conducted in the most efficient manner and at the least cost, a project implementation team should be established. International Development Aid would be sought to provide the team leader from the date of the decision to invest until the expanded plant is fully in operation.

9. Financial and economic evaluation (Chapter X)

9.1 Appreciation of present financial status

Accumulated losses to the end of the most recent financial year, 31st March 1983, are now in excess of ZK 1.00m (US$ 820,000), and unless a plan to halt these losses is implemented without delay, the Cannery will continue to sustain them. The condition of the plant, machinery and vehicles is such that profit-earning is impossible.

9.2 Use of computer

The COMFAR (Computer Model for Feasibility Analysis and Reporting), Software programme developed by UNIDO for the Apple III computer was used in conjunction with the UNIDO Manual for the Preparation of Industrial Feasibility Studies to evaluate the project viability and work out the financial effects on several alternatives with respect to a number of possible assumptions.

9.3 Total investment costs -

	Foreign	Local	Total
		- ZK'000 -	
Civil engineering works	5	140	145
Equipment	376	227	603
Pre-production	-	2	2
Working capital	-	728	728
Total - new investment	381	1097	1478
Existing assets	-	200	200
	381	1297	1678
US$ '000	312	1064	1376

9.4 Project financing (assumed)

	ZK '000	US$'000
Foreign loan	748	613
Development Bank of Zambia	590	484
	1338	1097
Internally generated	140	115
	1478	1212

Cost of financing	10% per annum from year 1, and a front-end fee of .25%.
Debt servicing	10% on reducing balances outstanding after annual repayment of ZK 56,900 for 20 years, starting year 5, and totalling ZK 1,338,000.

9.5 Total production costs (at feasible normal capacity)

Variable costs for year 3 may be summarized as follows:

	ZK'000
Fruit	144.5
Other raw materials	554.6
Direct labour	33.1
Total variable costs =	732.2

In year 3 the annual cost of tin cans is 55% of variable costs.

Fixed costs amount to ZK 670,000 in year 3 and decrease slowly thereafter because of decreasing financial costs and lower depreciation charges after year 5.

Total production costs may be summarized for year 3 (Page 120)

	ZK'000
Factory costs - variable	732
fixed	209
total	941
Administration	130
Selling and distribution	73
Operating costs	1144
Financial charges	134
Depreciation	124
Total production costs	1402
US$ '000	1150

9.6 Financial evaluation

On the basis of the forecast of sales described in Chapter III, the availability of required raw materials and inputs described in Chapter IV and the financial arrangements described in Chapter 10, the base case of COMFAR was executed. The following points summarize the results of the evaluation:

1. Profit after tax varies between ZK 100,360 and ZK 166,870 - 6.6% and 11.0% of net sales - during the years 3 - 15. Year 2 shows a nominal loss, because full capacity has not been reached.
2. Accumulated cash balances are positive throughout.
3. At a 10% cut-off rate, the net present value is negative ZK 165,230. The internal rate of return is 8.29%.
4. The pay-back period is 8 years.
5. The simple rate of return, profit after tax expressed as a percentage of investment, is 7.8%.
6. The break-even point, the level of production and sales at which income equals costs, is 85.3% or 41,800 cases.

Several other runs were made with different assumptions. These alternatives were:

A. Lower production and sales forecast; no exports.
B. No tomato puree production.
C. Tomato puree production increased to 5,000 cases.
D. Increased costs of equipment and civil works.
E. Rebate of customs duty and sales tax on imported machinery.

From the output schedules of the COMFAR runs made based on these alternatives, it will be seen that the net present value at the 10% cut-off rate is positive only in two cases: - Alternative C. - Tomato puree production increased to 5,000 cases per year instead of 2,000 and

Alternative E. - Rebate of customs duty and sales tax on imported machinery. The internal rates of return are 10.15% and 10.69% respectively.

The sensitivity to the variation of variable costs, fixed costs and selling price vis-à-vis annual profit based on information from the Net Income Statement for year 3 was also calculated. The results are as follows:

If production and sales remain at full production levels, then -

1. For every 1% increase in the purchase prices of raw material, annual profit is reduced by ZK 7,000.
2. For every 10% increase in direct labour rates, annual profit is reduced by ZK 3,300.
3. For every 1% increase in fixed costs, annual profit is reduced by ZK 6,700.
4. For every ZK 1 increase in net selling price per case - all products - annual profit is increased by ZK 49,000.

Overall contribution (variable margins) for each year are calculated by COMFAR and appear in the Net Income Statement Schedule. The contribution of each product in year 3 is shown below:

	Pineapple	Guava	Tomato	Total
	ZK'000	ZK'000	ZK'000	ZK'000
Variable costs	591	69	72	732
Contribution	681	76	28	785
Sales income, net	12272	145	100	1517
Fixed costs				670
Net profit - contribution less fixed costs				115

9.7 National economic considerations

Generation of wealth

At full production, sales generate income of ZK 1.805 m (US$ 1.480 m) of which ZK 288,000 (US$ 236,000) is claimed by Government, as sales tax. The benefits to the Northwestern Province, by way of payments to farmers, wages and salaries, and overhead costs incurred in Mwinilunga, amount to ZK 300,000 (US$ 246,000).

The national net value added (NNVA) of ZK 7.02 m, 41% of the gross sales value of the Cannery, is generated over the first 10 years of the project. Indirect value added within the Northwestern Province is estimated, over the same period, to be ZK 1.38 m, less the costs of material inputs purchased by the farmers which are estimated to be less than 10% of the indirect value added.

Export sales result in foreign currency earnings of ZK 80,000 (US$ 65,000). Although almost all inputs are purchased locally, the costs of spares, cans, fuel for vehicles et cetera have foreign currency components.

10. Conclusions and recommendations

Overall advantages and disadvantages of project may be summarized as follows:

Advantages

a. Continued and increased employment in agriculture in the District and Province (an area of some 100,000 square kilometres, where no other industry exists) and in the Cannery itself.

b. Continued support and promotion of a rural industrial development project.

c. The conversion of a loss-making manufacturing and selling unit into a profitable one.

d. Provision of a dependable market for fruit which is already grown in the District in large and increasing quantities.

e. Provision of the supply of high quality canned fruit, and the introduction of a new canned product, tomato puree.

f. The project is supported in Government's national development plans.

Disadvantages

a. Remoteness of the Cannery.

b. Lack of infrastructure in Mwinilunga - communications, banks, machine shops and other services.

c. Difficulty in recruiting factory managerial staff of high calibre.

d. Financial vulnerability of the project.

As shown in the above advantages, one of the important elements in evaluating the project is the high priority which the government has given to expansion/modernization of the Cannery. This reflects the Government's policy of rural industrialization based on agricultural products.

The base run of COMFAR shows that the financial indicators calculated on the base case conditions and shown in the examples given in Chapter 10, are not highly favourable. The project would require careful management control over the production and sales effort as well as reconsideration of the loan repayment schedule. A number of possible improvements in these financial terms can be envisaged as shown in the alternatives studied in the sensitivity analysis.

The increase in production and sales of tomato puree to 5,000 cases per year is one of the typical self-supported improvements. Furthermore, the possibility of increasing the price of pineapple products by 10% and the price of tomato puree by 20% to 30% (on the basis of the low variable margin calculated for tomato puree as compared to pineapple and guava products) ought to be studied. It is foreseen in this case that a well elaborated distribution plan and expansion of sales channels will be required to reach the proposed sales levels with the increased price. Such a scheme would certainly give much more favourable financial indicators - a positive net present value and an internal rate of return significantly higher than the cut-off rate.
The Cannery would also operate with much less financial burden, if the cost of the plant manager could be financed through an aid programme. It would reduce the overhead cost of ZK 60,000 per year. In fact, the sound managerial control over the plant operation is one of the important keys for successful implementation of the project. It may be advisable that such expertise be provided by technical assistance programme, until the counterpart become competent in running its entire operation.

As the COMFAR's base run shows, the project is financially vulnerable. In addition to the above suggestions, the provision of softer loan to finance major part of investment may be considered.

Over and above, it would be justifiable to conclude that the Government should support the implementation of the project, taking into account the basic framework of the project investigated in this report as well as additional suggestions put forward above.

CHAPTER II - Project Background and History

11. Project background

11.1 Project idea

Given the following facts -

a. As much as 2000 tons of pineapple are grown in the Mwinilunga District of Northwestern Province by between 600 and 1000 farmers.

b. A cannery to process pineapples already exists in the District having been established some 13 years ago.

c. The flavour of the canned pineapple produced is excellent and in recent years the Cannery has sold its entire production.

d. With the exception of one year, when there were certain changes in methods of accounting, losses have been incurred by the Cannery.

e. The Cannery continues to operate and while suppliers of fruit have been steadily increasing, the Cannery has not been able to purchase all the fruit available and fruit goes to waste in the field.

- the question, should the Cannery continue to be operated, may be asked, and, if the answer is affirmative, should it be repaired, modernized and/or expanded, and can it be made a technically and economically profitable unit?

It is the declared intention of the Government of the Republic of Zambia to foster all efforts to expand the rural and agricultural base of the economy of the country and so endeavour to halt the exodus of rural populations to the cities - (Zambia is presently the most "urbanised" country in Africa, south of the Sahara Desert).

The Cannery is the largest industry in the Mwinilunga District, and the second largest industry in the entire Northwestern Province. The largest industry in the Province is a copper mine located near Solwezi, some 300 kilometres to the east. Substantial sums of money have been and continue to be paid to farmers for purchase of fruit, and to labour and staff employed in the Cannery.

In the first year of expansion of the Cannery, it is anticipated that a sum in excess of ZK 200,000 will be paid, increasing to some ZK 277,000 in year 3, when full capacity is reached.

	Year 1	Year 3
	ZK '000	ZK '000
Fruit	85	144
Wages	23	33
Salaries	100	100
	208	277

The only agricultural crop of greater significance in the commercial economy of the Province is maize, Zambia's staple food, sales of which generated ZK 656,000 in 1980-81.

It will be seen therefore that the Cannery is of very considerable importance to the economy of the Province, and the reason for the idea to promote and expand it is obvious.

11.2 Project parameters

It has frequently been suggested that it might be more economical to attempt to market all of the pineapple fresh instead of processing it. In this alternative the Cannery would be closed, and local farmers or traders from the Copperbelt would carry the pineapples to markets in the

Copperbelt and in Lusaka, or perhaps Rucom or another government organization would take over the responsibility of fresh pineapple marketing. It is to be remembered that this alternative is considered in the light of the tarring of the final 70 kilometres of the Solwezi-Mwinilunga Road, a project expected to be complete by 1985.

From available information, the closure of the Cannery and the marketing of all the pineapples as fresh fruit would not meet the two major criteria of the project - to provide an adequate market for pineapples produced in Mwinilunga District, and to make Rucom a profit-earning unit.

Present estimates of the total output of pineapples in Mwinilunga District are between 1,500 and 2,000 tons per year. In recent years, the Cannery has processed 500 to 700 tons per year, the remainder, being sold as fresh fruit, or, going to waste. The amount of fresh fruit carried to the Copperbelt can only be roughly estimated at between 500 and 1000 tons per year. The remainder of the available fruit goes to waste in the field.

A visit to farms in February 1983 confirmed that a large quantity of unharvested over-ripe fruit remained in the field.

A December 1982 newpaper story indicated that in excess of 100 tons of pineapples had gone to waste that month during which the Cannery has processed 150 tons.

Also, during that month, the tarring of the Solwezi-Mwinilunga Road had reached to within 70 kilometres of Mwinilunga. It should be noted that the pineapple growing area is 60 to 100 kilometres beyond Mwinilunga, and that it will be a number of years before upgrading of the roads to the pineapple growing area is undertaken.

The difficulties of mounting a fresh fruit marketing operation with such large distances between growing area and marketing area would be immense, particularly with the lack of any service infrastructure in

Mwinilunga. Two previous parastatal organizations in Zambia have failed in attempts to market fresh fruit and vegetables. A report by a Food and Agricultural Organization horticulturist (Fruit Growing in Zambia by Landau) states that "the marketing of fresh pineapples from Mwinilunga on the fresh fruit markets of the Copperbelt and Lusaka will never be successful because of the damage fruit sustains during transport".

A market for canned food exists and will continue to exist in Zambia. Importation of canned food is banned, and food canning will continue. Were the Cannery to be closed, the canning of pineapples would to some extent be taken over by private companies on the Copperbelt.

The cost to Zambia in foreign currency required for the importation of cans and other components would not be significantly reduced, but the quality of the canned product certainly would be, because of the conditions experienced during shipment.

The resulting transfer of pineapple processing from Mwinilunga to Ndola would be contrary to the three objects implicit in the involvement of the United Nations Development Programme in the Mwinilunga Cannery - the development of rural industries, the redistribution of wealth to all levels of society; and the reduction of the emigration of rural people to the urban areas.

The possibility of repairing existing plant and equipment was examined but the implementation of such a plan in isolation is precluded by the extent of existing plant wear and tear, since this would not solve the problems of profitability, presently associated with the lack of adequate levels of output.

The possibility of large scale expansion to share in world market demands was also examined and is dealt with in Chapter III, paragraph 14.3.

Finally, the possibility of modernization and expansion essentially to meet the demand of the domestic market and to export to neighbouring countries forms the basis of this study.

Orientation is positively towards raw material - pineapple of very high quality is already grown in abundance, and guavas to a much lesser extent. The soil and climate are conducive to the growing of tomatoes and the canning of tomato puree is therefore planned.

The domestic market demand for canned pineapple is in excess of supply. Nevertheless, it is planned to export to neighbouring countries - Zimbabwe and perhaps even Botswana, in order to earn much needed foreign currency; this will however, require considerable promotion and effort, because of the extremely strong and dominant hold in these markets by the Malawi-based Admarc Canning Company.

With the exception of the Cannery buildings, all other fixed assets - plant and especially vehicles - require urgent replacement; local capital to finance this replacement does not exist, and a large sum of foreign currency will be required; in addition, working capital is perilously inadequate.

The capacity of the new equipment has been planned to be able to cope adequately with the anticipated increasing demands for pineapple products.

Implementation of the modernization and expansion programme will require to be planned in great detail and directed, managed and supervised by personnel of administrative skills and competence.

11.3 National policies of the Government of the Republic of Zambia

The National Development Plan, the main features of which include balanced industrial development throughout the country, generation of more and fuller employment and diversification of the economy, calls for modernization of the Mwinilunga Cannery. Operation Food Production, 1980-1990, has as its object the making of agriculture the basis for industrialization, and the increase of employment and redistribution of incomes through this development.

12. Project promoter

The project promoter is Rucom Industries Limited, Longolongo Road, Lusaka, Zambia, a company which is a wholly-owned, subsidiary company of the Industrial Development Corporation Limited which itself is wholly State-owned. Rucom is an acronym for Rural Commercial.

Rucom Industries Limited
Balance Sheet as at
31st December 1982

	ZK '000
Equity capital	6,100
Long-term loans	4,493
	10,593
Accumulated losses	4,337
Capital employed	6,256

Of the capital employed of ZK 6,256,000, ZK 3,000 is attributable to the Cannery -

	ZK '000
Assets: fixed, net value	53
current, net value	(50)
Capital employed	3

This almost negligible value of capital employed is a result of the under-valuation of the Cannery's fixed assets and the large bank overdraft carried by Rucom. The low net value given for fixed assets is a consequence of the methods and rates of depreciation used. Straight line depreciation is used by Rucom - depreciation over 10 years for equipment, over 50 years for civil works and over 4 years for motor vehicles and trailers. However, civil works are depreciated over the period of the lease for less than 50 years. The Cannery buildings and other civil works will have been completely depreciated at the end of 1983 when the lease on the Cannery land expires. In Zambia, all land is owned by the State and can be leased but not bought or sold - only improvements on the land can carry value. Renewal of Rucom's lease on the Cannery land is considered a formality.

A major part of the equipment is now 13 years old and the newest vehicle is six years old. The net value of fixed assets - ZK 53,000 - indicated in Rucom's books at the end of 1983 is a total of the undepreciated value of (1) the original civil works, (2) some equipment purchased in 1977, and (3) some capitalized expenses resulting from rebuilding equipment and vehicles. This value is a book value only, it is not related to either the replacement value or the price which Rucom might receive if the Cannery were to be put up for sale.

The value of net current assets is negative primarily because of the bank overdraft maintained by Rucom to provide working capital for the Cannery's operation.

The other major activity of Rucom is the growing and processing of coffee - a project financed by World Bank funds.

Within the proposed project, Rucom and its personnel would obviously have an important role to perform. The observation has already been made that administrative compentence and skill in the planning and implementation of the modernization and expansion programme will be essential; such competence and skill will be equally - and vitally - necessary in the direction and management of the Cannery in order that the proposed investment shall be properly safeguarded and never put in jeopardy.

13. Project history

In 1979, the Government of the Republic of Zambia requested the United Nations Industrial Development Organization to provide an expert in fruit and vegetable canning in order to assist Rucom. That project SI/ZAM/79/801 began with the arrival of the expert Mr. Gregory D. Wooster in October 1979. Both executive and non-executive assistance was, and continues to be given by Mr. Wooster in all fields of activities of the Cannery.

In January 1982, a World Bank team visited Zambia in order to identify in the Northwestern Province possible projects which could be financed from loans from the International Fund for Agricultural Development. It was agreed to include the Mwinilunga Cannery, but that a feasibility study should be undertaken as soon as possible; in the event, the United Nations Industrial Development Organization undertook to conduct the study from the beginning of 1983, and Mr. John A. Paterson joined Mr. Wooster on 8th March, 1983. Data was collected and neighbouring countries visited during March, April and May; Computer (COMFAR) analysis and report were completed in Vienna during the first two weeks of June 1983. The feasibility study was finalized in October 1983.

CHAPTER III - Market and Plant Capacity

14. Demand and market study

14.1 General information

The pineapple, Ananas comosus Merrill, is widely grown in the tropics and sub-tropics. It is native to South America and was most probably introduced into Africa by the Portuguese. There are perhaps forty different varieties, the most important commercial varieties of which are Smooth Cayenne, Queen, Red Spanish and Perola or Pernambuco. Smooth Cayenne is by far the most popular variety grown world-wide.

World production of fruit now exceeds 9 m. tons. Major producers are Thailand, Hawaii, Taiwan, Brazil, Philippines, Mexico, and in Africa, Ivory Coast, South Africa, Zaire, Kenya and Swaziland.

While both fresh and canned pineapples are items of world trade, the majority of all pineapples are consumed domestically, either fresh or canned.

In terms of weight, annual world trade in canned pineapples is ten times that of fresh pineapples, which are of minor importance compared with apples, oranges and bananas.

Canned pineapple is the second most important canned fruit in world trade being exceeded only by peaches. It is the only tropical fruit which has achieved world-wide large-scale distribution in processed form. Pineapple juice now ranks third among the different kinds of single strength (not concentrated) pasteurized juices canned in the United States being exceeded only by tomato and grapefruit juice.

World trade in fresh pineapple fruit can be broadly divided into two categories, the luxury market for very large fruit (generally used by the catering industry) and the fruit market trade. Luxury fruit is shipped by air while trade fruit is generally shipped by sea in refrigerated ships (10 to 15 days' transport).

Pineapple is canned in a number of different forms - slices (or rings), half slices, broken slices, titbits, chunks and juice - natural and concentrated. Variations include canning of fruit in syrup (sugar plus water) or in its own juice.

By-products include jam, wine and vinegar, and where the cannery is located nearby an intensive livestock feeding centre, the solid waste may be used in producing compound animal feeds. The cost of drying or stabilising and transporting pineapple waste is not feasible over long distances. The delicate pina cloth of the Philippines is woven from the fibre of the large leaves of the plant.

Presently, tomato paste and puree are not produced in Zambia and the market which exists is untapped. Because of the seasonal nature of supplies of tomato, it is available at low cost for canning during October, which is between pineapple seasons, and could therefore most usefully be introduced into the Cannery programme.

By processing guava and tomato, spare capacity which exists because of the seasonal availability of pineapple, will be utilized. Processing of guava is planned to take place during March, April and May prior to the first pineapple season, and tomato during October, between the end of the first and the beginning of the second pineapple season.

14.2 Determination of domestic market size

Canned Fruit - General

The market for canned foods in Zambia began with the development of the mining industry in Zambia, the growth of industry generally, and urbanization. Until 1974 this demand was met by imported canned foods, mainly from Europe but also from South Africa and the Peoples' Republic of China. With the decline in world copper prices and Zambia's consequent difficulties in

obtaining foreign exchange, importation of all canned fruit and vegetables into Zambia was banned in 1974. The Mwinilunga Cannery was the first fruit canning plant established in Zambia and was opened in 1970, its establishment being motivated as much by the surplus pineapple available, as by the already existing market for canned fruit. Other fruit and vegetable canneries were also established in order to exploit the market generally. The one manufacturer of food grade tin cans in Zambia has indicated that the demand for food grade cans in Zambia is now approximately 1.2 million cans per month but production is limited by the availability of imported tinplate.

Many tropical and sub-tropical fruit, for example mango, guava, banana, avacado and citrus grow well in Zambia, but their fruiting seasons are short and there are several months when only small quantities of fresh fruit are to be found and then only at high prices. The pineapple grown in Mwinilunga bears fruit naturally during two seasons of the year - June to September and December to March. Despite this extended period of fruiting, compared with the other fruit mentioned, fresh pineapple is not always abundant in the urban areas because of the long distances from Mwinilunga, and the great difficulties experienced in transportation especially during the rainy season, October to March.

The variety of canned fruit and fruit juice available is very limited. Other than Rucom's present Sunripe brand pineapple rings and chunks and guava slices, only pineapple chunks manufactured by one producer, are marketed. No other type of canned fruit is available, except very limited quantities of poor quality orange juice and tomato juice, at high prices, and a mango drink (diluted juice). Only Rucom presently markets pineapple juice.

The present market for the Cannery's products includes the upper and middle income groups, the hotel and restaurant trade and the nation's Defence Services. The major retail markets are Lusaka and the cities and towns on the Copperbelt. Smaller markets exist in the farming centres of the Midlands and Southern Province and the tourist centre at Livingstone. The continuing migration of people to the urban centres together with an ever-increasing population ensures the continued growth of the canned food market.

Market Size for Pineapple

Two approaches were used in estimating the present size of the market for canned pineapple products. One approach is based on market segments and per capita consumption projections; another is based on past sales by Rucom with projections assuming the Cannery's products would be available throughout the year and distributed throughout the country.

Estimate based on market segments and per capita consumption

Given the wide range of incomes and living standards in Zambia, projection of an overall per capita consumption figure would not bear much relation to fact. In order to make a projection of possible consumption levels the potential market was divided into segments and the per capita consumption for each segment was estimated.

The most recent available reference data (for the year 1980-81) for estimating market segments was obtained from the government publication "Monthly Digest of Statistics". The following data are of interest:

Employment:	
Non-Zambians employed	21,980
Zambians employed	367,010
Population	
1980 census	5,680,000
1981 estimate	6,030,000
Visitors to Zambia in 1981	146,632
of those for holiday or business	50,736
International air arrivals	36,238

Market segments designated are: (1) the upper income group, (2) the middle income group, (3) the low income group, (4) international visitors, and (5) the national defense forces.

The upper income group would include many non-Zambians employed in Zambia on contract, owners of large commercial farms, businessmen and government officials, members of the diplomatic corps, international development aid personnel and missionaries. This group might be expected to consume canned fruit at per capita levels similar to those found in developed countries. The middle income group includes some individuals coming from the groups mentioned above having lower incomes, shopkeepers, owners of smaller businesses, and many educated and trained Zambians, particularly those from households where both husband and wife work. For this estimate the number of middle income households which regularly purchase canned fruit is taken as 5 per cent of the total number of Zambians employed. The quantity of canned fruit purchased by the lower income group is negligible.

Annual per capita consumption for the upper income group is taken as 4 kg per year, and for the middle income group 1 kg per year. This compares with the following figures for civilian consumption in the United States. The figures listed are the averages of the data available for the years 1946 to 1980; data were not available for every year.

	Annual per capita consumption kg per year
All canned fruit	9.3
Canned pineapple fruit	1.5
All canned fruit juices	6.5
Canned pineapple juice	1.3
Total canned fruit and canned juice:	
All fruit	15.8
Pineapple	2.8

A consumption of 4 kg per year used in the estimate for the upper income group in Zambia compares with the total of 2.8 kg for canned pineapple fruit and pineapple juice in the United States. Four kg per year is considered conservative bearing in mind that it is for a selected population and that the purchaser has virtually no other canned fruit or juice, locally produced or imported, readily available to him. In the United States the per capita consumption for all canned fruit and fruit juices totals 15.8 kg per year averaged over the entire population. The figure of 1 kg per year for the middle income group is based on observations and discussions with individuals.

Consumption for the upper and middle income levels can be estimated as follows:

Market segment	Number of households which regularly purchase fruit	Number of individuals per household	Annual per capita consumption kg per year	Total demand cases*
Upper income	10,990	4	4.0	17,600
Middle income	18,400	6	1.0	10,500

*(a case contains 24 cans each of 440 g net weight)

For visitors to Zambia who might purchase a fruit desert or fruit juice while staying at a hotel, estimated consumption was based on some 40,000 visitors and a per capita consumption of 0.5 kg (approximately equal to two glasses of pineapple juice) giving a total of 1,900 cases demand.

The total estimated civilian demand is as follows:

Market segment	Yearly demand cases
Upper income	17,600
Middle income	10,500
Visitors (hotel and restaurant)	1,900
TOTAL	30,000

If the anticipated (on the basis of past orders) demand of 18,000 cases by the national defence forces is added to this figure, present effective demand comes to a grand total of 48,000 cases.

Estimate based on Rucom sales. During the four years April 1979 to March 1983, 62,400 cases of pineapple products were produced and sold by the Cannery. During that period production varied from 11,191 to 19,382 cases per year. It is known that in May 1981, the Cannery's 1980-81 production of 18,420 cases had been sold and firm orders were held for 6,000 additional cases. It is also apparent that during 1980 only a small quantity (1,712 cases) of Sunripe products were distributed to the Copperbelt area, which should be the largest retail market in Zambia for canned pineapples. Projection of available sales data from 1980-81 gives the present effective demand shown below:

Marketing area	Orders/Purchases from Rucom 1980-81 cases	Demand projection cases
Lusaka urban	7,329	11,000
Copperbelt	1,712	15,600
Rest of country	358	3,000
National defence forces	15,021	18,000
TOTAL		47,600

Note that national distributors may purchase quantities included in the Lusaka or Copperbelt market segments for nationalwide distribution.

The projection is required because products were not available throughout the entire year in Rucom's Lusaka warehouse nor was any significant sales effort made on the Copperbelt. The Copperbelt market is the largest retail market in the country and is assumed to have a demand 42 per cent greater than the Lusaka area (based on population employment statistics). Total annual domestic demand is obtained by assuming that the demand for Sunripe pineapple products represents two-thirds of the total - an approximate sales ratio reported by several retail store managers in Lusaka.

Present and future requirements of the national defence forces for canned pineapple products are assumed to be constant. The canned fruit and juices are supplied to forces in the field in order to meet nutritional requirements for a balanced diet. It is not possible to guarantee that contracts to supply the defence forces will be awarded to Rucom every year. Rucom is, however, the only supplier of pineapple rings and juice. Also, the wholesale price for Rucom's pineapple chunks is competitive on the basis of price per unit weight and the quality is superior to that of other suppliers. The fact that Rucom is also a state-owned enterprise may as well be a factor in deciding that purchase orders ought to be placed with Rucom rather than with either of the two privately owned suppliers of canned fruit.

The present demand by the defence forces was determined by totalling the orders received by Rucom in 1980-81 together with estimated purchases from the other two suppliers of canned pineapples.

Future demand. No significant increase in the overall size of the domestic market for canned pineapple rings, chunks and juice is anticipated during the lifetime of the project. It is, however, anticipated that the Sunripe brand will within one year begin to displace some of its

competition on the Copperbelt and capture at least 60 per cent of the market there by the third year of expanded operations. It is also projected that the total demand of the national defence forces for pineapple rings, chunks and juice will be supplied by Rucom by the third year.

Other producers. Two food canners based on Ndola on the Copperbelt market canned pineapple chunks and pineapple jam. Both also produce a wide range of other canned foodstuffs but do not produce pineapple rings or juice. Together the two firms purchase between 200 and 300 tons of fresh pineapple in Mwinilunga for shipment by truck to Ndola. The fruit is purchased unripe and immature (hard and green) in order to reduce losses during the 600 kilometres shipment. Fruit for processing is however, best harvested mature and partly ripe and processed within 24 hours. Although both Ndola firms produce pineapple chunks (packed in sugar syrup to sweeten the unripe fruit), they cannot compete with the flavour of the fruit canned by the Cannery in Mwinilunga. Both firms concentrate their marketing of pineapple chunks in areas where Rucom does not presently market its products.

Based on discussions with these producers it is estimated that together they produce and sell some 18,000 cases annually - with a higher proportion of jam than chunks. The can sizes used by these firms differ from the can size used by Rucom as do the number of cans of jam per case. Of the 18,000 cases, present pineapple chunk production is estimated to be the weight equivalent of 6,000 Rucome cases. If these two firms sold 6,000 cases while Rucom sold an average of 15,600 cases over the last four years, the Cannery's market share is currently 72 per cent of total sales.

Guava and tomato products. The demand for guava slices is more difficult to project because statistics on per capita consumption of guava products elsewhere in the world are not available nor has past production been high enough to enable very meaningful projections. The Cannery has produced as many as 500 cases in a year although in more recent years the average has been nearer 250 cases per year. These products are sold within one month of their arrival in Lusaka and distribution is only within the Lusaka area. On the basis of the known sales a domestic market of 5,000 cases of guava slices, 20 times recent annual production, is projected. As with the Cannery's pineapple products each case contains 24 cans each of 440 g net weight. Production will be increased from 3,000 cases in year 1 to 4,000 cases in year two and 5,000 cases in year 3. This is to allow for the development of adequate raw material supplies and a supply network. This study indicates production would continue at 5,000 cases per year from year three. During year three an evaluation of sales data should be carried out to more accurately determine the size of the market for canned guava slices. The investment proposed in this study would accomodate increased guava processing to meet a larger demand. This can be accomplished by increasing the number of labourers per shift of the number of shifts to two without additional capital investment. One other canner packs guava slices but supplies are only infrequently seen in retail shops. The demand projection of 5,000 cases is for the Cannery's guava products. No estimate is included for the other canner's production or sales which are assumed to be small.

At present time there is no tomato puree produced or marketed in Zambia. A number of firms market tomato sauces and ketchup and the two Ndola food canners mentioned above market canned whole peeled tomatoes and tomato juice. As noted in the section on Materials and Inputs (Chapter IV) the wide fluctuation in price and availability of fresh tomatoes make tomato processing an attractive possibility.

If we take the same upper and middle income markets identified for estimating the market for pineapples and apply the average per capita consumption figures for tomato sauce and paste (one-fourth the average for the middle income group) for the United States over the past decade, an estimate for these two market segments can be obtained. Since tomato is an ingredient in a wide variety of traditional Zambian dishes and there are periods of the year when tomatoes are expensive and in short supply, the market for a canned product can be assumed to be broader than that for canned guava and pineapple. To complete the estimate it is assumed that some 3 per cent of the national population in the lower income group might purchase a single tin per year. This gives a present effective demand in excess of 20,000 cases per year shown as follows:

Market segment	Number of households which regularly purchase fruit	Number of individuals per household	Annual per capita consumption kg per year	Total demand cases*
Upper income	10,990	4	2.8	10,600
Middle income	18,400	6	0.7	6,600
Lower income	180,000[1)]		0.243	3,800
		TOTAL		21,000

*(A case contains 48 cans each of 243 g net weight).

1) The figure represents the total number of individuals, equivalent to 3% of the national population.

14.3 Foreign market

Current F.O.B. prices paid in the Middle East and Europe for canned pineapple products are in the range of ZK 9.75 to ZK 12.20 per case and are substantially below the variable cost incurred at Mwinilunga. When additional costs (about ZK 2.00 per case) for shipping to European ports are added, it is obvious that such exports could not be undertaken without large subsidies, which are not likely to available. Exports to these markets are therefore not proposed.

While detailed statistics of consumption in neighbouring countries are also not available, information has been gleaned from conversations with producers, manufacturers and wholesalers in Zimbabwe, Malawi and Botswana. Large quantities of pineapples are not presently grown in Zimbabwe. Pineapples which are grown there are sold principally on the fresh fruit market. At least one Zimbabwe firm imports fresh pineapples from Malawi for canning. It would seem that the market for canned pineapple products in Zimbabwe increases each year by 10 - 15% amounting presently to 30,000 cases. Two-thirds of this market demand is met by imports. The landed cost requires to be ZK 16 per case to compete. Variable cost in the Cannery is estimated to be ZK 14.07 per case.

The market demands in Malawi are less impressive and Botswana lesser still, and it is considered that the opportunities to export to these two countries are, presently at least, not great. Zaire, Angola and Mozambique were not visited.

15. Sales forecasting and marketing

Pineapples

The current domestic wholesale selling prices for the Cannery's products (rings and chunks ZK 38.85 per case; juice ZK 38.40 per case) are used to determine the estimated sales income shown in Schedule 3-1 which follows on page 44 . Total sales income shown includes 20 per cent

sales tax. An export price of ZK 16.00 is used to derive the estimate of sales income from exports. No sales tax is payable on exports. The export price is 10 per cent below the current price paid in Harare Zimbabwe for imported canned pineapple (see section 14.3). Setting the sales price below current market levels allows for discounting and initial competition in entering the market. It will be seen that the export price is below production cost and that local sales are being used to subsidize the exports.

Average annual sales during the last four years have amounted to 15,600 cases but it is to be remembered that products were not available during the whole of the year nor anywhere in the country. Sales were limited by constraints on production - machinery breakdowns, lack of cans and spare parts, poor transport facilities, absence of technically skilled personnel, to mention a few - not by lack of demand.

Under such circumstances it is difficult to determine price elasticity of demand. Since 1979 wholesale prices per case (pineapple rings of chunks) have risen from ZK 21.84 to ZK 29.50 in April 1982 to ZK 38.85 in April 1983. This rise generally follows the rate of inflation for the upper income group in Zambia. Competitors' prices have followed similar upward trends. Based on knowledge of the various market segments that purchase canned pineapple products it would seem that the demand elasticity is low and that if sales price follows inflation rate, little change in domestic demand would occur.

Guava

Previous production and sales of guava slices have been so low that even less market and demand data are available than for pineapples but it is assumed that the same demand in elasticity exists. The point may be made that by raising guava slice production, a substitute fruit product is introduced which is in competition with pineapple products. However, the complete absence of other canned fruit and the low level of guava production proposed make a reduction of overall demand for either product doubtful. The current wholesale price, ZK 34.91 per case, is used in the estimate of sales income.

Tomato

The total demand for tomato puree may be more dependant on price on a long run because a significant part of the demand is from the low income group. It should be noted, however, that sales of tomato puree of the Cannery would not be so much affected by price changes at the stage of new introduction to the market, since the production rate proposed for the Mwinilunga Cannery is less than 10 per cent of the total potential demand for puree. The wholesale selling price is taken as ZK 60.00 per case, taking into acount a variable cost of ZK 35.96.

The forecast, based on studies of the markets, domestic and foreign, calls for the production and sale of 30,000 cases of pineapple products, 3,000 cases of guava slices and 480 cases of tomato puree in year 1, the first full year of expansion, increasing to 42,000 cases of pineapple products, 5,000 cases of guava slices and 2,000 cases of tomato puree in year 3 - and then remaining at this level for some years. Exports of pineapple products rise from 3,000 cases in year 1 to 5,000 cases in year 3 and then remain at this level.

Domestic sales forecast by market area

Since the two other firms which produce pineapple products are located on the Copperbelt and have well established customers, the Copperbelt market share for Sunripe products is projected to be initially 4,000 cases, well below the proportion of the Lusaka market held by Rucom. By year 3, sales are projected to rise to 61 per cent of the Copperbelt market. Domestic sales forecast by market area are as follows:

Market area	Year 1 cases	Year 3 cases
Lusaka	7,000	7,500
Copperbelt	4,000	9,500
Rest of country	1,000	2,000
National defence forces	15,000	18,000
TOTAL	27,000	37,000

The marketing and selling of Rucom products is directed by a Sales Manager who operates through wholesalers and retailers, and directly with the Defence Services, whose purchases are considerable.

Although some distribution to large wholesale buyers and the Defence Services has been conducted directly from the Cannery at Mwinilunga, it has never been practicable to conduct sales from there because of its remoteness from the market and the lack of adequate communications and financial facilities. At various times, Cannery products have been warehoused in Solwezi or Luanshya. This has not been successful in improving distribution and sales because of inadquate supervision and poor communication.

Rucom canned products have never been exported in past years, but a small initial consignment of pineapple products is presently being exported to Zimbabwe to be handled there by an import-export house with considerable experience not only in canned food, but in canned pineapple also (from Malawi).

Annual selling and distribution costs have been estimated to be some ZK 73,000, representing 5% of total costs (in year 3).

Schedule 3-1. Estimate of sales income

Product Description	Unit price		Year 1 - 1984-85						Year 2 - 1985-86						Year 3 - 1986-87					
			Quantities to be sold			Sales income including sales tax			Quantities to be sold			Sales income including sales tax			Quantities to be sold			Sales income including sales tax		
	exp.	dom.	exp.	dom.	Total	exp.	dom.	Total	exp.	dom.	Total	exp.	dom.	Total	exp.	dom.	Total	exp.	dom.	Total
	ZK	ZK	'000 cases			ZK '000			'000 cases			ZK '000			'000 cases			ZK '000		
Canned - Pineapple																				
Rings	16	38.85	1	8	9	16	311	327	1.5	9.5	11	24	369	393	2	11	13	32	427	459
Chunks	16	38.85	1	8	9	16	311	327	1.5	9.5	11	24	369	393	2	11	13	32	427	459
Juice	16	38.40	1	11	12	16	422	438	1	13	14	16	499	515	1	15	16	16	576	592
			3	27	30	48	1044	1092	4	32	36	64	1237	1301	5	37	42	80	1430	1510
Guava slices		34.91	-	3	3	-	105	105	-	4	4	-	140	140	-	5	5	-	175	175
Tomato puree		60.00	-	.5	.5	-	30	30	-	1	1	-	60	60	-	2	2	-	120	120
Grand Total			3	30.5	33.5	48	1179	1227	4	37	41	64	1437	1501	5	44	49	80	1725	1805

Note: exp. = export; dom. = domestic

Pineapple -) each case contains 24 cans, each of 440 grams.
Guavas -) " " " " " " " "
Tomato - each case contains 48 cans, each of 243 grams.
Sales revenue, domestic, includes sales tax of 20%.

Year	Net sales ZK '000	Sales tax ZK '000	Gross sales ZK '000
1	1031	196	1227
2	1262	239	1501
3	1517	288	1805

16. Production programme and plant capacity

The production programme based on anticipated sales and the seasonal availability of raw materials is contained in Schedule 3-3 which follows on page 50. The schedules list the total number of pineapple products produced. Throughout this report it is assumed that pineapple processing will result in the following product mix: for every 100 cases produced 30 will be rings, 30 will be chunks and 40 will be juice. This is the ratio presently obtained. It is also assumed that the demand for pineapple products is in the same ratio. This ratio may be altered if required by market demand - by producing more chunks from rings or more juice from either rings or chunks - but it is not likely that the percentage of rings could be increased above 30 per cent of the percentage of rings plus chunks to more than 60 per cent. Converting rings to chunks has no effect on sales income because the price for rings and chunks is the same. Increasing the percentage of juice would reduce income from sales because the price for juice is lower and converting rings or chunks results in the loss of some solid material. It is also assumed that the practice of packing rings and chunks in juice will continue.

Production is programmed to increase by steps over the first three years and to remain constant at year three levels thereafter. It would not be possible to achieve feasible normal capacities during the first year of operation because the installation of new machines, the construction of new civil works, repairs to existing plant and equipment as well as training programmes will be going on as production continues. Time is also required to locate or develop increased guava supplies, to begin a programme to insure adequate and timely supplies of tomatoes, to organize sales and distribution to the Copperbelt market and to begin exporting.

Capacity. Feasible normal plant capacity to be designed for is determined by the highest level of input of the primary fruit to be processed - pineapples. In the case of the Mwinilunga Cannery the month when the most fruit is available is January, 252 tons are purchased in that month (see Chapter IV). If the Cannery operates two shifts every day of the month, equipment specified must have a feasible normal capacity of:

$$\frac{252 \text{ tons} \times 0.986}{31 \text{ days} \times 2 \text{ shifts per day}} = 4.0 \text{ tons per shift}$$

In the fruit and vegetable canning industry, especially in canneries the size of the Mwinilunga plant, a production programme which calls for operations every day of the month during peak harvest months is not unusual.

Fruit and vegetables are generally not available for processing throughout the year, so calculation of meaningful annual capacity and percentage utilization figures for these food processing plants requires explanation. Additional complications are introduced when more than one product is processed in the same plant. The method used to calculate annual capacity and per cent utilization for the Cannery is outlined below.

1) Assume the year can be divided into the following processing "seasons":

Pineapple	-	8 months
Guava	-	3 months
Tomato	-	1 month

(See Fruit Processing Programme chart in Chapter IV).

2) Having selected equipment for the month with the highest pineapple input (January), calculate the total feasible normal capacity for the "season" assuming here a normal working month of 24 days.

$$\frac{4 \text{ tons}}{\text{shift}} \times \frac{2 \text{ shifts}}{\text{day}} \times 8 \text{ months} \times \frac{24 \text{ working days}}{\text{month}}$$

$$= 1536 \text{ tons pineapple per year}$$

Repeat this calculation for each product:

$$\frac{1 \text{ ton guava}}{\text{shift}} \times \frac{1 \text{ shift}}{\text{day}} \times 3 \text{ months} \times \frac{24 \text{ working days}}{\text{month}}$$

$$= 72 \text{ tons guava per year}$$

$$\frac{5 \text{ tons tomato}}{\text{shift}} \times \frac{2 \text{ shifts}}{\text{day}} \times 1 \text{ month} \times \frac{24 \text{ working days}}{\text{month}}$$

$$= 240 \text{ tons tomato per year}$$

3) Per cent of capacity utilized is calculated by dividing the weight of fruit processed by the feasible normal annual capacity:

$$\text{Pineapple: } \frac{985.6 \text{ tons}}{1{,}536 \text{ tons}} \times 100 = 64\%$$

$$\text{Guava: } \frac{66 \text{ tons}}{72 \text{ tons}} \times 100 = 92\%$$

$$\text{Tomato: } \frac{100 \text{ tons}}{240 \text{ tons}} \times 100 = 42\%$$

Note that capacity utilization for individual fruit cannot be added to arrive at overall plant capacity.

4) Overall utilization of plant capacity is determined by multiplying individual product utilization by the fraction of the year each fruit is processed:

Pineapple:	64%	X $\frac{8}{12}$	=	43%
Guava:	92%	X $\frac{3}{12}$	=	23%
Tomato:	42%	X $\frac{1}{12}$	=	3.5%

Overall capacity utilization 69.5%

Equipment to be purchased must have a minimum feasible normal capacity of 4 tons of pineapple per shift in order to process all the pineapples supplied in January. For guava in the peak month of April, equipment must be able to process:

$$\frac{25 \text{ tons X } 0.99}{30 \text{ days X } 1 \text{ shift per day}} = 0.83 \text{ tons per shift}$$

Some of the same equipment used for pineapple is used in canning guava; no additional equipment is required. Feasible normal guava processing capacity for the equipment recommended is 1 ton per shift, which exceeds the peak processing rate of 0.83 tons per shift required in April. Note that single shift operation is projected; if two shifts operate , the number of tons of guava which could be processed increases from 72 to 144 tons.

To meet the levels indicated in the production programme equipment must be able to process tomatoes at the rate of:

$$\frac{100 \text{ tons tomatoes X } 0.80}{30 \text{ days X } 2 \text{ shifts per day}} = 1.3 \text{ tons per shift}$$

Again some of the same equipment used to process pineapples is used in processing tomatoes; no additional equipment is required. From the table on the following page it can be seen that the feasible normal tomato processing capacity of the planned equipment is 5 tons of tomatoes per shift, considerably more than will be needed to process the tomatoes supplied.

The projected losses of pineapple and guava between purchase and processing are as presently experienced - approximately as a result of the method of purchasing: fruit is brought to the Cannery, off-loaded by hand, selected and weighted, and only fruit selected and weighted is purchased. Planned recoveries of pineapples to be canned from fruit processed, are greater than presently experienced, and would flow from more modern equipment and more efficient management.

The planned recoveries of tomato are based on statistics of experienced tomato growers in Zimbabwe who have knowledge of the climatic and soil conditions of the Mwinilunga District.

From past Cannery operation it is known that approximately 20% of the sugar used in preparing the syrup in which guavas are packed is lost because of the practice of preparing a larger quantity of syrup than the minimum daily requirement and because of spillage and pilferage.

The planned losses of cans, labels and cartons of 2% are based on past and present experience; they are unlikely to change significantly.

Schedule 3-3. Production programme

Product	Feasible normal capacity	Year 1 - 1984-85			Year 2 - 1985-86			Year 3 - 1986-87		
		capacity utilization			capacity utilization			capacity utilization		
		%	cases	shifts	%	cases	shifts	%	cases	shifts
Pineapple		31	30,000	176	37	36,000	211	43	42,000	246
Guava		14	3,000	40	18	4,000	53	23	5,000	67
Tomato		1	480	5	2	1,000	10	4	2,000	21
		46	33,480	221	57	41,000	274	70	49,000	334

% capacity utilization is per cent utilization of overall capacity

Recoveries and losses

Product	Fruit	
	Processed as % age of purchased	Canned as % age of processed
Pineapple	99.6	45
Guava	99	48
Tomato	80	23.3
	Sugar	
Guava	100	80

Can)
Label) 2% losses between purchases and finished product
Carton)

CHAPTER IV - Materials and Inputs

17. Characteristics of materials and inputs

17.1 Pineapple

The basic raw material required is pineapple, and the Smooth Cayenne variety is grown in large quantities throughout the Mwinilunga District; some Queen variety is also grown. It is estimated that between 1,500 and 2,000 tons of pineapple are grown in the District annually.
The flavour of the fully mature pineapple is generally very good and in fact is the outstanding quality of the pineapple grown in the District. Whenever Mwinilunga pineapple products, marketed by the Cannery under the name "Sunripe", are featured in European trade shops, their flavour always creates great interest, in spite of some variations in texture and colour and even in degree of ripeness.
Pineapple is purchased from farmers at 10 ngwee per kg. An additional 1.5 ngwee per kg is paid for fruit delivered to the Cannery.

17.2 Guava

Again, an adequate supply of guava to meet planned production is assured. It is estimated that, in the District and close to the Cannery, existing plantations yield some 65 tons of fruit - sufficient for 5,000 cases. The average price for guavas purchased for processing is assumed to be 10.5 ngwee per kg.

17.3 Tomato

Because soil and climatic conditions in Mwinilunga District are conducive to the growing of tomatoes, it is planned to include the processing of this fruit in the overall Cannery programme.

The selection of a suitable variety is particularly important. A variety with high solids content which gives high yield and which does not damage easily in transport and which grows well under local conditions is required. Roma variety is recommended. From the beginning of the project it is important that the close involvement and support of the Department of Agriculture be assured.

Tomato prices in Zambia fluctuate considerably with the highest prices occurring during the rainy season. Tomatoes are more easily grown in the dry season so the largest quantities and lowest prices occur from September to November. Retail prices can vary from a high of ZK 1.50 per kg to 20 ngwee per kg in October if a crate containing 10 kg is purchased. These prices apply to sales in the urban retail markets. A purchase price of 30 ngwee per kg of tomatoes in Mwinilunga in October is assumed.

17.4 Other inputs

Cans

The tin cans in which the Cannery packs pineapple and guava products are standard size 307 x 309 (3 7/16 inch diameter x 3 9/16 inch height) cans equivalent to metric size 83 mm x 91 mm. This can size is internationally accepted, specifically for pineapple products. A 73 mm x 68 mm (diameter x height) can may be purchased in Zambia and is recommended for packing tomato puree. Cans are purchased in flattened form without ends fitted. The cylindrical body of the can, which is flattened for shipment, is reformed at the Cannery and the bottom end is seamed on to form the open top can. For pineapple and guava differentially coated 75/25 electrolytic tinplate with no internal lacquer or enamel coatings is specified. Tomato products require cans internally coated with tomato or acid fruit enamel.

The Metal Box Company of South Africa has been the principal supplier of cans to the Cannery. The Crown Cork Company (Zambia) Ltd. of Ndola is now producing the tomato puree can and has or soon will have the capability to produce the cans required for packing pineapple and guava. The tinplate to produce the cans is imported and availability of cans is dependent on allocations of foreign exchange to the producer. Current prices for locally produced cans are 30 ngwee and 22 ngwee each for pineapple and tomato cans respectively plus 10% sales tax.

Labels and cartons

Labels and cardboard cartons are obtainable in Lusaka or on the Copperbelt from several suppliers. Labels currently supplied by a printer on the Copperbelt cost 6.5 ngwee each. The current ex-factory price for cartons is K1.01 per carton from a Lusaka supplier. Sales tax is 10% on labels and 15% on cartons.

Sugar

Sugar is grown in Zambia and is generally readily available. It is required for preparation of the syrup in which guava are packed. Sugar is purchased in Lusaka at the current price of 70 ngwee per kg for quantity industrial purchases and no sales tax is payable.

18. Supply programme

18.1 Purchases of fruit

A system of contracts for suppliers of pineapple should be instituted between the Cannery and individual farmers covering both the rainy season and dry season crops. This would help to ensure suppliers in the dry season when the Cannery faces competition from buyers from the Copperbelt.

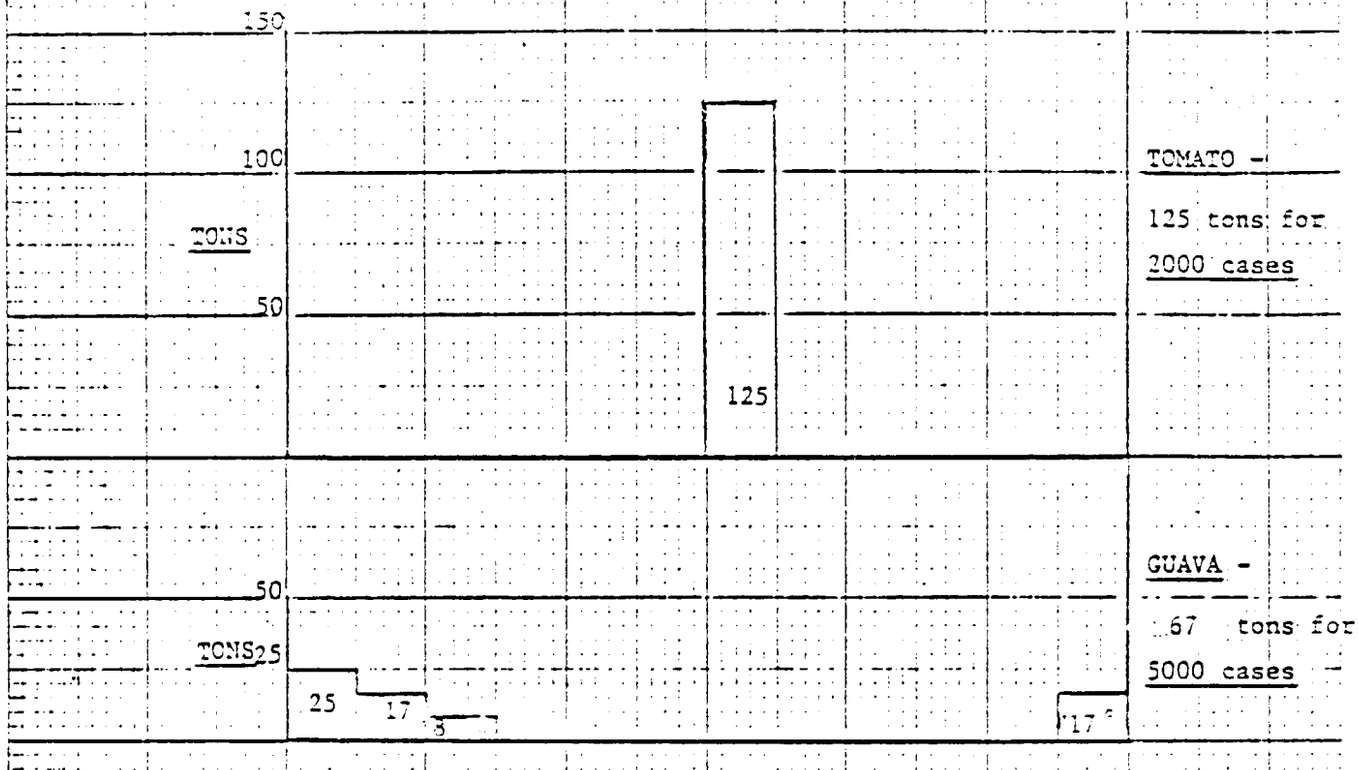
A system of contracts for supplies of guava and tomato to the Cannery should also be instituted. This would help to ensure that an organized production schedule is maintained when fruit availability overlaps. It would also enable the Cannery to control the variety grown. This is especially important for tomato, because the solids content of the fruit varies greatly from variety to variety. Any drop in solids content has a significant effect of rates of recovery.

It will be necessary to establish a sound programme to develop a supply of tomatoes because commercial quantities are not now grown in the District. The sources of supply of both guava and tomato should be close to the Cannery in order to avoid damage to fruit, which occurs when it is transported over long distances.

The total quantity of tomatoes to be purchased and processed by the Cannery is small - 30 tons in year 1, 62.5 tons in year 2 and 125 tons in year 3. The area of land required to be planted in tomatoes is also not great. Commercial plantings might give yields of 50 to 75 tons per hectare. It is anticipated that most of the tomatoes supplied to the Cannery would be grown by small-scale farmers having plots or "gardens" and not by large commercial farms. If yields of 20 tons per hectare are achieved on "gardens" of 0.1 hectare, 15 farmers could supply all of the Cannery's requirement for tomatoes in year 1 (60 farmers by year 3). The local market for fresh fruit and vegetables is also very limited so the only buyer for most of the tomatoes would be the Cannery. There is no opportunity to ship tomatoes to the distant urban markets.

Farmers are being trained at the Mwinilunga Farmers Training Centre and the Mwinilunga Farm Settlement Scheme. The Manager of the Farm Settlement Scheme has stated that they had little difficulty in attracting, training and settling local farmers. Their greatest difficulty is to find a market for the product which can be grown by the farmers since the local market for fresh fruit and vegetables is so small. A dependable market would be much welcomed by these institutions and the farmers they serve. A carefully planned and coordinated programme to ensure supplies of the most suitable variety for processing to the Cannery at the right time of the year is absolutely essential. The programme must be carried out with the cooperation of the two above mentioned institutions, extension personnel from the Department of Agriculture and the Mwinilunga Research Station, and should include recommendations to farmers, arrangements for supply of inputs, extension services and coordination of harvesting and transport to the Cannery. Furthermore, all farmers in the area must be made familiar with the Cannery's production programme so that timely fruit supplies are assured.

Fruit Purchasing Programme - Year 3

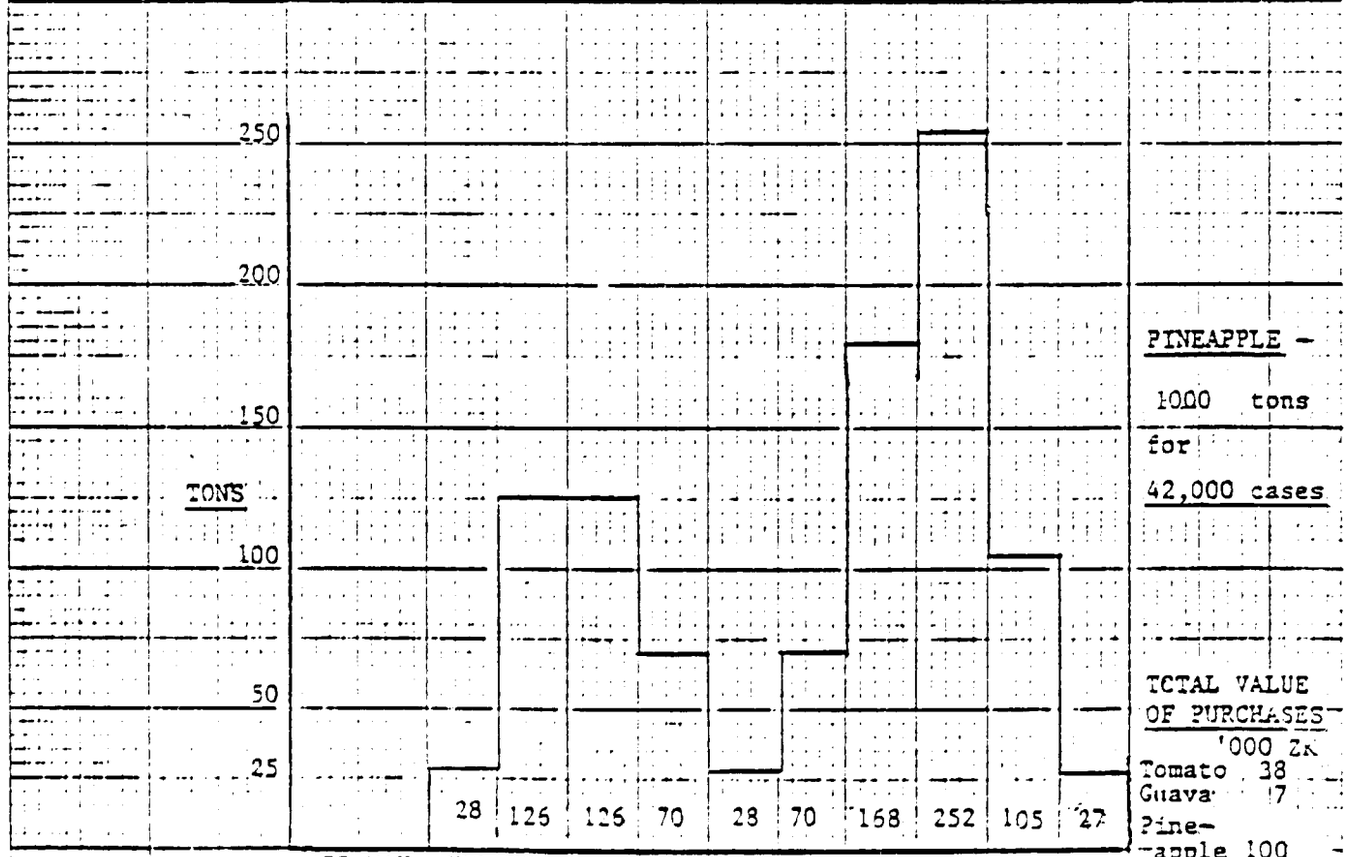


TOMATO -

125 tons for 2000 cases

GUAVA -

67 tons for 5000 cases



PINEAPPLE -

1000 tons for 42,000 cases

TOTAL VALUE OF PURCHASES

	'000 ZK
Tomato	38
Guava	7
Pine-apple	100
	145

Quantities are expressed to the nearest ton.

Values are expressed to the neares thousand kwacha.

A Chart showing the months and the tonnages of purchases required to meet the production programme follows, and it will be seen that the guava season March, April and May is before the first pineapple season, which begins in June. In between the end of this pineapple season and the beginning of the next one, i.e. October, tomato would be purchased and processed.

18.2 Production

The following Statement shows relationships between purchases of fruit and fruit processed, and between fruit processed and fruit canned.

Year 3

Fruit

	Purchased	Processed	Canned	
	Tons	Tons	Tons	Cases
Pineapple				
April	-	-	-	-
May	-	-	-	-
June	28	27.5	12.4	1180
July	126	124.2	55.9	5290
August	126	124.2	55.9	5290
September	70	69.0	31.1	2940
October	28	27.6	12.4	1180
November	70	69.0	31.1	2940
December	168	165.6	74.5	7060
January	252	248.4	111.8	10580
February	105	103.5	46.6	4410
March	27	26.6	11.9	1130
	1000	985.6	443.6	42000
	100 %	98.6 %	45 %	-

1 ton of pineapple purchased yields 42 cases of product.

Year 3

Fruit

	Purchased*	Processed	Canned	
	Tons	Tons	Tons	Cases
Guava				
April	25	24.7	11.8	1860
May	17	16.8	8.0	1270
June	8	7.9	3.8	600
March	17	16.8	8.0	1270
	67	66.1	31.6	5000
	100 %	99 %	48 %	-

1 ton of guava purchased yields 75 cases of product.

Tomato				
October	125	100	23.3	2000
	100 %	80 %	23.3 %	-

1 ton of tomato purchased yields 16 cases of product.

* Note: Monthly purchases expressed to the nearest ton.

18.3 Purchase prices - all products

Basic purchasing prices of raw material are as follows:

	ZK per kg	ZK per ton
Pineapple	.10	100
Guava	.105	105
Tomato	.30	300
Sugar	.70	700

	ZK each	ZK per '000
Cans: 440 g	.30 + 10% sales tax	300 + 10% sales tax
243 g	.22 + 10% sales tax	220 + 10% sales tax
Labels	.065 + 10% sales tax	65 + 10% sales tax
Cartons	1.01 + 15% sales tax	1010 + 15% sales tax

Supply of cans, made from imported steel, rests on the availability of foreign currency. The planning of requirements, well in advance of actual need, is therefore of fundamental importance.

18.4 Annual requirements of raw material at full production - year 3 (Ref. Schedule 4-2/1a, 4-2/1b, 4-2/1c)

	kg	number	ZK
Pineapple	999,600		99,960
Guava	66,693		7,000
Tomato	125,000		37,500
			144,460
Sugar	5,216		3,650
Cans: 440 g		1,151,030	379,839
243 g		97,958	23,704
Labels		1,248,988	89,302
Cartons		50,001	58,076
			554,571
Total			699,031
	US $ (ZK 1 - US$ .82)		573,205

19. Cost summaries

Schedule 4-2 which follows, contains details of quantities and costs of all raw material. The details behind these costs are shown on Schedules 4-2/1a, 4-2/1b and 4-2/1c. These Schedules follow immediately after Schedule 4-2, on pages 60 - 61 .

Schedule 4-2
Summary sheet - production cost: Materials and inputs

Component	Pineapple			Guava			Tomato			Total		
	Year			Year			Year			Year		
	1	2	3	1	2	3	1	2	3	1	2	3
	Kgs			Kgs			Kgs			Kgs		
Fruit	714000	856800	999600	40016	53354	66693	30000	62500	12500	-	-	-
Sugar	-	-	-	39616	52821	66027						
	ZK			ZK			ZK			ZK		
Fruit	71400	85680	99960	4202	5600	7000	9000	18750	37500	84602	110030	144460
Sugar				2191	2920	3650				2191	2920	3650
Cans	242451	290941	339431	24245	32327	40408	5689	11852	23704	272385	335120	403543
Labels	52531	63037	73543	5253	7004	8755	1681	3502	7004	59465	73543	89302
Cartons	35556	42667	49778	3556	4741	5927	369	1185	2371	39681	48593	58076
	330538	396645	462752	35245	46992	58740	7939	16539	33079	373722	460176	554571

Note: Sales tax included in purchase prices in year 3 are as follows:

		ZK
Fruit	-	-
Sugar	-	-
Cans	10%	36685
Labels	10%	8118
Cartons	15%	7576
		52379

Schedule 4-2/1a -

Material cost - year 3
Pineapple, rings, chunks, juice
42,000 cases x 24 cans x 440 grams

			Year K	Case K
VARIABLE				
Fruit	purchased - 100%	- 999,600 Kgms. @ K 0.10 per Kg.	99,960	2.38
	processed - 98.6%	- 985,606 Kgms.		
	canned - 45%	- 443,523 Kgms.		
Cans)		1029.580 @ K 0.30 + 10% sales tax	339,431	8.08
Labels)	2% losses	1029.580 @ K 0.065 + 10% sales tax	73.543	1.75
Cartons)		42,857 @ K 1.01 + 15% sales tax	49,778	1.19
			562,712	13.40

Schedule 4-2/1b -

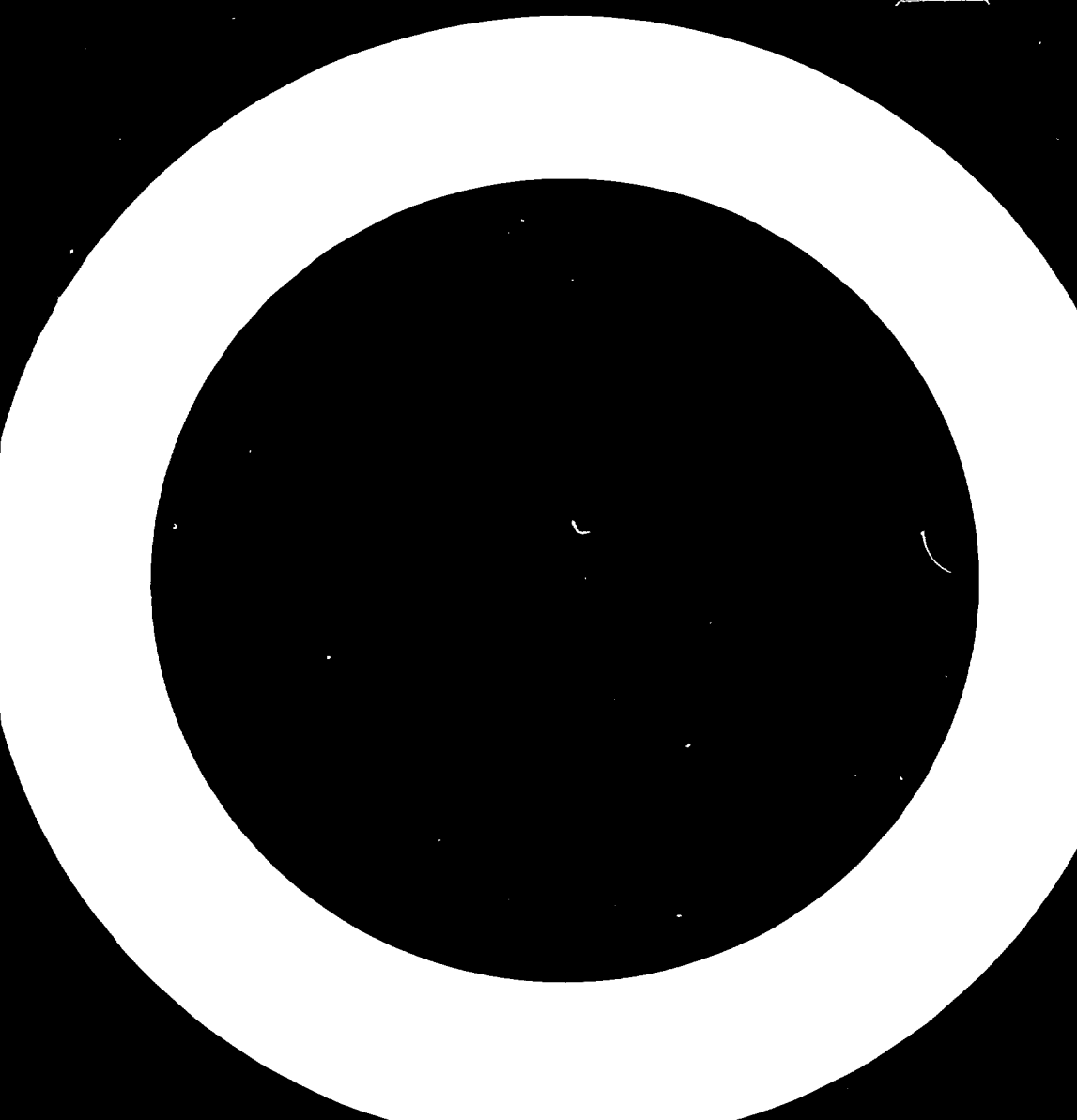
Material cost - year 3
Guava slices
5,000 cases x 24 cans x 440 grams

			Year K	Case K
VARIABLE				
Fruit	purchased - 100%	- 66,693Kgms. @ K0.105 per Kgm	7,000	1.40
	processed - 99%	- 66,026 Kgms		
	canned - 48%	- 31692 Kgms.		
Sugar	purchased - 100%	- 66026 x 0.70 per Kgm. = 5216 Kgms. @K0.70 per Kgm.	3,650	.73
	canned - 80%	= 4173 Kgms.		
Cans)		- 122,450 @K0.30 + 10% sales tax	40,408	8.08
Labels)	2% losses	- 122,450 @K0.065 + 10% sales tax	8,755	1.75
Cartons)		- 5,102 @K1.01 + 15% sales tax	5,927	1.19
Total			65,740	13.15

Schedule 4-2/1c -

Material cost - year 3
Tomato puree
2000 cases x 48 cans x 243 grams

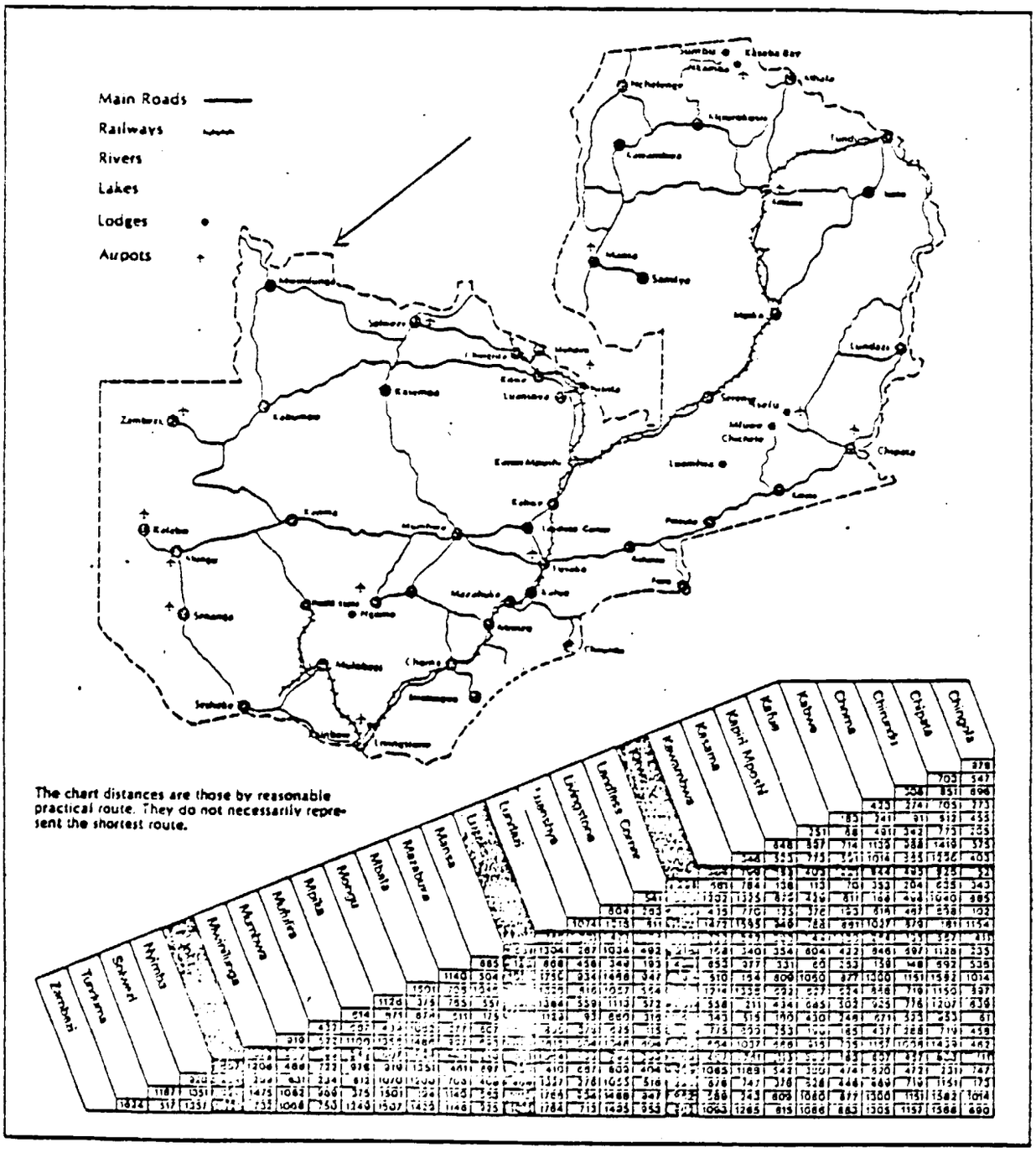
		Year IK	Case IK
VARIABLE			
Fruit - purchased - 100% - 125,000 Kgms. @K0.30 per Kg.		37,500	18.75
processed - 80% - 100,000 Kgms.			
canned - 70% of 70% = 70,000 Kgms.			
Cans)	- 97958 @K0.22 + 10% sales tax	23.704	11.85
Labels) 2% losses	- 97958 @K0.065 + 10% sales tax	7,004	3.50
Cartons)	- 2042 @K1.01 + 15% sales tax	2,371	1.19
Total		70,579	35.29



CHAPTER V - Location and Site

Zambia -

Scale - 1 cm.= 100 Km. approximately



20. Location

20.1 General

Zambia		'000 Square kilometres	
Area	-	752	
Agricultural land	-	142	
Under cultivation	-	37	(1982)

Population	'000,000		
	Urban	Rural	Total
1974	1.60	3.08	4.68
1975	1.81	3.17	4.98
1977	2.03	3.27	5.30
1980	3.24	2.44	5.68
1981 estimate	?	?	6.03

The existing location of the Cannery was chosen because pineapple were already being grown in very significant quantities in the Mwinilunga District. The fact that it is remote from the large cities and so therefore its markets is now to some extent irrelevant; the cannery exists and the requirement is that it should be modernized and expanded so that it may not only continue to contribute to the welfare of the local community, but that it may do so profitably.

The location of the 4 main pineapple growing areas of the District and their proximity to Mwinilunga are shown on the map on page 69.

20.2 Georgraphical statistics of Mwinilunga District

Location - between 11° and 12° south and between 24° and 25° east, on the borders of Zaire to the north and Angola to the east. Altitude between 1300 and 1500 metres.

Distance, by road from Lusaka	- 900 kilometres, and approximately 40 hours
Average rainfall	- 1377 millimetres, (highest in the country), between September and April.
Average humidity	- 75% between November and April.
Average temperature	- hottest September - 31°C coldest July - 6°C
Soil	- Kalahari sand or plateau.
Irrigation	- Sakeji River dam constructed in 1979 will provide water for the area of some 500 hectares of pineapple fields. Irrigation channels are under construction.
Administration	- Mwinilunga is the administrative centre for the District with local government offices, a police station, a post office, a government rest house, a secondary school and a number of shops. The nearest reliable garage and machine workshops are located in Chingola, 450 kilometres from Mwinilunga, and the nearest banking and diesel and petrol services in Solwezi, 300 kilometres from Mwinilunga. Electricity is generally constant and reliable.
Communication	- No telephone system exists, but plans for a system have been made. Communication between the Cannery and Lusaka is by radio, which during the rains is difficult due to interference of lightening.

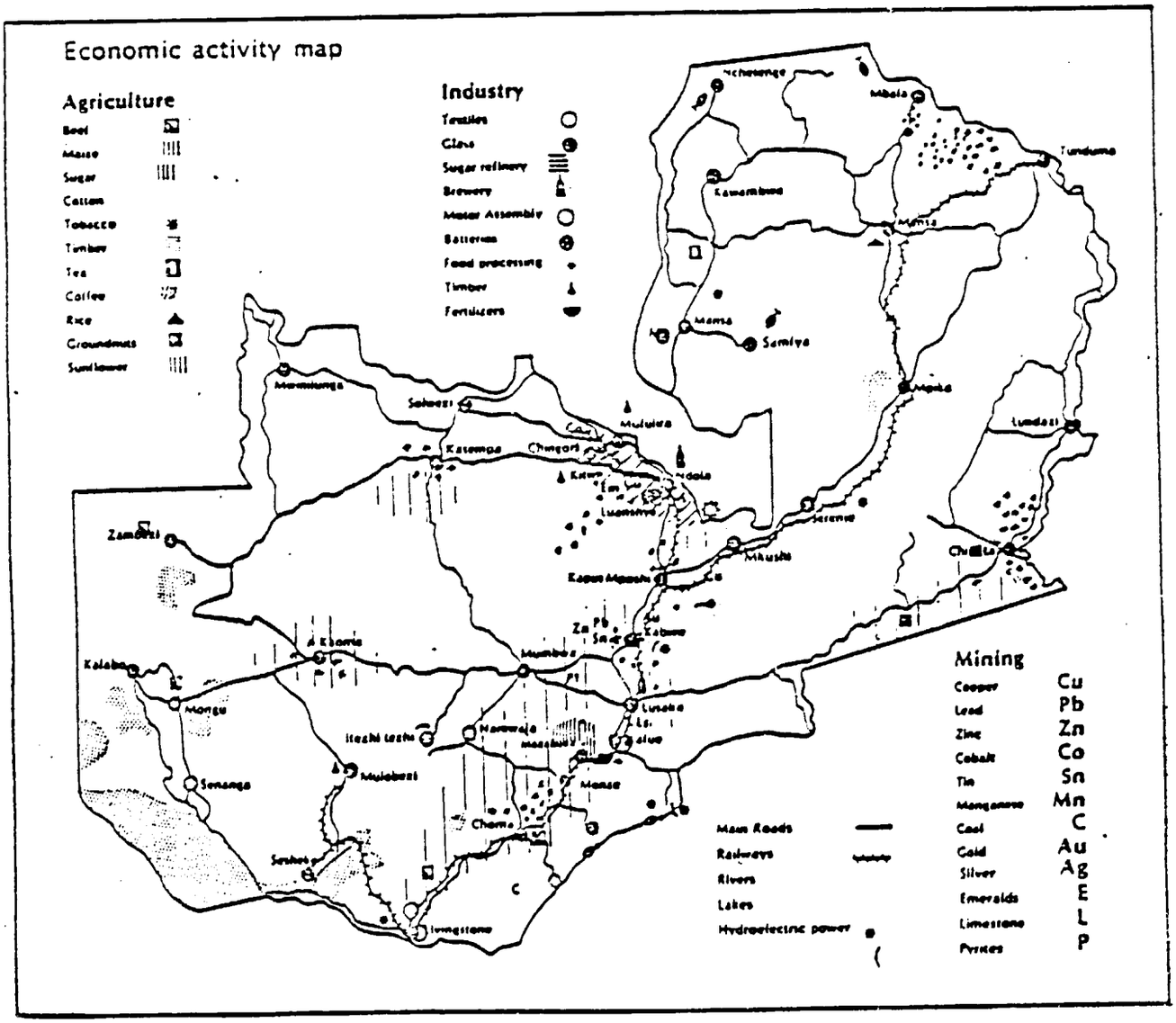
Roads	- From Lusaka to Solwezi 600 kilometres and 230 kilometres beyond are tarred; tarring of the final 70 kilometres to Mwinilunga, presently in very poor condition is planned to be completed by 1985. Average speeds cannot exceed 60 kilometres per hour in the dry season, and 10 kilometres per hour after heavy rain.
Rail	- None, throughout the entire Northwestern Province; nearest railhead in Zambia is at Chingola, 450 kilometres east. The railhead at Mutshatsha 150 kilometres to the north, in Zaire is presently unusable.
Airfield	- A grass strip exists for light aircraft some 10 kilometres north of the Cannery on the Mwinilunga Ikelenge road. By air the distance from Lusaka is some 650 kilometres.
Pineapple growing area	- The major area is centred around Ikelenge 60 kilometres north of Mwinilunga, and fruit is regularly collected within a radius of some 40 kilometres; other areas exist 60 kilometres north-east, 100 kilometres east and 40 kilometres west of Mwinilunga.

21. Site

The actual site of the Cannery is 6 kilometres from Mwinilunga; the road to the Cannery is from the Mwinilunga-Ikelenge road 4 kilometres north of the Mwinilunga Boma. The Cannery is built at the base of a small hill alongside the West Lunga River, which carries water throughout the year; the Cannery operates its own water supply. The total area occupied by the Cannery, associated buildings, and water supply system is some 2.5 hectares.

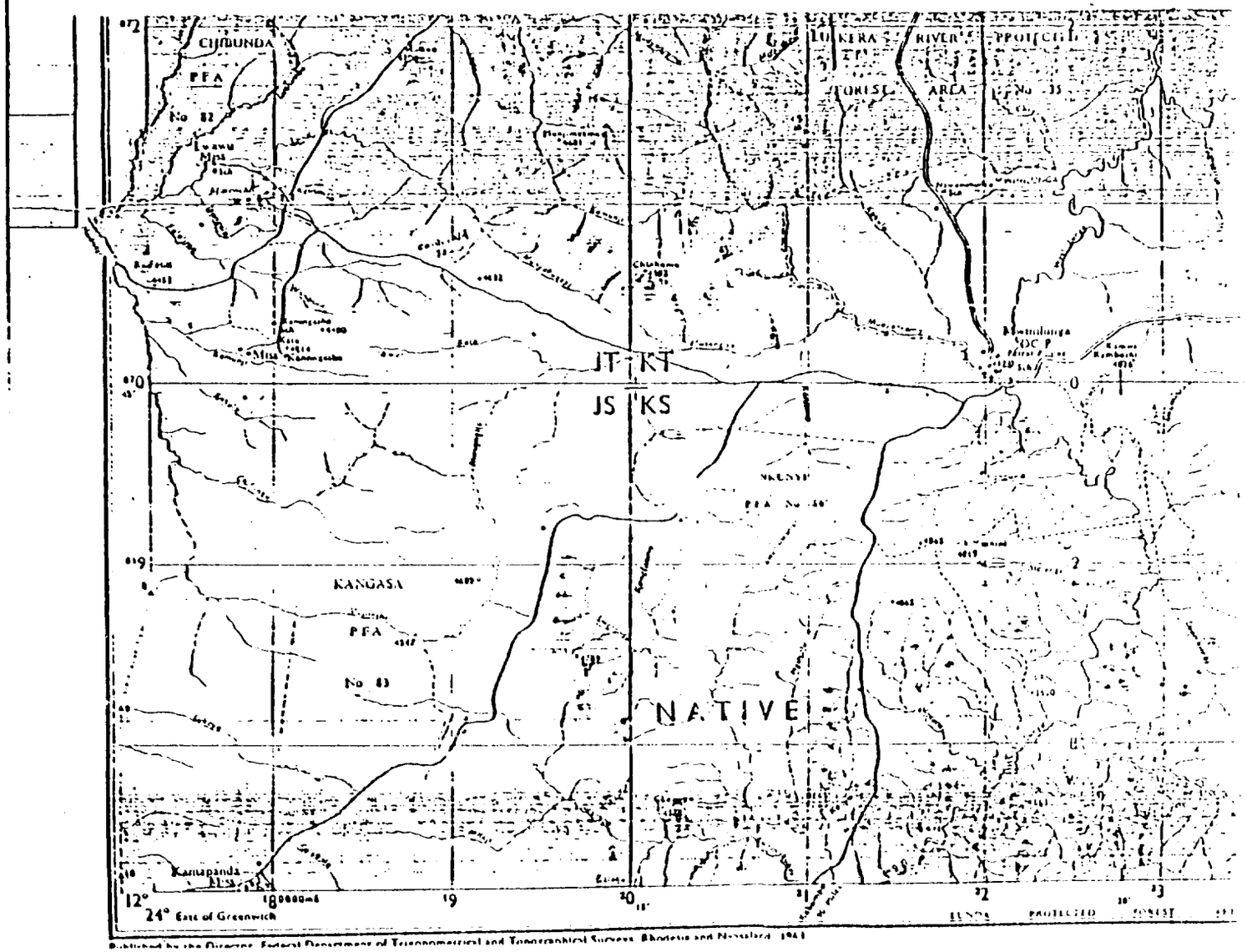
Zambia -

Scale - 1 cm. = 100 Km. approximately



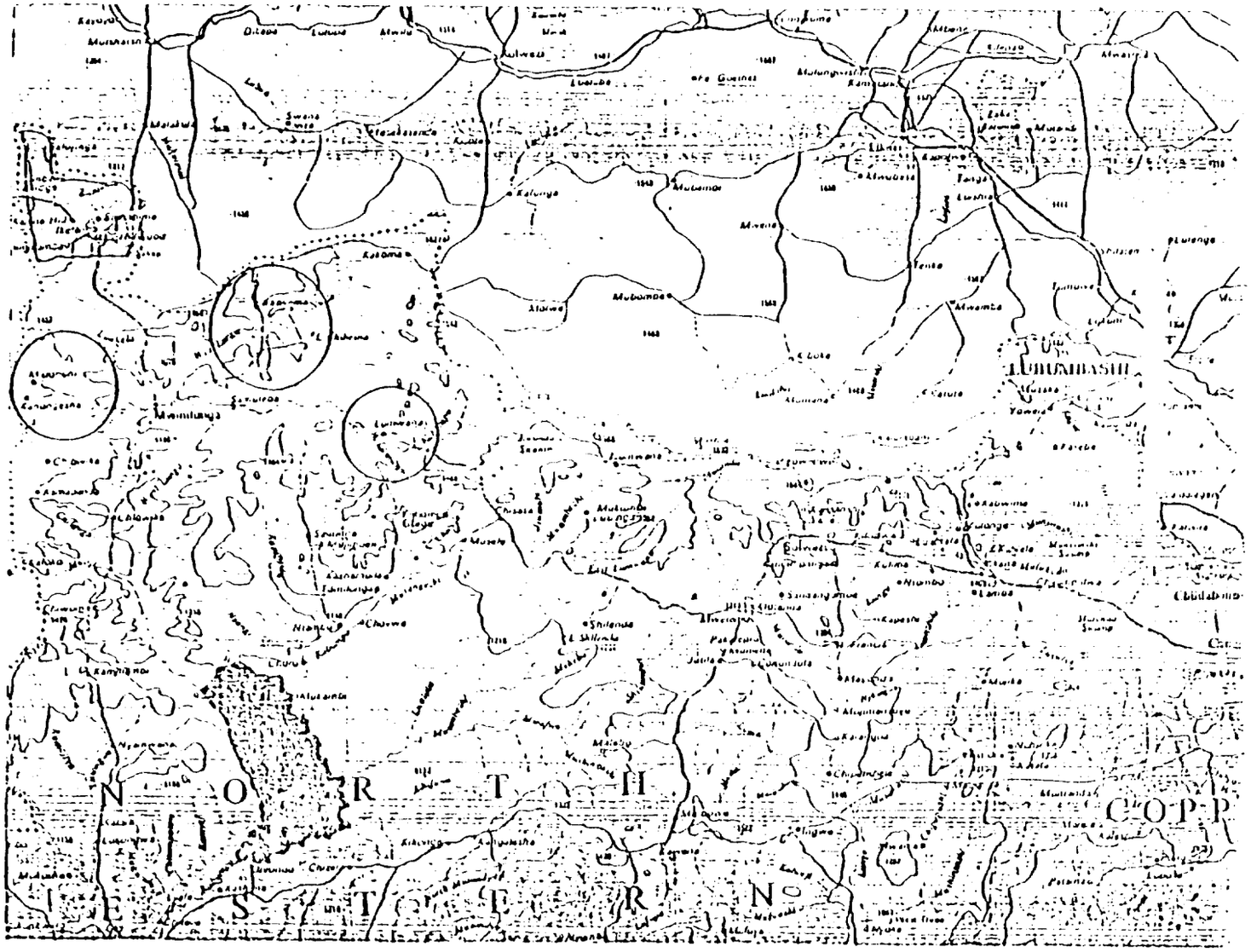
ZAMBIA - Mwinilunga District,
Northwestern Province

Scale - 1 cm.= 2.5 Km. approximately



ZAMBIA – part of Northwestern Province,
pineapple growing areas

Scale – 1 cm.= 15 Km. approximately



22. Environmental impacts

The proposed modernized and larger Cannery will certainly require a larger - than presently exists - labour force and this will present no problem whatsoever. It is presently estimated by the Department of Agriculture that 800 hectares are under pineapple cultivation, and the yield from a hectare is some 2-3 tons - low indeed but more than adequate to meet requirements of the Cannery and other producers and the fresh fruit market. At full capacity the Cannery requires 1,000 tons of pineapple. There will be little or no effect on the ecology of the region.

The fact that the Cannery plays an extremely important part in the economy of the District must again be stressed. Closure of the Cannery - and this has been considered - would surely result in considerable hardship to the local community. The Cannery off-take of 1,000 tons of pineapple could never ever be absorbed by the fresh fruit market, considering that that market is hundreds of kilometres from the pineapple growing areas.

CHAPTER VI - Project Engineering

23. Project layouts

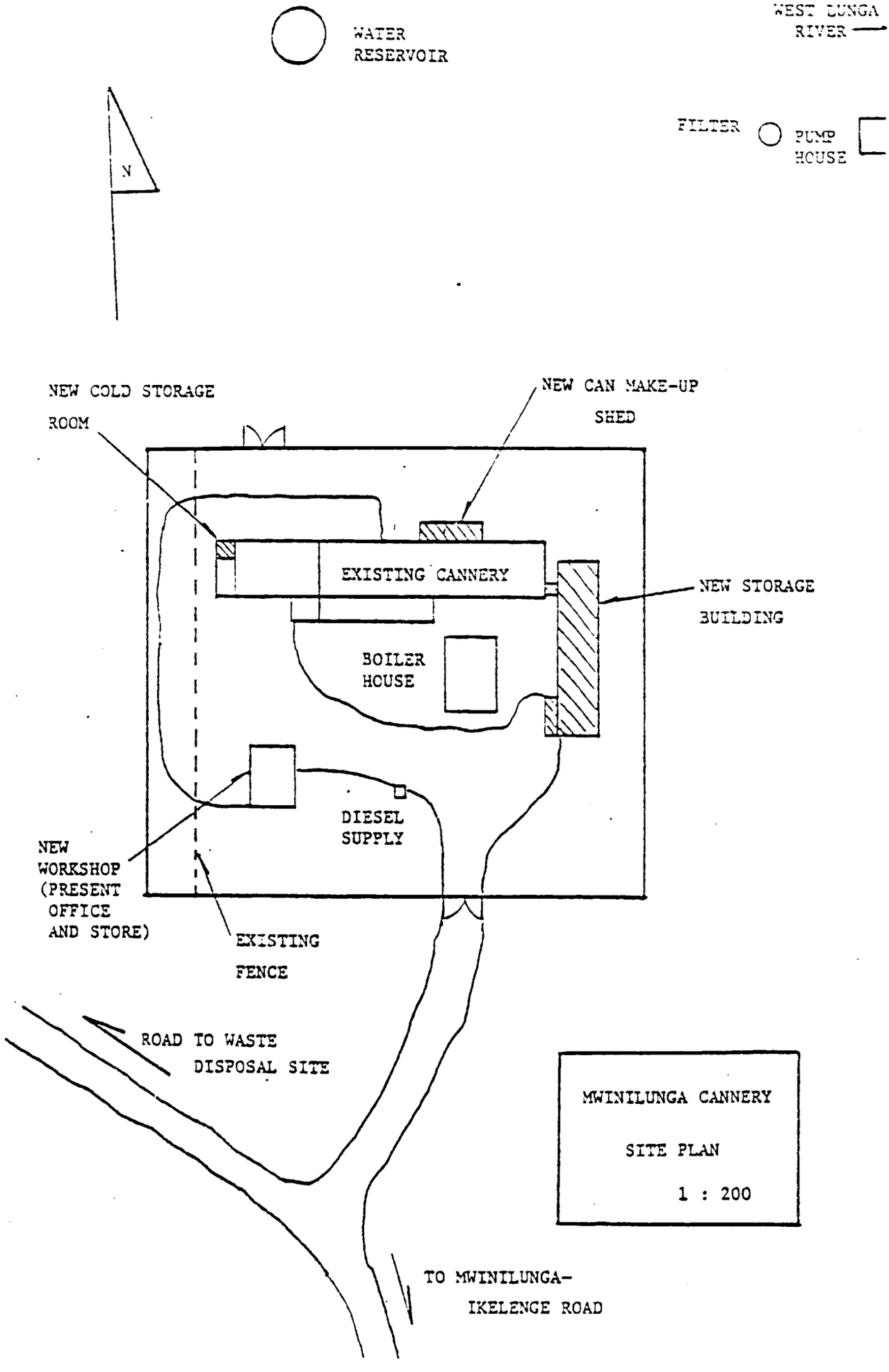
23.1 Site plan

The physical layout of the Mwinilunga Cannery shown on the Site Plan which follows indicates the relative positions of existing structures and the proposed sites of new civil works - the storage building, the can make-up shed and the cold storage room. The extension of the existing fence will allow continued access to the back of the Cannery. The new storage building is directly linked to the storage section of the existing Cannery building and a covered loading bay is located at the south end of the building.

The Cannery is located at the base of a small hill 20 to 30 metres high, directly behind (north of) the factory. The water supply reservoir for the Cannery is located at the top of the hill. The Cannery is sited on the west bank of the West Lunga River. Surface water drainage from the site is to the south and east.

The fenced site of the Cannery is part of a larger site of several hectares of undeveloped land along the side of the river and is leased to the Cannery. The present lease of the land expires at the end of 1983 but since the land is state-owned, renewal is considered a formality. Although the presently fenced area is small, there remains a considerable area of land for future expansion.

Site Plan


WATER RESERVOIR
WEST LUNGA RIVER
FILTER
PUMP HOUSE
N
NEW COLD STORAGE ROOM
NEW CAN MAKE-UP SHED
EXISTING CANNERY
NEW STORAGE BUILDING
BOILER HOUSE
DIESEL SUPPLY
NEW WORKSHOP (PRESENT OFFICE AND STORE)
EXISTING FENCE
ROAD TO WASTE DISPOSAL SITE
TO MWINILUNGA-IKELENGE ROAD
MWINILUNGA CANNERY
SITE PLAN
1 : 200

23.2 Process flow diagrams and general equipment layout

Material Flow Diagrams for pineapple, tomato and guava processing and for the can make-up operation, and the General Equipment Layout follow. All processing operations, from washing to and including cooling take place in the main processing hall of the factory. Receiving, weighing and sorting of incoming fruit takes place at the receiving platform at the west end of the Cannery building. Drying, labelling and casing are carried out in the present storage area.

The can make-up operation is presently undertaken in a room along the south face of the Cannery which will be converted into the quality control laboratory and manager's office in the proposed expansion. A new can make-up shed will be built on the north side of the Cannery.

Layout of equipment as shown for pineapple processing is planned to give relatively direct connections between processing operations. In most cases inter-machine transfers are by gravity feed or hand operations. The equipment recommended is balanced in terms of throughput, so that no build-up of processed fruit occurs between peeling and canning.

The same equipment* required for pineapple juice processing is used for tomato processing except that the fruit is first sorted, (General Equipment Layout - sorting table 1.3), then washed, (-washer 1.2), and sorted again - (-conveyor 1.7) before being ground (-comminutor 1.11). The tomato juice is concentrated to a puree in steam-jacketed kettles prior to filling into cans and seaming.

Inspection tables, washer and conveyor must be movable to permit the required rearrangement. Guava is peeled and sliced by hand (-tables 1.3, 1.5 and 1.9), then hand-packed in cans, filled with syrup made up in kettles and exhausted (- exhauster 1.16), before sealing and processing. Washed fruit is carried in bins by hand truck from the washer to the cutting tables.

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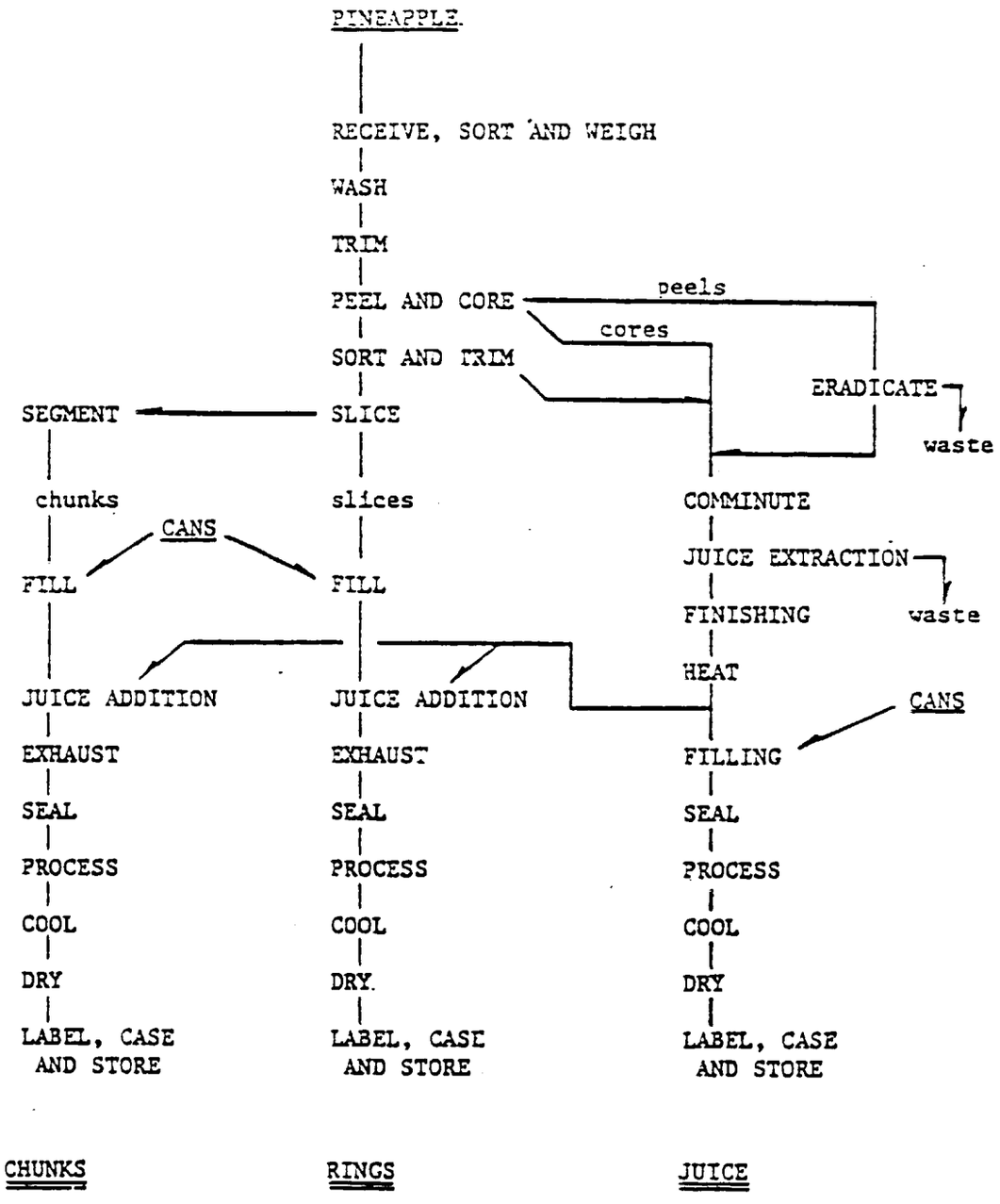
* numbers used in this and succeeding paragraphs refer to equipment item number in Schedule 6-2 at the end of this Chapter, and on the General Equipment Layout, page 76.

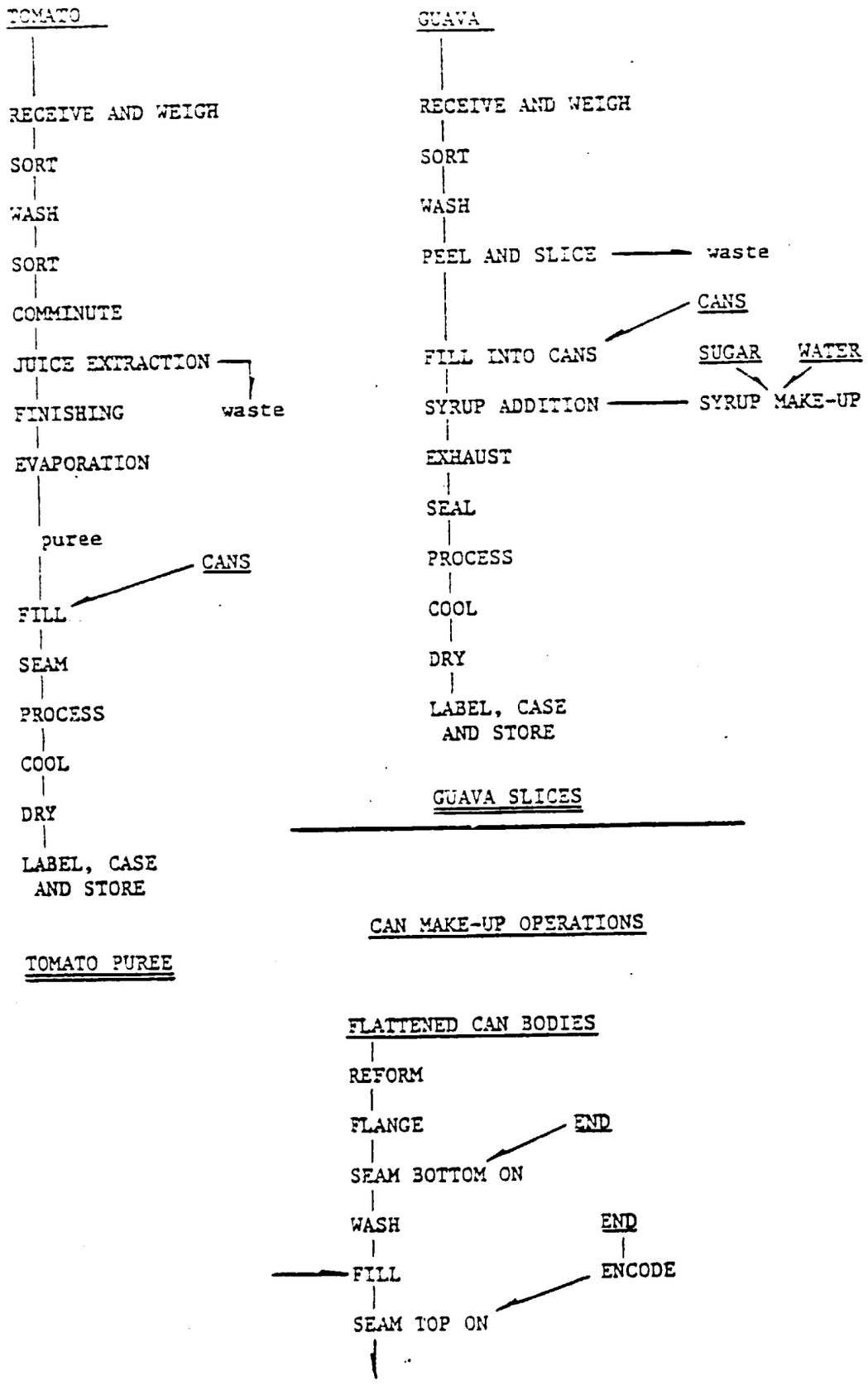
Process Flow Diagram - Pineapple



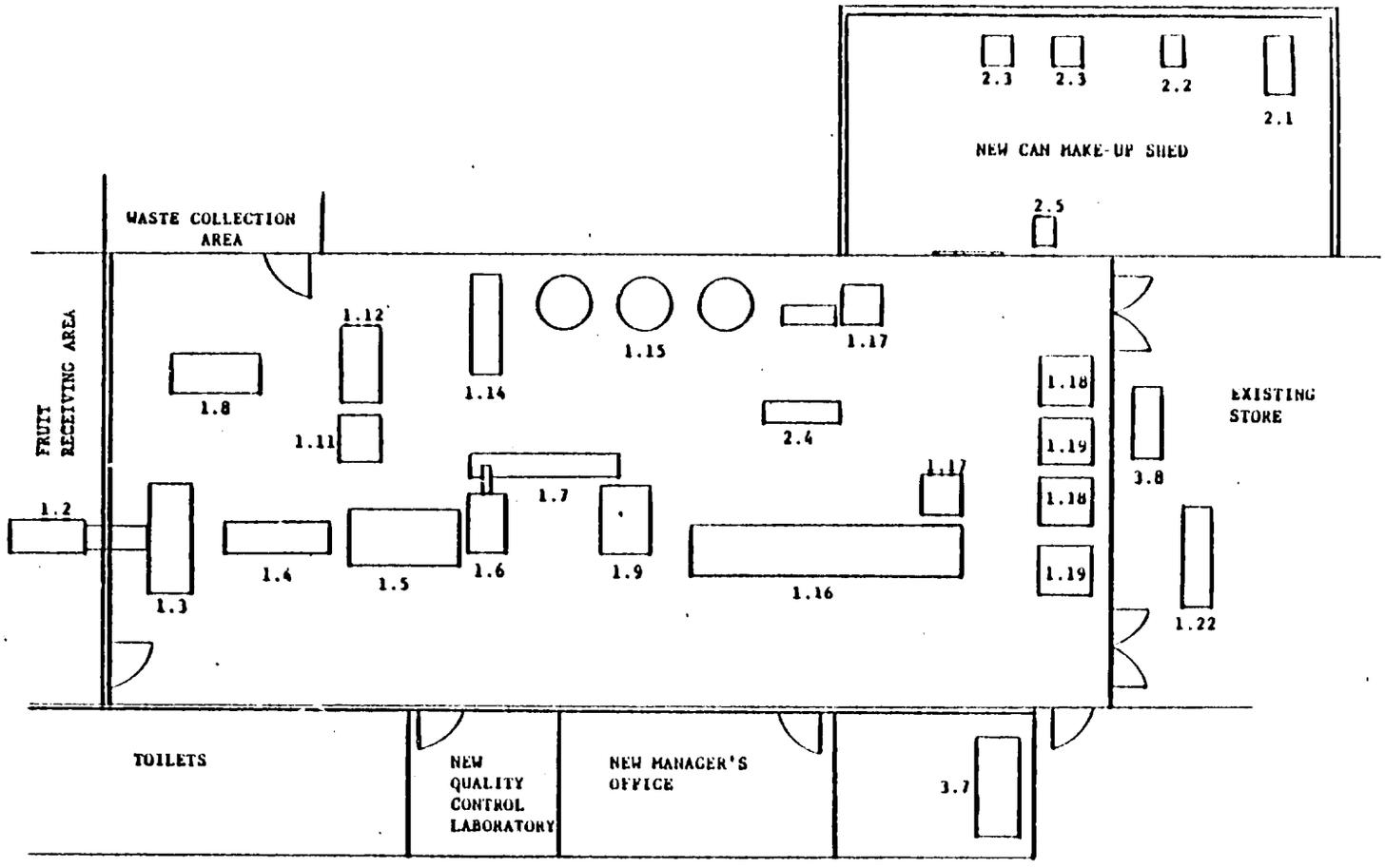
Process Flow Diagrams

Tomato, Guava and

Can make-up operations



General Equipment Layout Scale 1:100



Numbers refer to item equipment description in Schedule 6-2.

The flow of material for fruit would be from left to right; for cans from the can make-up shed, top right to the can washer, 2.4, and then to the conveyor 1.7 or to the table 1.9 or to the seamer 1.17. Waste is carried in bins to the collection area at top left, to await disposal.

24. Scope of the enterprise

The activities related to the operation of the Cannery both on-site and off-site are listed below:

1. Collection of fruit (but not growing);
2. All processing operations;
3. Supply of water and firewood;
4. Purchase of other inputs and transportation to Mwinilunga;
5. Disposal of wastes;
6. On-site storage of finished products;
7. Transport of products to the Copperbelt and Lusaka;
8. Storage, sales and distribution of products from Lusaka;
9. Operation and maintenance of transport fleet;
10. Maintenance of radio communications with Head Office;
11. Provision and maintenance of staff housing in Mwinilunga and utility services (water and electricity) to them;
12. Senior management and accounting services by Rucom Head Office in Lusaka.

25. Technology

Available technologies which are utilized in the processing of pineapple can be classified as manual, semi-automated and fully automated processing.

In small plants which process up to 1 or 2 tons of pineapples per day, most processing can be done by manual operations, for example, peeling and cutting of fruit, et cetera. In semi-automated production, coring, peeling, slicing, segmenting and the scraping of fruit pulp from the skin are carried out by machine operations but much of the inter-machine transfer, inspection, packing and filling are carried out by hand.

Semi-automated machines for coring and peeling pineapples are available which process 1/2 to 1 ton of fruit per hour. The step to fully automated processing - utilizing "Ginaca" machines - is a large one. The smallest Ginaca machines process 6 to 10 tons per hour. These automatically feed the pineapple into the machine, core, peel and slice the fruit and scrape the peels. Even in automated processing there is a great deal of manual labour (for example, in inspecting incoming fruit and inspecting and packing fruit into cans).

The quantities of pineapple available for processing in Mwinilunga necessitate the use of semi-automated technology. Zambia's overall employment intention to create jobs for the large pool of available labour and the cost implications of capital substitution also dictate the use of semi-automatic machines. For the near term, the installation of automated Ginaca machines is not recommended. The high capital cost (in foreign exchange), and the lack of adequate maintenance and repair facilities in Mwinilunga for machinery of this level of sophistication, also preclude the use of these machines.

The present work force at the Cannery has acquired considerable know-how in the operation of the Cannery equipment through their many years of experience. They have demonstrated a high degree of ingenuity in repairing and maintaining the present equipment with the barest minimum of tools and repair facilities. In general, however, the understanding of the principles of food technology is lacking. To overcome this difficulty, a suitable staff training programme in food technology is required.

Brief process description

Pineapples are placed in the corer/peeler which first removes the central core (which goes to waste) and then peels off the skin. The ends of the fruit are then trimmed off leaving a fruit cylinder which goes to the slicer. The rings from the slicer are packed directly into tins. Imperfect rings to the chunk cutting table where chunks are cut and placed in tins.

Rejects from the end-trimming cylinder inspection table, from the slicer and from the chunk table go to the juice extractor or to waste. The skins from the corer/peeler are fed to the eradicator which cuts off the remaining fruit pulp from the underside of the skin. This pulp is fed to the juice extractor.

The juice from the juice extractor is screened in the juice finisher and then heated in a steam jacketed kettle. The solids from the juice extractor go to waste. Hot juice is added to the cans of rings or chunks and the cans exhausted in the air exhauster before being seamed. Hot juice is also filled directly into tins and seamed. The seamed cans are then cooked in an open cook tank for 30 minutes, then cooled by cold water in the cool tanks, and dried. They are stored "bright" (without labels) for two weeks and then labelled and packed in cases of 24.

Guavas are washed, peeled, sliced into quarters and placed in cans, all by hand operation. A 20% sugar syrup is prepared and heated to 90° C in one of the steam jacketed kettles. The hot syrup is added to the can, which is put through the exhauster, seamed and cooked in the cook tank for 30 minutes.

To produce tomato puree, tomatoes are sorted, washed, ground and screened. The screened juice is then concentrated in the steam jacketed kettles to 15% total soluble solids. Cans are filled with hot puree, seamed and cooked for 20 minutes.

26. Equipment

Present equipment

The basic machinery and plant equipment were purchased and installed in 1969-70. A second pineapple sizer/corer, slicer, eradicator and segmenter, a juice extractor and a can seamer were purchased and installed in 1977-78. A grinding mill for fruit was included with the machinery to be purchased in 1969 but it was never received.

Almost all existing machinery requires replacement. The oldest machines have been in service for 13 years and the effects of wear and insufficient maintenance have contributed to their deterioration. In 1979 UNIDO made available some funds (in foreign currency) for the purchase of vitally needed spare parts which enabled the Cannery to continue in operation without major breakdowns in machinery over the years since then. A programme of rebuilding essential components of machines was also instituted in 1980, and a number of machines - one corer/peeler, the slicer, segmenter, eradicator, two can seamers, the exhauster, and juice finisher have been overhauled during the March to June off-season for pineapples, every year since then.

Because of the non-availability of foreign currency, replacement parts have been made locally, and in some instances the machines have been modified in order to allow them to continue to operate. It is becoming increasingly difficult to repair some of the machinery because of the advanced wear and the extent of the repairs already made. Although many repairs can be carried out and replacement parts made locally, the correct materials (bearing metals and fasteners, for example) are frequently not available. Thus, wear is accelerated, or alterations of strength of components occur and repairs become progressively more difficult to carry out.

Existing machinery which should be retained in the modernized Cannery is shown in Schedule 6-2, Estimate of investment cost: equipment, where the letter A (for available) is listed in the total cost column. Equipment to be retained include the platform scales for weighing incoming fruit, the 3 steam jacketed kettles, 6 cooking crates, the can lid coder and one can seamer. Auxiliary items to be retained include the steam boiler, the stand-by diesel generator and the air compressor.

Any spare parts required are either listed separately or included in the purchase costs of the equipment.

Where a machine is replaced by a similar machine from the same manufacturer, it is recommended that the old machinery be retained as a source of supply for replacement parts. All of the oldest machinery has been fully depreciated and has no salvage value. Provision has been made in the expansion programme for continuing depreciation of machinery purchased in the recent years.

In addition to the age, and the problems of obtaining spare parts and of repairing equipment, other important reasons for low levels of production, and low recovery rates include bottlenecks in the production line and missing equipment. The time taken by the existing exhauster to heat and exhaust the cans of pineapple rings and chunks adequately is twice that of the upstream equipment in the processing line. Production therefore either accumulates at the exhauster during each shift, or insufficient exhaust time is given to each can - by increasing the speed of throughput; increased spoilage of finished products results. An exhauster with enough capacity to heat and exhaust the rings and chunks adequately is needed.

If the exhauster is replaced by a suitably sized unit, another major bottleneck in production would result in the cooking and cooling of cans. New cooking and cooling units are therefore required.

Missing from the present equipment is the comminutor or fruit grinding mill ordered for the original Cannery but never received. Without the comminutor, fruit fed to the juice extractor is not broken down sufficienty to allow efficient juice recover, and the hard cores of the fruit cannot be fed to the juice extractor for recovery of the juice which they contain. Overall recovery should increase by 5 to 10% with the purchase and installation of a comminutor. The processing of tomato juice also requires the use of a comminutor.

Equipment recommendations

Equipment requirements are itemized in Schedule 6-2, and summarized in Schedule 6-3, at the end of this Chapter, on pages 89-92.

The basic processing technology in the expanded Cannery remains the same as that of the existing plant but new machinery replaces the old and several new operations are introduced. These include: the washing of fruit before processing, the grinding of fruit (including the pineapple cores) which is fed to the juice extractor, and the transfer of juice which will be carried out by pump rather than manually. Equipment for a small workshop and a quality control laboratory have been included in the estimate of investment costs.

Equipment has been selected for pineapple processing. No specialized individual machines have been recommended for processing either guava or tomato, but specialized change parts which will enable one machine to process several different fruit are included. If fruit availability demands, it is possible to parallel process guava and pineapple but not tomato and pineapple because the same fruit grinder (comminutor) is used in both process lines. The small (10 square metres floor area) cold storage has been included so that when seasons overlap, several day's fruit can be held for processing separately.

Capacity

The selection of the machinery to be installed in the Cannery takes into consideration the quantities of pineapple available presently and in the future, the market demand for various products, and the rated capacity of pineapple processing equipment which can be purchased. Various equipment with a fairly wide range of capacities is available for juice handling, can make-up and for processing the product once it is in the can. Only a very limited range of machines is available specifically for pineapple coring, peeling, trimming, slicing and segmenting. The capacity of the selected pineapple processing machinery therefore determines plant capacity.

In January of year 3, the peak month for pineapple availability, 252 tons of fruit will be purchased (see chart page 56). Operating the plant 2 shifts per day and 31 days requires equipment with a feasible normal capacity of 4.01 tons per shift when 252 tons are purchased (see Chapter III Section 16). Obviously "Ginaca" machines which have rated capacities of 6 to 10 tons per hour (24 to 40 tons per shift) are too large for this application. The pineapple corer/peeler recommended has a nominal capacity of 5.5 tons per 8 hour shift. Allowing for normal stoppages, downtime, maintenance and different operators (recommended corer/peelers are semi-automatic) a feasible normal capacity of 4 tons per 8 hour shift is estimated. Downstream machines are selected to match or exceed this capacity. The pineapple juice/tomato puree processing line has a nominal maximum capacity of 7 tons per shift, limited by the capacity of the grinder (comminutor) and also the evaporating capacity of the steam-jacketed kettles used to concentrate the tomato juice to puree. Estimated feasible normal capacity for this process line is 5 tons per shift. The sorting, peeling and slicing of guavas are hand-operations and the capacity of the Cannery to process guavas is limited by the number of labourers employed. The nominal maximum capacity - 3 tons per shift - is dependent on the space and table surface area available for the hand operations and on available supervisory staff. Feasible normal capacity utilizing 20 labourers is 1 ton per shift. Cans are purchased as flattened bodies with the ends separate. The can make-up line which reforms the body, seams on the bottom end and cleans the can, has a feasible normal capacity in excess of 9,000 cans per shift.

If fruit "seasons" are specified as suggested in Chapter III Section 16 annual maximum normal and feasible normal capacities can be calculated for each fruit processed. These are shown in the table which follows.

Production capacity - normal maximum and feasible normal

Product	"Season" length	Normal maximum capacity				Feasible normal capacity			
	months	per shift		per year		per shift		per year	
		tons processed	cases produced	tons processed	cases produced	tons processed	cases produced	tons processed	cases produced
Pineapple	8	5.5	235	2,112	90,240	4	170	1,536	65,280
Guava	3	3.0	225	216	16,200	1	75	72	5,400
Tomato	1	7.0	134	336	6,432	5	96	240	4,608

Selection of equipment

Many suppliers exist for juice processing equipment and can reforming and seaming equipment. Suitability for multi-purpose use, sturdiness, simplicity of design, capacity and price were considered in selecting equipment. Files of all suppliers' equipment recommendations are available at Rucom's Head Office in Lusaka.

Vehicles

Two 8 tons capacity cargo trucks with drop side bodies are recommended for the Cannery. Each should be equipped to pull an 8 tons capacity trailer, also to be purchased. The trucks carry about 2/3rds of the fruit required by the Cannery; the balance is carried to the Cannery by privately owned trucks. The trucks are required to move about 860 tons of fruit annually within Mwinilunga District. At full production 640 tons of cases of finished products must be moved to Lusaka and 88 tons of cans carried from Ndola to Mwinilunga.

The limit of 8 tons capacity, or approximately 13 tons gross is necessitated by the condition of the roads in the fruit collection area during the rainy season and the capacity of bridges in the area. The trailer would be used for carrying finished products to Lusaka but would not be used for fruit collection.

Replacement of the Land Rover at the Cannery is recommended as is the purchase of a 2 tons farm trailer for hauling waste from the plant to the disposal area.

Cost estimate

The cost of each item listed in Schedule 6-2, on pages 89 to 92 is based on quotations obtained from equipment suppliers. The costs in foreign exchange include Carriage and Freight charges, spare parts and special tool requirements. Local costs for imported equipment include insurance, customs duty, sales tax, carriage to Mwinilunga and installation cost. Total local costs also include costs for items of equipment to be manufactured in Zambia.

27. Civil and engineering works

Existing plant

The physical layout of the existing structures at Mwinilunga is shown on the Site Plan, page 72 . The major buildings or structures are:-

1. Cannery plant;
2. Receiving platform;
3. Boiler house/wood store;
4. Office (store/covered work area, pit);
5. Pump house and filter;
6. Water reservoir.

The main building, the Cannery plant itself, is constructed mainly of IBR galvanized sheeting supported by I-Beam stanchions and trusses. The roof is IBR sheeting with fiberglass sheeting roof lights and a central ridge ventilator which runs the length of the building. The main building

is 9 by 36 metres with a total floor area (including appended rooms) of about 400 square metres. A 9 x 12 metre covered receiving and weighing platform was added at the west end of the Cannery.

The boiler house at the front of the Cannery is 6 by 12 metres and constructed of IBR sheeting supported by steel pipe. The office and spares store have a covered area of 7 by 10 metres. A water pump-house and sand filter is located north-east of the factory at the river edge. An 18,000 litres water reservoir is located near the top of a hill immediately behind the Cannery.

The existing plant and civil works have been almost completely depreciated by Rucom. Depreciation was accelerated up to the end of the present lease on the land. No difficulty is anticipated in renewing the lease. Original cost for plant and equipment in 1969 was about ZK 150,000 (almost US$ 250,000 at the rate of exchange then). To replace only the factory buildings and other civil works would today cost in excess of ZK 300,000.

Three three-bedroom houses were also constructed adjacent to the Cannery for Cannery staff members.

Buildings and civil works

The proposed expansion of the Cannery includes construction of a product storage building, a can make-up shed, a small cold storage building and modifications to the existing plant. Estimates of investment costs are included in Schedule 6-4, on page 93. Locations of these proposed buildings are shown on the physical layout.

The storage building which will provide storage for up to 15,000 cases is required during peak production months when the Cannery's trucks are committeed to fruit collection and are unable to carry all production to

Lusaka. Products are currently stored in a storage area within the Cannery and are subject to varying temperatures and humidity which results in rusting of the cans. The new storage building will have an area of 150 square metres. Building plans have been drawn up and construction cost estimates obtained from local builders.

An additional room of 40 square metres will be required on the north side of the Cannery which will house can make-up machinery, and provide storage space of made-up cans, and a limited amount of storage for flattened cans.

A small cold storage building with 10 square metres of floor area is included to enable the Cannery to ripen and then store small quantities of fruit particularly at the beginning and end of each season, and when supplies of guavas or tomatoes overlap with pineapple supplies. When sufficient supplies of fruit have built up for a full shift's operation the fruit is processed.

Required modifications to the present plant include re-surfacing of the floor in the Cannery, converting the present can make-up room into an office and quality control laboratory, conversion of the present office/store into a workshop, and repair or alteration of some building utilities and services.

Tarring of the fruit receiving area would be prohibitively expensive if undertaken as a single project in remote Mwinilunga. It should be possible, however, to arrange the putting down of tar at a nominal cost when work crews paving the Solwezi to Mwinilunga Road reach Mwinilunga. Other outdoor works include the shifting of fencing and gates to alter traffic patterns inside the Cannery fence, and repairs to the Cannery's septic waste system.

Estimates of civil engineering works costs were prepared after consultations with a Lusaka based architectural firm and a contractor based in Solwezi in Northwestern Province who has carried out building projects in Mwinilunga.

Investment costs for equipment, vehicles and civil works summarized in Schedules 6-3 and 6-4 on pages 92 and 93 are rounded to the nearest thousand Kwacha and inserted in COMFAR together with depreciation rates and conditions noted in Chapter VIII. These appear in Computer print-out 2 - Total Current Investment Costs, page 130. As equipment is depreciated, replacement investment costs are shown in the appropriate year.

Schedule 6-2.

Estimate of investment cost: equipment

Reference	Quantity	Unit	Item Description ('A' in total cost column denotes that the item is amongst existing equipment)	Cost		
				Foreign	Local	Total
1			PRODUCTION EQUIPMENT	%	%	%
1.1	1	ea	Platform scale, 250 kg. capacity	-	-	A
1.2	1	ea	Fruit washer/elevator	8,720	3,750	12,470
1.3	1	ea	Inspection table and connection pieces	-	2,500	2,500
1.4	1	ea	Pineapple sizer/corer	39,240	15,100	54,340
1.5	1	ea	Inspection/trimming table	-	2,500	2,500
1.6	1	ea	Pineapple slicer	40,960	13,970	54,930
1.7	1	ea	Ring inspection belt	13,660	5,250	18,910
1.8	1	ea	Eradicator	29,050	9,990	39,040
1.9	1	ea	Chunk cutter	7,070	2,930	10,000
1.10	1	ea	Inspection table	-	2,500	2,500
1.11	1	ea	Fruit grinder	31,500	10,840	42,340
1.12	1	ea	Juice extractor	20,960	7,210	28,170
1.13	2	ea	Juice pump	2,740	940	3,680
1.14	1	ea	Juice finisher	17,550	6,040	23,590
1.15	3	ea	Steam jacketed kettles, 50 gal.	-	-	A
1.16	1	ea	Exhauster	22,550	7,760	30,310
1.17	1	ea	Seamer	10,950	3,380	14,330
1.18	1	ea	Seamer	-	-	A
1.19	2	ea	Cooking tanks	-	2,400	2,400
1.20	2	ea	Cooling tanks	-	2,200	2,200
1.21	6	ea	Cooking crates	-	-	A
1.22	2	ea	Chain hoist, 1 ton	920	310	1,230
1.23	1	ea	Can dryer	1,680	600	2,280
Total				247,550	100,170	347,720
2.			CAN MAKE-UP EQUIPMENT			
2.1	1	ea	Reformer	4,860	1,240	6,100
2.2	1	ea	Flanger	3,700	940	4,640
2.3	2	ea	Seamers	6,580	2,260	8,840
2.4	1	ea	Can washer	1,420	490	1,910
2.5	1	ea	Lid coder	-	-	A
Total				16,560	4,930	21,490

Requirement	Quantity	Unit	Item Description ('A' in total cost column denotes that the item is amongst existing equipment)	Cost		
				Foreign	Local	Total
				IK	IK	IK
3.			AUXILIARY EQUIPMENT			
3.1	1	ea	Water-supply pump	2,540	908	3,548
3.2	1	ea	Water chlorination unit	650	220	870
3.3	1	ea	Steam boiler	-	-	A
3.4	1	ea	Alarm system for boiler		1,000	1,000
3.5	1	ea	Boiler water supply pump	3,110	1,070	4,180
3.6	1	ea	Boiler manual pump	1,300	450	1,750
3.7	1	ea	Boiler feed water deionizer	-	5,110	5,110
3.8	1	ea	Stand-by diesel generator,30 KVA	-	-	A
3.9	1	ea	Air compressor	-	-	A
			WORKSHOP EQUIPMENT			
3.10	1	ea	Stand drill			
3.11	1	ea	Press			
3.12	1	ea	Grinder	18,500	-	18,500
3.13	1	ea	Arc welder			
3.14	1	ea	Lathe			
3.15	1	ea	Steel work bench and vise	-	900	800
3.16	1	set	Complete set hand tools	-	2,500	2,500
3.17	1	ea	Battery charger	-	200	200
3.18	1	ea	Storage cabinet and shelving	-	3,000	3,000
Total				26,200	15,258	41,458
4.			VEHICLES			
4.1	2	ea	8 ton capacity cargo truck - capable to pull 8 ton trailer (Mercedes Benz 1313 or equivalent)	60,000	40,000	100,000
4.2	1	ea	8 ton trailer	-	15,000	15,000
4.3	1	ea	Land Rover pick-up	-	20,000	20,000
4.4	1	ea	2 ton farm trailer (for waste disposal)	-	6,000	6,000
Total				60,000	81,000	141,000

Reference	Quantity	Unit	Item Description ('A' in total cost column denotes that the item is amongst existing equipment)	Cost Foreign	Local	Total
				ZK	ZK	ZK
5.			LABORATORY			
5.1	2	ea	Ovens			
5.2	1	ea	pH meter			
5.3	1	ea	Centrifuge			
5.4	1	ea	Air/vacuum pump			
5.5	1	ea	Hot plate			
5.6	1	ea	Mixer			
5.7	1	ea	Microscope	22,000	7,570	29,570
5.8	1	set	Glassware and plasticware			
5.9	1	set	Thermometers			
5.10	1	set	Laboratory chemicals			
5.11	1	set	Miscellaneous			
5.12	2	ea	Refractometer			
5.13	1	ea	Triple beam balance	-	-	A
5.14	1	ea	Standard sieve			
5.15	4	ea	Inspection trays			
Total				22,000	7,570	29,570
6.			OFFICE EQUIPMENT			
6.1	2	ea	Stationery cupboard	-	700	700
6.2	1	ea	Calculator	-	1,000	1,000
Total				-	1,700	1,700
7.			SUNDRY			
7.1	100	ea	Can baskets	-	4,000	4,000
7.2	20	ea	Fiberglass bins	-	4,400	4,400
7.3	5	ea	Stainless steel pails	1,130	390	1,520
7.4	3	ea	Hand trucks	-	1,650	1,650
7.5	3	ea	Suspended scales	-	-	A
7.6	2	ea	Radio transceiver 100 watt SSB	2,290	790	3,080
7.7	2000	ea	Fruit crates	-	5,000	5,000
Total				3,420	16,230	19,650
Grand Total				375,730	226.858	602,588

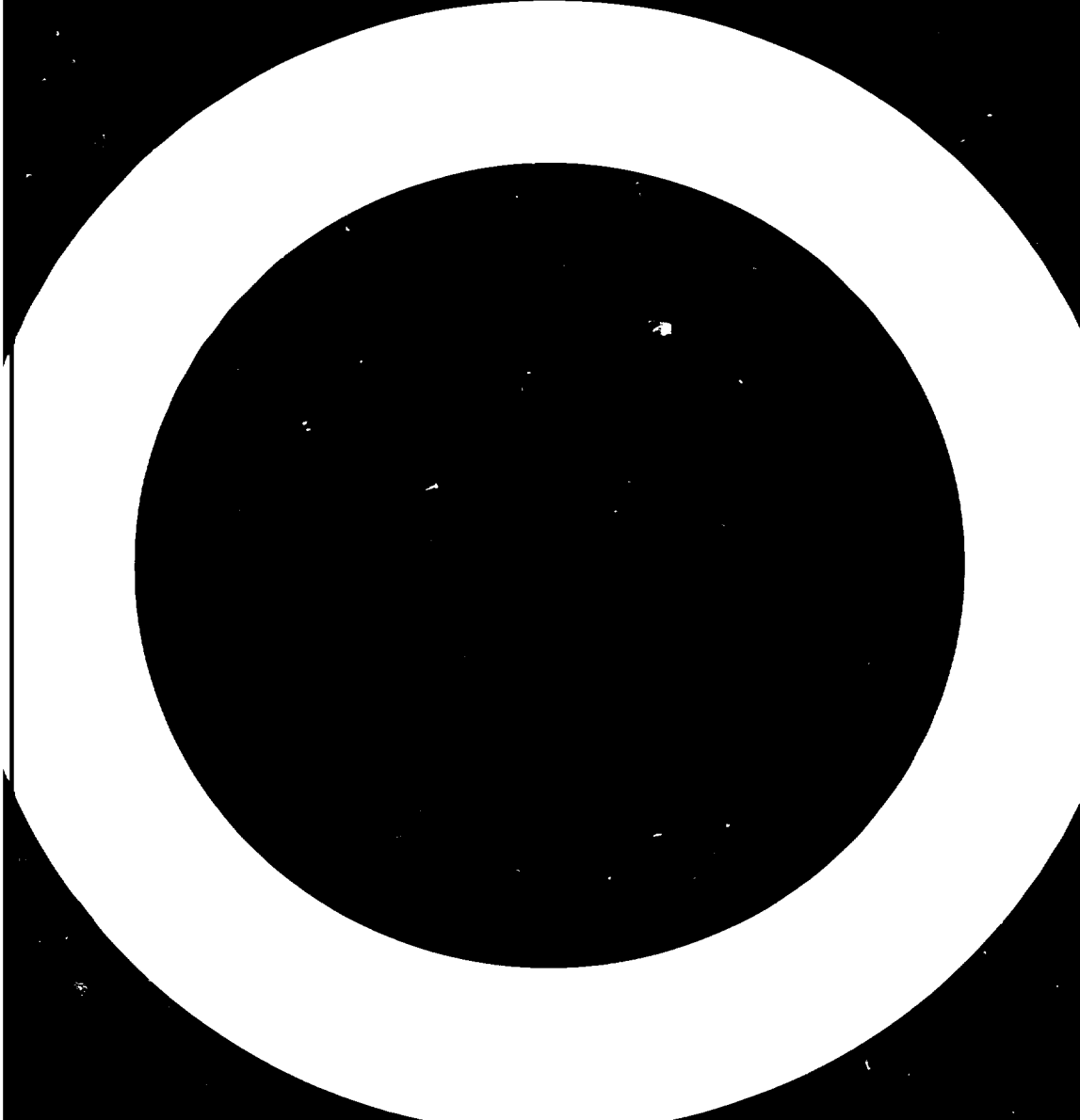
Schedule 6-3.
Summary sheet -
Estimate of investment Cost: Equipment

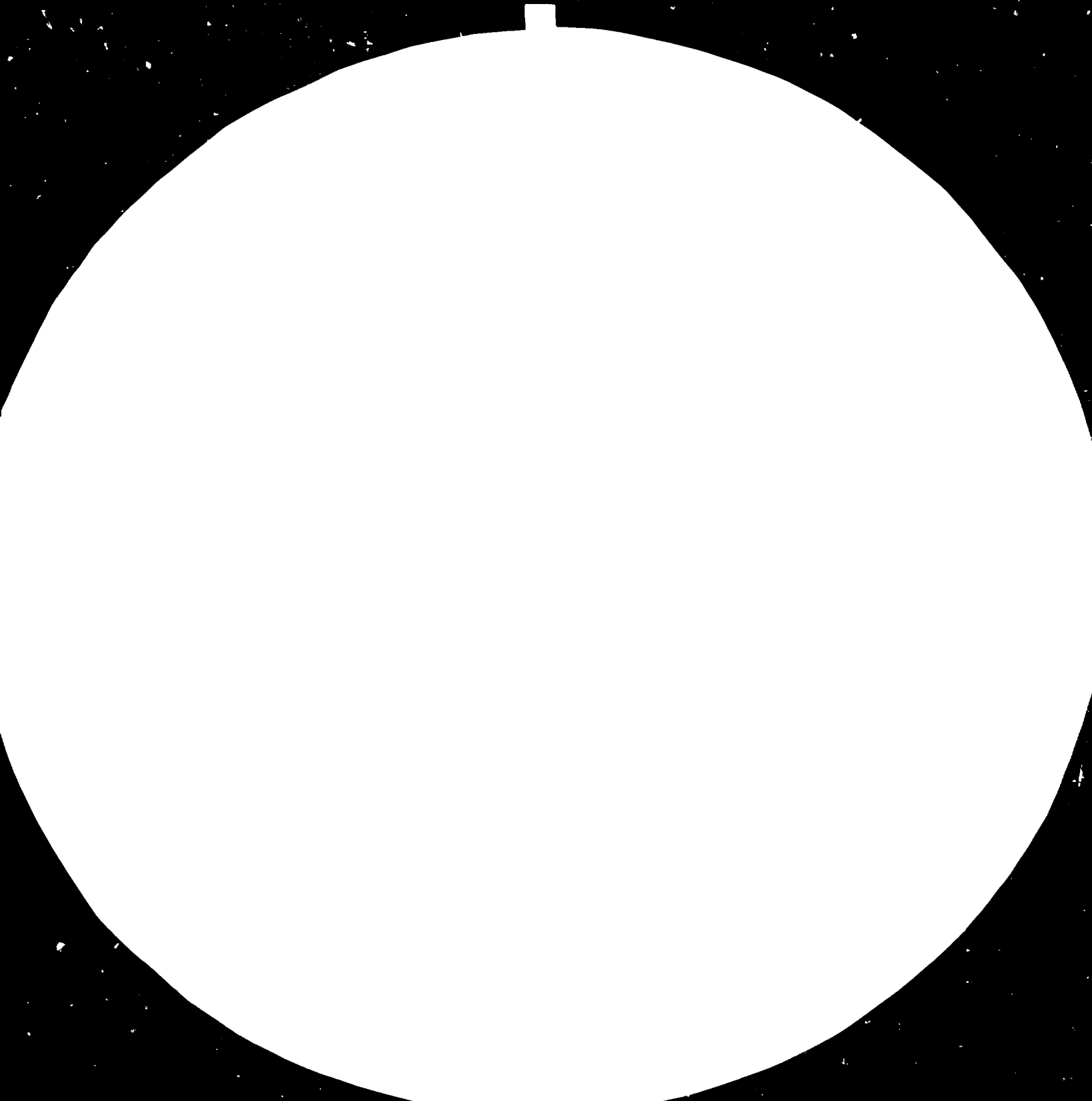
No.	Description	Foreign	Local	Total
		IK	IK	IK
1.	Production equipment	247,550	100,170	347,720
2.	Can make-up equipment	16,560	4,930	21,490
3.	Auxiliary equipment	26,200	15,258	41,458
4.	Vehiles	60,000	81,000	141,000
5.	Laboratory equipment	22,000	7,570	29,570
6.	Office equipment		1,700	1,700
7.	Other	3,420	16,230	19,650
Total		375,730	226,858	602,588
Possible rebates			123,000	123,000
Possible total:		375,730	103,858	479,588

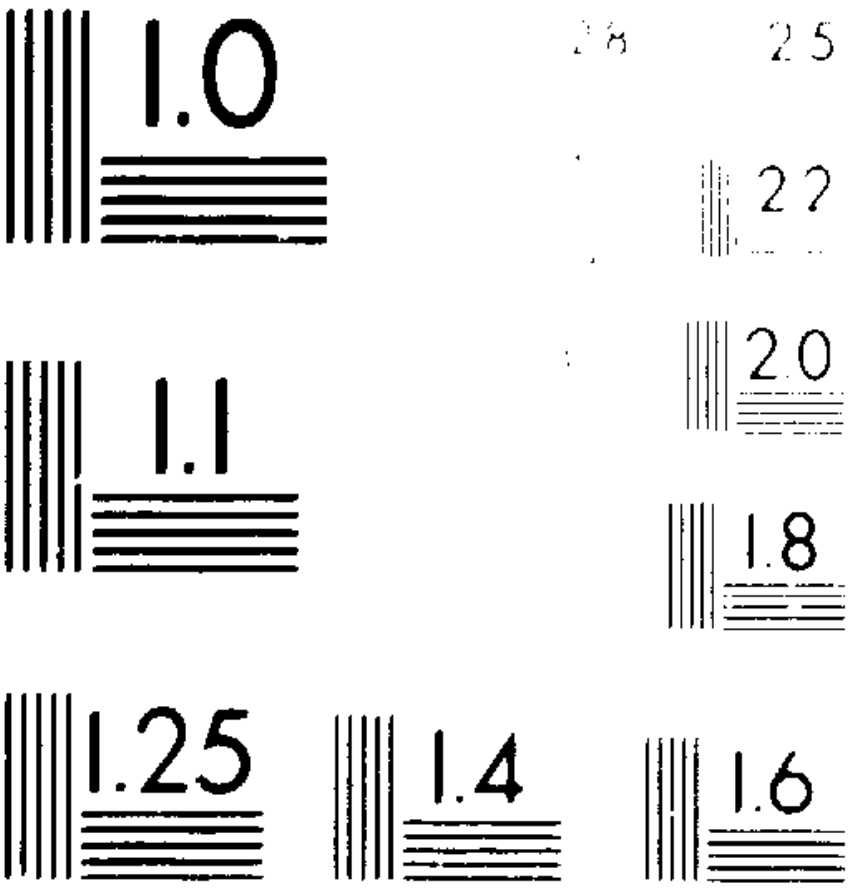
Note: rebates of customs duties and sales tax may be granted; if so they would, in total, amount to approximately IK 123,000.

Schedule 6-4. Estimate of investment cost: civil engineering works

Requirement	Unit	Item Description	Cost		
			Foreign	Local	Total
			ZK	ZK	ZK
1.		SITE PREPARATION	-	-	nil
2.		BUILDINGS AND CIVIL WORKS			
2.1	1 ea	Storage warehouse (150 sq.m.)	-	68,000	68,000
2.2	1 ea	Can make-up shed (40 sq.m.)	-	18,000	18,000
2.3	1 ea	Cold storage (10 sq.m.)	5,000	15,000	20,000
		MODIFICATIONS TO EXISTING PLANT			
2.4	1 ea	1. Quality control laboratory and office	-	4,000	4,000
2.5	1 ea	2. Workshop	-	2,000	2,000
2.6	1 ea	3. Toilets	-	1,000	1,000
2.7	1 ea	4. Flooring	-	10,000	10,000
2.8	1 ea	5. Water reservoir	-	1,000	1,000
2.9	1 ea	6. Steam and water supply	-	5,000	5,000
2.10	1 ea	7. Miscellaneous	-	2,000	2,000
Total			5,000	126,000	131.000
3.		OUTDOOR WORKS			
3.1	1 ea	Tarred areas, grading surface drainage	-	10,000	10,000
3.2	1 ea	Fencing and gates	-	1,000	1,000
3.3	1 ea	Septic system	-	3,000	3,000
			-	14,000	14,000
GRAND TOTAL			5,000	140,000	145,000



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CHAPTER VII - Plant Organization and Overhead Costs

28. Cost centres

Rucom Industries uses a code and schedule of accounts and cost centres which was introduced in 1981 in order to provide more detailed information for management of the Company. Basically the code is a numerical one, and adequately allows for the collection of accounting information; more work requires to be completed in regard to costing of individual operations, but when it is realized that the Cannery as a whole, is treated - and correctly so for the time being at least, as one cost centre, the need for determining costs of individual operations does not immediately arise; nevertheless studies ought to be made, so that efficiencies may be improved.

Factory overhead costs are collected according to the code and are not allocated or apportioned to individual operations. To do so is quite unnecessary and would only lead to unnecessary arithmetic, based on arbitrary and inaccurate assumptions.

Administrative and selling and distribution costs are all collected in Lusaka Head Office, and apportioned between Mwinilunga Cannery and the Kasama coffee project on equitable bases.

To summarize therefore, accounting and costing information is collected for -

Cannery	-	Raw material costs	- in individual accounts
		Direct labour	- in one account
		Factory costs	- in individual accounts
Head Office	-	Administrative costs	- in individual accounts
		Selling and distribution costs	- in individual accounts

Control is exercised through an examination of variances from budgets which are set for each account.

29. Overhead costs

Based on past actual overhead costs, and projections of these into the future, individual overhead costs for each account have been estimated and are shown on the following statement. They reflect the costs which will be incurred relative to the planned higher levels of production and sales and the employment of more staff. This is especially evident in the following accounts.

Depreciation and finance charges for years 1 to 15 are shown in Computer print-out 7 - Total Production Costs on pages 138 and 139. Depreciation amounts to ZK 40,000 in year 1, ZK 124,350 from year 2 to year 5 and ZK 104,350 thereafter. Finance costs rise to ZK 133,800 in year 3 and decrease thereafter as one loan is repaid in year 3 and repayment of development loans begins in year 6.

Depreciation. Rucom uses straight line depreciation at the following annual rates:

Buildings and civil works	- 2%
Plant and equipment	- 10%
Vehicles	- 25%

A nil scrap value is projected.

Some of the more recently purchased equipment from the existing factory is to be utilized in the modernized Cannery. ZK 200,000 has been included under pre-production fixed investment costs to account for these (see Initial Investment Costs page 129) and depreciated at a higher rate of 20% instead of 10%. Only these assets are depreciated in year 1. New investment depreciation does not begin until year 2. This carried-over equipment is replaced in year 5 and depreciation begins in year 6 but at a rate of 10% which is the standard depreciation rate for plant and equipment.

Financial charges. Assuming that soft-loan can be obtained, the conditions applied in the study are an interest rate of 10% per year from year 1 with repayment over 20 years starting after a 5 year grace period. Institutions such as the World Bank currently require payment of a "front-end fee" of 0.25% of the total value of the loan before a loan will be granted. The ZK 1,900 "front-end" fee is capitalized in year 1 (see the entry for pre-production capital expenditure in Total Current Investment Costs, page 130).

Account	Cost	
	present	estimated - year 3
	ZK'000	ZK'000
Salaries, wages, benefits	50	100
Repairs, maintenance and operation - vehicles	28	45
Selling and distribution	42	73
Depreciation	29	124
Financial charges	29	134
Total all overhead acounts	344	670

Schedule 7-1

Overhead costs (fixed) - Year 3

	Total 100%	Pineapple 91%	Guava 9%
Cannery	ZK'000	ZK'000	ZK'000
Salaries, wages and benefits	100		
Repairs, maintenance and operation - plant	15		
- vehicle	45		
Electricity, water, firewood	10		
Insurance, rates taxes	5		
Travelling	6		
Staff welfare	3		
Office supplies	2		
Miscellaneous	3		
	189	172	17
Spare parts	20	18	2
	209	190	19
Head office (share of total)			
Administration	130	118	12
Selling and distribution	73	66	7
	203	184	19
Depreciation	124	113	11
Financial charges	134	122	12
Overhead costs (fixed) - total	670	609	61

Note: No fixed expense has been apportioned to the cost of producing tomato puree, a new product for the Cannery, in order to avoid any distortion of the overall Cannery fixed cost.

CHAPTER VIII - Manpower

30. Labour - direct

Direct labour required for operations in the Cannery is unskilled, and the supply is plentiful. Direct labour requirements for year 3 are shown in Schedule 8-1. The number of shifts necessary is obtained by dividing the weight of the fruit to be processed per year obtained in Chapter IV Section 19 by the weight of the fruit which can be processed by the specified equipment as outlined in Chapter VI Section 26 under Capacity. It is assumed that the weight of the fruit processed per shift will be constant and that the increased capacities in year 2 and 3 will be accomplished by increasing the total number of shifts worked during the particular fruit season. A summary of this data for the production programme in years 1 to 3 is presented in Schedule 8-2. Dividing the fruit processed per shift by the number of labourers required gives the kilograms of fruit which can be processed per man per shift (kg per manshift).

Fruit	Fruit processed per shift	Number of shifts required	Number of men required	Weight of fruit processed per man per shift
	kg			kg per manshift
Pineapple	4,000	246	45	90
Guava	1,000	67	20	50
Tomato	4,800	21	25	192

These values are similar to those known to be obtainable at the Cannery when processing pineapple and guava.

The overall rate of pay, including benefits is ZK 2.56 per shift of 8 hours, and the requirements for full production from year 3 are shown in Schedule 8-3, which follows. The variable cost for direct labour per year as calculated in Schedule 8-3 is the value inserted in COMFAR as the cost at full production; it varies directly with production. (See Total Production Cost, Computer print-out 7, pages 138-139).

The direct labour force works as a team when and where required in the machine and hand operations of the Cannery. All other personnel are staff - and are indirect to these operations.

The level of education of direct labour is low, but the majority, through long association with the Cannery, most since it was established, are perfectly competent in the conduct of duties assigned to them.

Direct labour is sometimes termed general labour and is hired on a day to day basis when fruit is available for processing. When large quantities of fruit are available, longer term arrangements for labourers are agreed upon. Staff includes all salaried Cannery employees who are paid without regard to the availability of fruit. The total Cannery staff of 17 therefore includes the Cannery manager, foremen and supervisors as well as mechanics, clerks, drivers and watchmen.

31. Staff

Again, the level of education is not high. The mechanic, truck drivers, accounts clerk and typist have had formal training.

It is apparent that, given the salary levels offered, the remoteness of Mwinilunga and the absence of social amenities, the possibility of recruitment of skilled staff is limited. There can be no doubt that much of the success of the proposed expansion programme for the Cannery will rest on sound general management at the Cannery itself, and it is envisaged that the Cannery manager will require to be expatriate but that a Zambian national should understudy him throughout, and receive all necessary training and instruction to fit him to assume the role and responsibilities of manager as early as possible.

A training programme covering technical, production and labour management, and inventory and cost control, will be necessary, and should be started as soon as possible, and become part of the normal operation of the Cannery.

Schedule 8-4 which follows shows the requirement of staff (and their cost, including benefits) located or planned to be located at the Cannery. In Lusaka, in the Rucom Head Office, all functions of general administration for the company as a whole are conducted, and the Cannery bears a share of the costs involved. This share includes some costs for staff at the Head Office. These costs are not itemized and the whole of the amount is included under Overhead Costs, Head Office in Chapter VII Section 29.

Schedule 8-1. Manning table - Direct Labour

Pineapple

Primary duty Station	Number
Weighing and waste removal	3
Washer	1
End trim table	4
Sizer/corer	2
Inspection table	4
Slicer	1
Ring inspection conveyor	4
Chunk cutter table	4
Eradicatio	1
Gringing mill	1
Juice extractor	
Juice finisher	1
Steam-jacketed kettles	
Juice filler	2
Exhauster	3
Can seamer	1
Crate filler	1
Cook/cool tanks	1
Can reformer	1
Can flanger	1
Can seamer	1
can washer	1
Can lid coder	1
Can dryer	2
Labelers	4
Total	45

Guava

Primary duty Station	Number
Weighing	1
Sorting	2
Washer	1
Peeling and slicing	5
Can filling	2
Exhauster	2
Seamer	1
Cook/cool tanks	1
Can dryer	1
Labelers	2
Can reformer	
Can flanger	
Can seamer	2
Can washer	
Can lid coder	
Total	20

Tomato

Primary duty Station	Number
Weighing	2
Sorting	4
Washer	1
Sorting	4
Comminute	1
Juice extractor	1
Juice finisher	
Steam-jacketed kettles	1
Can filler	3
Can seamer	1
Cook/cool	1
Can dryer	1
Labelers	2
Can refromer	
Can flanger	
Can seamer	3
Can washer	
Can lid coder	
Total	25

Schedule 8-2. Production programme - shifts required.

Product	Feasible Normal Capacity	Year 1		Year 2		Year 3	
		Fruit processed	Number of shifts	Fruit processed	Number of shifts	Fruit processed	Number of shifts
	tons per shift	tons	No.	tons	No.	tons	No.
Pineapple	4.0	704	176	845	211	986	246
Guava	1.0	40	40	53	53	66	67
Tomato	4.8	24	5	50	10	100	21

Note: Weight of fruit processed rounded to nearest ton.
Number of shifts rounded upwards to next whole number of shifts.

Sechedule 8-3. Estimate of production cost:

wages (direct labour) - Year 3

Product	Number of local workers required per shift	Number of shifts	Cost per man per shift	Variable cost	
				per year	per case
	No.		ZK/manshift	ZK	ZK
Pineapple	45	246	2.56	28,340	0.67
Guava	20	67	2.56	3,430	0.69
Tomato	25	21	2.56	1,350	0.67

Total annual labour cost = ZK 33,120

Schedule 8-4. Manning Table - Staff

Function	Number		Cost
	Foreign	Local	
			IK
Manager	1		50,000
Manager - counterpart		1	12,000
Foreman - production		1	4,500
Supervisor - production		1	4,000
Supervisor - maintenance		1	4,000
Supervisor - quality control		1	4,000
Mechanics		2	4,000
Weighing clerk		1	1,500
Storeman		1	1,500
Accounts clerk		1	3,000
Typist		1	2,000
Boiler attendant		1	1,000
Drivers		3	6,000
Watchman		1	1,000
Office orderly		1	1,000
Total staff - Cannery	1	17	98,500
		rounded-off to	100,000

CHAPTER IX - Implementation Scheduling

32. Programme and time schedule

It is envisaged that planning and implementation of the project require 12 months from the date of the decision to invest.

Installation of machinery would be phased, so that production would continue with the least interruption. Ideally, most of this installation should be planned to be carried out during March, April and May, prior to the beginning of the first pineapple season. The busiest months are July and August and December through until February when there should be the minimum amount of interruption. To minimise interruption during any period, work of installation could be planned to take place outside of hours of processing. The re-casting of the floor would best be undertaken during March, April or May or perhaps October.

In order that implementation be conducted in the most efficient manner and at the least cost, a project implementation team should be established. International Development Aid would be sought to provide the team leader from the date of the decision to invest until the expanded plant is fully in operation.

The period required for various activities within the overall implementation programme should be defined in as much detail as possible, and the team leader would be directly responsible for this - probably using Critical Path Analysis, CPA, or Project Evaluation and Review Technique (PERT) in order to ensure a well-knit and co-ordinated programme. This is especially important in orde- to make sure that interruptions to production operations are minimised.

Production scheduling and implementation scheduling would therefore require to be closely allied to each other.

Whatever techniques are used, it is important to carry out reviews of schedules to identify and resolve problems and constraints during implementation, and revise schedules and time tables as and when required.
A programme and schedule follow.

Programme and time schedule

Activity	Month	
	Start	Finish
1. Decision to invest	1	1
2. Application to Government for classification of project as "priority enterprise"	1	-
3. Arrangements for financing	1	3
4. Finalization of plans for civil works, calls for receipt of tenders and awards of contracts	1	3
5. Calls for and receipt of tenders and awards of contracts for supply of plant, machinery and vehicles	1	3
6. Preparation and implementation of programme of supply of pineapple, guava and tomato	1	3
7. Preparation and implementation of training programme covering all functions of management and supervision	1	-
8. Preparation of programme for promotion of export	1	2
9. Arrangement for payment of creditors for civil works and equipment	3	3
10. Design of equipment to be built in Zambia	3	4
11. Construction of new storage building and modifications to existing structures - this to be started as early as possible in the dry season	Time required 6 - 9 months depending on weather	
12. Receipt, clearance through customs and shipment to Mwinilunga, of imported machinery	8	9
13. Installation, testing and commissioning of machinery, imported and local	9	11
14. Establishment of quality control laboratory	9	11

CHAPTER X - Financial Evaluation

33. Appreciation of present financial status

The reasons for the losses which the Cannery has sustained since its establishment are many - and have already been stated in detail in other Chapters. Accumulated losses to the end of the most recent financial year, 31st March 1983, are now in excess of ZK 1.00 million (US$ 320,000) and unless a plan to halt these losses is implemented without delay, the Cannery will continue to sustain them, and the accumulation will become greater. The condition of plant, machinery and vehicles is such that profit-earning is impossible. A suggested plan is outlined in this study together with the investment, both foreign and local, which it is estimated would be required to sustain its successful implementation.

A low rate of return for a profitable operation must be compared with continued operation of the Cannery at loss levels noted in Chapter II - losses of 23% of net sales or ZK 74,000 per year (averaged over the past four years with 1982-83 results projected from mid-year operational results).

34. Use of computer

The COMFAR (Computer Model for Feasibility Analysis and Reporting) software programme developed by UNIDO for the Apple III Computer was used in conjunction with the UNIDO Manual for the Preparation of Industrial Feasibility Studies to evaluate the project viability with respect to a number of possible alternatives. Computer print-outs and schedules for each alternative which was considered are attached at the end of this Chapter.

Notes on, and explanations concerning items within these schedules are given on the schedules themselves.

35. Basic features of modernization and expansion programme

Base case

The production level of pineapple products at full operation - 37,000 cases per year for domestic sales and 5,000 export - was determined through assessment of the total market size and the possible sales forecast. The figure - 42,000 cases is also the lowest production level at which pineapples if processed alone, would provide a profit. Because of uncertainties in market projections of total demand of 47,000 - 48,000 cases per year and the level of production by competitors estimated at 6,000 cases, projections of higher levels of production were not considered. Exports of 5,000 cases would yield foreign exchange earnings almost equal to the estimated foreign exchange costs of spare part requirements and interest on the foreign loan. If exports were reduced or stopped, the entire annual production of 42,000 cases would have to be sold within Zambia. Even in this case, the total domestic demand projection of 48,000 cases arrived at in Chapter III would not be exceeded by the combined production of Rucom and its competitors. A further macro-economic consideration at the rural area may have to be expressed. It is desirable to increase the purchases of pineapple from the farmers as much as possible working within the corporate financial constraints of the Cannery.

The quantity of guava slices to be produced by year 3 was selected on the basis of the estimate of the total quantity of guava fruit already grown in the District but not too far from the Cannery, and the estimated demand.

Tomato puree production of 2,000 cases is included in the project because the Cannery equipment can be used to process tomatoes at a time of the year when tomatoes are relatively easily grown and inexpensive and when few pineapples are available. The demand for

puree is thought to be ten times higher than proposed production. Because of uncertainties in the development of sufficient supplies of tomatoes, production is projected at approximately 50% of feasible normal plant capacity during the period between pineapple seasons.

Taking the above levels of production as a starting point and utilizing existing selling prices of the Cannery's products, a "First Case" was selected as the base; then alternatives were explored. In the sections that follow the base case is described in more detail and the various alternatives are discussed in the section on sensitivity analysis.

The following points are to be noted.

1. Full capacity is attained in year 3 of production, shown throughout Schedules a year 1986 or 1986-87, each having the meaning, year 3.

2. Production and sales in year 3

Product	Production and sales		Unit price 1/		Net sales value 2/	
	Export	Domestic	Export	Domestic		
	cases	cases	ZK/case	ZK/case	ZK'000	
Pineapple						
Rings	2,000	11,000	16.00	38.85	388	
Chunks	2,000	11,000	16.00	38.85	388	
Juice	1,000	15,000	16.00	38.40	496	
						1,272
Guava		5,000		34.91		145
Tomato		2,000		60.00		100
Total cases	49,000			Total net sales		1,517

1/ Unit price includes the sales tax

2/ Net sales value excludes the sales tax of K 286,550

3. It is assumed that if increases in price generally follow the rate of inflation, the price elasticity of demand will remain low and sales will remain constant.

4. The tin plate for cans requires to be imported by the can-making company and its purchase requires foreign currency.

5. A rate of exchange, Zambia Kwacha to United States Dollars has been used, where necessary, as follows:

ZK 1 = US$ 0.82

US$ 1 = ZK 1.22

36. Total investment costs

Total investment costs are shown in varying degrees of detail in Schedules 6-2, 6-3, 6-4 in Chapter VI, on pages 89 - 93, and again in the Computer Print-outs 1 and 2 in this Chapter. In the first three years a sum of ZK 1.478 millions (US$ 1.211 m) is required for investment in fixed assets and working capital; the value of existing assets is ZK 200,000 (US$ 164,000).

	Year 1 - 3		
	Foreign	Local	Total
		- ZK'000 -	
Civil engineering works	5	140	145
Equipment	376	227	603
Pre-production	-	2	2
Working capital	-	728	728
Total - new investment	381	1097	1478
Existing assets	-	200	200
	381	1297	1678
US$	312	1064	1376

Existing fixed assets at the Cannery consist primarily of equipment purchased in 1977-78 which will be utilized in the modernized plant. They are included in the Initial Investment Costs, page 129 depreciated at 20% per year and replaced in year 5 and 15. The ZK 200,000 is entered in the Project Balance Sheet, Pre- Production, page 145 as construction in progress.

New investments required at 4 year intervals for vehicles and at 10 years intervals for equipment are shown in Computer print-out 2. These are financed from accumulated capital as shown on print-out 6.

37. Project financing

It is envisaged that a foreign currency loan of ZK 748,000 (US$ 613,000) will be required for re-equipping the Cannery. The balance of ZK 730,000 (US$ 599,000) will be sought from the Development Bank of Zambia to the extent of ZK 590,000 (US$ 484,000) while funds of ZK 140,000 (US$ 115,000) will be generated internally. Schedules 6-2, 6-3, 6-4 in Chapter VI, on pages 89 - 93 and Computer print-outs 1, 2, 3, 4 in this Chapter refer.

	ZK '000	US$ '000
Foreign loan	748	613
Development Bank of Zambia	590	484
	1338	1097
Internally generated	140	115
	1478	1212

Cost of financing	10% interest per annum from year 1, and a front-end fee of .25%.
Debt servicing	10% on reducing balances outstanding after annual repayment of ZK 56,900 for 20 years, starting year 5, and totalling ZK 1,338,000.

38. Total production costs

Variable costs

Variable costs for year 3 may be summarized as follows. For details see Section 18.4, Schedules 4-2, 4-2/1b and 1c, and 8-3.

	ZK '000
Fruit	144.5
Other raw materials	554.6
Direct labour	33.1
Total variable costs	732.2

Variable cost is very sensitive to the price of cans. The annual cost for cans in year 3 and thereafter is ZK 403,543 (see Schedule 4-2) or 55% of variable cost.

Total production costs

Total production costs for the base case appear in Computer print-out 7 - Total Production Costs, pages 138 and 139. A summary of figures from year 3 is presented below.

	Fixed cost	Variable costs	Total Production Costs
Factory costs	209	732	
Other costs			
Administration	130		
Selling and distribution	73		
Financial charges	134		
Depreciation	124		
Total	670	732	1402
		US$ '000	1150

Variable cost is 52.21% of total manufacturing cost in year 3. Sales tax was excluded from costs in calculating this figure. COMFAR includes sales tax in total manufacturing costs to ensure that it is counted as cash outflow and cancels out its inflow as part of cash revenue in the cash-flow analysis; the line item - Direct costs, sales and distribution in the Total Production Cost Schedule, page 138 is sales tax. A calculation of the

per cent of manufacturing cost which is variable (excluding sales tax) for each year has been added to the Total Production Cost Schedule.

The percentage of manufacturing cost that is variable increases from year 3 through the life of the project. This is a result of decreasing financing costs as loans are repaid and the lower depreciation charges beginning in year 5 when carried-over equipment from the existing factory is fully depreciated.

39. Financial evaluation

1. Profit after tax (and tax does not require to be paid, by reason of the accumulation of past losses, until year 9) varies between ZK 100,360 and ZK 166,870 - 6.6% and 11.0% of net sales - during the years 3 - 15. Year 2 shows a nominal loss, because full capacity has not been reached.

   Accumulated cash balances are positive throughout.

2. The net present value at 10% discount rate of the project is (ZK 165,230)
3. The internal rate of return is 8.29%
4. With an initial investment of ZK 1,478 m (US$ 1.211 m) of which ZK 1,338,000 was borrowed, the pay-back period is 8 years, during which transactions will have been as follows -

	ZK	US$
Year 3 repayment of overdraft	200,000	
Year 5-8 instalment repayment of loans	227,600	
balance outstanding 16 X ZK 56,900	910,400	
	1338,000	1,097,000
Accumulated profit in year 8 is	912,750	748,455
sufficient to repay outstanding amount of	910,400	946,528

5. Contribution (Variable margin)

Overall contribution (Variable margins) for each year are calculated by COMFAR and appear in print-out 9 - Net Income Statement. Schedules 10-1a, 1b, 1c which follow contain details of costs and sales and show the contribution of each product for year 3. These may be summarized as follows:

	Pineapple ZK'000	Guava ZK'000	Tomato ZK'000	Total ZK'000
Variable costs	591	69	72	732
Contribution	681	76	28	785
Sales income, net	1272	145	100	1517
Fixed costs				670
Net profit = contribution less fixed costs				115

Contribution is the difference between net sales income and total variable cost of any product or of the project as a whole. In other words, of the net sales income, any sum in excess of total variable cost is a contribution to the overall burden of fixed costs of the project as a whole, and when total fixed costs - here for the project ZK 670,000 - have been recovered, profit then begins to be earned.

The significance of this is that the production and sale in year 3 of 42,000 cases of pineapple products is sufficient to generate a contribution of ZK 681,000, enough to recover the entire burden of fixed costs of ZK 670,000, but that without guava and tomato production and sales, profit would amount only to ZK 11,000.

Individual product contributions per case are -

Product	Domestic ZK	Export ZK
Pineapple	18.15	1.93
Guava	15.26	
Tomato	14.04	

Schedule 10-1a -

Product cost - year 3
Pineapple rings, chunks, juice
42,000 cases x 24 cans x 440 grams

			Year	Case	
			ZK	ZK dom.	ZK exp.
VARIABLE					
Fruit			99,960	2.38	
Cans			339,431	8.08	
Labels			73,543	1.75	
Cartons			49,778	1.19	
			562,712	13.40	13.40
Direct labour		=	28,339	.67	.67
Total variable cost			591,051	14.07	14.07
CONTRIBUTION			681,199	18.15	1.93
NET SALES INCOME	ZK				
domestic sales	1192,250			32.23	
foreign sales	80,000		1272,250		16.00
SALES TAX , 20Z, of domestic sales only			238,450	6.45	-
GROSS SALES INCOME					
domestic sales	1430,700			38.[illegible]	
foreign sales	80,000		1510,700		16.00

Schedule 10-1b -

Product cost - year 3
Guava slices
5,000 cases x 24 cans x 440 grams

	Year $K	Case $K
VARIABLE		
Fruit	7,300	1.40
Sugar	3,650	.73
Cans	40,408	8.08
Labels	8,755	1.75
Cartons	5,927	1.19
	65,740	13.15
Direct labour =	3,430	.68
Total variable cost	69,170	13.83
CONTRIBUTION	76,280	15.26
NET SALES INCOME	145,450	29.09
SALES TAX	29,100	5.82
GROSS SALES INCOME	174,550	34.91

Schedule 10-1c -

Product cost - year 3
Tomato puree
2000 cases x 48 cans x 243 grams

		Year IK	Case IK
VARIABLE			
Fruit		37,500	18.75
Cans		23,704	11.35
Labels		7,004	3.50
Cartons		2,371	1.19
		70,579	35.29
Direct labour	=	1,345	.67
Total variable cost		71,924	35.96
CONTRIBUTION		28,096	14.04
NET SALES INCOME		100,000	50.00
SALES TAX		20,000	10.00
GROSS SALES INCOME		120,000	60.00

6. Miscellaneous ratios

		ZK'000	%
Profit before tax:	Sales (net)	115.49:1517.00	7.6
Profit after tax :	Sales (net)	115.49:1517.00	7.6
Profit after tax :	Investment	115.49:1478.00	7.8
Profit after tax + interest :	Investment	115.49+ 133.80:1478.00	16.9

7. Break-even analysis

The following break-even chart shows that, in year 3, the break-even point is reached on the production and sale of 41,800 cases of all products - which represents 85.3% of full capacity.

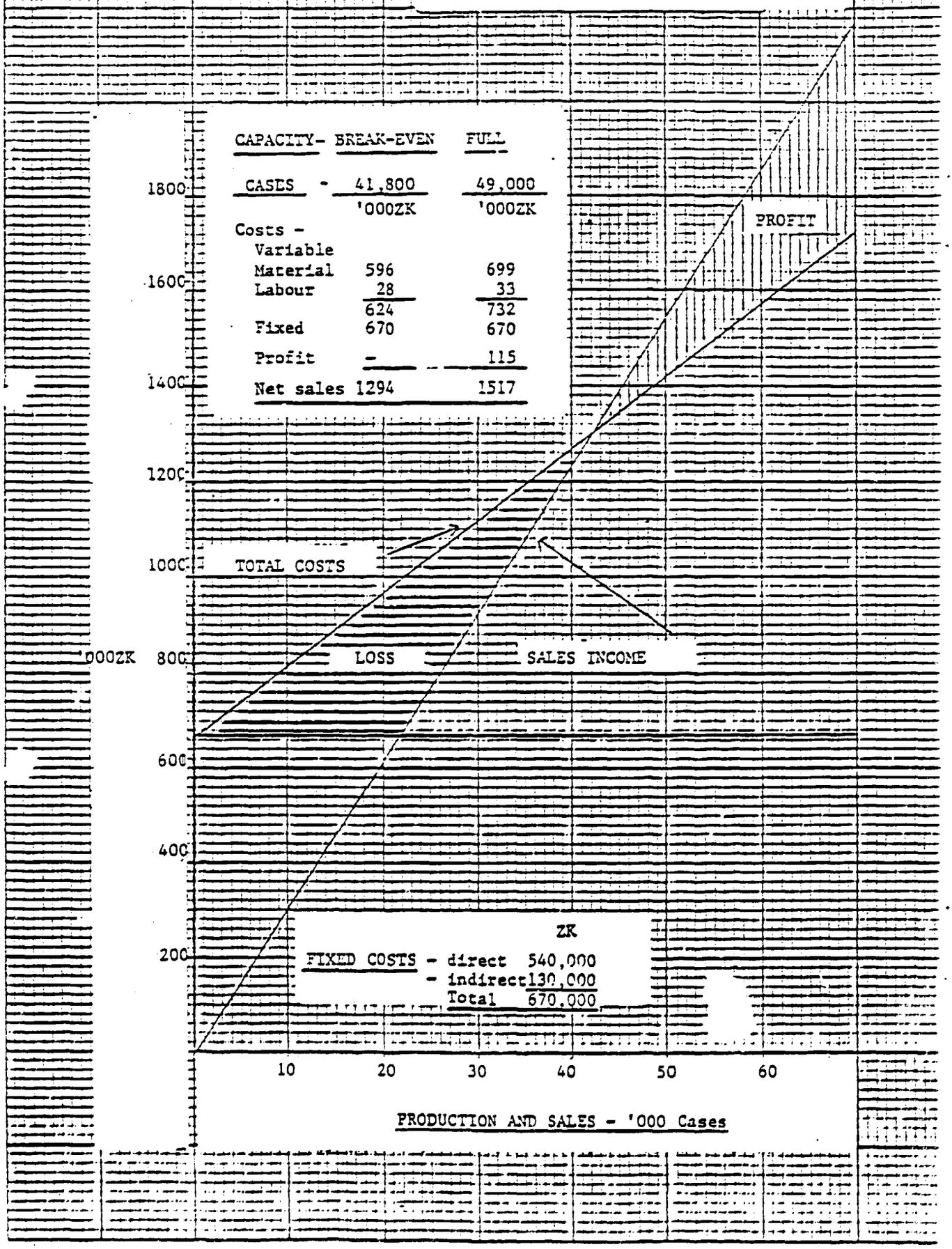
Product		100% cases	85.3% cases
Pineapple	export	5.000	4,265
	domestic	37,000	31,561
Guava	domestic	5,000	4,265
Tomato	domestic	2,000	1,709
		49,000	41,800

8. Sensitivity analysis

COMFAR was utilized to prepare a complete analysis of the base case for which a complete series of COMFAR Output Schedules are attached. A series of possible alternatives was studied to consider the effects of possible variations in levels of production and sales, the effect of increased equipment and civil works costs and the effect special investment promotion incentives would have if the Cannery were to qualify for them. The five alternatives which follow were analyzed; the relevant COMFAR Output Schedules are found on pages 148 to 195 following the "base case" Schedules.

Break-even Graph - Year 3, 1986-87

CAPACITY-	BREAK-EVEN	FULL
CASES -	41,800	49,000
	'000ZK	'000ZK
Costs -		
Variable		
Material	596	699
Labour	28	33
	624	732
Fixed	670	670
Profit	-	115
Net sales	1294	1517



Alternative A - No exports. This alternative assumes that it is not possible to export pineapple products and that total pineapple production is reduced from 42,000 to 37,000 cases; all other conditions remain the same as for the base case. A nominal loss again occurs in year 2 but all other years show a profit (see Net Income Statement, page 154). The accumulated cash balance remains positive throughout the life of the project although net cash outflows occur in years 3, 5, 11 and 15 when loan repayments or equipment replacements are made (Cash-Flow Tables, page 148). The overall financial effect of the reduced production is small because, in the base case, exports are sold at a heavily discounted price in order to compete with other suppliers. The internal rate of return is 7.97% compared to 8.29% when exports are included.

The major effect is economic - if export sales are not included in the Cannery's operating programme, the Cannery will not earn foreign exchange. Therefore, it will be unable to cover its own direct foreign exchange costs for spare parts and interest on the foreign loan components. Thus, exports are included in the Cannery's programme, because of the possibility of earning some needed foreign exchange.

Alternative B - No tomato processing. If tomatoes are not processed in October, annual profits will be lower than in the base case (Net Income Statement, page 165). Earnings are sufficient to accumulate a cash balance so that replacement equipment can be purchased throughout the life of the project (Cash-Flow Tables, page 159). The internal rate of return for Cannery operation will drop from 8.29 to 6.94 if no tomato production will be added to the production programme.

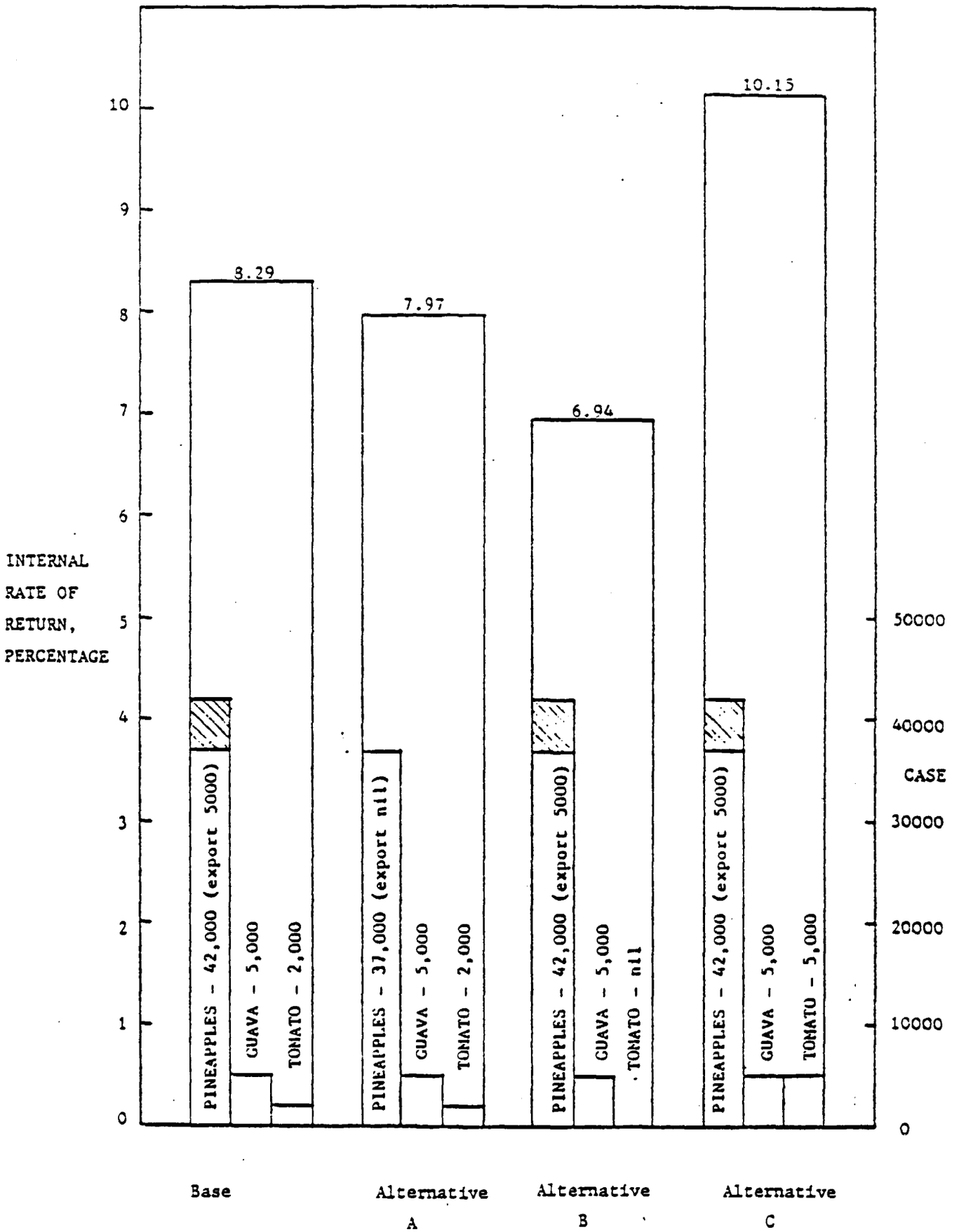
Alternative C - Accelerated tomato processing. If an accelerated tomato growing programme can be carried out - tallow production of 480 cases in year 1, 2,000 in year 2 and 5,000 in year 3 and thereafter - the internal rate of return rises to 10.15%. The Net Income Statement, page 176, indicates that this operation would show a profit in every year. It should be noted, however, that a negative figure of ZK 3,890 occurs in the accumulated cash balance in year 3 of the Cash-Flow Tables, page 170. The deficit occurs because of the increased working capital requirements for the larger tomato processing operation. This is a result of an increase in inventories of materials and finished products.

In practice, a negative accumulated cash balance would not occur - a method of financing the requirements would have to be arranged. One way of avoiding this situation would be to delay the repayment of the bank overdraft of ZK 200,000 which is repaid in year 3 in the base case. If repayment could be delayed by only one month, cash inflows would be sufficient to prevent the cash balance from becoming negative. A small additional interest charge would be incurred, but this would not significantly effect the overall financial evaluation.

Note that feasible normal capacity for processing tomatoes is 4,608 cases per year (see Chapter VI, page 84). This capacity is based on an assumption of plant operations for one month of 2 shifts with 24 working days. If the plant is operated every day of the month (31 days in October) with 2 shifts, a production of 5,000 cases is possible with the proposed equipment.

Effects of these variations (Alternatives A, B and C) in levels of production and sales on the internal rate of return compared to the base case are shown on the chart which follows.

Effect of variations in volumes of production and sales on internal rate of return



Alternative D - Effect of increased costs of equipment and civil works.

If the costs of equipment and civil works increase by say 10%, due, for example to delayed implementation of the project, or to variations in exchange rates and inflation, the internal rate of return for the reference capacity (normal feasible capacity), drops from 8.29% to 7.09%. The need for improved liquidity in year 3 (see Cash-Flow Tables, page 184) requires that the repayment of the overdraft (loan 3L ZK 200,000) be postponed for some months in a similar manner as noted in Alternative C.

Alternative E - Effect of rebate of customs duties and sales tax.

If the Cannery is accepted as a "priority enterprise" under the provisions of the Industrial Development Act of 1977, it would be eligible for various incentives including rebate of customs duties and sales tax on imported machinery. This could amount to ZK 123,000, and so reduce the local loan requirements by at least ZK 148,000. The internal rate of return for the base capacity would then be 10.69% (see Cash-Flow Table, page 197).

In considering various aspects of manufacturing and selling to which the project might be sensitive, great value may be obtained from an examination of the Break-even graph. From this it will be seen that, if production and sales remain at full capacity levels, then

1. For every 1% increase in the purchase prices of raw material, profit would be reduced by ZK 7,000.
2. For every 10% increase in direct labour rates, profit would be reduced by ZK 3,300.
3. For every 1% increase in fixed costs, profit would be reduced by ZK 6,700.
4. For every ZK 1 increase in net selling price per case - all products - profit would be increased by ZK 49,000.

From an examination of Product Costs, Schedules 10/1a-c, on pages 60 - 61, it will be seen that additional production and sales result in additional profit as follows -

Product	Additional production and sales		Contribution per case	Additional profit
	%	cases	ZK	ZK'000
Pineapple	2.5	1050	18.15(dom.)	19
Guava	5	250	15.26	4
Tomato	10	200	14.04	3
	3	1500		26

40. National economic considerations

In addition to the detailed financial evaluation carried out in this chapter, the following brief considerations of the project form the national economic point of view should be noted. Three significant features of the project are: (1) The generation of wealth, (2) the benefits of the Northwestern Province and (3) the foreign exchange requirements.

Generation of wealth

At full capacity, sales will generate income of ZK 1.805 m (US$ 1.480 m) of which ZK 288,000 (US$ 236,000) will be claimed by government as sales tax.

The national net value added (NNVA) of ZK 7.02m, 41% of the value of gross sales of the Cannery, is generated over the first 10 years of the project. The indirect value added within the Northwestern Province is estimated, over the same period, to be ZK 1.38m, less the costs of material inputs purchased by the farmers which are estimated to be less than 10% of the indirect value added.

Benefits to Northwestern Province	Year 3
	ZK
Payments to some 1000 farmers	144,460
Direct labour wages	33,120
Staff salaries	100,000
Overhead costs incurred in Mwinilunga	20,000
	297,580
approximately	300,000
or US $	246,000

Direct payments to staff, labourers and farmers would exceed ZK 275,000 annually from the third year of operation of the modernized Cannery. Total direct payments within the Province approach ZK 300,000 annually. Employment is provided for more than 60 Cannery staff members and labourers and for 600 to 1,000 farmers who grow fruit required by the Cannery.

Foreign exchange

Export sales of 5,000 cases of pineapple products will generate an income equivalent to ZK 80,000 per year in foreign exchange from year 3 onwards. Every year ZK 20,000 is projected as the cost in foreign exchange for spare parts for equipment. Interest on the foreign loan will cost ZK 74,800 every year up to year 5 and will decrease thereafter. Foreign exchange is therefore required for ZK 94,800 of manufacturing costs giving a net foreign exchange deficit of ZK 14,800 per year.

This study assumes that all raw material inputs are purchased locally which is likely to be the case. However, a number of these inputs have a significant foreign exchange component, the most obvious being the cost of imported tinplate to produce cans. Cardboard for cartons and paper and ink for labels are also imported. Note might also be made of the foreign exchange components in fuel costs, vehicle spare parts, and electricity (Mwinilunga's electricity is from a diesel-electric generation system).

The foreign exchange component in the annual cost of cans may be estimated as follows:

		ZK '000
Cost of cans to Cannery		403.5
Sales tax thereon	less	36.7
Zambian supplier's mark-up (approximately 20%)	less	61.1
Suppliers total cost		305.7
Supplier's raw material cost (approximately 60%)		183.4

Foreign exchange component in cost of cans = ZK 183,400 approximately.

Although this foreign exchange component for cans is high, it is almost a certainty that a food canning industry will remain in Zambia and will continue to expand and develop.

Computer print-out 1

TOTAL INITIAL INVESTMENT-COSTS IN: '000 ZAMBIAN KWACHA

PRE-PRODUCTION PHASE (CONSTRUCTION)

Year	1983
Fixed investment costs	
Land site preparation and development	0.0
Buildings and civil works	0.0
Auxiliary and service facilities	200.00
Incorporated fixed assets	0.0
Plant machinery and equipment	0.0
Total fixed investment costs	200.00
Pre-production capital expendit	0.0
Working capital	0.0
Total initial investment costs	200.00
as it foreign, in %	0.0

- the value of existing fixed assets

Computer print-out 2

TOTAL CURRENT INVESTMENT COSTS IN: '000 ZAMBIAN KWACHA

PRODUCTION PHASE

Year	1984	1985	1986	1987	1988
Fixed investment costs:					
Land, site preparation and development	0.0	0.0	0.0	0.0	0.0
Buildings and civil works	145.00	0.0	0.0	0.0	0.0
Auxiliary and service facilities	0.0	0.0	0.0	0.0	200.00
Incorporated fixed assets	0.0	0.0	0.0	0.0	0.0
Plant, machinery and equipment	603.00	0.0	0.0	0.0	141.00
Total fixed investment costs	748.00	0.0	0.0	0.0	341.00
Preproduction capitals expend's 25%	1.99	0.0	0.0	0.0	0.0
Working capital*	561.08	78.57	88.56	0.0	0.0
Total current investment costs	1310.98	78.57	88.56	0.0	341.00
Of it foreign, %	29.06	0.0	0.0	0.0	57.77

* from Networking Capital - Computer print-out 8

TOTAL CURRENT INVESTMENT COSTS IN: '000 ZAMBIAN KWACHA

PRODUCTION PHASE

.AR	1989	1990	1991	1992	1993
Fixed investment costs:					
Land, site preparation and development	0.0	0.0	0.0	0.0	0.0
Buildings and civil works	0.0	0.0	0.0	0.0	0.0
Auxiliary and service facilities	0.0	0.0	0.0	0.0	0.0
Incorporated fixed assets	0.0	0.0	0.0	0.0	0.0
Plant, machinery and equipment	0.0	0.0	0.0	141.00	0.0
Total fixed investment costs	0.0	0.0	0.0	141.00	0.0
Preproduction capitals expend's	0.0	0.0	0.0	0.0	0.0
Working capital	0.0	0.0	0.0	0.0	0.0
Total current investment costs	0.0	0.0	0.0	141.00	0.0
Of it foreign, %	0.0	0.0	0.0	42.55	0.0

Computer print-out 2

TOTAL CURRENT INVESTMENT COSTS (In: [illegible])

PRODUCTION PHASE

Year	1994	1995	1996	1997	1998
Fixed investment costs:					
Land, site preparation and development	0.0	0.0	0.0	0.0	0.0
Buildings and civil works	0.0	0.0	0.0	0.0	0.0
Auxiliary and service facilities	0.0	0.0	0.0	0.0	200.00
Incorporated fixed assets	0.0	0.0	0.0	0.0	0.0
Plant, machinery and equipment	462.00	0.0	141.00	0.0	0.0
Total fixed investment costs	462.00	0.0	141.00	0.0	200.00
Preproduction capital expend's	0.0	0.0	0.0	0.0	0.0
Working capital	0.0	0.0	0.0	0.0	0.0
Total current investment costs	462.00	0.0	141.00	0.0	200.00
Of it foreign, %	68.40	0.0	42.55	0.0	67.00

SOURCE OF FINANCE, PRE-PRODUCTION IN '000 ZAMBIAN KWACHA Computer print-out 3

Year	1985
Equity, ordinary	200.00
Equity, preference	0.0
Subsidies, grants	0.0
Loan AF	0.0
Loan SF	0.0
Loan OF	0.0
Loan AL	0.0
Loan SL	0.0
Loan OL	0.0
Total loan	0.0
Current liabilities	0.0
Bank overdraft	0.0
Total funds available ...	200.00

The value of existing fixed assets, of ZK 200,000 is represented by Equity, ordinary.

Computer print-out 4

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1984	1985	1986	1987	1988
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	331.00	0.0	0.0	0.0	-19.05
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	367.00	0.0	0.0	0.0	-18.35
Loan BL	200.00	0.0	-200.00	0.0	0.0
Loan CL	382.98	27.02	0.0	0.0	-19.50
Total loan	1310.98	27.02	-200.00	0.0	-56.90
Current liabilities	57.50	9.75	11.19	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	1368.48	36.75	-188.81	0.0	-56.90

retained profit not included

Loans - AF and AL - equipment
BL - existing fixed assets
CL - working capital (Par V)

Costs of financing - 10% per annum from year 1, and front-end fee of .25%
Debt servicing - 10% on reducing balances outstanding after annual repayment of ZK 56.900 for 20 years, starting year 5 and totalling ZK 1,3308.000.

COMFAR 1.0 - Vienna

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

AF	1989	1990	1991	1992	1993
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	-19.05	-19.05	-19.05	-19.05	-19.05
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	-18.35	-18.35	-18.35	-18.35	-18.35
Loan BL	0.0	0.0	0.0	0.0	0.0
Loan CL	-19.50	-19.50	-19.50	-19.50	-19.50
Total loan	-56.90	-56.90	-56.90	-56.90	-56.90
Current liabilities	0.0	0.0	0.0	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	-56.90	-56.90	-56.90	-56.90	-56.90

retained profit not included

Computer print-out 4

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1994	1995	1996	1997	1998
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan MF	-19.05	-19.05	-19.05	-19.05	-19.05
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan ML	-18.35	-18.35	-18.35	-18.35	-18.35
Loan BL	0.0	0.0	0.0	0.0	0.0
Loan CL	-19.50	-19.50	-19.50	-19.50	-19.50
Total loan	-56.90	-56.90	-56.90	-56.90	-56.90
Current liabilities	0.0	0.0	0.0	0.0	0.0
Overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	-56.90	-56.90	-56.90	-56.90	-56.90

retained profit not included

C A S H F L O W T A B L E S ,PRE-PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA Computer print-out 5

Year	1983
Total CF-inflow	200.00
. Financial resources	200.00
. Sales	0.0
Total CF-outflow	200.00
. Total assets	200.00
. Operating costs	0.0
. Debt service and interest	0.0
. Repayment	0.0
. Corporate tax	0.0
. Dividends paid	0.0
Surplus (deficit)	0.0
Accumulated cash balance	0.0

C A S H F L O W T A B L E S, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA Computer print-out 6

Year	1984	1985	1986	1987	1988
Total CF-inflow	2536.60	1529.10	1905.34	1905.34	1905.34
. Financial resources	1310.98	27.02	0.0	0.0	0.0
. Sales	1225.62	1501.08	1905.34	1905.34	1905.34
Total CF-outflow	2523.26	1470.21	1865.25	1545.50	1943.40
. Total assets	1332.48	88.32	99.74	0.0	341.00
. Operating costs .including.sales tax	1089.23	1249.44	1431.70	1431.70	1431.70
. Debt service and interest	65.55	132.45	133.80	113.80	113.80
. Repayment	0.0	0.0	200.00	0.0	56.90
. Corporate tax	0.0	0.0	0.0	0.0	0.0
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	13.35	57.88	-59.91	259.84	-138.06
Cumulated cash balance	13.35	71.23	11.32	271.16	133.10

COMFAR 1.0 - Vienna

C A S H F L O W T A B L E S, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total CF-inflow	1905.34	1905.34	1905.34	1905.34	1905.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1905.34	1905.34	1905.34	1905.34	1905.34
Total CF-outflow	1596.71	1591.02	1585.33	1799.63	1656.72
. Total assets	0.0	0.0	0.0	141.00	0.0
. Operating costs .including.salestax	1431.70	1431.70	1431.70	1431.70	1431.70
. Debt service and interest	108.11	102.42	96.73	91.04	85.35
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	0.0	0.0	0.0	77.69	82.77
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	208.63	214.32	220.01	6.81	148.62
Cumulated cash balance	341.73	556.05	776.05	782.86	931.48

Computer print-out 6

CASHFLOW TABLES, PRODUCTION PHASE IN: 1000 ZAMBIAN KWACHA

Year	1994	1995	1996	1997	1998
Total CF-inflow	1805.34	1805.34	1805.34	1805.34	1805.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1805.34	1805.34	1805.34	1805.34	1805.34
Total CF-outflow	2115.59	1650.46	1788.34	1644.21	1841.08
. Total assets	462.00	0.0	141.00	0.0	200.00
. Operating costs ..including sales tax	1431.70	1431.70	1431.70	1431.70	1431.70
. Debt service and interest	77.66	73.97	68.28	62.59	56.90
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	55.33	87.39	90.45	93.01	95.57
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	-310.25	154.88	17.00	161.13	-35.74
Cumulated cash balance	621.22	776.10	793.10	954.24	918.50

CASHFLOW DISCOUNTING:

a) Interest payable on loan = cash-outflow:
Net present value at 10.0% = -155.23
Internal Rate of Return 8.29 %

b) Interest payable on loan added back to net-cashflow:
Net present value at 10.0% = 584.34
Internal Rate of Return 16.53 %

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

Computer print-out 7

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year.....	1994	1995	1996	1997	1998
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A.....	84.80	110.03	144.46	144.46	144.46
Other raw materials.....	373.72	480.16	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	22.64	27.72	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	159.00	159.00	159.00	159.00	159.00
Factory costs	659.96	806.93	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution m..salestax	196.27	239.51	287.55	287.55	287.55
Depreciation	40.00	124.35	124.35	124.35	124.35
Financial costs	95.55	132.45	113.80	113.80	113.80
Total manufacturing costs	1194.78	1506.24	1669.85	1669.85	1669.85
Of it variable.%	48.17	47.20	52.21	52.97	52.97
Total labour	22.64	27.72	33.12	33.12	33.12

Raw material A - costs of purchases of fruit
Other raw materials - costs of sugar (for guava) cans, labels and cartons
Administrative overheads include selling and distribution costs of ZK 73.000
Factory overheads include costs of energy, utilities and repairs and maintenance of fixed a

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

.....	1989	1990	1991	1992	1993
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A.....	144.46	144.46	144.46	144.46	144.46
Other raw materials.....	554.57	554.57	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	33.12	33.12	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	159.00	159.00	159.00	159.00	159.00
Factory costs	941.15	941.15	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution m.salestax	287.55	287.55	287.55	287.55	287.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	108.11	102.42	96.73	91.04	85.35
Total manufacturing costs	1644.16	1638.47	1632.78	1627.09	1621.40
Of it variable.%	53.97	54.20	54.42	54.66	54.89
Total labour	33.12	33.12	33.12	33.12	33.12

TOTAL PRODUCTION COSTS IN: [illegible] Computer print-out 7

Year	1994	1995	1996	1997	1998
% of max. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	144.46	144.46	144.46	144.46	144.46
Other raw materials	554.57	554.57	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	33.12	33.12	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	941.15	941.15	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution salestax	287.55	287.55	287.55	287.55	287.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	79.66	73.37	69.28	62.59	56.99
Total manufacturing costs	1615.71	1610.02	1604.33	1598.64	1592.75
Of it variable,%	53.13	55.36	55.60	55.84	56.09
Total labour	33.12	33.12	33.12	33.12	33.12

NET WORKING CAPITAL IN: '000 AUSTRIAN SCHILLING Computer print-out 8

Coverage:	adc	coto	1994	1995	1996	1997	1998
Current assets							
Accounts receivable	60	5.9	183.29	209.91	240.28	240.28	240.28
Inventory and materials	81	4.4	104.23	123.44	154.35	154.35	154.35
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	26.83	31.38	36.60	36.60	36.60
Finished products	100	3.6	246.04	280.54	317.82	317.82	317.82
Cash in hand	30	12.0	36.22	36.64	37.09	37.09	37.09
Total current assets			618.55	706.90	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	57.50	67.24	78.43	78.43	78.43
Net working capital			561.03	639.66	728.22	728.22	728.22
Increase in working capital			561.08	78.57	88.56	0.0	0.0
working capital, local currency			541.08	619.66	702.22	708.22	708.22
net working capital, foreign currency			20.00	20.00	20.00	20.00	20.00

Notes: adc = minimum days of coverage ; coto = coefficient of turnover .

Accounts receivable - co-efficient of turnover is a weighted average
Inventory and material - minimum days of coverage is a weighted average

NET WORKING CAPITAL IN: '000 AUSTRIAN SCHILLING

Coverage:	adc	coto	1989	1990	1991	1992	1993
Current assets							
Accounts receivable	60	5.9	240.28	240.28	240.28	240.28	240.28
Inventory and materials	81	4.4	154.35	154.35	154.35	154.35	154.35
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	36.60	36.60	36.60	36.60	36.60
Finished products	100	3.6	317.82	317.82	317.82	317.82	317.82
Cash in hand	30	12.0	37.09	37.09	37.09	37.09	37.09
Total current assets			806.65	806.65	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	78.43	78.43	78.43	78.43	78.43
Net working capital			728.22	728.22	728.22	728.22	728.22
Increase in working capital			0.0	0.0	0.0	0.0	0.0
Net working capital, local currency			708.22	708.22	708.22	708.22	708.22
Net working capital, foreign currency			20.00	20.00	20.00	20.00	20.00

Notes: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: [illegible]

Computer print-out 8

Coverage:	adc	coto					
Year			1994	1995	1996	1997	1998
Current assets							
Accounts receivable	60	5.9	240.28	240.28	240.28	240.28	240.28
Inventory and materials.....	31	4.4	154.35	154.35	154.35	154.35	154.35
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	36.60	36.60	36.60	36.60	36.60
Finished products	100	3.6	317.82	317.82	317.82	317.82	317.82
Cash in hand	30	12.0	37.09	37.09	37.09	37.09	37.09
Total current assets			806.65	806.65	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	78.43	78.43	78.43	78.43	78.43
Net working capital			728.22	728.22	728.22	728.22	728.22
Increase in working capital			0.0	0.0	0.0	0.0	0.0
Net working capital, local currency ...			708.22	708.22	708.22	708.22	708.22
Net working capital, foreign currency ...			20.00	20.00	20.00	20.00	20.00

Notes: adc = minimum days of coverage ; coto = coefficient of turnover .

NET INCOME STATEMENT PRODUCTION IN '000 ZAMBIAN KWACHA

Computer print-out 9

Year	1984	1985	1986	1987	1988
Total sales, including sales tax	1225.62	1501.08	1805.34	1805.34	1805.34
Less: variable costs, including sales tax	677.23	937.44	1019.70	1019.70	1019.70
Variable margin	548.39	563.64	785.64	785.64	785.64
As % of total sales excluding salestax	44.74	44.21	43.52	43.52	43.52
Non-variable costs, including depreciation	452.00	536.35	536.35	536.35	536.35
Operational margin	96.39	127.29	249.29	249.29	249.29
As % of total sales excluding salestax	7.86	8.48	13.81	13.81	13.81
Cost of finance	65.55	132.45	133.80	113.80	113.80
Gross profit before tax	30.84	-5.16	115.49	135.49	135.49
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	30.84	0.0	115.49	135.49	135.49
:	0.0	0.0	0.0	0.0	0.0
Net profit after tax	30.84	-5.16	115.49	135.49	135.49
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	30.84	-5.16	115.49	135.49	135.49
Accumulated undistributed profit	30.84	25.68	141.17	276.66	412.15
Gross profit, % of total sales excluding salestax	3.00	- 0.04	7.61	8.93	8.93
Net profit, % of total sales "	3.00	- 0.04	7.61	8.93	8.93
Net profit % of capital employed (RCE)	2.00	- 0.03	7.82	8.39	8.00

Taxation does not become payable, by reason of the carrying forward of previous losses, until year 9.

NET INCOME STATEMENT PRODUCTION IN '000 ZAMBIAN KWACHA Computer print-out 9

Year	1989	1990	1991	1992	1993
Total sales, including sales tax	1805.34	1805.34	1805.34	1805.34	1805.34
Less: variable costs, including sales tax	1019.70	1019.70	1019.70	1019.70	1019.70
Variable margin	785.64	785.64	785.64	785.64	785.64
As % of total sales excluding salestax	43.52	43.52	43.52	43.52	43.52
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	269.29	269.29	269.29	269.29	269.29
As % of total sales excluding salestax	14.92	14.92	14.92	14.92	14.92
Cost of finance	108.11	102.42	96.73	91.04	85.35
Gross profit ...before tax...	161.18	166.87	172.56	178.25	183.94
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	161.18	166.87	172.56	173.09	183.94
Tax	0.0	0.0	0.0	77.39	82.77
Net profit ...after tax...	161.18	166.87	172.56	100.36	101.17
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	161.18	166.87	172.56	100.36	101.17
Accumulated undistributed profit	573.33	740.19	912.75	1013.11	1114.28
Gross profit, % of total sales excluding salestax	10.62	10.99	11.37	11.73	12.12
Net profit, % of total sales "	10.62	10.99	11.37	6.61	6.67
Net profit % of capital employed (RCE)	8.97	8.75	8.53	4.86	4.79

NET INCOME STATEMENT PRODUCTION [illegible] Computer print-out 9

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1805.34	1805.34	1805.34	1805.34	1805.34
Less: variable costs, including sales tax	1019.70	1019.70	1019.70	1019.70	1019.70
Variable margin	785.64	785.64	785.64	785.64	785.64
As % of total sales excluding salestax	43.52	43.52	43.52	43.52	43.52
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	269.29	269.29	269.29	269.29	269.29
As % of total sales excluding salestax	14.92	14.92	14.92	14.92	14.92
Cost of finance	79.66	73.97	68.23	62.59	56.90
Gross profit before tax	189.63	195.32	201.01	206.70	212.39
Allowances	0.0	0.0	0.0	0.0	0.0	
Taxable profit	189.63	195.32	201.01	206.70	212.39
Tax	85.33	87.89	90.45	93.01	95.57
Net profit after tax	104.30	107.43	110.55	113.68	116.81
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	104.30	107.43	110.55	113.68	116.81
Accumulated undistributed profit	1219.57	1326.99	1436.55	1550.24	1667.05
Gross profit, % of total sales excluding salestax	12.49	12.87	13.24	13.62	13.99
Net profit, % of total sales "	6.87	7.08	7.28	7.49	7.70
Net profit% of capital employed (RCE)	4.83	4.86	4.89	4.90	4.91

PROJECTED BALANCE-SHEET, PRE-PRODUCTION IN: [illegible] Computer print-out 10

Year	1983
Total assets	200.00
Fixed assets, net of depreciation	0.0
Construction in progress	200.00
Current assets	0.0
Cash, bank	0.0
Cash surplus, finance available	-0.0
Total liabilities	200.00
Equity capital	200.00
Reserves, retained profit	0.0
Profit.(loss)	0.0
Long and medium term debt	0.0
Current liabilities	0.0
Bank overdraft, finance required	0.0
Total debt	0.0
Capital employed : network	200.00

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA Computer print-out 11

Year	1994	1995	1996	1997	1998
Total assets	1599.32	1630.93	1557.68	1693.89	1771.68
Fixed assets, net of depreciation	180.00	790.71	666.36	542.01	417.66
Construction in progress	749.30	0.0	0.0	0.0	341.00
Current assets	900.36	670.26	769.55	769.55	769.55
Cash, bank	36.22	36.64	37.09	37.09	37.09
Cash surplus, finance available	78.84	133.31	84.59	344.43	206.37
Total liabilities	1599.32	1630.93	1557.68	1693.89	1771.68
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	0.0	30.34	25.18	141.17	276.66
Profit,(loss)	30.34	-5.16	115.49	135.49	135.49
Long and medium term debt	1311.49	1333.00	1138.00	1138.00	1081.10
Current liabilities	57.50	67.24	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1368.49	1405.24	1216.43	1216.43	1159.53
Capital employed: networth	1541.82	1563.69	1479.17	1614.66	1693.25

Capital employed (networth) is represented by fixed assets plus net current assets

Net current assets = current assets less current liabilities

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total assets	1875.96	1985.92	2101.58	2145.04	2169.31
Fixed assets, net of depreciation	554.31	549.96	445.61	336.19	372.75
Construction in progress	0.0	0.0	0.0	141.00	0.0
Current assets	769.55	769.55	769.55	769.55	769.55
Cash, bank	37.09	37.09	37.09	37.09	37.09
Cash surplus, finance available	415.00	629.32	849.32	861.29	1009.91
Total liabilities	1875.96	1985.92	2101.58	2145.04	2169.31
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	412.15	573.28	740.14	912.75	1013.11
Profit,(loss)	161.13	166.87	172.56	100.36	101.17
Long and medium term debt	1024.20	967.20	910.40	853.50	796.60
Current liabilities	78.43	78.43	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1102.63	1045.73	988.83	931.93	875.03
Capital employed: net worth	1797.53	1907.49	2023.15	2066.61	2110.80

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA Computer print-out 11

Year	1994	1995	1996	1997	1998
Total assets	2236.70	2297.23	2340.83	2397.66	2457.58
Fixed assets, net of depreciation	768.40	626.05	521.70	553.35	454.00
Construction in progress	462.00	0.0	141.00	0.0	200.00
Current assets	769.55	769.55	769.55	769.55	769.55
Cash, bank	37.09	37.09	37.09	37.09	37.09
Cash surplus, finance available	699.65	954.53	971.53	1032.67	996.93
Total liabilities	2236.70	2297.23	2340.83	2397.66	2457.58
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	1114.23	1218.57	1325.00	1436.55	1550.24
Profit,(loss)	104.30	107.43	110.55	113.68	116.31
Long and medium term debt	739.70	662.30	625.90	569.00	512.10
Current liabilities	78.43	78.43	78.43	78.43	78.43
Net overdraft, finance required	0.0	0.0	0.0	0.0	0.0	
Trade debt	319.13	761.23	704.33	647.43	590.53
Capital employed: networth	2158.27	2208.80	2262.45	2319.23	2379.15

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

ALTERNATIVE A

Year	1984	1985	1986	1987	1988
Total CF-inflow	2462.88	1490.37	1725.34	1725.34	1725.34
. Financial resources	1284.71	65.39	0.0	0.0	0.0
. Sales	1177.62	1437.98	1725.34	1725.34	1725.34
Total CF-outflow	2449.73	1402.67	1754.94	1475.13	1375.03
. Total assets	1338.68	78.39	89.31	0.0	341.00
. Operating costs	1047.31	1193.14	1361.33	1361.33	1361.33
. Debt service and interest	64.24	131.14	133.30	113.80	113.80
. Repayment	0.0	0.0	200.00	0.0	56.90
. Corporate tax	0.0	0.0	0.0	0.0	0.0
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	12.40	87.70	-29.60	250.21	-147.69
Cumulated cash balance	12.40	100.10	40.50	290.71	142.31

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CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total CF-inflow	1725.34	1725.34	1725.34	1725.34	1725.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1725.34	1725.34	1725.34	1725.34	1725.34
Total CF-outflow	1526.34	1520.65	1514.76	1720.95	1582.02
. Total assets	0.0	0.0	0.0	141.00	0.0
. Operating costs	1361.33	1361.33	1361.33	1361.33	1361.33
. Debt service and interest	108.11	102.42	96.53	91.04	85.33
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	0.0	0.0	0.0	70.68	78.44
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	199.00	204.69	210.58	4.39	143.32
Cumulated cash balance	342.01	546.70	757.08	761.46	904.78

CASHFLOW TABLES, PRODUCTION PHASE IN: 1000 ZAMBIAN KWACHA

ALTERNATIVE A

Year	1994	1995	1996	1997	1998
Total CF-inflow	1725.34	1725.34	1725.34	1725.34	1725.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1725.34	1725.34	1725.34	1725.34	1725.34
Total CF-outflow	2040.89	1575.76	1713.63	1569.59	1766.37
. Total assets	462.00	0.0	141.00	0.0	200.00
. Operating costs	1361.33	1361.33	1361.33	1361.33	1361.33
. Debt service and interest	79.66	77.97	68.23	62.59	56.90
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	81.00	83.56	86.12	88.68	91.24
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	-315.55	149.59	11.71	155.34	-41.03
Cumulated cash balance	589.23	738.81	750.52	906.05	865.02

CASHFLOW DISCOUNTING:

a) Interest payable on loan = cash-outflow:

Net present value at	10.0 % =	-191.86
Internal Rate of Return	7.97 %	

b) Interest payable on loan added back to net-cashflows:

Net present value at	10.0 % =	535.42
Internal Rate of Return	16.34 %	

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

Total cash-outflow at	10.0 % , FVAL =	200.00
Total cash-outflow, Nominal value	NVAL =	200.00

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TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE A

Year	1984	1985	1986	1987	1988
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	77.46	100.51	132.56	132.56	132.56
Other raw materials	340.67	416.10	499.48	499.48	499.48
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	20.61	25.02	29.74	29.74	29.74
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	647.74	750.63	870.78	870.78	870.78
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	196.27	239.51	287.55	287.55	287.55
Depreciation	40.00	124.35	124.35	124.35	124.35
Financial costs	64.24	131.14	133.80	113.80	113.80
Total manufacturing costs	1151.24	1448.63	1619.48	1599.48	1599.48

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TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	132.56	132.56	132.56	132.56	132.56
Other raw materials	499.48	499.48	499.48	499.48	499.48
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	29.74	29.74	29.74	29.74	29.74
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	870.78	870.78	870.78	870.78	870.78
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	287.55	287.55	287.55	287.55	287.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	109.11	102.42	96.73	91.04	85.35
Total manufacturing costs	1573.79	1568.10	1562.41	1556.72	1551.03

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE A

Year	1994	1995	1996	1997	1998
% of nom. capacity (single product only)	0.0	0.0	0.0	0.0	0.0
Raw material A	132.56	132.56	132.56	132.56	132.56
Other raw materials	499.48	499.48	499.48	499.48	499.48
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	29.74	29.74	29.74	29.74	29.74
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	870.78	870.78	870.78	870.78	870.78
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	287.55	287.55	287.55	287.55	287.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	79.66	73.97	68.28	62.59	56.90
Total manufacturing costs	1545.34	1539.65	1533.96	1528.27	1522.58

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NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE A

Coverage:	adc	coto	1994	1995	1996	1997	1998
Year							
Current assets &							
Accounts receivable	60	5.9	176.17	200.52	228.56	228.56	228.56
Inventory and materials	31	4.4	95.06	116.14	139.48	139.48	139.48
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	25.19	29.19	33.86	33.86	33.86
Finished products	100	3.6	236.32	264.90	298.27	298.27	298.27
Cash in hand	30	12.0	36.05	36.42	36.81	36.81	36.81
Total current assets			588.78	667.17	756.99	756.99	756.99
Current liabilities and							
Accounts payable	30	12.0	53.99	62.55	72.57	72.57	72.57
Net working capital			534.81	604.62	684.42	684.42	684.42
Increase in working capital			534.81	69.82	79.80	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

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NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

Coverage:	adc	coto	1999	1990	1991	1992	1993
Year							
Current assets &							
Accounts receivable	60	5.9	228.56	228.56	228.56	228.56	228.56
Inventory and materials	31	4.4	139.48	139.48	139.48	139.48	139.48
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	33.86	33.86	33.86	33.86	33.86
Finished products	100	3.6	298.27	298.27	298.27	298.27	298.27
Cash in hand	30	12.0	36.81	36.81	36.81	36.81	36.81
Total current assets			756.99	756.99	756.99	756.99	756.99
Current liabilities and							
Accounts payable	30	12.0	72.57	72.57	72.57	72.57	72.57
Net working capital			684.42	684.42	684.42	684.42	684.42
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B A

Coverage:	mdc	coto	1994	1995	1996	1997	1998
Year							
Current assets :							
Accounts receivable	60	5.9	223.56	223.56	223.56	223.56	223.56
Inventory and materials	31	4.4	139.48	139.48	139.48	139.48	139.48
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	33.36	33.36	33.36	33.36	33.36
Finished products	100	3.6	299.27	299.27	299.27	299.27	299.27
Cash in hand	30	12.0	76.31	76.31	76.31	76.31	76.31
Total current assets			756.99	756.99	756.99	756.99	756.99
Current liabilities and							
Accounts payable	30	12.0	72.57	72.57	72.57	72.57	72.57
Net working capital			684.42	684.42	684.42	684.42	684.42
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE A

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1177.62	1437.05	1725.34	1725.34	1725.34
Less: variable costs, including sales tax	635.01	781.14	949.33	949.33	949.33
Variable margin	542.61	655.94	776.01	776.01	776.01
As % of total sales	46.08	45.64	44.98	44.98	44.98
Non-variable costs, including depreciation	452.00	536.05	536.05	536.05	536.05
Operational margin	90.61	119.89	239.96	239.96	239.96
As % of total sales	7.69	8.32	13.89	13.89	13.89
Cost of finance	64.24	131.14	113.60	113.60	113.60
Gross profit	26.38	-11.25	105.36	125.36	125.36
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	26.38	0.0	105.36	125.36	125.36
Tax	0.0	0.0	0.0	0.0	0.0
Net profit	26.38	-11.25	105.36	125.36	125.36
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	26.38	-11.25	105.36	125.36	125.36
Accumulated undistributed profit	26.38	14.87	120.67	246.54	372.40

ALTERNATIVE A

NET INCOME STATEMENT PRODUCTION IN '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total sales, including sales tax	1725.34	1725.34	1725.34	1725.34	1725.34
Less: variable costs, including sales tax	949.33	949.33	949.33	949.33	949.33
Variable margin	776.01	776.01	776.01	776.01	776.01
As % of total sales	44.98	44.98	44.98	44.98	44.98
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	259.66	259.66	259.66	259.66	259.66
As % of total sales	15.05	15.05	15.05	15.05	15.05
Cost of finance	108.11	102.42	96.73	91.04	85.35
Gross profit	151.55	157.24	162.93	168.62	174.31
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	151.55	157.24	162.93	157.87	174.31
Tax	0.0	0.0	0.0	70.68	78.44
Net profit	151.55	157.24	162.93	97.94	95.87
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	151.55	157.24	162.93	97.94	95.87
Accumulated undistributed profit	525.95	683.18	846.11	942.05	1037.92

NET INCOME STATEMENT PRODUCTION IN '000 ZAMBIAN KWACHA

ALTERNATIVE B A

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1725.34	1725.34	1725.34	1725.34	1725.34
Less: variable costs, including sales tax	949.33	949.33	949.33	949.33	949.33
Variable margin	776.01	776.01	776.01	776.01	776.01
As % of total sales	44.98	44.98	44.98	44.98	44.98
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	259.66	259.66	259.66	259.66	259.66
As % of total sales	15.05	15.05	15.05	15.05	15.05
Cost of finance	79.66	73.97	68.28	62.59	56.90
Gross profit	180.00	185.69	191.38	197.07	202.76
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	180.00	185.69	191.38	197.07	202.76
Tax	81.00	83.56	86.12	88.68	91.24
Net profit	99.00	102.13	105.26	108.39	111.52
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	99.00	102.13	105.26	108.39	111.52
Accumulated undistributed profit	1136.92	1239.04	1344.30	1452.69	1564.21

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA ALTERNATIVE A

Year	1984	1985	1986	1987	1988
Total assets	1565.06	1615.03	1531.25	1657.11	1726.07
Fixed assets, net of depreciation	160.00	797.10	672.75	546.40	424.05
Construction in progress	749.90	0.0	0.0	0.0	341.00
Current assets	552.73	630.76	720.17	720.17	720.17
Cash, bank	36.05	36.42	36.81	36.81	36.81
Cash surplus, finance available	66.38	151.11	101.51	351.72	294.05
Total liabilities	1565.06	1615.03	1531.25	1657.11	1726.07
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	0.0	25.38	14.33	120.89	246.54
Profit, (loss)	25.38	-11.05	105.86	125.86	125.86
Long and medium term debt	1284.71	1338.00	1138.00	1138.00	1091.10
Current liabilities	53.98	62.65	72.57	72.57	72.57
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1338.68	1400.65	1210.57	1210.57	1163.67
Equity, % of liabilities	12.78	12.38	13.06	12.07	11.59

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total assets	1820.71	1921.05	2027.08	2068.11	2107.08
Fixed assets, net of depreciation	660.70	556.35	452.00	356.10	372.75
Construction in progress	0.0	0.0	0.0	141.00	0.0
Current assets	720.17	720.17	720.17	720.17	720.17
Cash, bank	36.81	36.81	36.81	36.81	36.81
Cash surplus, finance available	403.03	607.71	818.09	854.03	977.35
Total liabilities	1820.71	1921.05	2027.08	2068.11	2107.08
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	372.40	523.95	681.18	844.11	942.05
Profit, (loss)	151.55	157.24	162.93	97.94	95.87
Long and medium term debt	1024.20	967.30	910.40	853.50	796.60
Current liabilities	72.57	72.57	72.57	72.57	72.57
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1096.77	1039.87	982.97	926.07	869.17
Equity, % of liabilities	10.99	10.41	9.87	9.37	8.49

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B A

Year	1994	1995	1996	1997	1998
Total assets	2149.18	2194.41	2242.77	2294.25	2348.87
Fixed assets, net of depreciation	288.40	626.95	521.70	556.55	454.00
Construction in progress	462.00	0.0	141.00	0.0	200.00
Current assets	720.17	720.17	720.17	720.17	720.17
Cash, bank	36.81	36.81	36.81	36.81	36.81
Cash surplus, finance available	661.80	811.37	823.08	979.92	937.89
Total liabilities	2149.18	2194.41	2242.77	2294.25	2348.87
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	1037.92	1136.92	1239.04	1344.38	1452.69
Profit/loss	99.00	102.13	105.34	108.69	111.52
Long and medium term debt	739.70	682.80	625.90	569.00	512.10
Current liabilities	72.57	72.57	72.57	72.57	72.57
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	812.27	755.37	698.47	641.57	584.67
Equity, % of liabilities	9.31	9.11	8.92	8.72	8.51

C A S H F L O W T A B L E S, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1994	1995	1996	1997	1998
Total CF-inflow	2497.82	1478.08	1685.34	1685.34	1685.34
. Financial resources	1301.00	37.00	0.0	0.0	0.0
. Sales	1196.82	1441.08	1685.34	1685.34	1685.34
Total CF-outflow	2489.28	1411.38	1749.54	1453.59	1951.49
. Total assets	1357.86	75.95	75.95	0.0	341.00
. Operating costs	1067.17	1203.49	1339.79	1339.79	1339.79
. Debt service and interest	65.05	131.95	133.80	113.80	113.80
. Repayment	0.0	0.0	200.00	0.0	56.90
. Corporate tax	0.0	0.0	0.0	0.0	0.0
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	8.54	66.70	-64.20	231.75	-166.15
Cumulated cash balance	8.54	75.24	11.04	242.79	76.63

C A S H F L O W T A B L E S, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total CF-inflow	1685.34	1685.34	1685.34	1685.34	1685.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1685.34	1685.34	1685.34	1685.34	1685.34
Total CF-outflow	1504.80	1499.11	1493.42	1687.89	1552.17
. Total assets	0.0	0.0	0.0	141.00	0.0
. Operating costs	1339.79	1339.79	1339.79	1339.79	1339.79
. Debt service and interest	108.11	102.42	96.73	91.04	85.35
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	0.0	0.0	0.0	59.15	70.13
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	180.54	186.23	191.92	-2.55	133.17
Cumulated cash balance	257.17	443.40	635.31	632.77	765.93

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1994	1995	1996	1997	1998
Total CF-inflow	1685.34	1685.34	1685.34	1685.34	1685.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1685.34	1685.34	1685.34	1685.34	1685.34
Total CF-outflow	2011.04	1545.92	1683.79	1539.66	1736.53
. Total assets	462.00	0.0	141.00	0.0	200.00
. Operating costs	1339.79	1339.79	1339.79	1339.79	1339.79
. Debt service and interest	79.66	73.97	66.28	62.59	56.90
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	72.69	75.25	77.81	80.37	82.93
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	-325.70	139.42	1.55	145.68	-51.19
Cumulated cash balance	440.23	579.65	581.21	726.89	675.71

CASHFLOW DISCOUNTING:

a) Interest payable on loan = cash-outflow:

Net present value at	10.0 % =	1376.66
Internal Rate of Return	6.94 %	

b) Interest payable on loan added back to net-cashflow:

Net present value at	10.0 % =	2760.11
Internal Rate of Return	15.19 %	

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

Total cash-outflow at	0.0 % , FVAL =	200.00
Total cash-outflow, Nominal value	NVAL =	200.00

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1984	1985	1986	1987	1988
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	75.80	91.28	106.96	106.96	106.96
Other raw materials	365.78	443.64	521.49	521.49	521.49
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	22.32	27.05	31.79	31.79	31.79
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	672.70	770.97	869.24	869.24	869.24
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	191.47	229.51	267.55	267.55	267.55
Depreciation	40.00	124.35	124.35	124.35	124.35
Financial costs	65.05	131.95	113.80	113.80	113.80
Total manufacturing costs	1172.22	1459.79	1597.94	1577.94	1577.94

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	106.96	106.96	106.96	106.96	106.96
Other raw materials	521.49	521.49	521.49	521.49	521.49
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	31.79	31.79	31.79	31.79	31.79
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	869.24	869.24	869.24	869.24	869.24
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	267.55	267.55	267.55	267.55	267.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	108.11	102.42	96.73	91.04	85.35
Total manufacturing costs	1552.25	1546.56	1540.87	1535.18	1529.49

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1994	1995	1996	1997	1998
% of nom. capacity (single product only)	0.0	0.0	0.0	0.0	0.0
Raw material A	106.96	106.96	106.96	106.96	106.96
Other raw materials	521.49	521.49	521.49	521.49	521.49
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	31.79	31.79	31.79	31.79	31.79
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	869.24	869.24	869.24	869.24	869.24
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	267.55	267.55	267.55	267.55	267.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	79.66	73.77	68.28	62.59	56.90
Total manufacturing costs	1523.80	1518.11	1512.42	1506.73	1501.04

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Coverage:	adc	coto					
Year			1994	1995	1996	1997	1998
Current assets &							
Accounts receivable	60	5.9	179.53	202.25	224.97	224.97	224.97
Inventory and materials	33	4.3	192.03	123.74	145.45	145.45	145.45
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	26.16	29.98	33.80	33.80	33.80
Finished products	100	3.6	243.25	270.55	297.85	297.85	297.85
Cash in hand	30	12.0	36.19	36.59	36.98	36.98	36.98
Total current assets			807.16	883.11	759.05	759.05	759.05
Current liabilities and							
Accounts payable	30	12.0	56.06	64.25	72.44	72.44	72.44
Net working capital			551.10	618.86	686.61	686.61	686.61
Increase in working capital			551.10	67.76	67.76	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

Coverage:	adc	coto					
Year			1989	1990	1991	1992	1993
Current assets &							
Accounts receivable	60	5.9	224.97	224.97	224.97	224.97	224.97
Inventory and materials	33	4.3	145.45	145.45	145.45	145.45	145.45
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	33.80	33.80	33.80	33.80	33.80
Finished products	100	3.6	297.85	297.85	297.85	297.85	297.85
Cash in hand	30	12.0	36.98	36.98	36.98	36.98	36.98
Total current assets			759.05	759.05	759.05	759.05	759.05
Current liabilities and							
Accounts payable	30	12.0	72.44	72.44	72.44	72.44	72.44
Net working capital			686.61	686.61	686.61	686.61	686.61
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Coverage:	adc	coto					
Year			1994	1995	1996	1997	1998
Current assets &							
Accounts receivable	60	5.9	224.97	224.97	224.97	224.97	224.97
Inventory and materials	33	4.3	145.45	145.45	145.45	145.45	145.45
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	33.80	33.80	33.80	33.80	33.80
Finished products	100	3.6	297.85	297.85	297.85	297.85	297.85
Cash in hand	30	12.0	36.98	36.98	36.98	36.98	36.98
Total current assets			759.05	759.05	759.05	759.05	759.05
Current liabilities and							
Accounts payable	30	12.0	72.44	72.44	72.44	72.44	72.44
Net working capital			686.61	686.61	686.61	686.61	686.61
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1196.82	1441.08	1685.34	1685.34	1685.34
Less: variable costs, including sales tax	655.17	791.49	927.79	927.79	927.79
Variable margin	541.65	649.59	757.55	757.55	757.55
As % of total sales	45.25	45.08	44.95	44.95	44.95
Non-variable costs, including depreciation	452.00	536.35	536.35	536.35	536.35
Operational margin	89.65	113.24	221.20	221.20	221.20
As % of total sales	7.49	7.86	13.12	13.12	13.12
Cost of finance	65.05	131.95	113.80	113.80	113.80
Gross profit	24.60	-18.71	87.40	107.40	107.40
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	24.60	0.0	87.40	107.40	107.40
Tax	0.0	0.0	0.0	0.0	0.0
Net profit	24.60	-18.71	87.40	107.40	107.40
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	24.60	-18.71	87.40	107.40	107.40
Accumulated undistributed profit	24.60	5.89	93.29	200.69	308.09

ALTERNATIVE A B

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total sales, including sales tax	1685.34	1685.34	1685.34	1685.34	1685.34
Less: variable costs, including sales tax	927.79	927.79	927.79	927.79	927.79
Variable margin	757.55	757.55	757.55	757.55	757.55
As % of total sales	44.95	44.95	44.95	44.95	44.95
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	241.20	241.20	241.20	241.20	241.20
As % of total sales	14.31	14.31	14.31	14.31	14.31
Cost of finance	108.11	102.42	96.73	91.04	85.35
Gross profit	133.09	138.78	144.47	150.16	155.85
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	133.09	138.78	144.47	131.45	155.85
Tax	0.0	0.0	0.0	57.15	70.13
Net profit	133.09	138.78	144.47	91.00	85.72
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	133.09	138.78	144.47	91.00	85.72
Accumulated undistributed profit	441.17	579.95	724.42	815.42	901.14

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIA KWACHA

ALTERNATIVE 3B

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1685.34	1685.34	1685.34	1685.34	1685.34
Less: variable costs, including sales tax	927.79	927.79	927.79	927.79	927.79
Variable margin	757.55	757.55	757.55	757.55	757.55
As % of total sales	44.95	44.95	44.95	44.95	44.95
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	241.20	241.20	241.20	241.20	241.20
As % of total sales	14.31	14.31	14.31	14.31	14.31
Cost of finance	79.66	73.97	68.28	62.59	56.90
Gross profit	161.54	167.23	172.92	178.61	184.30
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	161.54	167.23	172.92	178.61	184.30
Tax	72.69	75.25	77.81	80.37	82.93
Net profit	88.85	91.97	95.10	98.23	101.36
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	88.85	91.97	95.10	98.23	101.36
Accumulated undistributed profit	989.98	1081.96	1177.06	1275.30	1376.66

COMFAR 1.0 - Vienna

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1984	1985	1986	1987	1988
Total assets	1581.66	1608.14	1583.73	1611.13	1681.62
Fixed assets, net of depreciation	160.00	864.26	679.91	555.56	431.21
Construction in progress	749.90	0.0	0.0	0.0	381.30
Current assets	570.96	646.52	722.07	722.07	722.07
Cash, bank	36.19	36.59	36.98	36.98	36.98
Cash surplus, finance available	64.60	120.73	64.77	296.52	130.37
Total liabilities	1581.66	1608.14	1583.73	1611.13	1681.62
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	0.0	24.60	5.89	93.29	200.69
Profit, (loss)	24.60	-18.71	87.40	107.40	107.40
Long and medium term debt	1301.00	1338.00	1138.00	1138.00	1081.10
Current liabilities	56.06	64.25	72.44	72.44	72.44
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1357.06	1402.25	1210.44	1210.44	1153.54
Equity, % of liabilities	12.64	12.44	13.30	12.41	12.04

COMFAR 1.0 - Vienna

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total assets	1737.81	1819.69	1907.25	1941.36	1970.17
Fixed assets, net of depreciation	367.86	563.51	459.16	336.10	372.75
Construction in progress	0.0	0.0	0.0	141.00	0.0
Current assets	722.07	722.07	722.07	722.07	722.07
Cash, bank	36.98	36.98	36.98	36.98	36.98
Cash surplus, finance available	310.90	497.13	689.05	705.21	838.37
Total liabilities	1737.81	1819.69	1907.25	1941.36	1970.17
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	308.09	441.17	579.95	724.42	815.42
Profit, (loss)	133.09	138.78	144.47	91.00	95.72
Long and medium term debt	1024.20	967.30	910.40	853.50	796.60
Current liabilities	72.44	72.44	72.44	72.44	72.44
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1096.64	1039.74	982.84	925.94	869.04
Equity, % of liabilities	11.51	10.99	10.49	10.30	10.15

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE B

Year	1994	1995	1996	1997	1998
Total assets	2002.12	2037.19	2075.40	2116.73	2161.20
Fixed assets, net of depreciation	288.40	625.05	521.70	558.35	454.00
Construction in progress	462.00	0.0	141.00	0.0	200.00
Current assets	722.07	722.07	722.07	722.07	722.07
Cash, bank	36.98	36.98	36.98	36.98	36.98
Cash surplus, finance available	512.67	652.09	653.65	799.33	746.14
Total liabilities	2002.12	2037.19	2075.40	2116.73	2161.20
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	901.14	989.98	1081.96	1177.06	1275.30
Profit, (loss)	88.85	91.97	95.10	98.23	101.36
Long and medium term debt	739.70	682.30	625.90	569.00	512.10
Current liabilities	72.44	72.44	72.44	72.44	72.44
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	812.14	755.24	698.34	641.44	584.54
Equity, % of liabilities	9.99	9.82	9.64	9.45	9.25

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1984	1985	1986	1987	1988
Total CF-inflow	2556.60	1558.10	1985.34	1985.34	1985.34
. Financial resources	1310.98	27.02	0.0	0.0	0.0
. Sales	1225.62	1561.08	1985.34	1985.34	1985.34
Total CF-outflow	2523.26	1539.76	2050.71	1683.37	2081.27
. Total assets	1358.48	112.12	147.34	0.0	341.90
. Operating costs	1089.23	1295.39	1569.57	1569.57	1569.57
. Debt service and interest	65.55	132.45	133.80	113.80	113.80
. Repayment	0.0	0.0	200.00	0.0	56.90
. Corporate tax	0.0	0.0	0.0	0.0	0.0
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	13.35	48.13	-65.37	301.97	-95.93
Cumulated cash balance	13.35	61.48	-3.89	298.08	202.16

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total CF-inflow	1985.34	1985.34	1985.34	1985.34	1985.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1985.34	1985.34	1985.34	1985.34	1985.34
Total CF-outflow	1734.58	1728.89	1723.20	1957.68	1813.55
. Total assets	0.0	0.0	0.0	141.00	0.0
. Operating costs	1569.57	1569.57	1569.57	1569.57	1569.57
. Debt service and interest	108.11	102.42	96.73	91.04	85.35
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	0.0	0.0	0.0	99.17	101.73
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	250.76	256.45	262.14	27.66	171.79
Cumulated cash balance	452.92	709.37	971.52	999.18	1170.97

CASHFLOW TABLES, PRODUCTION PHASE IN: 1990 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1994	1995	1996	1997	1998
Total CF-inflow	1985.34	1985.34	1985.34	1985.34	1985.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1985.34	1985.34	1985.34	1985.34	1985.34
Total CF-outflow	2272.42	1807.29	1945.16	1881.03	1997.90
. Total assets	462.00	0.0	141.00	0.0	200.00
. Operating costs	1569.57	1569.57	1569.57	1569.57	1569.57
. Debt service and interest	77.66	73.77	69.33	62.59	58.30
. Repayment	56.90	56.90	56.90	56.90	56.90
. Corporate tax	104.29	106.85	109.41	111.98	114.54
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	-287.08	178.05	40.18	104.31	-12.56
Cumulated cash balance	983.39	1061.94	1102.12	1206.43	1273.37

CASHFLOW DISCOUNTING:

a) Interest payable on loan = cash-outflow:

Net present value at 10.0 % = 14.83

Internal Rate of Return 10.15 %

b) Interest payable on loan added back to net-cashflow:

Net present value at 10.0 % = 764.39

Internal Rate of Return 19.29 %

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-productions:

Total cash-outflow at 10.0 % , FVAL = 200.00

Total cash-outflow, Nominal value NVAL = 200.00

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1994	1995	1996	1997	1998
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	84.60	128.78	200.71	200.71	200.71
Other raw materials	375.72	476.72	604.19	604.19	604.19
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	22.64	28.38	35.11	35.11	35.11
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	167.00	167.00	167.00	167.00	167.00
Factory costs	669.96	842.38	1049.02	1049.02	1049.02
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	196.27	249.51	317.55	317.55	317.55
Depreciation	40.00	124.35	124.35	124.35	124.35
Financial costs	65.55	132.45	133.80	113.80	113.80
Total manufacturing costs	1194.78	1552.19	1827.72	1807.72	1807.72

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	200.71	200.71	200.71	200.71	200.71
Other raw materials	604.19	604.19	604.19	604.19	604.19
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	35.11	35.11	35.11	35.11	35.11
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	1049.02	1049.02	1049.02	1049.02	1049.02
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	317.55	317.55	317.55	317.55	317.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	108.11	102.42	96.73	91.04	85.35
Total manufacturing costs	1782.03	1776.34	1770.65	1764.96	1759.27

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1994	1995	1996	1997	1998
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	200.71	200.71	200.71	200.71	200.71
Other raw materials	604.19	604.19	604.19	604.19	604.19
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	35.11	35.11	35.11	35.11	35.11
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	187.00	187.00	187.00	187.00	187.00
Factory costs	1049.02	1049.02	1049.02	1049.02	1049.02
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	317.55	317.55	317.55	317.55	317.55
Depreciation	104.35	104.35	104.35	104.35	104.35
Financial costs	79.66	73.97	68.28	62.59	56.90
Total manufacturing costs	1753.58	1747.89	1742.20	1736.51	1730.82

PROJECTED BALANCE-SHEET, PRE-PRODUCTION IN: '000 ZAMBIAN KWACHA ALTERNATIVE C

Year	1983
Total assets	200.00
Fixed assets, net of depreciation	0.0
Construction in progress	200.00
Current assets	0.0
Cash, bank	0.0
Cash surplus, finance available	-0.0
Total liabilities	200.00
Equity capital	200.00
Reserves, retained profit	0.0
Profit,(loss)	0.0
Long and medium term debt	0.0
Current liabilities	0.0
Bank overdraft, finance required	0.0
Total debt	0.0
Equity, % of liabilities	100.00

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Coverage:	adc	coto	1994	1995	1996	1997	1998
Year							
Current assets %							
Accounts receivable	60	5.9	183.20	217.57	263.26	263.26	263.26
Inventory and materials	51	4.4	104.29	133.14	168.95	168.95	168.95
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	26.83	32.78	40.80	40.80	40.80
Finished products	100	3.6	245.04	290.52	347.78	347.78	347.78
Cash in hand	30	12.0	35.22	36.70	37.26	37.26	37.26
Total current assets			618.58	730.70	878.04	878.04	878.04
Current liabilities and							
Accounts payable	30	12.0	57.50	70.24	87.42	87.42	87.42
Net working capital			561.08	660.46	790.63	790.63	790.63
Increase in working capital			561.08	99.38	130.16	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

Coverage:	adc	coto	1989	1990	1991	1992	1993
Year							
Current assets %							
Accounts receivable	60	5.9	263.26	263.26	263.26	263.26	263.26
Inventory and materials	51	4.4	168.95	168.95	168.95	168.95	168.95
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	40.80	40.80	40.80	40.80	40.80
Finished products	100	3.6	347.78	347.78	347.78	347.78	347.78
Cash in hand	30	12.0	37.26	37.26	37.26	37.26	37.26
Total current assets			878.04	878.04	878.04	878.04	878.04
Current liabilities and							
Accounts payable	30	12.0	87.42	87.42	87.42	87.42	87.42
Net working capital			790.63	790.63	790.63	790.63	790.63
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Coverage:	adc	coto					
Year			1994	1995	1996	1997	1998
Current assets &							
Accounts receivable	59	5.7	263.26	263.26	263.26	263.26	263.26
Inventory and materials	81	4.4	168.95	168.95	168.95	168.95	168.95
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	40.80	40.80	40.80	40.80	40.80
Finished products	100	3.6	347.78	347.78	347.78	347.78	347.78
Cash in hand	30	12.0	37.26	37.26	37.26	37.26	37.26
Total current assets			878.04	878.04	878.04	878.04	878.04
Current liabilities and							
Accounts payable	30	12.0	87.42	87.42	87.42	87.42	87.42
Net working capital			790.63	790.63	790.63	790.63	790.63
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1984	1985	1986	1987	1988
Total sales, including sales tax	1225.62	1561.08	1985.34	1985.34	1985.34
Less: variable costs, including sales tax	677.23	883.39	1157.57	1157.57	1157.57
Variable margin	548.39	677.69	827.77	827.77	827.77
As % of total sales	44.74	43.41	41.69	41.69	41.69
Non-variable costs, including depreciation	452.00	536.35	536.35	536.35	536.35
Operational margin	96.39	141.34	291.42	291.42	291.42
As % of total sales	7.86	9.05	14.68	14.68	14.68
Cost of finance	65.55	132.45	133.80	113.80	113.80
Gross profit	30.84	8.89	157.62	177.62	177.62
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	30.84	8.89	157.62	177.62	177.62
Tax	0.0	0.0	0.0	0.0	0.0
Net profit	30.84	8.89	157.62	177.62	177.62
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	30.84	8.89	157.62	177.62	177.62
Accumulated undistributed profit	30.84	39.73	197.35	374.98	552.60

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1989	1990	1991	1992	1993
Total sales, including sales tax	1985.34	1985.34	1985.34	1985.34	1985.34
Less: variable costs, including sales tax	1157.57	1157.57	1157.57	1157.57	1157.57
Variable margin	827.77	827.77	827.77	827.77	827.77
As % of total sales	41.69	41.69	41.69	41.69	41.69
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	311.42	311.42	311.42	311.42	311.42
As % of total sales	15.69	15.69	15.69	15.69	15.69
Cost of finance	108.11	102.42	96.73	91.04	85.35
Gross profit	203.31	209.00	214.69	220.38	226.07
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	203.31	209.00	214.69	220.38	226.07
Tax	0.0	0.0	0.0	99.17	101.73
Net profit	203.31	209.00	214.69	121.21	124.34
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	203.31	209.00	214.69	121.21	124.34
Accumulated undistributed profit	755.92	964.92	1179.61	1300.82	1425.17

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE C

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1985.34	1985.34	1985.34	1985.34	1985.34
Less: variable costs, including sales tax	1157.57	1157.57	1157.57	1157.57	1157.57
Variable margin	827.77	827.77	827.77	827.77	827.77
As % of total sales	41.69	41.69	41.69	41.69	41.69
Non-variable costs, including depreciation	516.35	516.35	516.35	516.35	516.35
Operational margin	311.42	311.42	311.42	311.42	311.42
As % of total sales	15.69	15.69	15.69	15.69	15.69
Cost of finance	79.66	73.97	68.28	62.59	56.90
Gross profit	231.76	237.45	243.14	248.83	254.52
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	231.76	237.45	243.14	248.83	254.52
Tax	104.29	106.85	109.41	111.98	114.54
Net profit	127.47	130.60	133.73	136.86	139.99
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	127.47	130.60	133.73	136.86	139.99
Accumulated undistributed profit	1552.64	1683.24	1816.96	1953.82	2093.81

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA ALTERNATIVE C

Year	1984	1985	1986	1987	1988
Total assets	1599.32	1647.97	1622.77	1900.40	1921.12
Fixed assets, net of depreciation	160.00	785.55	661.20	536.85	412.50
Construction in progress	749.90	0.0	0.0	0.0	341.00
Current assets	582.36	694.00	840.78	840.78	840.78
Cash, bank	36.22	36.70	37.26	37.26	37.26
Cash surplus, finance available	70.84	131.72	83.53	355.59	289.58
Total liabilities	1599.32	1647.97	1622.77	1900.40	1921.12
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	0.0	30.84	39.73	197.35	374.98
Profit, (loss)	30.84	8.89	157.62	177.62	177.62
Long and medium term debt	1310.98	1338.00	1138.00	1138.00	1081.10
Current liabilities	57.50	70.24	87.42	87.42	87.42
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1368.48	1408.24	1225.42	1225.42	1168.52
Equity, % of liabilities	12.51	12.14	12.32	11.11	10.41

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total assets	2067.53	2219.64	2377.43	2441.74	2509.18
Fixed assets, net of depreciation	649.15	544.80	440.45	336.10	372.75
Construction in progress	0.0	0.0	0.0	141.00	0.0
Current assets	840.78	840.78	840.78	840.78	840.78
Cash, bank	37.26	37.26	37.26	37.26	37.26
Cash surplus, finance available	540.34	796.79	1058.94	1086.60	1258.39
Total liabilities	2067.53	2219.64	2377.43	2441.74	2509.18
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	552.60	755.92	964.92	1179.61	1300.82
Profit, (loss)	203.31	209.00	214.69	121.21	124.34
Long and medium term debt	1024.20	967.30	910.40	853.50	796.60
Current liabilities	87.42	87.42	87.42	87.42	87.42
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1111.62	1054.72	997.82	940.92	884.02
Equity, % of liabilities	9.67	9.01	8.41	8.19	7.97

PROJECTED BALANCE-SHEET, PRODUCTION IN '000 ZAMBIAN KWACHA — ALTERNATIVE C

Year	1994	1995	1996	1997	1998
Total assets	2579.75	2653.45	2730.28	2810.24	2893.33
Fixed assets, net of depreciation	268.40	626.05	521.70	558.35	454.00
Construction in progress	462.00	0.0	141.00	0.0	200.00
Current assets	840.78	840.78	840.78	840.78	840.78
Cash, bank	37.26	37.26	37.26	37.26	37.26
Cash surplus, finance available	971.31	1149.36	1189.54	1373.85	1361.29
Total liabilities	2579.75	2653.45	2730.28	2810.24	2893.33
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	1425.17	1552.64	1683.24	1816.96	1953.82
Profit, (loss)	127.47	130.60	133.73	136.86	139.99
Long and medium term debt	739.70	682.80	625.90	569.00	512.10
Current liabilities	87.42	87.42	87.42	87.42	87.42
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	827.12	770.22	713.32	656.42	599.52
Equity, % of liabilities	7.75	7.54	7.33	7.12	6.91

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1984	1985	1986	1987	1988
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	420.00	0.0	0.0	0.0	-21.00
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	404.00	0.0	0.0	0.0	-20.20
Loan BL	200.00	0.0	-200.00	0.0	0.0
Loan CL	363.18	36.82	0.0	0.0	-20.00
Total loan	1387.18	36.82	-200.00	0.0	-61.20
Current liabilities	57.50	9.75	11.19	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available ...	1444.68	46.56	-188.81	0.0	-61.20

retained profit not included

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	-21.00	-21.00	-21.00	-21.00	-21.00
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	-20.20	-20.20	-20.20	-20.20	-20.20
Loan BL	0.0	0.0	0.0	0.0	0.0
Loan CL	-20.00	-20.00	-20.00	-20.00	-20.00
Total loan	-61.20	-61.20	-61.20	-61.20	-61.20
Current liabilities	0.0	0.0	0.0	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available ...	-61.20	-61.20	-61.20	-61.20	-61.20

retained profit not included

ALTERNATIVE D

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1994	1995	1996	1997	1998
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	-21.00	-21.00	-21.00	-21.00	-21.00
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	-20.20	-20.20	-20.20	-20.20	-20.20
Loan BL	0.0	0.0	0.0	0.0	0.0
Loan CL	-20.00	-20.00	-20.00	-20.00	-20.00
Total loan	-61.20	-61.20	-61.20	-61.20	-61.20
Current liabilities	0.0	0.0	0.0	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	-61.20	-61.20	-61.20	-61.20	-61.20

retained profit not included

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1984	1985	1986	1987	1988
Total CF-inflow	2612.30	1537.70	1805.34	1805.34	1805.34
. Financial resources	1387.16	36.32	0.0	0.0	0.0
. Sales	1225.62	1501.38	1805.34	1805.34	1805.34
Total CF-outflow	2603.27	1479.32	1873.85	1554.10	1970.38
. Total assets	1444.66	38.32	99.74	0.0	355.80
. Operating costs	1089.23	1249.44	1431.70	1431.70	1431.70
. Debt service and interest	69.36	140.56	142.40	122.40	122.40
. Repayment	0.0	0.0	200.00	0.0	61.20
. Corporate tax	0.0	0.0	0.0	0.0	0.0
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	9.54	57.57	-68.51	251.24	-164.76
Cumulated cash balance	9.54	67.11	0.60	251.84	86.88

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total CF-inflow	1805.34	1805.34	1805.34	1805.34	1805.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1805.34	1805.34	1805.34	1805.34	1805.34
Total CF-outflow	1609.18	1603.06	1596.94	1809.32	1660.75
. Total assets	0.0	0.0	0.0	155.00	0.0
. Operating costs	1431.70	1431.70	1431.70	1431.70	1431.70
. Debt service and interest	116.28	110.16	104.04	97.92	91.80
. Repayment	61.20	61.20	61.20	61.20	61.20
. Corporate tax	0.0	0.0	0.0	63.49	76.04
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	196.16	202.28	208.40	-3.98	144.59
Cumulated cash balance	283.04	485.32	693.71	689.74	834.33

CASHFLOW TABLES, PRODUCTION PHASE IN: 1000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1994	1995	1996	1997	1998
Total CF-inflow	1805.34	1805.34	1805.34	1805.34	1805.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1805.34	1805.34	1805.34	1805.34	1805.34
Total CF-outflow	2166.05	1654.01	1805.65	1647.28	1843.92
. Total assets	509.00	0.0	155.00	0.0	200.00
. Operating costs	1431.70	1431.70	1431.70	1431.70	1431.70
. Debt service and interest	95.68	79.56	73.44	67.32	61.20
. Repayment	61.20	61.20	61.20	61.20	61.20
. Corporate tax	78.80	81.55	84.31	87.06	89.81
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	-361.04	151.33	-0.31	158.06	-38.58
Cumulated cash balance	473.29	624.62	624.31	782.37	743.79

CASHFLOW DISCOUNTING:

a) Interest payable on loan = cash-outflow:

Net present value at I 0.0 % = -294.77

Internal Rate of Return 7.09 %

b) Interest payable on loan added back to net-cashflow:

Net present value at I 0.0 % = 507.70

Internal Rate of Return 15.41 %

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

Total cash-outflow at -I 0.0 % , FVAL = 200.00

Total cash-outflow, Nominal value NVAL = 200.00

ALTERNATIVE D

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1994	1995	1996	1997	1998
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	84.30	110.03	144.46	144.46	144.46
Other raw materials	373.72	488.18	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	22.64	27.72	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	689.96	906.93	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	196.27	259.51	287.55	287.55	287.55
Depreciation	49.00	132.95	122.95	132.95	132.95
Financial costs	69.36	140.56	142.40	122.40	122.40
Total manufacturing costs	1198.59	1522.95	1706.95	1686.95	1686.95

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	144.46	144.46	144.46	144.46	144.46
Other raw materials	554.57	554.57	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	33.12	33.12	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	941.15	941.15	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	287.55	287.55	287.55	287.55	287.55
Depreciation	112.95	112.95	112.95	112.95	112.95
Financial costs	116.28	110.16	104.04	97.92	91.80
Total manufacturing costs	1660.83	1654.71	1648.59	1642.47	1636.35

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1994	1995	1996	1997	1998
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	144.46	144.46	144.46	144.46	144.46
Other raw materials	554.57	554.57	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	33.12	33.12	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	941.15	941.15	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	287.55	287.55	287.55	287.55	287.55
Depreciation	112.85	112.85	112.85	112.85	112.85
Financial costs	85.68	79.56	73.44	67.32	61.20
Total manufacturing costs	1630.23	1624.11	1617.99	1611.87	1605.75

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Coverage:	mdc	coto	1984	1985	1986	1987	1988
Year							
Current assets &							
Accounts receivable	60	5.9	183.20	209.31	240.28	240.28	240.28
Inventory and materials	81	4.4	104.28	125.44	154.85	154.85	154.85
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	25.83	31.39	36.60	36.60	36.60
Finished products	100	3.6	248.04	280.54	317.82	317.82	317.82
Cash in hand	30	12.0	36.22	36.64	37.09	37.09	37.09
Total current assets			619.58	706.90	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	57.50	67.24	78.43	78.43	78.43
Net working capital			561.08	639.66	728.22	728.22	728.22
Increase in working capital			561.08	78.57	88.56	0.0	0.0

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

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NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

Coverage:	mdc	coto	1989	1990	1991	1992	1993
Year							
Current assets &							
Accounts receivable	60	5.9	240.28	240.28	240.28	240.28	240.28
Inventory and materials	81	4.4	154.85	154.85	154.85	154.85	154.85
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	36.60	36.60	36.60	36.60	36.60
Finished products	100	3.6	317.82	317.82	317.82	317.82	317.82
Cash in hand	30	12.0	37.09	37.09	37.09	37.09	37.09
Total current assets			806.65	806.65	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	78.43	78.43	78.43	78.43	78.43
Net working capital			728.22	728.22	728.22	728.22	728.22
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

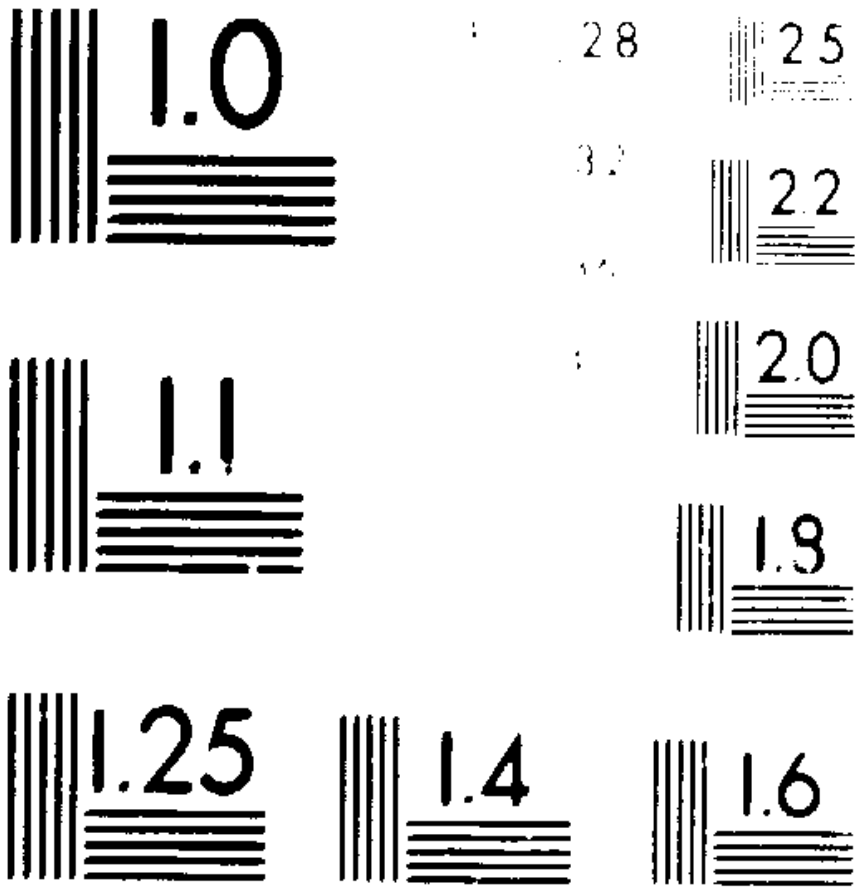
Coverage:	adc	coto	1994	1995	1996	1997	1998
Year							
Current assets &							
Accounts receivable	60	5.9	240.28	240.28	240.28	240.28	240.28
Inventory and materials	81	4.4	154.35	154.35	154.35	154.35	154.35
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	36.60	36.60	36.60	36.60	36.60
Finished products	199	3.6	317.82	317.82	317.82	317.82	317.82
Cash in hand	30	12.0	37.09	37.09	37.09	37.09	37.09
Total current assets			906.65	906.65	906.65	906.65	906.65
Current liabilities and							
Accounts payable	30	12.0	78.43	78.43	78.43	78.43	78.43
Net working capital			728.22	728.22	728.22	728.22	728.22
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1984	1985	1986	1987	1988
Total sales, including sales tax	1225.62	1501.08	1805.34	1805.34	1805.34
Less: variable costs, including sales tax	677.23	837.44	1019.70	1019.70	1019.70
Variable margin	548.39	663.64	785.64	785.64	785.64
As % of total sales	44.74	44.21	43.52	43.52	43.52
Non-variable costs, including depreciation	452.00	544.85	544.85	544.85	544.85
Operational margin	96.39	118.79	240.79	240.79	240.79
As % of total sales	7.86	7.91	13.34	13.34	13.34
Cost of finance	69.36	140.56	142.40	122.40	122.40
Gross profit	27.03	-21.77	98.39	118.39	118.39
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	27.03	0.0	98.39	118.39	118.39
Tax	0.0	0.0	0.0	0.0	0.0
Net profit	27.03	-21.77	98.39	118.39	118.39
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	27.03	-21.77	98.39	118.39	118.39
Accumulated undistributed profit	27.03	5.26	103.65	222.04	340.43



NET INCOME STATEMENT PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1989	1990	1991	1992	1993
Total sales, including sales tax	1805.34	1805.34	1805.34	1805.34	1805.34
Less: variable costs, including sales tax	1019.70	1019.70	1019.70	1019.70	1019.70
Variable margin	785.64	785.64	785.64	785.64	785.64
As % of total sales	43.52	43.52	43.52	43.52	43.52
Non-variable costs, including depreciation	524.85	524.85	524.85	524.85	524.85
Operational margin	260.79	260.79	260.79	260.79	260.79
As % of total sales	14.45	14.45	14.45	14.45	14.45
Cost of finance	116.28	110.16	104.04	97.92	91.80
Gross profit	144.51	150.63	156.75	162.87	168.99
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	144.51	150.63	156.75	141.10	168.99
Tax	0.0	0.0	0.0	63.49	76.04
Net profit	144.51	150.63	156.75	99.37	92.94
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	144.51	150.63	156.75	99.37	92.94
Accumulated undistributed profit	464.94	615.56	772.31	891.69	984.63

NET INCOME STATEMENT PROJECTION IN: 1000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1994	1995	1996	1997	1998
Total sales, including sales tax	1805.34	1805.34	1805.34	1805.34	1805.34
Less: variable costs, including sales tax	1019.70	1019.70	1019.70	1019.70	1019.70
Variable margin	785.64	785.64	785.64	785.64	785.64
As % of total sales	43.52	43.52	43.52	43.52	43.52
Non-variable costs, including depreciation	524.85	524.85	524.85	524.85	524.85
Operational margin	260.79	260.79	260.79	260.79	260.79
As % of total sales	14.45	14.45	14.45	14.45	14.45
Cost of finance	85.68	79.56	73.44	67.32	61.20
Gross profit	175.11	181.23	187.35	193.47	199.59
Allowances	0.0	0.0	0.0	0.0	0.0
Taxable profit	175.11	181.23	187.35	193.47	199.59
Tax	78.80	81.55	84.31	87.06	89.81
Net profit	96.31	99.68	103.04	106.41	109.77
Dividends paid	0.0	0.0	0.0	0.0	0.0
Undistributed profit	96.31	99.68	103.04	106.41	109.77
Accumulated undistributed profit	1090.94	1190.61	1293.66	1390.06	1499.84

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1984	1985	1986	1987	1988
Total assets	1671.71	1696.51	1606.08	1724.47	1781.86
Fixed assets, net of depreciation	160.00	375.02	742.17	889.02	476.47
Construction in progress	325.10	0.0	0.0	0.0	355.00
Current assets	582.36	676.26	769.55	769.55	769.55
Cash, bank	36.22	36.64	37.09	37.09	37.09
Cash surplus, finance available	67.03	114.58	57.26	308.50	143.54
Total liabilities	1671.71	1696.51	1606.08	1724.47	1781.86
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	0.0	27.03	5.26	105.65	222.04
Profit, (loss)	27.03	-21.77	98.39	116.39	118.39
Long and medium term debt	1387.18	1424.00	1224.00	1224.00	1162.80
Current liabilities	57.50	67.24	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1444.68	1491.24	1302.43	1302.43	1241.23
Equity, % of liabilities	11.96	11.79	12.45	11.60	11.23

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total assets	1864.97	1954.39	2049.94	2088.11	2119.86
Fixed assets, net of depreciation	718.62	605.77	492.92	358.30	400.45
Construction in progress	0.0	0.0	0.0	155.00	0.0
Current assets	769.55	769.55	769.55	769.55	769.55
Cash, bank	37.09	37.09	37.09	37.09	37.09
Cash surplus, finance available	339.70	541.98	750.37	768.17	912.76
Total liabilities	1864.97	1954.39	2049.94	2088.11	2119.86
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	340.43	484.94	635.56	792.31	891.69
Profit, (loss)	144.51	150.63	156.75	99.37	72.94
Long and medium term debt	1101.60	1040.40	979.20	918.00	858.80
Current liabilities	78.43	78.43	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1180.03	1118.83	1057.63	996.43	935.23
Equity, % of liabilities	10.72	10.23	9.76	9.58	9.43

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE D

Year	1994	1995	1996	1997	1998
Total assets	2154.77	2193.44	2235.28	2280.49	2329.07
Fixed assets, net of depreciation	287.60	583.75	578.90	613.05	590.20
Construction in progress	509.00	0.0	155.00	0.0	200.00
Current assets	769.55	769.55	769.55	769.55	769.55
Cash, bank	37.09	37.09	37.09	37.09	37.09
Cash surplus, finance available	551.72	703.05	702.74	860.79	822.22
Total liabilities	2154.77	2193.44	2235.28	2280.49	2329.07
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	984.63	1050.94	1180.61	1283.66	1370.06
Profit (loss)	96.31	99.68	103.04	106.41	109.77
Long and medium term debt	795.80	734.40	673.20	612.00	550.80
Current liabilities	78.43	78.43	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	874.03	812.83	751.63	690.43	629.23
Equity, % of liabilities	9.28	9.12	8.95	8.77	8.59

ALTERNATIVE E

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1985	1986	1987	1988	1989
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	381.00	0.0	0.0	0.0	-19.05
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	244.48	0.0	0.0	0.0	-12.20
Loan BL	200.00	0.0	-200.00	0.0	0.0
Loan CL	362.95	2.02	0.0	0.0	-18.25
Total loan	1187.48	2.02	-200.00	0.0	-49.50
Current liabilities	57.50	9.75	11.19	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	1245.48	11.76	-188.81	0.0	-49.50

retained profit not included

COMFAR 1.0 - Vienna

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1990	1991	1992	1993	1994
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	-19.05	-19.05	-19.05	-19.05	-19.05
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	-12.20	-12.20	-12.20	-12.20	-12.20
Loan BL	0.0	0.0	0.0	0.0	0.0
Loan CL	-18.25	-18.25	-18.25	-18.25	-18.25
Total loan	-49.50	-49.50	-49.50	-49.50	-49.50
Current liabilities	0.0	0.0	0.0	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	-49.50	-49.50	-49.50	-49.50	-49.50

retained profit not included

COMFAR 1.0 - Vienna

SOURCE OF FINANCE, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE E

Year	1995	1996	1997	1998	1999
Equity, ordinary	0.0	0.0	0.0	0.0	0.0
Equity, preference	0.0	0.0	0.0	0.0	0.0
Subsidies, grants	0.0	0.0	0.0	0.0	0.0
Loan AF	-19.05	-19.05	-19.05	-19.05	-19.05
Loan BF	0.0	0.0	0.0	0.0	0.0
Loan CF	0.0	0.0	0.0	0.0	0.0
Loan AL	-12.20	-12.20	-12.20	-12.20	-12.20
Loan BL	0.0	0.0	0.0	0.0	0.0
Loan CL	-18.25	-18.25	-18.25	-18.25	-18.25
Total loan	-49.50	-49.50	-49.50	-49.50	-49.50
Current liabilities	0.0	0.0	0.0	0.0	0.0
Bank overdraft	0.0	0.0	0.0	0.0	0.0
Total funds available	-49.50	-49.50	-49.50	-49.50	-49.50

retained profit not included

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

ALTERNATIVE E

Year	1984	1985	1986	1987	1988
Total CF-inflow	2410.60	1503.10	1905.34	1905.34	1905.34
. Financial resources	1187.73	0.02	0.0	0.0	0.0
. Sales	1225.82	1501.08	1905.34	1905.34	1905.34
Total CF-outflow	2394.11	1456.66	1850.45	1530.78	1876.20
. Total assets	1245.48	86.32	99.74	0.0	316.00
. Operating costs	1089.23	1249.44	1431.70	1431.70	1431.70
. Debt service and interest	59.40	118.90	119.00	99.00	99.00
. Repayment	0.0	0.0	200.00	0.0	49.50
. Corporate tax	0.0	0.0	0.0	0.0	0.0
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	19.50	46.45	-45.11	374.64	-30.86
Cumulated cash balance	19.50	65.93	20.82	395.46	364.60

CASHFLOW TABLES, PRODUCTION PHASE IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total CF-inflow	1905.34	1905.34	1905.34	1905.34	1905.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1905.34	1905.34	1905.34	1905.34	1905.34
Total CF-outflow	1575.25	1570.30	1565.35	1769.16	1650.44
. Total assets	0.0	0.0	0.0	116.00	0.0
. Operating costs	1431.70	1431.70	1431.70	1431.70	1431.70
. Debt service and interest	94.05	89.10	84.15	79.20	74.25
. Repayment	49.50	49.50	49.50	49.50	49.50
. Corporate tax	0.0	0.0	0.0	92.75	94.99
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	330.09	335.04	339.99	76.18	154.90
Cumulated cash balance	434.69	669.73	909.71	985.89	1140.79

CASHFLOW TABLES, PRODUCTION PHASE IN: 1000 ZAMBIAN KWACHA

ALTERNATIVE E

Year	1994	1995	1996	1997	1998
Total CF-inflow	1805.34	1805.34	1805.34	1805.34	1805.34
. Financial resources	0.0	0.0	0.0	0.0	0.0
. Sales	1805.34	1805.34	1805.34	1805.34	1805.34
Total CF-outflow	2011.72	1645.00	1758.27	1639.55	1836.83
. Total assets	384.00	0.0	114.00	0.0	200.00
. Operating costs	1431.70	1431.70	1431.70	1431.70	1431.70
. Debt service and interest	69.30	64.25	59.40	54.45	49.50
. Repayment	49.50	49.50	49.50	49.50	49.50
. Corporate tax	97.22	99.44	101.67	103.90	106.13
. Dividends paid	0.0	0.0	0.0	0.0	0.0
Surplus (deficit)	-206.38	160.34	47.07	165.79	-31.49
Cumulated cash balance	594.41	1054.75	1101.82	1267.61	1236.12

CASHFLOW DISCOUNTING:

a) Interest payable on loan = cash-outflow:

Net present value at	10.0 % =	61.62
Internal Rate of Return	10.69 %	

b) Interest payable on loan added back to net-cashflow:

Net present value at	10.0 % =	720.35
Internal Rate of Return	18.68 %	

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

Total cash-outflow at	10.0 % , FVAL =	200.00
Total cash-outflow, Nominal value	NVAL =	200.00

ALTERNATIVE E

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1985	1986	1987	1988	1989
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	94.80	115.83	144.46	144.46	144.46
Other raw materials	373.72	460.18	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	22.64	27.72	35.12	35.12	35.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	197.30	197.30	197.00	197.00	197.00
Factory costs	689.96	806.93	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	196.27	239.61	287.55	287.55	287.55
Depreciation	40.00	108.30	108.30	108.30	108.30
Financial costs	59.40	116.90	119.00	99.00	99.00
Total manufacturing costs	1188.63	1474.64	1659.00	1639.00	1639.00

TOTAL PRODUCTION COSTS IN: '000 ZAMBIAN KWACHA

Year	1990	1991	1992	1993	1994
% of nom. capacity (single product only).	0.0	0.0	0.0	0.0	0.0
Raw material A	144.46	144.46	144.46	144.46	144.46
Other raw materials	554.57	554.57	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	35.12	35.12	35.12	35.12	35.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	941.15	941.15	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	287.55	287.55	287.55	287.55	287.55
Depreciation	98.30	98.30	98.30	98.30	98.30
Financial costs	84.05	87.10	84.15	73.20	74.25
Total manufacturing costs	1614.05	1609.10	1604.15	1599.20	1594.25

ALTERNATIVE E

TOTAL PRODUCTION COSTS IN '000 CANADIAN DOLLARS

Year	1995	1996	1997	1998	1999
% of nom. capacity (single product only)	0.0	0.0	0.0	0.0	0.0
Raw material A	144.46	144.46	144.46	144.46	144.46
Other raw materials	554.57	554.57	554.57	554.57	554.57
Energy	0.0	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0
Labour, direct	33.12	33.12	33.12	33.12	33.12
Repair	0.0	0.0	0.0	0.0	0.0
Spares	20.00	20.00	20.00	20.00	20.00
Factory overheads	189.00	189.00	189.00	189.00	189.00
Factory costs	941.15	941.15	941.15	941.15	941.15
Administrative overheads	203.00	203.00	203.00	203.00	203.00
Indir. costs, sales and distribution	0.0	0.0	0.0	0.0	0.0
Direct costs, sales and distribution	287.55	287.55	287.55	287.55	287.55
Depreciation	88.70	88.70	88.70	88.70	88.70
Financial costs	69.30	64.75	59.40	54.45	49.50
Total manufacturing costs	1589.30	1584.75	1579.40	1574.45	1569.50

ALTERNATIVE E

NET WORKING CAPITAL IN '000 ZAMBIAN KWACHA

Coverage:	adc	coto	1985	1986	1987	1988	1989
Current assets							
Accounts receivable	60	5.9	193.29	269.91	240.28	240.28	240.28
Inventory and materials	81	4.4	104.29	123.44	154.85	154.85	154.85
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	26.85	31.38	36.60	36.60	36.60
Finished products	100	3.6	245.94	259.54	317.82	317.82	317.82
Cash in hand	30	12.0	36.22	36.64	37.09	37.09	37.09
Total current assets			619.53	706.90	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	57.50	67.24	78.43	78.43	78.43
Net working capital			561.03	639.66	728.22	728.22	728.22
Increase in working capital			561.03	78.57	88.56	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN '000 ZAMBIAN KWACHA

Coverage:	adc	coto	1990	1991	1992	1993	1994
Current assets							
Accounts receivable	60	5.9	240.28	240.28	240.28	240.28	240.28
Inventory and materials	81	4.4	154.85	154.85	154.85	154.85	154.85
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	25.7	36.60	36.60	36.60	36.60	36.60
Finished products	100	3.6	317.82	317.82	317.82	317.82	317.82
Cash in hand	30	12.0	37.09	37.09	37.09	37.09	37.09
Total current assets			806.65	806.65	806.65	806.65	806.65
Current liabilities and							
Accounts payable	30	12.0	78.43	78.43	78.43	78.43	78.43
Net working capital			728.22	728.22	728.22	728.22	728.22
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

NET WORKING CAPITAL IN: '000 CAMBIAN KHACHA

ALTERNATIVE E

Coverage:	soc	coto	1995	1996	1997	1998	1999
Year							
Current assets &							
Accounts receivable	60	5.9	240.28	240.28	240.28	240.28	240.28
Inventory and materials	31	4.4	154.85	154.85	154.85	154.85	154.85
Energy	0	0.0	0.0	0.0	0.0	0.0	0.0
Spares	360	1.0	20.00	20.00	20.00	20.00	20.00
Work in progress	14	28.7	36.80	36.80	36.80	36.80	36.80
Finished products	100	3.6	317.82	317.82	317.82	317.82	317.82
Cash in hand	30	12.0	37.09	37.09	37.09	37.09	37.09
Total current assets			806.85	806.85	806.85	806.85	806.85
Current liabilities and							
Accounts payable	30	12.0	78.43	78.43	78.43	78.43	78.43
Net working capital			728.22	728.22	728.22	728.22	728.22
Increase in working capital			0.0	0.0	0.0	0.0	0.0

Note: soc = minimum days of coverage ; coto = coefficient of turnover .

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE E

Year	1984	1985	1986	1987	1988
Total assets	1482.47	1518.68	1476.20	1642.54	1759.38
Fixed assets, net of depreciation	160.00	678.60	570.20	462.06	353.70
Construction in progress	626.99	0.0	0.0	0.0	316.00
Current assets	582.36	670.26	769.55	769.55	769.55
Cash, bank	36.22	36.54	37.09	37.09	37.09
Cash surplus, finance available	76.99	133.17	99.25	373.89	293.03
Total liabilities	1482.47	1518.68	1476.20	1642.54	1759.38
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	0.0	36.99	61.43	207.77	374.11
Profit/(loss)	36.99	24.44	146.34	166.34	166.34
Long and medium term debt	1187.98	1190.00	990.00	990.00	940.50
Current liabilities	57.50	67.24	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	1245.48	1257.24	1068.43	1068.43	1018.93
Equity, % of liabilities	13.49	13.17	13.55	12.18	11.37

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

Year	1989	1990	1991	1992	1993
Total assets	1901.17	2047.90	2199.59	2263.47	2330.07
Fixed assets, net of depreciation	581.40	493.10	404.80	316.50	344.20
Construction in progress	0.0	0.0	0.0	116.00	0.0
Current assets	769.55	769.55	769.55	769.55	769.55
Cash, bank	37.09	37.09	37.09	37.09	37.09
Cash surplus, finance available	513.12	748.15	988.14	1024.32	1179.22
Total liabilities	1901.17	2047.90	2199.59	2263.47	2330.07
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	540.45	731.74	927.97	1129.16	1242.54
Profit/(loss)	191.29	196.24	201.19	113.38	116.10
Long and medium term debt	891.00	841.50	792.00	742.50	693.00
Current liabilities	78.43	78.43	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	969.43	919.93	870.43	820.93	771.43
Equity, % of liabilities	10.52	9.77	9.09	8.84	8.58

PROJECTED BALANCE-SHEET, PRODUCTION IN: '000 ZAMBIAN KWACHA

ALTERNATIVE E

Year	1994	1995	1996	1997	1998
Total assets	2399.39	2471.43	2546.20	2623.68	2703.90
Fixed assets, net of depreciation	255.90	531.60	443.30	471.00	382.70
Construction in progress	364.00	0.0	116.00	0.0	200.00
Current assets	769.55	769.55	769.55	769.55	769.55
Cash, bank	37.09	37.09	37.09	37.09	37.09
Cash surplus, finance available	972.84	1133.18	1180.25	1346.04	1314.55
Total liabilities	2399.39	2471.43	2546.20	2623.68	2703.90
Equity capital	200.00	200.00	200.00	200.00	200.00
Reserves, retained profit	1358.64	1477.46	1599.00	1723.27	1850.26
Profit, (loss)	118.82	121.54	124.27	126.99	129.71
Long and medium term debt	643.50	594.00	544.50	495.00	445.50
Current liabilities	78.43	78.43	78.43	78.43	78.43
Bank overdraft, finance required	0.0	0.0	0.0	0.0	0.0
Total debt	721.93	672.43	622.93	573.43	523.93
Equity, % of liabilities	8.34	8.09	7.85	7.62	7.40