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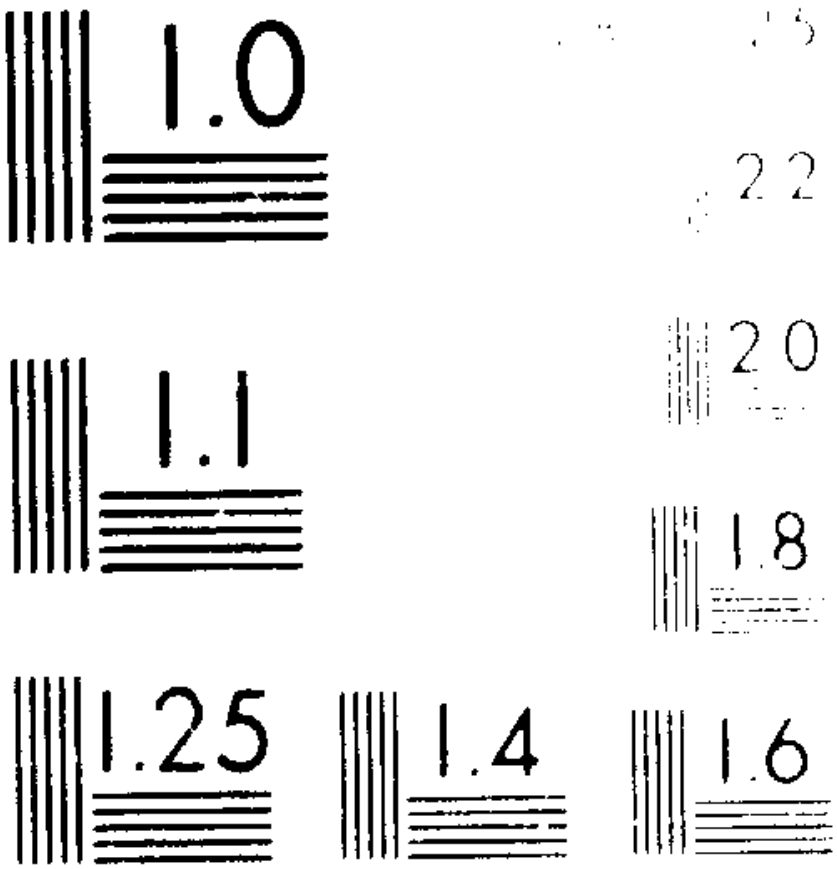
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ASSISTANCE TO THE AGRICULTURAL DEVELOPMENT AND MARKETING CORPORATION OF MALAWI ON FRUIT AND VEGETABLE PROCESSING PROSPECTS FOR ADMARC CANNING COMPANY IN MULANJE

RP/MLW/81/002
RP/MLW/82/001

Technical report*

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

Based on the work of Erik Kissmeyer-Nielsen,
Fruit and Vegetable Processing Expert

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INDE BANK Management

UNDP Acting Resident Representative and staff

UNIDO Industrial Development Advisor

UNIDO Regional SIDFA

Malawi Ministry of Industry and Agriculture Officials

Malawi Export Promotion Council

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I. SUMMARY

A. Background

The ADMARC Canning Company, Ltd. was established at Mulanje in southern Malawi in a remodeled tea processing plant in 1972. The cannery existed as a very small establishment at Luchenza before. A major reason to move it to Mulanje was to get closer to the main supply of pineapples in the Mulanje area. The cannery absorbs surplus pineapples, which cannot be sold on the fresh market. The major processing activity is processing of pineapples, but also other produce is processed such as tomatoes, oranges, grapefruit, apples, etc. The plant equipment is mostly set up for processing of pineapples and mostly dates back to 1973. The plant set-up is basically lacking the sophistications often seen in larger, more modern plants.

The continuing economic losses sustained by the cannery operation has led to increased concern by the ADMARC administration and INDE BANK, a major source of finance for ADMARC. This culminated in 1980 in the decision by the INDE BANK general manager to visit the factory together with some of his and Southern Bottlers staff. An interim report dated 13th of August, 1980 (Appendix I) deals with impressions and data collected by this mission. It points out various shortcomings of the plant operation such as excessive waste of pineapple, a very large inventory of unsold canned goods and the cumulative deficit reaching in excess of two million Malawi Kwatcha.

A later, early 1981 visit by a UNIDO Mission led to the appointment of the expert to appraise the operation of the ADMARC Canning Co., Ltd., Mulanje.

B. Purpose and Scope

The purpose of the project is to assist the Government of Malawi to appraise the technical and economic performance of the ADMARC Canning Co., Ltd., Mulanje. The project includes a detailed market survey for canned products and in particular pineapple products. This is done for Malawi and selected European and African Countries

specifically for pineapple juice concentrate market potentialities. The aim is to find means to turn the cannery operation profitable from the present persistant accumulation of losses. Particularly the extensive waste from the pineapple processing is brought into focus. Production, wholly or partly of pineapple juice concentrate for export was suggested by INDE BANK and SOBO (Southern Bottlers of Malawi) in their interim report of 13th of August, 1980 (Appendix I). This is suggested, since appropriate equipment for juice production can more fully make use of the pineapples than in the present processing set-up producing rings, chunks, pieces and juice as a by product. Such equipment is not included in the present set-up. However, the quantity of pineapples available is quite limited and on the small side for commercial production of pineapple juice concentrate. The peak production period is only 3 to 4 months from December through March. There is thus a need to identify other and economically promising productions of juice concentrate, which could be processed on essentially the same set-up. Passion fruit poses as such, since it is reported as growing well in Malawi and the World Market for passion fruit juice concentrate is expanding and the price increasing.

C: Conclusions

The present ADMARC Canning Company, Ltd. at Mulanje is a small scale commercial canning plant. Its management problems are to a great degree tied down to its small scale not allowing extensive use of professionals in the various aspects of its operation. Others are tied down to the very basic nature of its equipment not allowing all the operations of a normal, larger scale commercial plant.

The equipment of the canning company is mostly set up for pineapple processing. It produces pineapple rings, pieces and some pineapple juice. The pineapple juice is produced from sound trimmings and is mostly used as syrup in the canning of pineapple flesh. The lack of a so-called "irradicator" unit commonly combined with the peeling and coring machines to scrape off sound flesh from the peels limits the recovery of sound flesh for juice stock. Also a set-up for recovery of juice from pineapple waste such as peels, tops and bottoms is lacking. This juice is called "mill juice" and is normally used

as syrup in the packing of the pineapple. It is generally purified in settling tanks and by centrifugation before it enters the syrup department, where its brix is regulated.

The overall recovery rate from the pineapple processing is very low. During the 1981/82 season it was 8.5% versus 39.5% for a Southern African pineapple processing plant during the same season (See Appendix II). However, the nature of the small grower pineapple production versus large scale commercial pineapple production will hardly allow an optimum recovery rate or anything even close to the quoted figure which is during a not too favorable pineapple production season in the Southern African country. Still 8.5% versus 39.9% recovery rate appears too great a gap.

Also, the Mulanje Cannery fails to account for 40.1% of its waste versus 13.3% at the large scale pineapple processing plant. Above bring out the apparent lack of exacting all over data collection and accounting at the Mulanje Cannery. There are shortcomings in production log bookkeeping, individual product costing and overall accounting. This is contributed to lack of properly trained personnel in production, quality control and accounting. The overall management and supervision of the cannery is at present mostly resting on the shoulders of the Manager. There is a need to reinforce the operation of the plant with a highly skilled production manager, a supervisor of quality control and accountants to allow the General Manager to devote more time to the overall administration of the cannery.

There is an apparent need to reinforce the quality control with well-trained personnel as well as improved physical facilities. In view of the desire to expand the production of exportable products the laboratory must be equipped with the basic instruments to carry out standard quality tests. Exacting quality control log books must be kept in order to be able to refer back quality complaints to date, time and processing circumstances.

The building housing the processing plant is not ideal for the purpose. With its second floor (mainly used for storage of empty cans and other packing materials) it is harder to obtain adequate ventilation.

Particularly the cement floors and drains are not adequate. The cement floors are not acid resistant and thus not resistant to the acid liquid from the pineapples. Also the main drain is located on the side rather than the center of the floor. The cement floor is not laid out in such a way as to facilitate the fast drain-off and/or wash-off of fluid waste. The buildings were constructed for housing tea processing, being of dry nature and thus not demanding highly corrosion resistant floors and walls.

Office space is inadequate and can hardly house additional senior staff in a proper way. The site of the canning plant is in a gully and has rather steep and curving road approaches. Numerable accidents have happened with delivery trucks for this reason. The site configurations does also make needed additions more difficult than if the plant had been located on an ample level site with good drainage.

There are speculations, that it might be better to move the plant site onto a nearby higher, level site. The Malawi climate is mild and buildings do thus not need to be insulated at all. The most important is a highly corrosive resistant cement floor with adequate drains, walls to protect against theft, rhodents and insects and large roof overhangs to protect against heavy rain storms. The most important is to be able to arrange the processing equipment in the most efficient manner, which can be achieved, when designing the building according to the optimum plant equipment arrangement.

Storages for finished products at the Mulanje Cannery are also less satisfactory. They are apt to be very hot, possibly due to lacking ventilation and high heat absorption by the roofs. High storage temperature enhances deterioration of canned goods. Storages used at ADMARC Headquarters in Limbe have been reported suffering from occasional flooding during heavy rain storms.

Supplies of cans and other packaging materials are expensive due to the land-locked situation of Malawi. The volume of cans used in Malawi is too small to make it economically viable to produce it in Malawi. The domestic can plant has now collapsed financially and ceased to function. The cans are now imported mostly from the Republic of South Africa.

One way to decrease the cost of the cans used for the pineapple products is only to use one diameter cans for the consumer products. This would be the mm 99 x 119 (440 gram net size). A small size such as a 440 gr. net consumer pack could be produced by roughly halfing its length. This would make it possible to use the same can top sizes (and bottoms if using collapsed cans). This would involve using only choice A size pineapple and use the rest for juice stock and mill juice stock (for syrup in the canned pineapple flesh products).

The plant operates on expensive imported fuel oil, since neither petroleum nor other domestically produced fuel is available (apart possibly from wood which is in heavy demand by the surrounding tea plantations). A cheaper imported fuel source such as coal might be desirable and should be looked into. It is normally fed automatically to the steam boiler by a stoker devise but the operation demands a boiler attendant with an official certificate.

In view of excessively expensive packaging and other imported materials the Mulanje Cannery products are very costly and less competitive on the export markets. As a matter of fact the Mulanje Cannery is only exporting to Zimbawe, which could appear to be for political rather than economic reasons.

Export products potentially competitive on the World Market must be compact, high priced. One such immediate opportunity is concentrated pineapple juice. This production could in the future be complimented by concentrated passion fruit juice, which at present commands an excellent profitable World Market. It can virtually be produced on the same plant as the concentrated pineapple juice with very few and less expensive additions. The Malawi climate appears uniquely suitable for growing of passion fruit. It grows wild on the slopes of the Zomba plateau. The season for passion fruit falls inside as well as outside that of pineapples. It will grossly improve the profitability of the fruit juice concentration plant. Production of other fruit juice concentrates is not excluded.

Passion fruit is a crop which can be grown by small scale growers and will help them increase their income from cash crops which is much needed. It will help make it more attractive for the small scale growers to remain on the land.

D. RECOMMENDATIONS

Very serious restraints in data collection have delayed producing the following recommendations. Fortunately the advisors original 2 months project period was extended by three months through the recommendations of the Resident Representative of UNDP in Lilongwe and the Agro Industry Division of UNIDO in Vienna. The excellent cooperation of the Development Manager of ADMARC in Limbe and other staff members plus Admarc Canning Company Management in Mulanje has made it possible to procure most essential pineapple processing data. A general lapse in production data and accounting at Admarc Canning Company, Mulanje and Admarc main office have given serious voids in essential data collection. Through cooperation of the Admarc Canning Company Management the advisor has been able to conduct a ten day trial period for pineapple data collection with emphasis on quantities of canned pineapple products produced. Aside from this the advisor was able to have assembled 8 days data on pineapple processing, both from the 1981/82 season. As reference material the advisor was able to collect detailed pineapple processing data from the larger pineapple and citrus processing company in Swaziland, Libby (see attached Appendix 2.) Annual accounts for the Admarc Canning Co. produced by Admarc's official accountants Deloitte, Haskins and Sells, Blantyre were provided for 1980 and 1981 and will be inserted as an appendix in the final report. It shows an accumulated loss from 1973 to 1981 of 2,187,058 Kwatcha and a bank overdraft of 252,375 Kwatcha.

Above and in depth technical study of the Canning Company has allowed the advisor to arrive at the following recommendations. Since some machinery quotations are still pending, they are subject to alterations. They are, however, made according to his experience and best belief.

The 1981/82 and 1975 through 1980 pineapple production data reveals an alarming low recovery rate. In order to remedy this it is recommended to rehabilitate and install an efficient pineapple juice concentrate line; the plant and estimates of cost are given.

Production of pineapple juice concentrate provides better recovery rates for small and inferior grade larger fruit than production of canned pineapple flesh. It is recommended only to use choice grade A pineapples for production of canned pineapple flesh and the rest for production of juice concentrate. It is estimated that only 25% of the purchased pineapples meets this criteria. The other 75% will be efficiently processed into juice concentrate. It is recommended:

1. Install a pineapple juice concentrate line capable of processing about 38 tons of pineapples per working day or about 15 tons of straight juice. The concentrate produced is about 1:3.75 in concentration or about 60° Brix hot packed in 5 kg net cans for export to U.K. In view of the high cost fuel it is recommended to use a double effect, falling film evaporator (capacity 1000 kg water evaporation per hour) rather than a single effect evaporator with about half the fuel efficiency.

2. Rehabilitate the existing two Ginaca coring and peeling machines including installing irradicators.
3. Rehabilitate floors and walls in the processing areas to render them resistant to the acid fluids from the pineapple processing.
4. Improve quality control instrumentation.
5. Expand office space by three 150 square foot offices to accommodate additional staff.
6. Reinforce the management with a production manager with extensive experience in fruit and vegetable processing, a chief of quality control with extensive experience in fruit and vegetable product quality control and a chief accountant capable of carrying out detailed accounting including product costing.
7. To secure proper management of the Canning Company it is recommended to arrange a management contract with a reputable international food processor and marketer, Carlsberg/SOBO, Malawi appears approachable although discussions between them and Admarc so far have not resulted in an agreement. SOBO (Southern Bottlers) are at present importing various fruit juice concentrates for use in their products. These might be produced by Admarc Canning Company taking up some of the spare capacity of the recommended fruit juice concentrate production line and thus improve the economics of its operation. Among such juice concentrates are passion fruit and citrus fruit juice concentrates.
8. Marketing efforts must be further strengthened either through implementation of item 7 above or strengthening of sales department.

9. The feasibility of small as well as large scale production of passion fruit for production of passion fruit juice concentrate should be investigated soonest. The world market for this product is expanding rapidly and prices are highly favorable. This will help further to support growers of produce. It will be necessary to add flavour recovery unit and a passion fruit juice extractor to the pineapple juice concentration line. This will cost approximately US $200,000.

10. The pending changes in the Admarc Canning Company's technical and administrative set-up makes it desirable to seek the assistance of a UNIDO fruit and vegetable expert to assist in the implementation of the recommended changes. The expert would serve with the Admarc Development Manager at the Admarc Headquarters to closely assist in the implementations. It is estimated, that the expert's services would be needed for at least two years. The expert's terms of reference are shown in Appendix 5.

11. The increasing demanding nature of fruit and vegetable processing makes it desirable to have staff members of the Admarc Canning Company join various UNIDO or other appropriate training programs within their fields. Detailed information about such programs can be obtained through the UNDP Representative in Lilongwe. The estimated cost of the recommended plant equipment is US $1,000,031, for buildings it is MK140,000 and additional staff is 50,000.

Above recommendations are expected to grossly improve pineapple fruit recovery rates and increase the annual turnover more than three fold. As is shown in the cash flow analysis Table 25, it is estimated that the project will break even about the fifth year.

II. PRESENT SITUATION

A. Fruit and Vegetable Processing

A.1 Present Processing Set-up

The present food processing set-up was installed in an old two story tea processing factory at Mulanje in 1972. The plant was constructed for processing of tea, which is a dry process. and not for the present wet process, where floors and walls are subject to large amounts of highly corrosive, acid pineapple liquids. Although some improvements of floors and walls were carried out in 1972, before the equipment was installed, particularly the floor has given constant troubles, not being able to resist the highly corrosive pineapple liquid it is subject to. The problems are enhanced by the floor not having an even slant towards the main drainage channel, which furthermore is located on the side, rather than in the center of the floor.

Figure 1 shows the present processing set-up. The site is located next to the Blantyre - Mulanje - Mozambique P Post road on the northern side. It has the shape of a with a stream running through it. Apart from the road, it is bordered by tea plantations. The shape of the site makes access difficult, particularly for large trucks and accidents occur occasionally.

At present the major processing activity is processing of pineapples for which the processing equipment is mostly designed and arranged. A description of the equipment is given in Table 1. The pineapples are delivered by trucks in plastic containers. The trucks are weighed in and out on the weighing bridge at the entrance to the plant. The pineapples ar unloaded in the approximately 70' x 38' receiving shed. They arrive in plastic containers graded in A and B size, i.e. about 4.5" to 5" and less than 4.5" in diameter respectively. The grading of the pineapples takes place at eight collection and grading stations for size and

Figure 1

Present Processing Set-Up

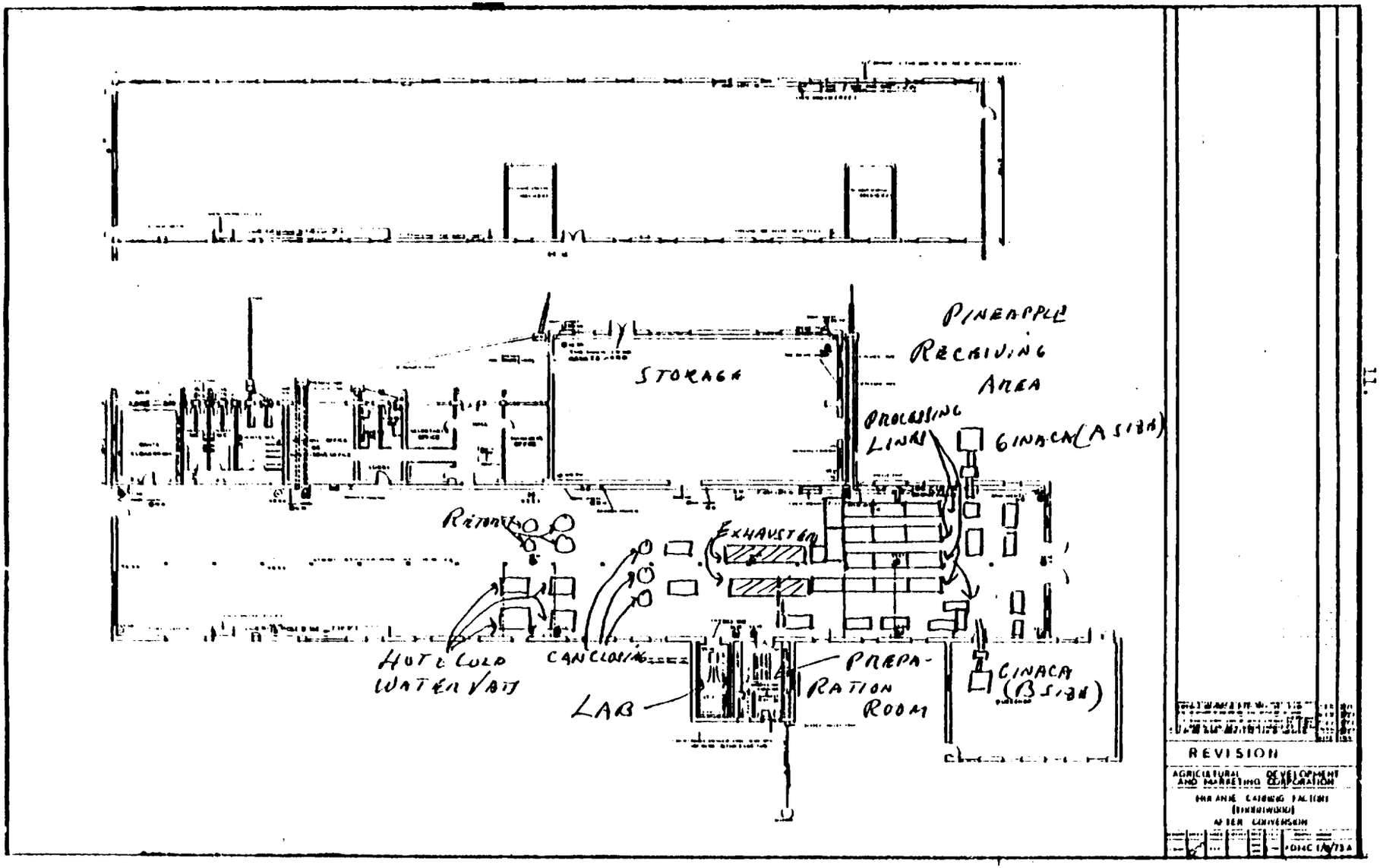


Table 1

List of major plant equipment at ADMARC CANNING COMPANY, Ltd.

Number	Type of Equipment
2	Ginaca Pineapple Coring and Peeling Machines
2	Pineapple Cylinder Slicing Machines
15	Profile Iron Tables with Stainless Steel Tops and Central Drain Hole, 93 x 43 x 40"
2	Steam Exhaust Tables, 20 feet long
3	Can Closing Machines (Metal Box, R.S.A. Ltd. Type 9 DS (June 1966) Serial ED98) for 99 and 85mm diameter cans, capacity 85 cans/min.
1	Can Closing Machine (Metal Box, R.S.A., Type 90S for 5 Kg. net Cans.
4	500 Gallon (Imperial) Capacity, square Sheet Iron Tubs for Pasteurizing as well as cooling cans
2	Conventional Retorts for Two Perforated Iron Baskets, Capacity 1320 440 gram Net Cans
2	Conventional Retorts for Two Perforated Iron Baskets, Capacity 900 8 ounce (227 gr.) Net Cans
1	One Electric Overhead Crane (CAT) with Rail for Transport of Retort and Cooling and Pasteurization Baskets.
8	Steam Jacketed Stainless Steel Kettles.
1	Leonhardt Disintegrator
1	Filter Press
1	Herbert Press
2	Cyclotherm Steam Generators, Type CP 700-2SP P. O. Box 68834, Bryanston, R.S.A. (Capacity 100 lbs. (45.4 kg.)/Hour at 50-60 lbs./sq" Year 1973.
1	O.C. Olsen, The Boilerman, Salisbury, Zimbabwe. Makers No. 0.99. Date of Hydrolic Test 23-8-72
2	Belt Conveyors to transport Packaging and other Materials to and from Storage on Top of Processing Floor.
1	Weighing Scales in Roller Conveyor Line in Receiving Shed.
1	Truck Weighing Station
1	Air Compressor
-	Miscellaneous Equipments such as cups, tables, stirrers, Laddles, measuring devices, buckets, Laboratory ware, refractometer Hydrometer (Brix) ecc.
1	Water Purification and Softener, plus Pumps and Pipes for Water from River Supply to produce Portable Water and Boiler Water.
-	Workshop with various Equipment for Maintenance

maturity. Sizing is done by means of wooden rings. There are representatives from the factory as well as the small scale growers at the collection and grading stations. In the factory receiving shed immature pineapples are set aside to mature more. There is one Ginaca peeling and cooring machine set for each grade, one located next to the receiving shed and one opposite in the same end of the building. Both Ginaca machines lack functioning eradicators, i.e. devices to shear off wholesome flesh from the pineapple peel being ejected from the pineapple coring and peeling machine. This eradicator flesh is highly valuable pineapple juice stock and normally used at commercial pineapple processing plants. The pineapples are washed in potable water in steel throughs before being processed.

There are thus initially two streams of processing; namely, for A and B grade. Trimming, sorting and grading of the pineapple cylinders prepared by the Ginaca machines is done on individual, stainless steel top tables with a drain whole in the middle. The dimensions of the tables are 43" x 93" x 40" (tall). They are constructed from profile iron with stainless steel trayes mounted on top. They are movable and can thus be arranged according to need. The present arrangement is shown in Figure 1 (as of the 1981/82 pineapple processing season).

Slides passing grading and trimming operations enter different filling stations, mainly being filled in two different can sizes; namely, 440 and 820 gram net sizes according to the diameter of the slices. However, also some institution size, 5 kg. net cans of slices are packed, chunks and pieces are filled into several can sizes, namely 440, 820, 2720 and 5000 gram net. Sound trimmings from the cylinders plus broken rings are cut into more even sized pieces and chunks by hand.

Pineapple juice is made from healthy off grade pineapple and drippings at the cutting and trimming tables. The flesh is comminuted on a "Leonhardt" comminuting machine. The juice is filtered before being canned and pasteurized. Filtering is

done through filter cloth. Solids from the filtering operation are occasionally used for production of low grade pineapple jam.

The tin cans are closed on automatic tin can closing machines with a capacity of 85 cans per minute for 73 as well as 99mm. diameter cans. The 2720 gram and 5 kg net tin can size is closed on manually fed semi-automatic can closing machines with a capacity of 15 tins per minute. All the can closing machines are manufactured by Metal Box Ltd., Republic of South Africa. The cans with slices, chunks and pieces are filled up with natural pineapple juice or sugar syrup, the brix of which is between 17 and 19 and about 14 respectively. The filled cans are exhausted in two 20' long steam exhausters at about 78° C for about 5 minutes before being closed. According to the Admarc Canning Company Manager the consumers prefer the pineapple pack with natural pineapple juice rather than sugar syrup. It should be pointed out, that other commercial pineapple processors use natural pineapple juice made from pineapple tops, bottoms and eradicator rejects. This juice is called "mill juice" and is produced on special "mill juice" production lines. One concern about the Admarc Canning Company is that it does not make use of such valuable waste and thus has a very low recovery rate.

The filled and closed cans are commercially sterilized in 212 F hot water for 25 and 50 minutes for 440 and 820 gram net can sizes respectively after which they are cooled in cold water. The 2720 gram and 5 kg. net, institution size cans with pieces, chunks or slices are likewise commercially sterilized in 212°F hot water for about 90 minutes after which they are cooled in cold water. For these purposes the plant has four 500 gallon capacity, square, sheet iron vats. Besides this the plant has two retorts with a capacity of 1320 440 gram net cans each held in two perforated iron baskets. There are also two smaller retorts each capable of holding 450 226 gram (8 oz.) net cans.

The water supply is from a nearby river at a maximum rate of about 2000 gallons of water per hour. The water is treated in a water treatment plant to produce soft, pottable water for

general as well as boiler use. The temperature of the water is according to the cannery manager between 35 and 40 °F.

Although the plant set-up is mainly for processing of pine-apples, it also produces a range of other products as it appears from the list of products sold on the domestic market for the past two years (See Table 2). In general it produces various jams and marmalades, tomato juice and sauce and various other fruit juices. It does, however, not have complete lines for these type of productions. For instance the various jams and marmalades are rather low grade, because the processing set-up is rather incomplete, using open stainless steel steam jacketed vats rather than cooking under vacuum. Emphasis throughout the operation is on maximum use of manual labour. It does not have a regular commercial line for production of citrus juices and apple sauce, etc. This raises the question, whether it would be worth while upgrading some of these lines in order to produce better quality products, which might command a better consumer appeal.

A.2 Management and Labour

The processing set-up is labour intensive. The total number of labour, office staff and management is 381 as it appears from Tables 3 and 4. This is very high for the size of the plant. Labour intensive operations remain the goal even after rehabilitation and addition to the plant. The Malawi Government is interested in helping to lower the high rate of unemployment.

Tables 3 and 4 show the labour, management and office staff at present employed at the plant. The source of this information is the plant manager. The interview failed to reveal certain categories of workers and staff such as is the case with mechanics. The expert has filled this void with his own estimate. It is interesting to notice how close the calculated cost for 1981 comes to the actual cost according to the official accounts for

Table 2

Agricultural Development and Marketing Corporation

P.O. Box 5052.
LIMBE.

5th February, 1981

Ref. C104/A

WHOLESALE PRICE LIST: MULANJE PEAR PRODUCTS PLUS 20% SURTAX

PRICE SUBJECT TO ALTERATION WITHOUT NOTICE

COMMODITY			PACKED PER C/S	PRICE PER CASE	MK
FRUIT - Pineapple Pieces	15½oz	440G	2 Doz	MK14.00	0.58
Pineapple Pieces	A.2½	830G	2 Doz	MK19.00	0.79
Pineapple Pieces	A10	3.098Kg	6 Tins	MK22.00	3.67
Pineapple Rings	15½ oz	440G	2 Doz	MK16.00	0.67
Pineapple Rings	A2½	880G	2 Doz	MK21.00	0.88
Pineapple Rings	A10	3.017Kg	6 Tins	MK23.00	3.83
P/apple Pieces Natural Juice	A2½	820G	2 Doz	MK18.00	
P/apple Rings Natural Juice	A2½	830G	2 Doz	MK20.00	
Paw Paw In Lemon	15½oz	440G	2 Doz	MK16.00	
VEGETABLES					
Tomato Puree	15½oz	440G	2 Doz	MK26.00	
Tomato Puree	A10	3.022Kg	6 Tins	MK48.00	
Green Beans	15½oz	410G	2 Doz	MK18.00	
Sliced Green Beans	15½oz	440G	2 Doz	MK18.00	
Whole Peeled Tomato	15½oz	425G	2 Doz	MK15.00	
Whole Peeled Tomato	A2½	804G	2 Doz	MK18.00	
Whole Peeled Tomato		5Kg	4 Tins		
Baked Beans	8oz	227G	4 Doz	MK18.00	
Baked Beans	15½oz	440G	2 Doz	MK16.00	
Baked Beans	A2½	850G	2 Doz	MK24.00	
Beetroot	1 lb.	400G	2 Doz	MK24.00	
Baby Beets	1 lb.	425G	2 Doz	MK22.00	
Whole Carrots	15½oz	425G	2 Doz	MK16.00	
Diced Carrots	A2½	798G	2 Doz	MK27.00	
Diced Carrots	15½oz	425G	2 Doz	MK15.00	
JUICE - Pineapple Juice	15½oz	440G	2 Doz	MK16.00	0.67
Pineapple Juice	A10	2921	6 Tins	MK24.00	4.
Orange Juice	15½	440G	2 Doz	MK16.00	
Orange Juice	A10	2.958Kg	6 Tins	MK24.00	
Guava Juice	15½oz	440G	2 Doz	MK16.00	
Guava Juice	A10	3.048Kg	6 Tins	MK24.00	
Grapefruit Juice	15½oz	440G	2 Doz	MK16.00	
Grapefruit Juice	A10	3.011Kg	6 Tins	MK24.00	
Tomato Juice	6oz	170G	4 Doz	MK14.00	
Tomato Juice	10oz	301G	12 Tins	MK14.08	
Tomato Juice	15½oz	440G	2 Tins	MK16.00	
Tomato Juice	A10	3.031Kg	6 Tins	MK24.00	
Tomato Juice		5Kg	4 Tins	MK24.00	
ITPATSO FLAVOURED JAMS					
Strawberry	8oz	226G	48	MK16.00	
Raspberry	1 lb	450G	48	MK27.00	
Apricot	A10		6 Tins	MK30.00	
Mixed Fruit		5Kg	4 Tins	MK24.00	
FRUIT JAM					
Whole Strawberry Jars 4 Tins		450G	4 Doz	MK27.00	
Whole Strawberry	A10	3714	6 Tins	MK27.00	
SAUCES					
Tomato Sauce	9oz	255G	4 Doz	MK26.00	
Tomato Sauce	15oz	425G	2 Doz	MK22.00	
Tomato Sauce	28oz	800 Mls.	2 Doz	MK26.00	
CHUTNEYS					
Tomato Chutney	1 lb	440G	4 Doz	MK24.00	
Hot Tomato Chutney	1 lb	369G	4 Doz	MK24.00	
SOUPS					
Tomato Soup	15½oz	400G	2 Doz	MK13.00	

P.S. G = Grams MK = Malawi Kwacha = about US $1.00

Table 3

Labour Requirements

Type of labour	Number per Shift	Shifts per Day	Months per Year	Days per Year	Man-Months per Year	Man-Days per Year	Cost per Man per Month	Cost per Man per Day	Cost per Year
Plant Foreman	1	1	12		12		102.50		1,230
Plant Foreman	1	1	12		12		75.66		908
Chief Mechanic*	1	1	12		12		80		960
Assistant " *	2	1	12		24		60		1,440
Boiler Men	2	1	12		24		35.75		858
Unskilled Labour;									
Can Seamers	6	1	(12)	312	(72)	1,872		0.70	1,310
Trimming and Can Filling	86	1	(12)	312	(1,032)	26,032		1.20	31,238
General Labour	262	1	(12)	312	(3,144)	81,744		0.50	40,872
Totals	361				4,332				78,816 MK

Source: Plant Manager

* Experts Estimate (this category of labour was not mentioned by plant manager)

Table 4

Management and Office Staff

Category	Number	Shifts per Day	Months per Year	Man-Months per Year	Cost per Man-Month	Cost per Year
Manager	1	-	12	12	-	18,000*
Superintendent	1	1	12	12	302	3,624
Quality Control	1	1	12	12	93.16	1,118
Quality Control Assistants	7	1	12	84	61.00	5,124
Assistant Accountant	1	1	12	12	396.00	4,752
Cashier	1	1	12	12	44.83	538
Debets Accountant	1	1	12	12	74,92	899
Credit "	1	1	12	12	30.50	366
Secretary	2	1	12	24	77.92	1,870
Storage Control	1	1	12	12	53.67	644
Messengers	3	1	12	36	(0.50/Day)	468
Totals	20			240		37,403
Totals, table	361			4,332		78,816
Total Labour, Office and Management				4,572		116,219

Source: Plant Manager

for the year ended 31st March, 1981 (see Appendix 3) namely, respectively MK116,219 and (62,741 + 52,015) = MK117,756.

It appears there is a general need of additional trained personnel virtually in all categories of management, quality control and office staff. Not least accounting is in great need of reinforcement. This applies to the so-called log bookkeeping on the daily plant operations as well as overall bookkeeping. The weakness of this very essential activity has made it very difficult for the expert to carry out his duties as outlined in his terms of reference. In many areas of his inputs he has had to resort to using estimates based on his previous experience. It is essential, that these functions become upgraded in order to bring the plant operation out of its present dismal situation with its steadily rizing defecit. As previously pointed out the persistant small turnover has made it difficult to find funding for additional highly qualified personnel. It is expected that the planned improvements and expansions of the plant operations will allow this.

A. Procurement of Produce

Pineapples are procured through eight pineapple collection and grading centers in the Mulanje area. These eight collection and grading centers are set up to receive and grade pineappples by size and maturity. They are graded into A and B size, 4½ - 5" and less than 4½" in diameter respectively by use of wooden rings. Each market has grower as well as factory representatives, which oversee the weighing and grading operations. The factory pays 35 and 30 MK per ton for A and B grades respectively. The pineapples are transported to the factory by truck in plastic baskets. At the factory the trucks are weighed in and out on a weigh bridge. A and B sizes are likewise weighed at the two processing lines for A and B size respectively. Less mature pineapples are set aside to mature further.

What differs at the Mulanje factory from the major international pineapple processors is that the pineapples are produced by small scale producers rather than large scale producers or own plantations. The production area is essentially an area for large scale tea producers with small scale growers in between. The Malawi Government wants to support the small scale growers and aside from setting up a tea processing plant for small scale tea growers, it also is interested in supporting the small scale production of pineapples and other fruits and vegetables. The Admarc Canning Company serves as a logical outlet for this produce, since the fresh market is too small to serve as an outlet for significant amounts of fresh fruits and vegetables.

Aside from processing pineapples, the factory is also processing other fruits and vegetables such as tomatoes, citrus fruits, strawberries, etc. These fruits and vegetables are purchased in the open market.

The small scale fruit and vegetable production gives the factory little control over the quality of the produce they purchase. Major international fruit and vegetable processors virtually have full control over the production of the produce they purchase. Not having full control over the produce they process tends to leave the Mulanje factory with a lower quality of produce than other commercial processors. This may partly but not wholly explain the exceedingly low yield amounting to less than one fifth of normal commercial yields on the pineapple processing.

A.4 Packaging

At present all the pineapple products, apart from a small pack of pineapple marmalade and jam, are packed in tin cans. The most common can size are 73 x 111mm (440 gr net) and 99 x 119mm (A 2½, 830 gr. net). A limited amount is packed in size A10 tin cans (3,017 gr. and 3,098 gr. net for rings and pieces respectively). Plastic containers are used for other products such as tomato sauce, jams and marmalades.

Table 5

Can Prices

ADMARC CANNING COMPANY LIMITED

LIWONDE _ _ CANS/METAL - BOX(SA)

ALL PRICES include Railage, Customs Duty, Cartons, Company Transport; Ends e.t.c., Landed Factory

LIWONDE CAN MAKERS:

73 x 111 m/m	450g	All Lacquers	22t each.
99 x 119 m/m	A2½	All Lacquers	29t each.

METAL BOX (SA):

73 x 111	450g	All Lacquers	12t each.
99 x 119	a2½	All Lacquers	19t each.

FLATTENED CANS - REMOULDED AT FACTORY:

73 x 111	440	All Lacquer	) Quote, R16.90/1000
			) Awaiting information of amount
99 x 119	A2½	All Lacquer	) of Cans Per Container.

Prices less than above

G. W. Rumney
MANAGER

GWR/rmn.

Table 6

Can Prices

Admarc Canning Co. Limited
P O Box 13
MULANJE
Malawi

E81/113

Att: Mr Jack Rumney

20 November, 1981

Dear Sirs,

We have pleasure in submitting our quotation as follows:-

SPECIFICATION	QUANTITY	PRICE
a) Open top can bodies supplied in flattened form. Specification: D3/1P (75/25 differentially coated electrolytic tinplate, internally and externally plain.)		Per 1000 C&F Nacala in S A Rands
73 x 111mm	100 230	R59,33
99 x 119mm	100 230	R82,90
b) Open top ends. Specification: E1FTX (No. 25 electrolytic tinplate internally lacquered for pines or tomatoes, externally lacquered for protection.):		
73mm	201 000	R16,90
99mm	200 000	R25,00

PACKING : In Cartons LCL

DELIVERY: To be mutually arranged.

PAYMENT : 90 day draft.

Yours faithfully,

W. J. HOOD
Export Manager

The tin cans are at present mainly imported from the Republic of South Africa. A can making plant was set up in Liwonde, Southern Malawi but only functioned a few years. It is now closed due to economic failure. As it appears from Tables 5 and 6, Liwonde can prices were not competitive with those of Metal Box, R.S.A. and furthermore the quality of the tin cans was not satisfactory. The reason for the failure of the Liwonde Can Factory is the limited market for tin cans in Malawi not allowing the needed high volume production.

A.5 Quality Control

According to Admarc's Sales Department and the manager of Admarc Canning Company, there are no complaints about the quality of the pineapple products. Furthermore, according to the same sources, the Malawi Standards Bureau has examined the products and found them to measure up to international standards. The UNIDO fruit and vegetable processing advisor examined a cross section of the pineapple products. He found the canned slices and pieces, generally acceptable, but found the canned pineapple juice high in sediment. He did, however, not have access to a well equipped quality control laboratory and therefore asked the Admarc Sales Department to airmail a representative sample of canned pineapple products to the Tropical Products Institute in London, England. He made arrangements for the testing at T.P.I. per telephone and telex and submitted the request in writing to the Admarc Sales Department in Limbe. They assured him the request was taken care of, but on contacting T.P.I. in London the second week in May, 1982 it was found, that the samples had not arrived. This was pointed out in a letter sent the same week to Mr. Salifu, Development Manager of Admarc. The advisor feels it is important to have the present line of pineapple products manufactured by the Admarc Canning Company evaluated by international experts on quality requirements for pineapple products. It is particularly important since Admarc wants to expand exports of pineapple and other fruit and vegetable products.

At present neither the Admarc Canning Company nor Admarc Headquarters possess adequate testing facilities to conduct satisfactory quality control on fruit and vegetable products. There is also a need for more highly qualified trained personnel to carry out quality control.

A.6 Economic Performance

The present economic status of the Admarc Canning Company is not favorable. As it appears from the official report by the Auditors, Deloitte, Haskins and Sells of 31st March, 1981, Appendix 3, the company has an accumulated loss at the end of the accounting year amounting to MK2,187,058 plus a Bank overdraft of MK392,575. Also, official accounts by the same auditors for the year ending 31st March, 1980 are shown in Appendix 4. According to Appendix 3 and 4 each of the years 1979, 1980 and 1981 show operating losses, namely MK365,728, MK252,664 and 186,731. The operating losses are, however, declining while the turnover has increased namely from MK330,010 through MK347,387 to MK760,769 for the years 1979 through 1981. As it appears from Appendix 3 and 4, pages 6, items 6 the long term borrowing is only partly bearing interest, in 1981 only MK146,000 bearing interest at 8½% and 710,010 at 10%, but loan interest were waived for 1979 through 1981 although these interest rates are very low. Admarc is carrying the burden of these long term loans and can actually in its present tight financial situation ill afford it. Had the Admarc Canning Company been charged with full interest rates, interest and loan payments, the financial situation would have looked dim to the extreme. It is the UNIDO advisor's duty to search for and identify the underlying reasons for the poor financial performance of the company. In his search he looked closely at the general technical and management performance of the company.

It is obvious, that the plant lacks numerable functions normal to international commercial pineapple and general fruit and vegetable processing plants. Among striking deficiencies in the technical set-up of the pineapple processing is lack of eradicators on the Ginaca peeling and coring machines. Eradicators

serve to scrape the sound and clean flesh from the peels. This is a major source for pineapple juice stock and amounts to a significant percent of the recovered pineapple in the processing. It is discarded as waste together with the peels, tops and bottoms, which normally are used to produce so-called "mill juice" used as syrup in the pineapple pack.

Admarc has not succeeded in disposing of its waste as animal feed as is the case at most commercial pineapple processing plants such as the Libby plant in Swaziland and the pineapple processing plant, Kenya Canners at Thika, near Nairobi in Kenya.

Collection of daily pineapple processing data was found difficult. It was therefore arranged in cooperation with the plant manager to undertake such data collection over a specific period. Data for 8 days were collected January 4 through 11, 1982 and presented in Table 7. Apart from item 1, 2 and 3 calculated by the advisor, the table is as it was submitted by the Admarc Canning Company. The UNIDO advisor calculated total drained weights, net weights and recovery percentages based on the given total processing weights. The fruit was packed in natural juice and the total amount of this is given. The recovery rates are very low, namely 8.65 percent for net weight and 5.34 percent for drained weight. This compares with a total recovery rate of almost 40 at the plant in Swaziland, where the recovery rate for net weight (recovered flesh) was 21.1 percent this processing season. Similarly, pineapple processing data was collected for a ten day period during February, 1982 as shown in Table 8. Here the total recovery rate is 8.67 percent and the net weight (flesh recovered) 5.41 percent, thus very close to the previous test.

Through the cooperation of the Manager of the Admarc Canning Company it was possible to collect data on total amounts of pineapples purchased and pineapple products produced during the period 1975 through 1981. These data are presented in Table 9. Based on the drained weights and net weights for different can sizes and pineapple products submitted by the same source, the advisor

3. Natural Juice								9,084					

(x) A theoretical yield of 50-55% of ingoing fruit weight is possible (source Fruit and Vegetable Processing Technology AVI Publishing U.S.A. 1978).

SOURCE: ADMARC CANNING COMPANY LIMITED

TABLE 7

PINEAPPLE PROCESSING DATA, JANUARY, 4 THROUGH 11, 1982, ADMARC CANNING COMPANY LIMITED, MULANJE, MALAWI.

DATE	FACTORY WEIGHTS, KG	PROCESSING WEIGHT, KG	ROTTEN KG	WASTE KG	PINEAPPLE SOLD, KG	CARRIED FORWARD, KG	A2½ CHUNKS IN NATURAL JUICE	A2½ RINGS IN IN NATURAL JUICE	440 grams NET CHUNKS IN NATURAL JUICE	440 grams NET RINGS IN NATURAL JUICE	WEIGH IN CANS KG	RECOVERY %	LABOUR	HOURS	COST	INCOME (US$)
4/1/82	33,907	30,804	-	22,110	-	3,103	2,294	952	-	416	3,039.50	10	168	6½	100.80	1252.10
5/1/82	67,950	44,505	-	31,070	-	20,488	2,477	779	-	592	3,257.76	7	130	8½	91.00	1752.00
6/1/82	55,215	48,942	-	24,302	-	32,701	4,025	1,055	770	-	5,370.48	12	158	11	94.80	1957.00
7/1/82	40,513	44,338	599	19,955	-	34,037	2,614	1,028	315	-	3,343.50	8	158	9½	94.80	1773.32
8/1/82	30,340	20,135	1,202	15,370	14	45.032	1,105	453	250	-	1,481.04	5	138	6½	82.80	1093.28
9/1/82	27,439	4,629	-	1,750	125	65,717	1,040	522	-	-	1,379.84	30	110	4	66.00	185.16
10/1/82	8,081	52,009	-	17,405	-	21,729	3,272	1,239	481	-	4,181.32	8	211	9	126.60	2080.76
11/1/82	52,555	35,930	-	10,285	25,245	13,109	2,311	991	453	-	2,841.08	8	159	9	95.40	1437.20
Totals NET..	328,000	288,012	2,101	148,507	25,384		19,749	7,319	2,276	1,308	25,395	-	1239	64	743.40	11508.36
1. Drained wt.							9,677	3,945	997	370	14,089	539				
2. Net wt. (%)							16,194	6,002	1,001	576	23,773	8.65				

Table 8

PINEAPPLE PROCESSING DATA FOR 10 DAY PERIOD, FEBRUARY, 1982

											TOTALS
PROCESSED WEIGHT, KG.	21,419	37,265	43,539	29,219	43,987	40,992	29,162	50,006	48,936	47,280	391,805
WASTE WEIGHT, KG.	(50.8%) 10,870	(50.4%) 18,785	60.0%) 21,765	(52.0%) 15,185	(50.8%) 22,345	(47.4%) 19,435	(47.1%) 13,730	(56.5%) 28,270	(52.7%) 25,790	(52.0%) 24,590	(51.2%) 200,765
CRUSH TO JAM AFTER EXTRACTING JUICE, KG.	-	410	320	480	274	-	-	-	-	-	1,490
A2½ CHUNKS, NATURAL JUICE CANS	1,222	2,974	3,263	3,891	3,352	2,400	2,653	5,524	4,205	3,964	33,448
NET WEIGHT, KG.	1,002.0	2,438.6	2,675.7	3,190.6	2,748.6	1,968.0	2,175.5	4,529.7	3,448.1	3,250.5	27,427.4
DRAINED WEIGHT, KG.	598.8	1,457.3	1,598.9	1,906.6	1,642.5	1,176.0	1,300	2,706.8	2,060.5	1,942.4	16,389.5
440 grammes NET RINGS NATURAL JUICE CANS	64	102	150		206	88	27	97	90	-	824
NET WEIGHT, KG.	28.2	44.9	66.0	-	90.6	38.7	11.9	42.7	39.6	-	362.6
DRAINED WEIGHT, KG.	18.5	28.9	42.5	-	58.3	24.9	7.6	27.5	25.5	-	233.2
A2½ RINGS, NATURAL JUICE CANS	339	849	790	646	418	179	490	748	605	697	5,761
NET WEIGHT, KG.	278.0	696.2	647.8	529.7	342.8	146.8	401.8	613.4	496.1	571.5	4,724.0
DRAINED WEIGHT	182.7	457.6	425.8	348.2	225.3	94.9	264.1	403.2	326.1	375.7	3,105.2
TOTAL NET WEIGHT, KG.	1,308.2	3,595.7	3,709.5	4,200.3	3,456.0	2,153.5	2,589.2	5,185.8	3,983.8	3,822.0	33,966.0 (8.67%)
TOTAL DRAINED WEIGHT, KG.	799.6	2,359.8	2,387.2	2,734.8	2,200.1	1,295.8	1,571.7	3,137.5	2,412.1	2,318.1	21,217.9 (5.41%)

SOURCE: AIRARC CANNING COMPANY LIMITED.

calculated recovery rates using the net and drained weights as given by The Canning Company in Table 9A except as indicated in the table. He had to estimate drained weights for the A-10 can sizes and flesh equivalents to the crush. His estimate is 60%. While the total recovery rate of 7.89 percent is lower than in the two test periods dealt with in the previous the calculated recovery rate for flesh as 7.57% is higher. However, he does not know to what extent natural pineapple juice is used as substitute for sugar syrup in the pack, which would increase the overall recovery rate.

Among the concerns over the state of the daily log book keeping on the pineapple processing at the Admarc Cannery Co. is the very high percentage of unaccounted for waste. This is according to Tables 7 and 8 percent based on the combined calculations.

	Processing Weight, kg.	Waste kg.	Recovery Net Wt., kg.	Unaccounted Waste, kg.	Unaccounted Percent
Table 7	274,903	148,507	23,773	102,623	37.3
Table 8	391,805	200,765	33,968	157,072	40.1
Totals, kg	666,708	349,272	57,741	259,695	
Percent		52.4	8.66	39.0	

Also the recovery rate as pineapple rings is extremely low, namely for the six year period 1975 through 1980, 1.52 percent versus 16.46 percent at Libby's Swaziland Pineapple Processing plant for 1982. At the Libby plant 78 percent of the recovered pineapple flesh was slices. This indicates malfunction in equipment and grading at the Admarc Canning Co. However, due consideration should be given to the disparity in procurement procedures between the Admarc Canning Company and other commercial pineapple processors. While Admarc Canning Co. has little control over this,other commercial pineapple processors have virtually full control.

The lack of detailed costing for each of the Admarc Canning Co.'s products is a serious shortcoming. In attempting to arrive at some cost figures it is thus necessary to itemize known cost factors such as the cost of the pineapple and packaging. Thus known costs for 440 and 830 gram net pineapple chunk packs are: Recovery rate 8.65 percent net in natural juice, pineapple 35K/ton

Table 9

Admarc Canning Company Limited

Pineapple Processing Data

1975 through 1981

Peak Period from December 1980 to March 1981

Boiler Fuel: Approximately 380 Liters per Day, @ 57.95 tambala per Litre.

Pineapple Product	Cases	Cans	Net weight kg.	Drained Weight, kg.
Pineapple Chunks 440 gr x 24	33,503	804,072	353,782	246,239
Pineapple Chunks 830 gr x 24	53,172	1,276,128	1,059,186	633,393
Pineapple Chunks A10 = 2720 gr x 6	1,285	7,710	20,971	12,583
Recovered Pineapple Flesh				892,215
Pineapple Rings 440 gr x 24	704	16,896	7,434	4,780
Pineapple Rings 830 gr x 24	22,420	538,080	446,606	267,070
Pineapple Rings A10 = 2720 gr x 6	158	948	2,578	1,546
Recovered Pineapple Flesh				273,396
Pineapple Crush 440 gr x 24	26,487	635,688	279,702	167,821
Pineapple Crush A10 = 2720 gr x 6	3,239	19,434	52,860	31,716
Recovered Pineapple Flesh (60% of Drained Weight)				199,537
Pineapple Juice 440 gr x 24	3,102	74,448	32,757	
Pineapple Juice 830 gr x 24	217	5,208	4,323	
Pineapple Juice A10 = 2720 gr x 6	1,309	7,854	21,363	
Total Pineapple Juice			58,443	
Total Pineapples Processed				18,023,000 kg
Total Recovered Pineapple Flesh				1,365,148 kg 7.57%
Total Recovered Pineapple Juice				58,443 kg 0.32%
Total Recovery Rate				7.89%

P.S. The Drained Weight of A10 pineapple Chunks and Rings and Pineapple Crush is not given by Admarc Canning Company but estimated as 60 per cent.

Source: Admarc Canning Company

Table 9A

PINEAPPLE/CANNED WEIGHTS

PRODUCT	CAN SIZE	NET WEIGHT	DRAIN WEIGHT
Pineapple Chunks (Syrup)	440g Net	440g	306g
Pineapple Chunks (Syrup)	A2½	820g	490g
Pineapple Rings (Syrup)	440g Net	440g	283g
Pineapple Rings (Syrup)	A2½	820g	539g
Pineapple Chunks(Natural)	440g Net	440g	440g (306g)*
Pineapple Chunks(Natural)	A2½	820g	820g (490g)*
Pineapple Rings (Natural)	440g Net	440g	440g (283g)*
Pineapple Rings (Natural)	A2½	820g	820g (539g)*

SOURCE: ADMARC CANNING COMPANY LIMITED

* These drained weights are inserted by the UNIDO Advisor, since through error Admarc Canning Company repeated the net weight rather than inserting the drained weight.

Net weights	440 gr.	830 gr.
Cost of pineapple	0.17	0,34
Cost of can:		
Liwonde	0.22	0.29
Metal Box, R.S.A.	0.12	0.19
Costs in:		
Liwonde can	0.39	0.63
Metal Box can	0.29	0.53
Net Wholesale price	0.48	0.66

Packed in Liwonde tin cans this leaves 9 and 3 tambala respectively for 440 and 830 gr. net cans. Packed in Metal Box cans it leaves 19 and 13 tambala respectively for 440 and 830 gr. net cans. This is very little to cover all other expenses such as for fuel, power, labour, depreciation, interest and loan payments plus maintenance. According to the official accounts it is obviously too little. The difference in cost between Liwonde and Metal Box, R.S.A. is obviously significant and helps to explain the failure of the Liwonde Can Manufacturing Plant.

B. Present Marketing

Marketing of the Admarc Canning Company's fruit and vegetable products is carried out by Admarc's sales department at Limbe. It has only received limited attention since it is a small part of the 26 to 28 million Malawi Kwatcha (presently about equal in U.S. dollar value) Admarc annual turnover, still the marketing channels for fruit and vegetable products are quite different from those for agricultural produce, which is what Admarc mainly deals with. It should, however, be pointed out, that the three to four hundred thousand Malawi Kwatcha annual turnover of the Admarc Canning Company limits the expenditure, which can be devoted to these efforts. Admarc generally appoints two salesmen to carry out sales of the Admarc Canning Company products, but frequent transfers of personnel has curtailed persistent sales efforts. With the planned improvements and expansion of the Admarc Canning Company, including an expected significant increase in turnover and overall improved economic performance more funding can be devoted to sales efforts. With the planned improvement and expansion of office facilities at the Admarc Canning Company it will be possible to house the sales department at the plant, which will give a better opportunity for direct cooperation between production and sales as is needed.

B.1 Domestic Marketing

The Malawi domestic market for fruit and vegetable products is very limited. Among reasons for this is the virtually year round availability of fresh fruits and vegetables and the low per capita GDP. The GDP was according to the Malawi National Statistical Office for the years 1974 through 1978 as follows in Malawi Kwatcha:

	1974	1975	1976	1977	1978
Malawi Kwatcha*	99	113	127	139	158

TABLE 10 FRUIT AND VEGETABLE PRODUCT IMPORTS 1976

BTN AND DESCRIPTION	COUNTRY OF	UNIT	QUANTITY	(ME) VALUE
20010000: VEGETABLES AND FRUIT, PRESERVED IN VINEGAR	Zimbabwe	Kg	18	27
	Rep. S. Africa	"	3,270	2,941
	India	"	29	58
	U.S. of America	"	27	148
	United Kingdom	"	143	298
	Total	"	3,487	3,472
20020000: VEGETABLES PRESERVED, NOT IN VINEGAR	Zimbabwe	Kg	768	390
	Rep. S. Africa	"	35,948	29,568
	China Republic	"	1,060	1,855
	Hong Kong	"	280	74
	India	"	631	407
	U.S. of America	"	109	154
	Germany West	"	34	34
	Portugal	"	2,414	2,362
	United Kingdom	"	16,932	18,332
	Total	"	58,176	53,176
20030001: JAM AND MARMALADE	Rep. S. Africa	Kg	64,278	45,763
	India	"	140	288
	United Kingdom	"	9,015	6,225
	Total	"	73,433	52,276
20030009: FRUIT PREPARATIONS WITH SUGAR, NES	Zimbabwe	Kg	90	41
	Rep. S. Africa	"	68,312	52,084
	Japan	"	599	1,824
	China Republic	"	408	756
	Hong Kong	"	544	1,041
	Malaysia	"	441	418
	India	"	978	1,938
	U.S. of America	"	23	205
	United Kingdom	"	1,012	2,247
	Total	"	72,407	60,554
20070000: JUICES, FRUIT OR VEGETABLE NOT CONTAINING SPIRIT	Zimbabwe	Kg	1,470	879
	Rep. S. Africa	"	58,338	28,773
	China Republic	"	110	124
	United Kingdom	"	12,336	13,967
	Total	"	72,254	43,743

Source: Malawi National Statistical Office

TABLE 11 FRUIT AND VEGETABLE PRODUCT

IMPORTS 1980

BTN AND DESCRIPTION	COUNTRY OF	UNIT	QUANTITY	(MK) VALUE
20010000: VEGETABLES AND FRUIT, PRESERVED IN VINEGAR	Zimbabwe	Kg	130	87
	Rep. S. Africa	"	35,851	56,242
	Japan	"	60	623
	Spain	"	750	1,924
	United Kingdom	"	920	1,623
	Total	"	37,711	60,499
20020000: VEGETABLES PRESERVED, NOT IN VENEGAR	Zimbabwe	Kg	6,213	6,894
	Rep. S. Africa	"	36,492	46,072
	India	"	268	459
	Italy	"	2,400	3,546
	Spain	"	16	80
	United Kingdom	"	20,503	23,948
	Total	"	65,892	80,999
20030001: JAM AND MARMALADE	Zimbabwe	Kg	7,630	10,328
	Rep. S. Africa	"	38,120	43,582
	Japan	"	4	37
	Netherlands	"	493	1,175
	United Kingdom	"	5,824	11,292
	Total	"	52,071	66,414
20030009: FRUIT PREPARATIONS WITH SUGAR NES	Zimbabwe	Kg	1,892	2,507
	Rep. S. Africa	"	60,429	76,607
	Japan	"	224	457
	India	"	292	732
	Canada	"	45	199
	Spain	"	389	1,462
	United Kingdom	"	4,608	10,077
	Total	"	67,879	92,041
20070000: JUICES, FRUIT OR VEGETABLE NOT CONTAINING SPIRIT	Zimbabwe	Kg	862	2,017
	Rep. S. Africa	"	73,153	60,270
	Japan	"	46	412
	Hungary	"	13	39
	Denmark	"	2,517	1,987
	Germany West	"	21	841
	Spain	"	600	1,522
	United Kingdom	"	4,260	8,326
	Total	"	81,472	76,014

Source: Malawi National Statistical Office

Table 12

1976 through 1978

IMPORTS OF MALAWI FRUIT AND VEGETABLE PRODUCTS (MK)

	Quantity KG	Value MK	Quantity KG	Value MK	Quantity KG	Value MK
#20010000: Vegetables and Fruit, Preserved in Vinegar	10,358	16,358	39,297	47,604	8,964	16,658
#20020000: Vegetables Preserved, Not in Vinegar	44,906	56,013	159,595	125,700	40,122	49,625
#20030001: Jam and Marmalade	38,623	32,997	61,120	52,482	17,597	24,738
#20030009: Fruit Preparations with Sugar, NES	55,654	55,439	203,629	128,486	63,382	73,860
$20070000: Juices, fruit or Vegetables not containing spirit	105,223	81,303	129,416	87,411	124,576	108,629
Total preparations of vegetables, fruit, etc., NES		242,110		441,684		273,510

Table 13

1980 DOMESTIC SALES CASES

	1980 April	1980 May	1980 June	1980 July	1980 August	1980 September	1980 October	1980 November	1980 December	Total Cases
Pineapple Pieces 15½ oz x 24	77	40	160	20	40	40	80	119	25	559
Pineapple Chunks A2½	50	10	25	25	1	10	20	30	25	196
Pineapple Chunks A10	16		5	5						26
Pineapple Rings 15½ oz										
Pineapple Rings A2½	34	14	3	46	10	8	34	60	23	223
Pineapple Rings A10	9	1	5	2	2					19
Pineapple Pieces Natural Juice A2½	29	13	15	5					121	183
Pineapple Rings natural Juice A2½	24	13	13	5				20	23	98
Pawpaw in Lemon 15½ oz	29	10	15		9					53
Tomato puree 15½ oz x 24	170	111	202	142	87	156	142	83	75	1,168
Tomato puree 5 kg. x 6										
Green Beans 15½ oz.			93	67	14	21	2			197
Whole peeled tomatoes 15½ oz	19			60	37	40	35			172
Whole peeled tomatoes A2½				35	17	30	30			112
Whole peeled tomatoes 5 kg										
Baked Beans 8 oz x 48	10	23	15	20		10	35	28	1	142
Baked Beans 15½ oz x 24	75	20	21	49	65	18	74	23		345
Baked Beans A2½ x 24		28	30	24	18	14		32	5	151
Beetroot 1lb x 24			25	5	10	5			1	48
Babybeets 1lb x 24										
Whole carrots 15½ oz x 24	65	17	20	30	40		40			212
Diced Carrots 15½ oz x 24										
Diced Carrots A2½ x 24	10	29			20	1	15			75
Pineapple Juice 15½ oz x 24	151	100	170	119	110	112	106	88	78	1,034
Pineapple Juice 5kg										
Orange Juice 15½ oz x 24	163	58	220	108	96	21	5	35	50	756
Orange Juice 5kg	10	10	17							37
Guava Juice 15½ oz x 24	78	23	20	25	61	82	108	60	1	458
Guava Juice 5kg	2	15	5	5	10					37
Grapefruit Juice 15½ oz x 24	69	34	60	50	30	16		57	29	355
Grapefruit Juice 5kg	10	1	22	20	11		23			88
Tomato Juice 5 oz x 48	30	7	30					43	4	114
Tomato Juice 10 oz	11	10		15	20		5			61
Tomato Juice 15½ oz		35	90	4	31	52	87	70	81	450
Tomato Juice 5kg									44	44
Whole Strawberry Jam 500g x 24					20	30	16	10		76
Whole Strawberry Jam A10		4	1	4	6	24	2	2	2	43
Whole Strawberry Jam 1lb x 24										
Strawberry Jam 8 oz x 48							2			2
Raspberry Jam 8 oz x 48							75			75
Mixed fruit jam 8 oz x 48							92			92
Apricot Jam 8 oz x 48							19			19
Strawberry Jam 4. 24	74	234	293	90	32	56	36	70	5	890
Raspberry Jam 450g x 4	78	70	200	90	20	56	36	80	5	645
Mixed fruit jam 450g x 24	38		515	30	32	36	30	50	55	386
Apricot jam 450g x 24			115	114	34	28	58	34	51	444
Strawberry jam 5kg						44				44
Raspberry jam 5kg						48				48
Mixed fruit jam 5kg						16				16
Apricot jam 5kg										
Tomato Sauce 9 oz x 48	65	20	48				25	51	13	232
Tomato Sauce 15 oz x 12	83	58	210	126	70	54	166	54	66	957
Tomato Sauce 28 oz x 12	161	104	110	140	152	93	151	140	65	1,108
Tomato Chutney 1lb x 24	10	6	10	18	12	4	28	6	4	98
Hot Chutney 1lb x 24	2			10	5		2	9		28
Tomato Soup 400g							37	5		42

Table 14

1981 DOMESTIC SALES. CASES

	1981 January	1981 February	1981 March	1981 April	1981 May	1981 June	1981 July	1981 August	1981 September	1981 October	1981 November	1981 December	Total Cases	MK
Pineapple Pieces 15½ oz	20	5				30		60	15	50	45	55	281	3,934
Pineapple Chunks A2½	10	4			10	10	70	30		30	15		179	2,506
Pineapple Rings 15½ oz								15		20	55	50	40	2,240
Pineapple Rings A2½	30	16		6		65	27	39	15	30	55	20	303	6,363
Pineapple Rings 5kg											10		10	230
Pineapple Pieces Natural Juice A2½		1				8		15	10				34	646
Pineapple Rings Natural Juice A2½		11			8	1		10			15		45	945
Pawpaw in Lemon 15½ oz	20				8	20		11		17		4	80	1,280
Tomato Puree 15½ oz	56	64	142	61	82	84	43	80	90	40	50	52	844	21,344
Tomato Puree 5kg						5	26	29	24	38	44	103	259	4,560
Green Beans 15½oz								40	55				95	1,805
Whole peeled tomatoes 15½ oz	10	46	20	8	15	55	10	15	35	30	50		294	4,410
Whole peeled tomatoes A2½		28			16	20	5	6		15	10		100	1,800
Whole peeled tomatoes 5kg														
Baked Beans 8oz	8	9		12	27	35	10	40	10	24		8	183	3,294
Baked Beans 15½ oz	30	21		27	31	130	5	110	5	23	15		397	6,352
Baked Beans A2½	30	16	20	32	4	30		31	4	9	24	8	208	4,992
Beetroot 1 lb	8	1	1	1		3	3	2		1			20	480
Baby beets 15½ oz						1		3		1			4	88
Whole carrots 15½ oz	7	2	10	35	20	35		19				30	158	2,528
Diced Carrots 15½ oz		2		50		50							102	1,530
Diced Carrots A2½					5	10	50					10	75	2,025
Pineapple Juice 15½ oz	66	77	30	86	59	65		20	40	15	50	100	608	9,728
Pineapple Juice 5kg						22	28	40	41	37	39	48	255	6,120
Orange Juice 15½ oz	50	35	18	20	45	68		30	30	20	64	118	498	7,968
Orange Juice 5kg						8	16	9	15	5	20	1	74	1,776
Guava Juice 15½ oz			13	95	84	237	72	79	74	88	77	172	991	15,856
Juice 5kg														
Grape fruit juice 15½ oz	41	32		40	55	68		30	15	5	10	25	321	5,136
Grape fruit juice 5kg						17	13	25	12	34	23	77	201	4,824
Tomato juice 6 oz					10		8	20			25	10	73	1,022
Tomato juice 10 oz	10	8		10	10	20	50						108	1,512
Tomato juice 15½ oz	15	20	20	70	10	65	2	35	50	40	30	50	397	6,352
Tomato juice 5kg	5	6	24	20	20	21	19	30	14	30	27	86	302	7,248
Mango juice 15½ oz.					14	13	9	38	34				108	1,728
Whole strawberry jam 500g x24	12	34		21		130	40			16	120		373	13,801
Whole strawberry jam A10									10				10	370
Strawberry Jam 8 oz x 48			73		168	45	13	40	5	9	5		358	5,728
Mixed fruit jam 8 oz x 48			20										20	320
Raspberry Jam 8 oz x 48			70		113	145	13	40	5	9	10		405	10,325
Apricot Jam 8 oz x 48			24		5	45	13	40		7		5	151	4,530
Strawberry Jam 450g x 24	42	65	25	86	113	92	20	7	40	48	135	5	589	25,493
Raspberry Jam 450g x 24	22	74	32	84	85	170	14			62	100	40	683	18,441
Mixed fruit jam 450g x 24	252	55	62	46	42								457	10,368
Apricot jam 450g x 24	52	61				88	4	43	31	26	25	40	371	11,130
Strawberry jam 5kg														
Raspberry jam 5kg									34				34	918
Mixed fruit jam 5kg									10				10	240
Apricot jam 5kg						2			26		2		30	900
Tomato Sauce 9 oz x 48	10	50	55	50	90	40	60	96	11	79	105	42	698	18,148
Tomato Sauce 15 oz x 12	102	102	38			77	38	22	203	160	28		770	16,940
Tomato Sauce 28 oz x 12	102	160	98	110	191	294	88	227	110	65	254	186	1,905	49,530
Tomato Chutney 1 lb x 24	10	22	16		10	84	8	11	14	6	69	10	253	6,312
Tomato Soup 400g x 24	6				5	6	6	16		12	6	6	70	1,350
Tomato Sauce with onions 400g x 40		1			1		2		2	1		5	18	396
Hot pepper sauce 400g x 40												10	10	240

Unfortunately detailed categorized statistics on the trade in Fruit and Vegetable products are not available for Malawi. However, broadly categorized statistics are available. Imports of fruit and vegetable products are shown in Table 10 and 11 for the years 1976 and 1980 as submitted by the Malawi Commissioner for Census and Statistics. They are given by BTN nomenclature (Brussels Tarif Nomenclature). Totals of these items are tiven in Table 12 for the years 1977 through 1979 as listed in the Malawi Annual Statement of External Trade for 1979.

As it appears from Tables 10, 11 and 12 imports of preparations of fruit and vegetables are not very significant. Re-exports of these are not listed here, since they are insignificant.

Domestic sales of fruit and vegetable preparations manufactured by the Admarc Canning Company at Mulanje was requested from the Admarc Sales Department at Limbe, which is in charge of these sales. They submitted sales for 1980 and 1981 as shown in Tables 13 and 14. The Malawi Kwatcha value was only given for 1981, as seen in Table 14. Admarc Canning Company in Mulanje is virtually the only company canning fruits and vegetables in Malawi. The sums of imports and domestic sales of the Admarc Canning Company's products thus represents essentially the total consumption of these products in Malawi.

Retail mark-ups in the Supermarkets and Grocery stores for Mulanje Peak fruit and vegetable products varies between 60 and 70 percent. This study is focused on the pineapple products, the turn-over of which is very slow contributing to the rather high mark-ups.

3.2 Exports

Exports of Mulanje Peak products is limited to pineapple products. The high cost of raw materials caused by Malawi being landlocked

makes the canned products costly and thus less competitive on the export market. Furthermore Malawi does not offer a sufficiently large market for tin cans to make can making profitable so all tin cans must be imported from Zimbabwe or Republic of South Africa. The high transportation costs makes them expensive.

At present only Zimbabwe poses as an export market for Mulanje Peak products. The Admarc sales department is well introduced on the Zimbabwe market, including the market for canned pineapple products and is able to export a significant quantity to Zimbabwe. The export outlet has further firmed up since formation of the new Zimbabwe Government.

A request for several years of detailed export figures from Admarc's sales department could not be met due to a complicated bookkeeping situation. However, the following data were given by the Admarc Canning Company's Manager as total exports for 1980 and 1981:

	Cases		Number of Cans/Case
Pineapple chunks, 440 gr. net	12,264	x	24
Pineapple chunks, 830 gr. net	10,053	x	24
Pineapple rings, 440 gr. net	1,240	x	24
Pineapple rings, 820 gr. net	2,861	x	24

III. POTENTIAL FRUIT AND VEGETABLE PROCESSING

As pointed out in Section II, B (Market for Fruit and Vegetable Products), the present Malawi domestic market for fruit and vegetable products is very limited. Among reasons for this is the virtually year round availability of fresh fruit and vegetables and the low per capita GNP. The export market thus becomes the major potential market for additional production. Among untapped domestic market possibilities is the soft drink industry, which makes use of various fruit juice concentrates. At present imported. Provided fruit of suitable quality and price can be procured and the market provides sufficient volume for economic production, they could be manufactured locally.

The major concern of this study is to improve the economics of the pineapple processing. The findings of this study and the INDEBANK Interim Report of August 13, 1980 indicate that the present pineapple processing methodology at the Admarc Canning Company is ineffective. It gives rise to excessive waste. The need for rehabilitation and renewal of the plant is indicated. There is also a need for improved overall management, accounting and quality control. One way to assure more satisfactory recovery rates in the processing of pineapple is to change the processing over to mostly producing pineapple juice concentrate and only produce canned pineapple flesh from select quality A size pineapples. It is estimated, that only 25% of the purchased pineapples are choice quality A size. The remaining 75% would be used in production of pineapple juice concentrate to be packed in 5 kg. net tins for export. Pineapple juice processing makes more efficient use of smaller and inferior grade fruits. This would assure recovery rates more in line with those obtained by major commercial pineapple processing companies provided the Admarc Canning Company is properly rehabilitated and a suitable pineapple juice concentrate line is installed.

A World Market investigation reveals that pineapple concentrate of an internationally acceptable quality commands a promising and profitable market. Also, other fruit juice concentrates such as passion fruit concentrate are gaining in popularity on the World Market. Their use is increasing in a wide variety of dairy, soft drink products and alcoholic beverages. The World Market for these products has been collected from various sources such as the U.N. International Trade Centre in Geneva, Switzerland, E.E.C. in Buxelles, Tropical Products Institute in London and others.

The landlocked situation of Malawi results in high cost transportation when trading in the World Market. This dictates the need for low volume, high value export products in order to be able to compete on the World Market. Pineapple (and passion fruit) juice concentrate are in this category. Although freeze pack of the products is desirable from a quality stand-point the difficulty and high cost of transporting frozen food products to and from Malawi makes it necessary to dispense with this at least until/and if such transport becomes more dependable and economic. Air transport is prohibitively expensive.

The desirability of supporting the small scale pineapple growers in the Mulanje area makes it desirable to assure a dependable outlet for their pineapple production. Pineapple juice concentrate production appears as a more economically viable way of providing this than the present processing schedule at the Admarc Canning Company. Provided this venture meets the expectations, it might provide an outlet for an increased production of pineapples. It does seem possible to increase the small scale pineapple production substantially provided Admarc Canning Company and the Malawi Ministry of Agriculture can supply the needed extension services to the growers. It is not likely that this small scale pineapple production can be controlled as tightly as large scale production undertaken by the major international pineapple processors. Thus the quality of the small scale growers' pineapples will be somewhat

inferior to that of the large scale producers. The purpose to provide the small scale growers with additional income and thus make it more attractive for them to remain in the farming sector is, however, met.

The pineapple juice concentrate plant can produce other fruit juice concentrates such as passion fruit juice concentrate with few and rather inexpensive additions of machinery. Growing of passion fruit can be carried out by small as well as large scale growers. Passion fruit was produced commercially in Malawi in the past and said to grow very well. Passion fruit juice concentrate is according to the collected World Market information commanding growing and profitable World Market. This production would be a logical second phase to the recommended rehabilitation and renewal of the Admarc Canning Company.

III. POTENTIAL FRUIT AND VEGETABLE PROCESSING

A. Pineapple Juice Concentrate Processing Requirements

The production technology used in production of pineapple concentrate in commercial processing plants varies somewhat in its details. The basic unit processes are, however, very similar and are as follows:

Juice stock from peeling and coring machines, eradicators and trimming
↓
Inspection
↓
Comminuting
↓
Presses → Juice → Tank - Cold Dearation
↓
Pulp for feed
↓
Heat Exchanger
↓
Juice, 140 - 150°C
↓
Tank - Hot Dearation
↓
Centrifuge
↓
Storage Tank
↓
Heat Exchanger
↓
Juice, 190°C
↓
Evaporator
↓
Storage Tank
↓
Filling

Details of virtually every unit operation outlined above varies from commercial plant to commercial plant. The "comminuting" step is done by means of different machines and commonly by means of a so-called "Schwartz Extractor" or various disintegrators. Also the type of

presses varies and are often of the screw type. Tanks are usually glass lined sheet iron tanks. Heat exchangers are rather standardized in their construction. When it comes to evaporators the differences are great in respect to evaporation principles and consequently efficiency and effect on juice. The processor is faced with a delicate choice between efficiency and quality of the final product. The more efficient evaporators utilize several effects, while a very sophisticated evaporator utilizes one step only but the evaporation is carried out under high vacuum at low temperature and in fractions of seconds. The latter is far more costly than the former and has poor fuel efficiency.

The short time, low temperature exposure produces a final fruit juice concentrate of very high quality, since it delivers a product only slightly affected by the process. Such a type evaporator is, however, very costly and has poor fuel efficiency. It is also complicated and demanding to maintain and repair. A double effect, falling film evaporator, such as used in Libby's pineapple juice concentrate plant in Swaziland is about double as effective in fuel utilization and of a far less sophisticated design and thus less demanding to maintain and repair. Libby is able to market the concentrate it produces on this. It concentrates the juice to about 60° Brix (1:3.75) and packs it as hot pack in 5 kg. net tin cans.

Yet another consideration is whether or not to use a flavour recovery unit in order to retain more of the natural flavour. The UNIDO advisor has looked into this and among others visited the pineapple and passion

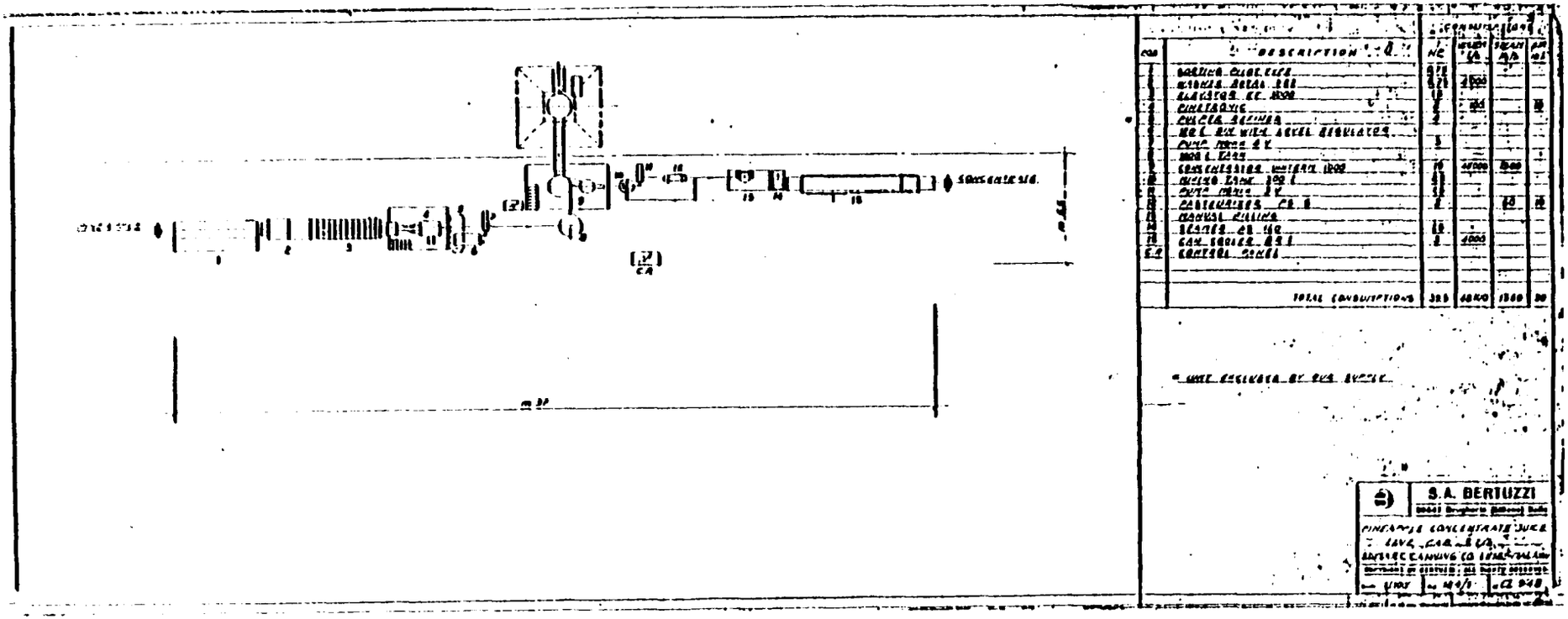
fruit juice concentrate plant in Thika, outside Nairobi, Kenya, where this principle is used in production of pineapple and passion fruit juice concentrate, sold as frozen pack. He has also discussed this with various fruit juice concentrate equipment manufacturers. It appears, it is not as important to utilize flavour retention in production of pineapple juice concentrate as it is in production of passion fruit juice concentrate. In the former this does not produce as remarkable an improvement as in the latter, where it is rather essential because of the delicate nature of the passion fruit juice flavour. Thus, at least initially, a pineapple juice plant at Admarc's Canning Company in Mulanje can do without a flavour retention unit.

Considering the overall situation at the Admarc Canning Company plant at Mulanje the double effect falling film evaporator with its higher fuel efficiency may be the wisest choice.

The type of packaging also presents various alternatives. It is common to use freeze packaging of fruit juice concentrates such as pineapple and passion fruit. This does, however, demand a difficult and expensive storage and transportation technology. It is difficult and costly to transport frozen foods from and to Malawi due to its landlocked situation and it is thus recommended, at least initially, to hot pack the pineapple concentrate in 5 kg. net tin cans and store and transport it without freezing or refrigeration.

A very basic pineapple juice concentrate line is shown in Figure 2. It utilizes a one step evaporator only. It has a pineapple peeling

Figure 2



and coring unit capable of handling a wide range of sizes, which may be needed for the pineapple juice concentrate line recommended. The suggested capacity of 3 tons of pineapples per hour is somewhat less than the capacity recommended in this report. The steam consumption, 1500 kg. per hour for a capacity of 3 tons pineapples per hour is high.

A.1 Plant Capacity

Admarc Canning Company only processes a small quantity of pineapples, when compairing it with international commercial pineapple processors. The annual volume does not exceed 5000 tons while for instance Libby in Swaziland processes approximately 40,000 tons annually. The pineapple juice concentrate plant in question is thus small scale. Considering 5000 tons annually, with only 25 percent used in production of canned pineapple flesh, the annual tonnage for juice production is 3,750 tons. With an estimated yield of juice of 40 percent this corresponds to 1,500 tons of juice annually plus the juice produced from juice stock from production of canned pineapple flesh. This is approximately 12 percent of 1,250 tons or 150 tons. Thus the total per annum straight juice production is approximately 1650 tons. Considering a peak processing season of approximately 100 days the average dayly evaporator throughput will be about 15 tons of juice or 37.5 tons of fruit during the peak season. Outside the peak season it varies greatly but is generally very small. The planned concentration is 1:3.75, which will mean production of 4,000 kg

concentrate and evaporation of 11,000 kg of water daily. The present working day is between 10 and 12 hours. There is thus a need of an evaporator capable of evaporating about 1,000 kg water per hour. Rather than turning the evaporator off and on each day it could be operated more continuously by installing larger refrigerated storage tanks for the juice to be able to collect enough juice to operate the evaporator continuously for several days. This would render the operation more efficient and economic.

A.2 Equipment

According to his terms of reference the UNIDO advisor presented his findings and recommendations to various food machinery manufacturers specializing in equipment for production of fruit juice concentrates to enable them to arrive at equipment quotations. Unfortunately, none have so far arrived at quotations apart from an early Italian estimate. That the request does not deal with a complete new pineapple juice concentrate plant, but rather rehabilitation and renewal of an old pineapple processing plant makes it more difficult for the food machinery manufacturers to arrive at estimates. One major international manufacturer of evaporators has declined to present quotations. Since it is important to speed up the process of rehabilitation and renewal of the Admarc Canning Company in order to improve its precarious economic performance the UNIDO expert is submitting his own estimates.

Table 15

Estimated Costs for Turnkey Installation of Pineapple Concentrate Line, Rehabilitation of Existing Plant Plus Addition of Office Space, US $000's

2 Rehabilitated Ginacas including Eradicators		70
1 Juice Processing and Concentration Line		500
1 Steam Boiler		50
	Sub-total	620
Miscellaneous and unforseen, 10%		62
Transport and Clearing, 20%		164
Installation Cost, 25%		155
Office Equipment and Furniture		10
Laboratory Equipment and Furniture		20
Additional Costs	Sub-total	411
TOTAL COSTS		1,031,000
Building Costs		
Rehabilitation of Floors and Walls in Processing Area		50
Additional Office Space, 3 offices 10 x 15 = 450 sq. ft. x 3 = 450 square feet each US $200		90
Total Building Costs		140,000

S. A. Bertruzzi, Milano, Italy submitted a description and quotation on a pineapple juice concentrate line with a capacity of 3 tons per hour to Admarc Canning Company as shown in Figure 2 but it needs updating. A.P.V., England quoted the price for a double effect falling film evaporator with a capacity to evaporate 1000 kg of water per hour as about US $200,000 including the heat exchanger. Quotations on new and rehabilitated pineapple coring and peeling machines were collected from various sources. Cost estimates for rehabilitation of floors and walls in the pineapple processing areas of the Admarc Canning Company were looked into. The need to reinforce the management of the Canning Company with a production manager with extensive experience in fruit and vegetable processing, a chief of quality control with extensive experience in fruit and vegetable product quality control and a chief accountant capable of overseeing the day to day accounting creates the need for three additional offices. Table 15 gives the estimated costs for turnkey installation of a pineapple juice concentrate line, rehabilitation of existing processing plant and addition of office space.

A.3 Labour and Management Requirements

The estimated labour and management requirements are the same as at present apart from reinforcement of management. It is recommended to add one production manager with extensive experience in fruit and vegetable processing, a chief of quality control with extensive experience in fruit and vegetable product quality

control and a chief accountant capable of overseeing the day to day accounting and product costing. Reference is made to Table 4, Labour Management and Office Staff Requirements and Costs. The following are the total estimated costs:

Costs according to Table 4	MK37,403
1 Production Manager.	MK25,000
1 Chief of Quality Control	MK15,000
1 Chief Accountant	MK10,000
Total Estimated Labour and Management Costs	MK87,403

A.4 Some Raw Material and Other Supply Needs

Raw material and other supply needs are estimated according to the following pineapple processing schedule and recovery rates:

	For Juice	For Canned Flesh
Tonnes of pineapple used	3,750	1,250
Flesh recovered and canned, 28%		350
Juice recovered, 12%		150
Juice recovered, 40%	1,500	

The estimated potential recovery rates are closer to normal than the present recovery rates. This is based on the expectation that renewal and rehabilitation of the plant will bring higher

recovery rates than before. Improved management will also improve the processing results.

In calculating operating costs it is presumed that the 1,650 tons of pineapple juice is concentrated to about 60° brix or 1:3.75 = 1,650/3.75 - 440 tons involving the evaporation of 1,210 tons of water.

The 350 tons of recovered pineapple flesh yields 50 percent or 175 tons rings and 175 tons pieces all packed in 440 gr. net cans. The yield of pineapple rings is estimated lower than for other commercial pineapple processors, because Admarc Canning Company does not have full control of the production of pineapples but gets them from small scale producers, which makes it harder to achieve an optimum uniform quality.

In calculating steam consumption this is partly based on information given by evaporator manufacturers and partly on previous consumption according to the official accounting. The evaporator is a double effect evaporator.

Electricity consumption is calculated the same way. The kwh cost is estimated. Although the Admarc Canning Company manufacturers other fruit and vegetable products than pineapple, the operating costs are calculated for pineapple processing only. The major reason for this, is that the present accounting system does not give exacting cost calculations for each product.

A.5 Operating Costs

A.5.1 Raw Materials

Pineapples will be produced by small scale growers and delivered through the eight collection centers, as is the case now. At present Admarc offers MK35 for grade A and MK30 for GRADE B. In the following operating cost calculations an average price of MK35 will be used in order to adjust for a likely price increase by the time the rehabilitation and renewal of the plant is completed.

In calculating the cost of cans and cartons for the pineapple juice concentrate it is assumed it is packed in 5 kg net tin cans, which will require 440,000/5 - 88,000 cans.

In choice of can size for canning of the pineapple flesh, it is recommended to use the 99 mm diameter can rather than the 73 mm diameter can in order to accommodate packing of the rings from the Grade A pineapples. This means a can slightly longer than half the length of th A 2½ can. It is recommended using this type can for pieces and chunks as well in order to cut down on the types of cans and cartons used. The 440 gr net size is a popular consumer size and it may very well be possible to sell all the canned pineapple flesh in this size. A need to meet other can size requirements can otherwise be met provided the needed cost calculations are carried out.

	Drained Wt., grams	Kg. Flesh	Required Cans, 440 gr. net	Cases	Required 18% Sugar Syrup, kg.	Required Sugar, kg
Rings	283	175,000	618,375	25,766	97,085	17,475
Chunks	306	175,000	571,895	23,829	76,634	13,794
Totals		350,000	1,190,270	49,595	173,719	31,269

The total estimated cost of raw materials is presented in Table 14.

A.5.2 Estimated Costs for Utilities

Estimation of the cost for utilities is partly based on information given by fruit juice concentration equipment Co, actual costs recorded in the Admarc Canning Company official accounts and the advisors own experience. It is estimated, that the new steam boiler will deliver a minimum of 20 kg steam per kg fuel oil. The canning company's management has given the daily fuel oil consumption as 300 liters indicating poor fuel efficiency from the old boilers. Electricity and water consumption estimates are derived at the same way. Only dealing with the pineapple processing, presents a problem in separating cost of utilities from the processing of other produce. The lack of product detailed costing enhances the difficulties. Table 17 shows the estimated cost of utilities.

A.5.3 Estimated Labour and Administration Costs

These are based on existing costs with the addition of added management staff. This added cost will increase if, it is decided to carry out all sales efforts at the canning factory. Table 18 and 19 shows these costs.

A.5.4 Estimated Property and Inventory Insurance Costs

These are shown in detail in Table 20.

A.5.5 Summary of Estimated Annual Operating and Administration Costs

These are shown in detail in Table 23.

A.5.6 Estimated Start-Up Expenses

These are shown in Table 21. They include the added production manager in order for him to familiarize himself with the existing and new pineapple processing set-up including the pineapple juice concentrate line. It would be advisable in addition to the production manager to have a senior UNIDO fruit and vegetable processing expert with extensive all around experience in management to assist during the transition period. This should include assisting in production and marketing of additional products, such as passion fruit concentrate and other fruit concentrates. There is also a need to improve the processing of other fruit and vegetable

products presently produced by the Admarc Canning Company. There is a need to look into alternative packaging methods for its products to make them more attractive to the consumers. Terms of reference for such an expert are shown in Appendix 5.

A.5.6 Estimated Sales Revenue

In order to estimate the price on the export market for pineapple concentrate, hot packed a study was made of the world market. Various international organizations dealing with this were contacted and the greatest cooperation was received. Among those contacted were U.N. International Centre for Trade in Geneva, Tropical Products Institute in London, U.K., United Kingdom Trade Agency, London, U.K., EUROSTAT, EEC and others. The greatest cooperation was received from the Commissioner of Trade, the British High Commission, Lilongwe, Malawi and the Malawi Export Promotion Council, Blantyre. The actual sales price is agreed on between buyer and seller through negotiations. The quality of the product is of the uttermost importance. It is thus essential that the Canning Company upholds international standards. The quality control must thus be based on international control methods. United Kingdom poses as the most important market for pineapple concentrate from Malawi. The major reasons are that Malawi enjoys trade preference in the U.K. and that the market is expanding rapidly in

U.K. for this product. The arrived c.i.f. price U.K. of US $1.32 per kilo concentrate is a medium price. The approximate shipping cost Malawi to U.K. harbour is US $250 per ton.

United Nations International Trade Centre in Geneva, Switzerland is finalizing a World Market Study for fruit juice, which will be published shortly. Reference is made to this rather than giving incomplete information in this report. The important markets are E.E.C. and U.S.A., where the uses for fruit juices are expanding. The major outlets are the beverage and dairy industries, but also other outlets such as baby food, confectionary and bakery are expanding.

Table 22 gives estimated pineapple product sales revenues.

Shipping costs, Malawi to U.K. port is a major cost item. It is estimated as US $250 per ton shipped in containers. In order to compensate for the weight of cans and cartons 10 percent is added to the net weight giving a total shipping weight of 440 + 44 = .84 tons. It is judged necessary to ship in containers, since otherwise a lot of spoilage could take place due to rough handling.

Table 16

Estimated Costs for Raw Materials and Other Supplies

	MK 000's
Sugar, 31.3 tons @ MK350	11.0
Pineapples, 5000 tons each MK35	175.0
Cans, 5 kg net, 88,000 each MK 0.70	61.6*
Cans, 440 gr net, 1,190,270 each MK 0.13	154.7*
Labels for 440 gr net cans each MK 0.03	35.7
TOTAL	MK 438,000

*Cost of Cartons and lids included

Table 17

Estimated Costs for Utilities

Fuel Oil for Evaporator, 35 tons each MK650	22.8
Fuel Oil for other uses, 38 tons each MK650	24.7
Electricity and water	15.0
TOTAL	MK 62,000

Table 18

Estimated Plant Operation Labour Cost

As of Table 3	78.8
TOTAL	78.8

Table 19

Estimated Administration and Associated Staff Costs

Costs according to Table 4	37.4
1 Production Manager	25.0
1 Chief Quality Control	15.0
1 Chief Accounting	10.0
TOTAL	MK87,400

Table 20

Estimated Property and Inventory Insurance Costs

Property Values	MK1000's
Equipment	1,031
Buildings	140
Inventory	
Fuel Oil, 10% of annual	4.8
Packing Materials, 50% of Annual	126.0
Finished Product, 50% of Annual	602.9
TOTAL	MK2,008,000
Insurance = 0.125%	MK2,510

Table 21

Estimated Start-up Expenses

	MK1000's
1 Production Manager, One Year's Wages	25.0
Waste of Materials, 5% first year	21.9
Utilities, 5% first year	3.1
TOTAL	MK50,000

Table 22

Estimated Pineapple Product Sales Revenues

	Cases	MK/Case	000's US$ Equivalent
Rings (Cases of 24 x 440 gr net)	25,766	16	412.3
Chunks (Cases of 24 x 440 gr net)	23,829	14	333.6
Concentrate (Cases of 4 x 5 kg net)	22,000	$26.4	$580.8
Shipping Cost for concentrate, $250 tons for 484 tons			(121.0)
TOTAL SALES REVENUE			1,205,762

Table 23

Summary of Estimated Annual Operating and Administration Costs

	MK000's
Raw Materials	438.0
Utilities	
Fuel Oil	47.5
Electricity and Water	15.0
Labour	78.8
Administration and Associated	87.4
Depreciation	
Buildings, 4%	5.6
Equipment, 10%	103.1
Maintenance of Equipment, 4%	41.2
TOTAL	816,600

Table 24

Estimated Working Capital Requirements

	MK000's
Payroll (10% of annual cost)	16.6
Raw Materials (50% of annual cost)	219.0
Finished Stock (50% of annual Sales)	602.9
Utilities (50% of annual cost)	31.0
Accounts receivable (25% of annual sales)	301.5
TOTAL	1,171,000

A.6 Projected Profitability and Cash Flow Analysis

2.6.1 Cash Flow Analysis

The mode of financing this venture is not yet quite clear. It may partly or wholly be financed by the Malawi INDE BANK. Other possible sources for finance is the EEC (European Economic Community) Development Aid Program, West German Bilateral Aid, CDC (Commonwealth Development Corporation) or other international or bilateral aid source.

There is a need of considerable capital to finance purchases of raw materials, stocks of finished products, labour, utilities, etc. The estimated working capital requirements are shown in Table 24. The equipment will be paid according to common terms, namely 20% down with order and the rest when equipment is installed and functioning satisfactorily. Buildings are considered paid in full the first year of plant operation. The cash flow analysis is shown in Table 25. Lack of detailed accounting and product costing has made it impossible to determine what share of labour and management cost should be carried by the significant production of other than pineapple products. The total of these expenses is carried by the pineapple processing as seen in Table 25. It is also not quite clear what the depreciation on existing buildings should be, thus only the new additions are depreciated. Interest on working

capital has been omitted, since the interest rate will not be known until source of financing is clear. The sales revenue on the pineapple concentrate is based on information from T.P.I. (Tropical Products Institute, London) by taking the mean of several quotations. There is a general trend on the World Market towards a higher UK cif price than US $1.32 per kg concentrate. In a letter of February 1, 1982, T.P.I. quotes a price of US $1.70 per kg cif UK from Swaziland for 50° Brix hotpack, which is presumably the Libby product made on a double effect falling film evaporator not using flavour recovery. There are thus possibilities for a more favorable cash flow than the one shown in Table 25. This depends largely on the effectiveness of the management including quality control.

A.6.2 Material Benefits

This venture will have manifold national benefits. It will serve as a stable outlet for locally produced produce and secure much needed jobs. It will also serve as a much needed source of foreign exchange.

Table 25

Projected Cash Flow Analysis (HK 000's)

	Start-up	I	II	III	IV	V	VI	VII	VIII	IX	X	Residual Values
Gross Sales Revenues		1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	
Sales Losses (0.5%)		6	6	6	6	6	6	6	6	6	6	
Net Sales Revenues		1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	
Plant Operation Costs:												
Raw Materials		438	438	438	438	438	438	438	438	438	438	
Utilities		62	62	62	62	62	62	62	62	62	62	
Labour		79	79	79	79	79	79	79	79	79	79	
Maintenance		41	41	41	41	41	41	41	41	41	41	
Insurance		3	3	3	3	3	3	3	3	3	3	
Depreciation:												
Plant Equipment		103	103	103	103	103	103	103	103	103	103	
Buildings		7	7	7	7	7	7	7	7	7	7	
Total Plant Operation Cost		733	733	733	733	733	733	733	733	733	733	
Gross Margins		467	467	467	467	467	467	467	467	467	467	
Administration		87	87	87	87	87	87	87	87	87	87	
Amortization		25	25									
Net Profit		355	355	380	380	380	380	380	380	380	380	
Depreciation and Amortization		145	145	120	120	120	120	120	120	120	120	
Operating Cash Inflow		500	500	500	500	500	500	500	500	500	500	
Capital Outlays:												
Fixed Assets:												
Plant Equipment	(206)	(825)										
Buildings	(70)	(70)										70 (Buildings)
Start-up	(25)	(25)										
Working Capital	(471)	(700)										1171 (Working Capital)
Net Annual Cash Flow	(772)	(1120)	500	500	500	500	500	500	500	500	500	
Net Equity Cash Flow	(772)	(1120)	500	500	500	500	500	500	500	500	500	
Cumulative Net Equity	(772)	(1892)	(1392)	(892)	(392)	108	608	1108	1608	2108	2608	

APPENDIX I

INDEBANK INTERIM REPORT ON

ADMARC CANNING COMPANY

13 AUGUST 1980

LPA/cam/INV.

18th June, 1981
D. Z. Tembo, Esq.,
Chairman (Indebank),
Executive Chairman (Admarc),
P. O. Box 5052,
LIMBE

Dear Sir,

UTILISATION OF SURPLUS PINEAPPLE FRUITS AT MULANJE

You will recall that we have recently been looking at ways and means of utilising a surplus pineapple fruits in Mulanje and as a result we have considered three possibilities, as follows:

a. Increasing the processing capacity for Admarc Canning Factory Limited;

b. Form a co-operative society that can transport pineapples from Mulanje to markets;

c. To process the pineapples into juice or juice concentrates.

It appears that the processing of pineapples into concentrated juice would be the most viable proposal and we are therefore looking in greater detail at this proposal.

I attach herewith a copy of a memorandum giving further details in regard.

Yours sincerely,

L. P. ANTHONY, GENERAL MANAGER

Enc.

MEMORANDUM

TO: THE CHAIRMAN, INDEBANK

FROM: GENERAL MANAGER, INDEBANK 13th August, 1980

ADMARC CANNING COMPANY LIMITED (ACC)
UTILISATION OF PINEAPPLES

1. This Paper is submitted to you as an interim report in pursuance of your instruction to investigate the present inability of ACC to utilise all the pineapples offered to and purchased by it, and to make proposals for action to relieve the situation. This interim report details progress to date and our preliminary conclusions, and seeks your approval to make further studies and prepare final recommendations.

2. The Present Situation of ACC

2.1 My Projects Department staff have made a number of visits to ACC's Mulanje factory, and have had talks with ACC's General Manager, Mr. J. Rumney. Discussions have also been held with the Managing Director and General Manager of Southern Bottlers Limited (SOBO), who have been considering at the request of the Ministry of Trade, Industry and Tourism, whether they can utilise pineapple juice for beverage purposes. The GM of SOBO, Mr. Walker, is a qualified food technologist, and his advice has been most useful to us.

2.2 ACC's main business is canning of pineapples, which still comprises 55% of production by volume. Other lines have been introduced to utilise capacity during the pineapple off-season. The costing system in force is not adequate to permit determination of costs and margins for each separate product line.

2.3 We understand that ACC is in practice obliged to purchase all pineapples offered to it for sale, and it has been unable to limit purchases by grading, scheduling or sizing. Purchases from MANR records have been as follows, on a calendar year basis:

Year	Short Tons Purchased
1975	1193.1
1976	2256.6
1977	2708.9
1978	2737.0
1979	3439.5

These figures show a clear increasing trend.

2.4 The nominal capacity of pineapple canning line has been said to be 2600 tons p.a. of fresh fruit, but it is not clear to us how this capacity is arrived at. Mr. Rumney has told us that the equipment can handle 60 tons per day, which should be more than sufficient to handle present tonnages provided a relatively smooth flow of fruit could be obtained by scheduling purchases. We understand that this is difficult to arrange, however, and that surpluses of fruit arise as a result of the wide fluctuations of purchases, with high peak inflows on certain days and weeks during the season.

2.5 ACC accounts show that in the 1979/80 financial year total purchases of pineapples were 2200 tons, but total production was only 22,118 cases, about 237 tons assuming 24 lbs per case, a utilisation factor of only 10.77%; this is understood to be only one-third of potential, indicating excessive waste factors, partly due to surplus fruit, partly to process inefficiencies.

2.6 We were not well impressed by conditions at the factory. Poor floor and ceiling finishes contributed to an environment inadequate for hygiene control. A lack of control equipment indicated an absence of control of temperature and other technical standards. There appeared to be no checking or inspection procedures in effect, and little supervision.

2.7 We understand that a major consideration for ACC is not expanding its output of canned pineapple had been the company's inability to sell the product at an economic price. In the belief that this aspect is also covered by our brief from you have we taken an outline look

at the commercial viability of ACC. The accounts to 31/3/80 are very disturbing; it is clear that major problems exist. There is a deficit of K2,047,861 on shareholders funds. Loans by Admarc to that date totalled K2,339,303, and bank overdraft was K347,387. Sales for the year were only K347,387 and the loss for the year was K335,198. Stocks had reached K677,075, or 23.3 months at current sales rate; in view of the limited shelf life of canned products, it is clear that further losses may arise by deterioration of stocks.

3. Utilisation of Pineapples

3.1 It is generally agreed that the pineapples produced in Mulanje district are of excellent quality, and have proved an economic crop for farmers in the area. It is a base assumption therefore that all plans for action are aimed at utilising an increasing volume of fruit rather than discouraging output. The objective is taken to be an optimum marketing plan for pineapples; we believe that the optimum plan involves more than one output.

3.2 Canning: We do not consider it practical to adopt any marketing plan for pineapples which does not include canning of rings and segments at least. Moreover, without pineapple ACC would be even less viable than at present, and the continuation of ACC's operations as a purchaser of other horticultural produce is important for Mulanje district. Canning of such produce is also important to facilitate its distribution and consumption throughout Malawi, particularly in the remoter areas, and throughout the year. We believe that the market for ACC canned produce in Malawi is capable of a large expansion. ACC products ought to be able to dominate the home market at least, to virtual exclusion of imported canned goods of the same type. We are also not convinced that the export market for canned pineapple is impossible to exploit commercially.

3.3 Clearly, such an expansion of canned produce sales cannot be achieved on the present basis. Increased sales volumes can only be achieved by improving quality and reducing costs. Our initial conclusion, and of the Sobo experts, subject to further detailed study, is that ACC losses can be eliminated and modest profitability attained by an improvement programme as follows:

3.3.1 Improved factory supervision and quality control.

3.3.2 Reduction of the present high waste factors.

3.3.3 Better co-ordination between production, sales and accounts functions.

3.3.4 Improved co-ordination of growers, and establishment of grading and purchasing schedules.

3.3.5 Reduced cost of cans by constructive liaison with Can Makers Limited.

3.3.6 A more active pricing, promotion and distribution policy for local sales in Malawi.

3.3.7 Renewed export sales drive.

3.3.8 Some modest capital expenditure on better control equipment, and factory environment improvement.

3.4 Juice Concentrate: The Sobo experts advise that there is a market within Malawi for pineapple juice at low concentration as a beverage, either fresh (stabilised) or carbonated. There is also a substantial export market for concentrated juice. About 70% of the pineapple fruit by weight is juice, and about 50% can be economically extracted. Much of the present high waste percentage is in the form of juice thrown away in the cores and shells. Thus a juice plant could well be viable based only on the waste from the pineapples canned, without reliance on surplus pineapples at all. However, whole surplus pineapples would certainly be added to pineapple wastes and utilised for juice at peak periods.

3.5 My staff are currently investigating alternative plants for juice extraction and concentration. The main items are a heavy duty macerator, a steriliser and an evaporator for concentration. There is adequate boiler capacity at ACC, and it is preferable for the plant to be located adjacent to the cannery to minimise raw juice transport costs. A juice concentration line could also handle tomato paste and other fruit concentrates outside the pineapple season.

3.6 At our request Sobo are seeking to establish market prices and volumes to enable us to complete a financial appraisal of a concentrate plant. It should be noted, however, that a juice project will only affect marginally the commercial viability of ACC, which will continue to depend on canned product sales for its main income.

3.7 Fresh Fruit Sales: We have considered the present arrangements for local marketing of fresh fruit, and the possibility of assisting formation of a marketing and transport cooperative, but do not consider that intervention is either necessary or economic. Fresh pineapples are already brought to Malawi markets during the season by the local entrepreneurs. However, we do feel that a limited export market for fresh fruit may exist, particularly for choice and oversize fruit not economically useable for canning, and that this possibility should be explored.

4. Implementation

4.1 The principal proposal for utilising surplus pineapples and reducing waste from the canning operation, is establishment of a juice concentration project. We recommend that this project be implemented in partnership with Sobo, which has the technical expertise and the distribution and marketing facilities to handle the product efficiently.

4.2 However, Sobo management has indicated that, while they are interested in the juice proposal, they have reservations about the project's dependence on ACC in view of its present situation. They would not wish to purchase or market ACC products unless they are satisfied that quality standards and production control would be radically improved. Moreover the financial structure of ACC at present does not encourage any third party to make an investment which depends on ACC's continuation in business.

4.3 Besides the juice concentrate proposal, we believe that utilisation of pineapples for canning can be increased, and some fresh fruit exports made, if some basic improvements to ACC's present organisation and management are put into effect. As made clear above, such improvements and a financial restructuring of the company would also greatly facilitate establishment of a juice concentrate plant.

4.4 The management of Sobo have agreed with us that they have the expertise and facilities to undertake a management and marketing function of ACC as a whole, and not just of the pineapple concentrate project. They

have indicated that in their view proper management and marketing, with some relatively small capital expenditure (say K100,000) on control equipment and finishes, would be able to put ACC onto a profitable basis. We believe that they would indeed be able to make a significant contribution to ACC.

4.5 Our recommendations for action are accordingly as follows:

4.5.1 That the management of Sobo be asked to undertake a detailed study of ACC with a view to them entering into a management contract with the company.

4.5.2 That Sobo be asked to submit proposals for action and investment for implementation by ACC under their management with a view to restoring the company to profitability.

4.5.3 That Sobo be asked to include with their submission proposals to utilise all pineapples offered to the company, by installation of a juice extraction and concentration plant, fresh fruit export, or otherwise.

4.5.4 That Indebank be authorised to consider, in cooperation with ACC's auditors, and advise you on a financial reconstruction of the company.

L. P. ANTHONY
GENERAL MANAGER

13th August, 1980

APPENDIX II

To: Mr. E. B. Salifu
Development Manager

From: E. Kissmeyer-Nielsen
UNIDO Fruit and Vegetable Processing Advisor

Topic: Visit to Libby's Pineapple and Citrus Fruit Processing Plant, Swaziland March 7-14, 1982. Major Contact: Mr. J. Cerra, Production Manager

This visit was organized by United Nations Development Programme (UNDP), in Mbabane, Swaziland as a result of a request from UNDP Lilongwe, Malawi.

A major purpose is to study their pineapple recovery rates and use of the pineapple waste.

The major processing activity is processing of pineapples of which it processes about 40,000 tons annually. The major season is November - April. With a short early June - July season the processing is carried out over a period of about 8 months annually.

Libby produces about 80% of its pineapple processing needs on its own plantation and about 20% by outgrowers. Libby's plantation is a separate company from the processing corporation.

The following is some data on the pineapple production by Libby:

Operates	4,000	acres
Plants	800	acres/annually
Crop	30	ton/acre
Rattoon	20	ton/acre (one rattoon only)
Plants/acre	18,000	to 25,000/acre

Libby finds it only pays to harvest one rattoon (second growth). Libby finds that the higher plant number (25,000/acre) gives the highest yield per acre.

Harvest is done manually in the fields and the picked fruit is placed on a wide conveyor belt and transported to a moving truck.

A so-called "optimum quality" is determined weekly based on the appearance of the fruit in the fields as judged by experts. Libby pays 63 rands per ton for optimum quality this season. Each truck load of pineapples delivered to the plant is sampled in a standard manner for its degree of compliance with the optimum quality and paid accordingly. Factors entering into this are such as size, degree of maturity, freedom of defects and general appearance. The fruit is processed in a pilot plant at the weighing bridge as part of the overall determination of quality and recovery rates. Standard forms are printed on which the needed information is filled in. The pilot plant recovery data is compared with data collected on the plant operation . This is likewise filled into standard forms and done on a daily operation base.

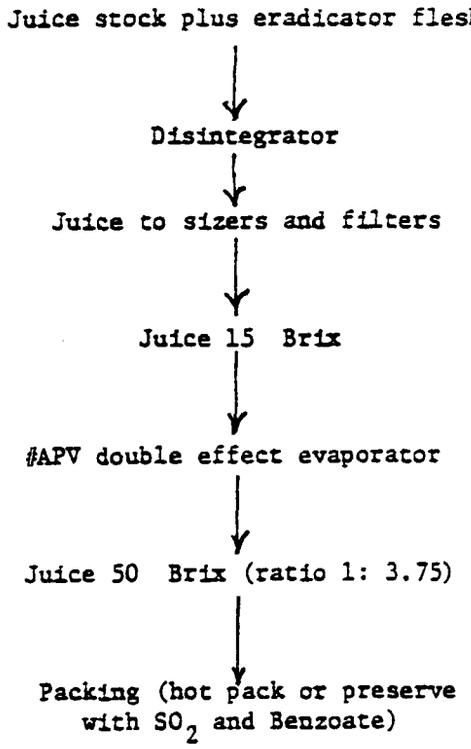
Key management, production and quality control personnel meet each morning to discuss current problems.

The plant makes full use of all healthy parts of the pineapple intake.

It has seven peeling and coring machines and is replacing older Ginaca machines with newer and more efficient straight through Hanomac peeling and coring machines (about US $70,000 each with eradicator (implement which cuts flesh away from the peels for use in juice stock).

The pineapple cylinders enter grading and trimming belts and are sliced and filled in cans. Sound trimmings become juice stock and defective trimmings waste.

Thus juice stock consists of:



APV Processing Ltd., Johannesburg P. O. Box 9448, phone 786-248017.

P.S. JAWO Engineering, Johannesburg, R.S.A., Mr. Kaiser
P. O. Box 81132, Parkhurst 2120, Johannesburg, 102 Second Avenue, Kew 2192.
JAWO does alterations of Ginacas and installation of eradicators.

Eradicator rejects, tops and bottoms go to mill and from there to wine presses, juice goes to settling tanks at 70 C, decanted "mill juice" to Westfalia Centrifuge, clean mill juice to syrup stock.

The solid waste from wine presses is used for stock feed. Was dried in a spary drying tower for use in feed mixes. 7 tons made 1 ton dry mix sold at 50 Rands/ton. Spray drier is at present out of commission due to corrosion by the pineapple waste. Libby looking for a drum dryer as used elsewhere.

Actual pineapple recovery rates during the 1981/82 season at the Libby, Swaziland Plant:

	kg	%	Mulanje kg	%
Tonnes used	339,580		679,817	
Flesh recovered and canned	71,489	21.1	35,907	5.3
Juice recovered and canned	43,317	12.8	21,834	3.2
Juice from eradicator Rejects+tops+bottoms for syrup in cans	20,250	5.9	Nil	Nil
Total.....	135,056	39.8-	57.741	8.5
Waste Truck weight	156,980	46.2	349,272	51.4
Waste Screening	2,440	0.7	Nil	Nil
Totals.....	159,420	46.9	349,272	59.9
Grand Total.....	294,420	86.7	407,013	59.9
Unaccounted.....	45,104	13.3	272,804	40.1

The "unaccounted" amount comprising 13.3% is presumed drippings, evaporations and general spillings.

The 1981/82 season figures for Mulanje Cannery have been inserted. They are for 18 days of processing. It is obvious the recovery rates are very low, namely a total recovery of 8.5% versus the 39.8% for Libby in Swaziland during the same season.

It should, however, be pointed out, that Libby operates modern plantation and outgrower production of pineapples while Mulanje obtains its pineapple from very small growers. The pineapples are, however, graded in A and B sizes at the 3 Mulanje pickup market places. It seems hard to account for the enormous difference in recovered flesh except by poor processing methods at Mulanje, which points out the need for rehabilitating the plant.

It should also be pointed out, that Libby, Swaziland uses cheap locally produced coal, while Mulanje uses expensive imported fuel oil. Thus, it is hardly possible to undertake drying of the waste even after introducing recovery of juice from waste for use as syrup. Still, it must be possible to use the waste for feed, since Libby is doing this without any reported complaints about such as abnormal flavor in beef or other animal production.

APPENDIX III

ADMARC CANNING COMPANY LIMITED

Accounts for the year ended
31 March 1981

REPORT OF THE AUDITORS TO THE MEMBERS OF
ADMARC CANNING COMPANY LIMITED

We have examined the accounts set out on pages 2 to 7 and have obtained all the information and explanations to the extent that we have considered necessary for the purpose of our audit.

These statements have been prepared on the basis that the company will continue as a going concern. The ability of the company to continue business operations is dependent primarily upon the Agricultural Development and Marketing Corporation continuing to provide adequate levels of finance until the solvency of the company is restored through the resumption of profitable operations.

In our opinion subject to the effects, if any, of the matter discussed in the preceding paragraph, the accounts of the company, which are in agreement with the books of account, give a true and fair view of the state of the company's affairs at 31st March, 1981 and of the loss and source and application of funds for the year ended on that date, in compliance with the Companies Act, Chapter 46:03.

Deloitte Haskins & Sells

22nd October, 1981

ADMARC CANNING COMPANY LIMITED
PROFIT AND LOSS ACCOUNT
For the year ended 31st March, 1981

	Notes	1981 K	1980 K
TURNOVER	3	760,769	347,387
OPERATING LOSS, after taking into account:-		186,731	252,664
Audit and accountancy fee		4,747	4,500
Depreciation		26,246	31,146
Interest payable	4	91,251	55,712
Loss on disposal of fixed assets		-	3,166
Rent payable		12,403	13,335
ACCUMULATED LOSS at beginning of year		2,000,327	1,747,663
ACCUMULATED LOSS at end of year		2,187,058	2,000,327

ACMARC CANNING COMPANY LIMITED
BALANCE SHEET
31st March, 1981

	Notes	1981 K	1980 K
CAPITAL EMPLOYED			
SHAREHOLDERS' DEFICIT			
Share capital	5	40,000	40,000
Accumulated loss		(2,187,058)	(2,000,327)
Total shareholders' deficit		(2,147,058)	(1,960,327)
LONG-TERM BORROWINGS	6	2,555,353	2,406,311
TOTAL CAPITAL EMPLOYED		408,295	445,984
EMPLOYMENT OF CAPITAL			
FIXED ASSETS	7	77,371	102,445
CURRENT ASSETS			
Stock	8	681,620	760,609
Debtors		150,249	96,981
Cash		2,880	2,261
Total current assets		834,749	859,851
CURRENT LIABILITIES			
Creditors		111,250	80,122
Bank overdraft	9	392,575	436,190
Total current liabilities		503,825	516,312
NET CURRENT ASSETS		330,924	343,539
TOTAL EMPLOYMENT OF CAPITAL		408,295	445,984

.....)
D.Z. Tamoo)
) DIRECTORS
)
.....)
U.S.G. Nyondo

ADMARC CANNING COMPANY LIMITED
STATEMENT OF SOURCE AND APPLICATION OF FUNDS
For the year ended 31st March, 1981

	1981 K	1980 K
SOURCE OF FUNDS		
Long-term borrowings raised	149,042	279,418
Increase in creditors	31,128	5,894
Decrease in stock	78,989	-
Total source of funds	259,159	285,312
APPLICATION OF FUNDS		
Loss for the year	186,731	252,664
Adjustment for items not involving the movement of funds:-		
- Depreciation	26,246	31,146
- Loss on disposal of fixed assets	-	3,166
Funds expended upon operations	160,485	218,352
Purchase of fixed assets	1,172	688
Increase in stock	-	222,444
Increase in debtors	53,268	33,862
Total application of funds	214,925	475,346
NET INCREASE/(DECREASE) IN LIQUID FUNDS	44,234	(190,034

1. NATURE OF BUSINESS

The main business of the company, which is incorporated in Malawi consists of the canning of foodstuffs.

2. ACCOUNTING POLICIES

The principal accounting policies of the company, which are set out below have been consistently followed in all material respects.

2.1. Accounting convention

The accounts are prepared in terms of the historical cost convention. No procedures have been adopted to reflect the impact on the accounts of specific price changes or changes in the general level of prices.

2.2. Depreciation of fixed assets

Fixed assets are depreciated on the straight line basis at rates that will reduce book amounts to estimated residual values over the anticipated useful lives of the assets as follows:-

Plant and equipment	10 years
Vehicles	5 years

2.3. Stock

Stock has been valued at the lower of cost and net realisable value, due provision having been made for obsolescence. Cost is determined on the following basis:-

Raw materials and consumable stores are valued at invoice cost. Finished goods at the lower of cost of production or net realisable value.

2.4. Foreign currency translation

Foreign balances

Assets and liabilities in foreign currencies are translated to Malawi currency at rates of exchange approximating those ruling at the balance sheet date or at dates applicable in forward exchange contracts.

3. TURNOVER

Turnover comprises amounts invoiced for goods sold.

4. INTEREST PAYABLE

	1981 K	1980 K
Debenture and long-term borrowings	12,410	12,410
Bank overdraft	78,841	43,302
Total interest payable	91,251	55,712

5. SHARE CAPITAL

Authorised, issued and fully paid 20,000 Ordinary shares of K2 each	40,000	40,000

ACMARC CANNING COMPANY LIMITED
NOTES TO THE ACCOUNTS (Continued)
31st March, 1981

6. LONG-TERM BORROWINGS

	1981 K	1980 K
Agricultural Development and Marketing Corporation: Debenture Secured by a floating charge on the company's assets, both present and future, repayable on demand and bearing interest at the rate of 8½% per annum.	146,000	146,000
Long-term loan Unsecured and terms of repayment have not been arranged. K710,010 (1980: K631,282), bears interest at the rate of 10%, the balance being interest free. Loan interest has been waived during the current financial year.	2,409,353	2,260,311
Total long-term borrowings	2,555,353	2,406,311

7. FIXED ASSETS

	Motor vehicles K	Plant and equipment K	Total 1981 K	Total 1980 K
Cost at beginning of year	36,892	263,990	300,882	308,8[illegible]
Additions	-	1,172	1,172	689
Disposals	-	-	-	(8,659
Cost at end of year	36,892	265,162	302,054	300,882
Depreciation at beginning of year	36,595	161,842	198,437	172,784
Charge for the year	144	26,102	26,246	31,146
On disposals	-	-	-	(5,493
Depreciation at end of year	36,739	187,944	224,683	198,437
Net book amount at end of year	153	77,218	77,371	102,445

The fixed assets are encumbered as indicated in note 6.

8. STOCK

	1981 K	1980 K
Raw materials	[illegible]78,757	204,286
Consumable stores	6,500	11,[illegible]10
Finished goods	496,363	544,613
Total stock	681,620	760,409

ADMARC CANNING COMPANY LIMITED
NOTES TO THE ACCOUNTS (Continued)
31st March, 1981

9. BANK OVERDRAFT

Overdraft facilities are secured by a guarantee of K300,000 (1980: K300,000) given by Agricultural Development and Marketing Corporation.

10. TAXATION

Taxation has not been provided as the company did not earn any taxable income during the year. The total estimated tax loss at 31st March, 1981 amounted to approximately K2,247,000 (1980: K2,001,000) which is deductable from future taxable profits.

ADMARC CANNING COMPANY LIMITED
DETAILED PROFIT AND LOSS ACCOUNT
For the year ended 31st March, 1981

	1981 K	1980 K
INCOME		
TRADING PROFIT/(LOSS)	73,994	(10,956)
SUNDRY INCOME	1,264	1,366
PROFIT/(LOSS) BEFORE EXPENSES	75,258	(9,590)
EXPENSES		
Depreciation	1,823	6,675
Advertising	303	-
Carriage out	208	40,630
Audit and accountancy fee	4,747	4,500
Bank charges	159	1,052
Insurance	9,007	12,635
Interest - Overdraft	78,841	43,302
Debenture	12,410	12,410
Legal	84	182
Licences	250	750
Medical	949	715
Motor vehicle expenses	51,625	35,260
Postages & telephone	2,056	2,362
Printing & stationery	2,204	3,894
Rent	12,403	13,335
Repairs & General	4,305	3,569
Salaries & wages	62,741	53,177
Staff welfare & cleaning	6,175	4,316
Travelling & entertainment	3,078	3,068
Workshop	1,061	1,242
Provision for bad debts	7,500	-
Total expenses	261,989	243,074
LOSS FOR THE YEAR	186,731	252,664
Accumulated loss at beginning of year	2,000,327	1,747,663
Accumulated loss at end of year	2,187,058	2,000,327

ADMARC CANNING COMPANY LIMITED
DETAILED TRADING ACCOUNT
For the year ended 31st March, 1981

	1981 K	1980 K
RAW MATERIALS CONSUMED	432,635	409,674
OTHER PRODUCTION EXPENSES		
Consumable stores	30,788	23,459
Depreciation - plant and machinery	24,423	24,4[illegible]
Loss on disposal of plant	-	3,[illegible]
Fuel and oil	73,229	45,237
Protective clothing	3,198	2,398
Repairs and maintenance	8,789	8,670
Direct wages	52,015	42,182
Water and electricity	13,447	8,279
COST OF GOODS MANUFACTURED	638,524	567,536
Decrease/(Increase) in stock of finished goods	48,251	(209,193)
COST OF GOODS SOLD	686,775	358,343
SALES	760,769	347,387
TRADING PROFIT/(LOSS)	73,994	(10,956)

APPENDIX IV

ADMARC CANNING COMPANY LIMITED

Accounts for the year ende
31 March 1980

REPORT OF THE AUDITORS TO THE MEMBERS OF
ADMARC CANNING COMPANY LIMITED

We have examined the books, accounts and vouchers of the company and have obtained all the information and explanations to the extent that we have considered necessary for the purpose of our audit.

These statements have been prepared on the basis that the company will continue as a going concern. The ability of the company to continue business operations is dependent primarily upon the Agricultural Development and Marketing Corporation continuing to provide adequate levels of finance until the solvency of the company is restored through the resumption of profitable operations.

In our opinion, subject to the effects, if any, of the matter discussed in the preceding paragraph, the accounts set out on pages 2 to 7 which are in agreement with the books of account, give a true and fair view of the state of the company's affairs at 31st March, 1980 and its results for the year then ended in compliance with the Companies Act, Chapter 46:03.

[signature]

2ND DECEMBER, 1980.

ADMARC CANNING COMPANY LIMITED

PROFIT AND LOSS ACCOUNT

For the year ended 31st March, 1980

	Notes	1980 K	1979 K
TURNOVER	2	347,387	330,010
OPERATING LOSS, after taking into account:-		252,664	365,728
Interest receivable	3	-	2,253
Audit and accountancy fee		4,500	5,000
Depreciation		31,146	32,344
Interest payable		55,712	68,348
Loss on disposal of fixed assets		3,166	10
Rent payable		13,335	19,145
ACCUMULATED LOSS at beginning of year		1,747,663	1,381,935
ACCUMULATED LOSS at end of year		2,000,327	1,747,663

ACHARC CANNING COMPANY LIMITED

BALANCE SHEET

31st March, 1980

	Notes	1980 K	1979 K
CAPITAL EMPLOYED			
SHAREHOLDERS' DEFICIT			
Share capital	5	40,000	40,000
Accumulated loss		(2,000,327)	(1,747,663)
Total shareholders' deficit		(1,960,327)	(1,707,663)
LONG-TERM BORROWINGS	6	2,406,311	2,126,893
TOTAL CAPITAL EMPLOYED		445,984	419,230
EMPLOYMENT OF CAPITAL			
FIXED ASSETS	7	102,445	136,069
CURRENT ASSETS			
Stock	8	760,609	538,165
Debtors		96,981	63,119
Cash		2,261	2,443
Total current assets		859,851	603,727
CURRENT LIABILITIES			
Creditors		80,122	74,228
Bank overdraft	9	436,190	246,338
Total current liabilities		516,312	320,566
NET CURRENT ASSETS		343,539	283,161
TOTAL EMPLOYMENT OF CAPITAL		445,984	419,230

.....
D.Z. Temco

DIRECTORS

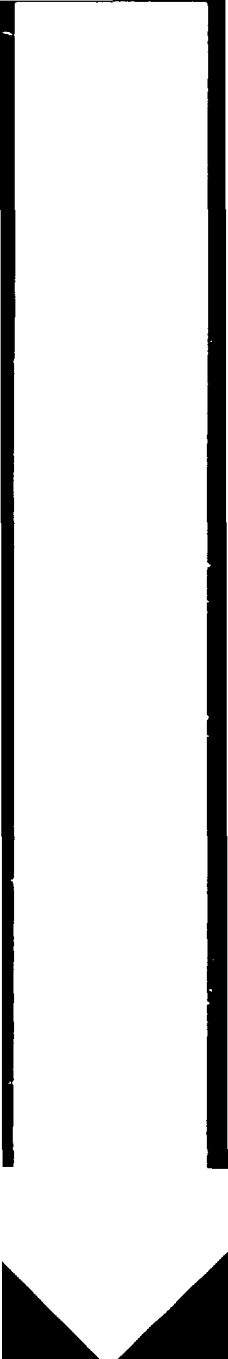
.....
J.B.C. Nyemco

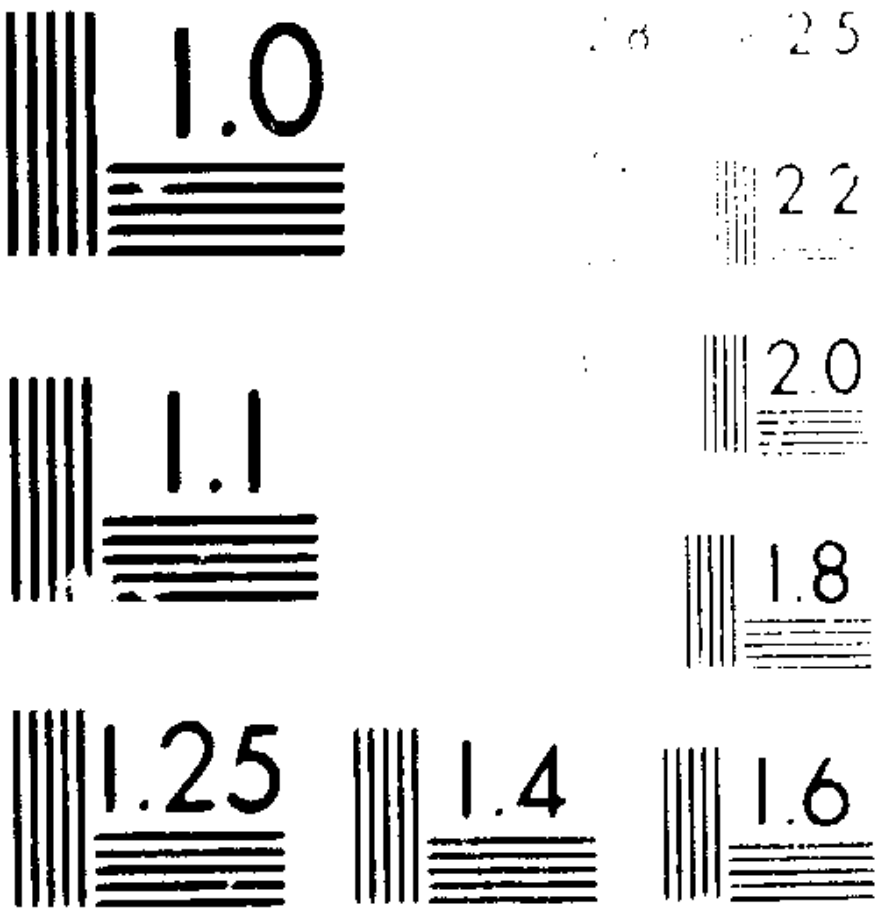
ADMARC CANNING COMPANY LIMITED

STATEMENT OF SOURCE AND APPLICATION OF FUNDS

For the year ended 31st March, 1980

	1980 K	1979 K
SOURCE OF FUNDS		
Long-term borrowings raised	279,418	181,758
Decrease in debtors	-	41,520
Increase in creditors	5,894	-
Total source of funds	285,312	223,278
APPLICATION OF FUNDS		
Loss for the year	252,664	365,728
Adjustment for items not involving the movement of funds:-		
Depreciation	31,146	32,344
Loss on disposal of fixed assets	3,166	10
Funds utilised to finance loss	218,352	333,374
Purchase of fixed assets	688	8,724
Increase in stock	222,444	37,597
Decrease in creditors	-	7,512
Increase in debtors	33,862	-
Total application of funds	475,346	387,207
NET DECREASE IN LIQUID FUNDS	190,034	163,929

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ADMARC CANNING COMPANY LIMITED

NOTES TO THE ACCOUNTS

31st March, 1980

1. ACCOUNTING POLICIES

The principal accounting policies of the company, which are set out below, have been consistently followed in all material respects.

1.1. Depreciation of fixed assets

Fixed assets are depreciated on the straight line basis over their anticipated useful lives which are:-

Plant and equipment	10 years
Vehicles	5 years

1.2. Stock

Stock has been valued at the lower of cost and net realisable value, due provision having been made for obsolescence. Cost is determined on the following basis:-

Raw materials and consumable stores are valued at invoice cost. Finished goods at the lower of cost of production or net realisable value.

1.3. Foreign currencies

Assets and liabilities in foreign currencies are translated to Malawi Kwacha at rates of exchange approximating those ruling at the balance sheet date.

2. TURNOVER

Turnover comprises amounts invoiced for goods sold.

3. INTEREST RECEIVABLE	1980 K	1979 K
Master Stores Limited	-	2,253

4. INTEREST PAYABLE		
Debenture and long-term borrowings	12,410	55,582
Bank overdraft	43,302	12,766
Total interest payable	55,712	68,348

5. SHARE CAPITAL		
Authorised: 20,000 shares of K2 each	40,000	40,000
Issued and fully paid: 20,000 shares of K2 each	40,000	40,000

6. LONG-TERM BORROWINGS

	1980 K	1979 K
Agricultural Development and Marketing Corporation:		
Debenture Secured by a floating charge on the company's assets, both present and future, repayable on demand and bearing interest at the rate of 8½% per annum.	146,000	146,000
Long-term loan Unsecured and terms of repayment have not been arranged. K631,282 (1979: K420,278), bears interest at the rate of 10%, the balance being interest free. Loan interest has been waived during the current financial year.	2,260,311	1,980,893
Total long-term borrowings	2,406,311	2,126,893

7. FIXED ASSETS

	Motor vehicles K	Plant and equipment K	Total 1980 K	Total 1979 K
Cost at beginning of year	37,326	271,527	308,853	300,379
Additions	-	688	688	8,724
Disposals	(434)	(8,225)	(8,659)	(250)
Cost at end of year	36,892	263,990	300,382	308,853
Depreciation at beginning of year	31,924	140,860	172,784	140,680
Charge for the year	5,016	26,130	31,146	32,344
On disposals	(345)	(5,148)	(5,493)	(240)
Depreciation at end of year	36,595	161,842	198,437	172,784
Net book amount at end of year	297	102,148	102,445	136,069

The fixed assets are encumbered as indicated in note 6.

ADMARC CANNING COMPANY LIMITED

NOTES TO THE ACCOUNTS (Continued)

31st March, 1980

8. STOCK

	1980 K	1979 K
Raw materials	204,286	190,360
Consumable stores	11,710	12,385
Finished goods	544,613	335,420
Total stock	760,609	538,165

9. BANK OVERDRAFT

Overdraft facilities are secured by a guarantee of K300,000 (1979: K300,000) given by Agricultural Development and Marketing Corporation.

10. TAXATION

Taxation has not been provided as the company did not earn any taxable income during the year. The total estimated tax loss at 31st March, 1980 amounted to approximately K2,001,000 (1979:K1,798,000) which is deductable from future taxable profits.

APPENDIX V

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

Project for the Government of MALAWI

JOB DESCRIPTION

Post title	Food processing specialist with experience in fruit and vegetable processing
Duration	Two years with possibility of extension
Date required	October 1982
Duty Station	Limbe with frequent visits to the Admarc Canning Company in Mulanje.
Purpose	To assist the Agricultural Development and Marketing Corporation implementation of installation of a fruit juice concentrate line and rehabilitation of existing plant at the Admarc Canning Company. Also assist in development and marketing of new products and packaging.
Duties	The expert will assist the Admarc Development Manager in the day to day liason with the management of the Admarc Canning Company to assure the speedy and smooth reneval and rehabilitation of the plant. The expert will also assist in creating an accounting system, which will make it possible for the Admarc Headquarters to follow the daily operations of the Admarc Canning Company plant in the greatest detail and be able to calculate the cost for each product. An important duty of the expert will be to assure detailed, and current quality control and log book keeping at the Admarc Canning Company.
Qualifications	Food processing technologist with extensive experience in the technology and management of fruit and vegetable processing. The expert should also have extensive experience in research and development and implementation of fruit and vegetable processing projects.
Language	English
Background	The Admarc Canning Factory is a small scale fruit and vegetable processor. The major products are canned pineapple products, but it also produces other products such as fruit jams and marmalades, tomato sauce and various fruit juices. The produce is procured from

small scale growers, who depend on this outlet for a significant part of their income. It is also an important employer providing much needed jobs.
The plant set-up is rather basic lacking more sophisticated and efficient equipment. Particularely the pineapple processing has been very inefficient with low recovery rates and exessive waste.
Significant economic losses have accumulated since the company mooved to its present location in Mulanje.
A UNIDO fruit and vegetable processing expert has submitted a report this year with specific recommendation for the rehabilitation and reneval of the plant with the view of correcting the present poor economic performance.