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PRE-FEASIBILITY STUDIES ON AGRO-BASED INDUSTRIES
FOR PTA

DP/RAF/88/074

terminal report*

Prepared for the Governments of
the Member Countries of the Preferential
Trade Area of Eastern and Southern African States
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

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* This document has not been edited.

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PREFACE

Project DP/RAF/8C/074 represents a part of UNIDO's long-standing and on-going programme of working with the PTA's Industry and Energy Division to assess the financial, economic and technical viability of investment projects in the sub-region. The present programme of investment analyses focuses on assessing the viability of establishing new industrial projects in the animal food, edible oil, grain milling and sugar sectors, and of rehabilitating existing capacity in the pulp and paper sector.

In order to give the appropriate weight to the sub-regional nature of the project, the programme commenced with methodological work focusing on determining the most appropriate countries to be included in the five detailed investment analyses. Interim and final reports were then prepared for each of the sub-sectors. During the course of the work, the results were regularly discussed both in the individual countries as well as with the PTA Secretariat.

The present report summarizes the results of the five individual analyses and provides a synthesis of these results with particular reference to their sub-regional dimension. A first version of the present report was presented to the 11th meeting of the PTA's Committee on Industrial Co-operation; the present version has been considerably expanded to include new material as well as to incorporate the results of the discussion at the Committee's meeting. It has not, however, been officially edited.

The present report is being given a very wide distribution both within and outside the PTA Member Countries in an effort to reach as many potential investors as possible with interest in investigating the possibility of promoting the investment projects identified, analysed and evaluated under the present programme.

Further information can be obtained by contacting UNIDO's Feasibility Studies Branch (Department of Industrial Operations, P.O.Box 300, A-1400 Vienna, Austria. Tel: 211.31/3743. Fax: 232.156), who will co-ordinate with the Director of PTA's Industry and Energy Division (PTA, Ndeke House Annexe, Haile Selassie Avenue, P.O.Box 30051, Lusaka, Zambia. Tel: 22.97.25. Fax: 25.25.24. TX: PTA ZA 40127)

INTRODUCTION

The UNDP-financed and UNIDO-implemented project DP/RAF/88/0/4 focuses on five agro-based industrial sectors: animal foodstuff, edible oil, grain, sugar, pulp and paper.

The overall aim is to assist the PTA secretariat and its members countries in taking technologically, economically, financially and environmentally sound decisions on the establishment of subregional agro-based industries.

According to the terms of reference, the focus is on projects which must be sound in all respects and which must be such as to promote economic cooperation between the PTA countries and to contribute to the sustained transformation of the production structures of national economies.

This sectorial study progressed on three stages, and the results were presented at 11th Committee on Industrial Cooperation, standing at Lusaka (Zambia) from 30 September to 4th of October 1991. The results of the discussion are integrated in this synthetic report.

FIRST STAGE

A preliminary selection to identify some specific countries for further industrial and economic investigation, in order to come up with the proper projects identification.

For this preliminary selection, assessment criteria adopted were classified in three categories :

- Market,
- Raw material available resources,
- Environment : available transport facilities and socio-economic environment.

Given the regional framework of the study, it was estimated necessary insofar as compatible with technical constraints, that the projects be geographically distributed so as to exploit the advantages of the various countries concerned.

This consideration led to define the following principle : during the preliminary study, any given country should be visited for at most 3 sectors (excluding the paper sector, given the special nature of that project).

On the basis of this principle and the results of the multicriterion analysis (weighted or not), we proposed, and PTA and UNIDO authorities accepted, selecting the following countries for the identification study :

Edible Oil Sector	: Zimbabwe, Tanzania, Uganda, Malawi
Grain	: Kenya, Zimbabwe, Tanzania
Animal feed	: Tanzania, Ethiopia, Kenya
Sugar	: Kenya, Zimbabwe

This selection took into account the PTA authorities observations.

When presenting this first stage, SUDAN delegate inquired why SUDAN was not selected for a sector. PTA authorities recalled that this contract was awarded to INTER G in 1989, when SUDAN was not yet full member of Preferential Trade Area.

Nethertheless SUDAN delegate insisted upon SUDAN facilities within the differents sectors :

Sugar sector: SUDAN has five sugar plants

. Kenana Sugar Co :	330 000 tons/year
. Elgurend Sugar Co :	60 000 tons/year
. New Halfa Sugar Co :	90 000 tons/year
. Seinar Sugar Co :	110 000 tons/year
. Assalya Sugar :	110 000 tons/year

i.e. 700 000 tons of sugar per year

Currently, the level of production is of 50 to 60 % of installed capacity.

Edible Oil Sector :

The existing processing capacity is of 4 000 000 tons/year.
60 % of current production is for exportation.

Animal Feedstuff :

In SUDAN, total capacity installed is of 3 000 000 tons/year and all the current production is sold on national market.

A project of 2 000 000 tons/year capacity plant is being studied.

SECOND STAGE

For each sector a project identification study within the selected countries, the aim being to identify the project most worthwhile for a prefeasibility study after an analysis of opportunities and requirements.

After the multicriterion analysis performed on the basis of the project identification study, following recommendations were suggested to PTA authorities (with a ranking resulting from the multicriterion analysis).

ANIMAL FOODSTUFF SECTOR

- 1 - KENYA : Fishmeal production
- 2 - KENYA : Animal waste processing
- 3 - TANZANIA : Soya bean processing
- 4 - ETHIOPIA : Ruminant blocks

EDIBLE OIL SECTOR

- 1 - ZIMBABWE : Multipurpose oil factory
- 2 - TANZANIA : Rehabilitation program

GRAIN MILLING SECTOR

- 1 - TANZANIA : Project to upgrade product such as millet and sorghum as a substitute for wheat imports
- 2 - TANZANIA : Project designed increase maize milling capacity
- 3 - KENYA : Composite flour production

SUGAR SECTOR

- 1 - ZAMBIA : Nakambala
- 2 - KENYA : Chemelil
- 3 - KENYA : Munias
- 4 - KENYA : Sony

THIRD STAGE

A prefeasibility study for the projects selected by PTA authorities among recommendations selected above.

ANIMAL FOOD SECTOR

PTA authorities asked INTER G to perform the animal food study on a cassava project upgrading in Burundi. This country was not selected in the first stage, and consequently there was no project identification study in this country.

The expert mission appraisal showed that current situation in Burundi did not enable to plan any significant investment in the animal food sector for different reasons : a current processing overcapacity, a significant lack of raw material, a low increase of local animal foodstuff denied.

The expert taking into account these local conditions suggested recommendations in order to improve the operation of the main production unit = ALCOVIT.

These recommendations lead to the implementation of a technical assistance mission to enable the unit to increase the current production at the level of 50 % of installed capacity.

EDIBLE OIL SECTOR

PTA authorities communicated us in November 1990 that selected project was a multipurpose oil factory in Zimbabwe. When the project technical mission was conducted in December 1990. The technical expert observed that, in comparison

with data collected during first mission in November-December 1989, poor climatic conditions generated a strong decrease of cotton seeds and most of raw material production.

Therefore, this pre-feasibility study was conducted considering the CMB's willingness to foster the cotton production (which is a valuable cash crop for the national economy), and that these poor climatic conditions were temporary.

It is obvious that, currently, edible oil demand is not met and that if the CMB's decision of implementing this project was postponed, the oil local expressors would under-take relevant actions to increase their oilseeds expressing capacity in order to supply national market.

CMB authorities should be prompt with their decision regarding this project investment were they will entirely be involved, failing that their contribution could occur with a joint-venture project with one of the local oil expressors.

The prefeasibility study has been achieved on this basis. The proposed project has a capacity of 88 000 T/year of oil seeds i.c. 15 800 T of edible oil.

GRAIN MILLING SECTOR

PTA authorities selection was : A project to upgrade products such as millet and sorghum as a substitute for wheat imports in Tanzania.

The project technical mission was conducted in Tanzania, the expert was in charge of updating data in order to perform the prefeasibility study for the identified project. When conducting the infield mission, the expert identified the need for a pilot project of mix flour production, a project which could be reproduced in various areas of the country to meet local populations needs through medium scale industrial production of mix flour.

The prefeasibility study has been achieved on the following basis : a production capacity estimated at 2 or 3 000 T/year for the basic option, at 5 000 T/year for the double option.

When presenting this project ZIMBABWE delegate stressed that to increase raw material crop production government has entranced grain production through the settlement of attractive producer prices.

Moreover to reduce imports of wheat, production of composite flour with millet is promoted.

SUGAR SECTOR

PTA authorities selected Nakambala project in Zambia.

Nakambala estate, produced in 1990, 124 000 tons of sugar. This factory has a nominal level of 160 000 tons but due to shortage of foreing exchange in the last 80's serious deterioration led to a decline of sugar production.

Without urgent rehabilitation, factory and estate performances will continue to decline.

Most of the sugar production is sold on domestic market. Due to forecast exchanges of the domestic market, Nakambala will need to increase its production.

Booker-Tate (ex. Tate Lyle) and ZSC considered different options and retained the option which would enable to reach a production level of 170 000 tons of commercial sugar.

The prefeasibility study has been performed on this basis.

This project, during the 1990's will aim at supplying 25 to 35 000 tons of sugar per year on the intra-PTA sugar trade.

MAURICIUS delegate emphasized on the fact that in Africa many sugar plants have gone bankrupt, because of the hard competition existing in sugar world market and proposed that PTA countries importing sugar would import from PTA countries producing sugar.

PULP and PAPER SECTOR

According to the terms of reference, this sector study was to be a survey leading to a diagnostic on ongoing projects.

According to the preliminary study, two countries had to be visited : KENYA and ZIMBABWE, but as the consultant had the opportunity to get detailed information on a specific project in ZAMBIA, INTER G considered interesting to diagnostic also this project.

This diagnostic showed the ability of KENYA and ZIMBABWE to supply their own needs from their own resources until approximately the year 2020.

With regard to the short term, the expert made recommendation to allow the development of existing plants and projects. The expert specified for each plant or project the type of assistance when necessary : technical assistance, training, ...

The following chapters summarize the results of the analyses for the five sub-sectors (chapters 1-5) and synthesize the results and recommendations (chapter 6).

1 - ANIMAL FOOD SECTOR

1.1. GENERAL OVERVIEW

Issued of the preliminary selection and the project identification study performed in Kenya, Tanzania and Ethiopia recommendations suggested to the PTA authorities, were :

- 1 - Fishmeal production (Kenya)
- 2 - Animal waste processing (Kenya)
- 3 - Soya bean processing (Tanzania)
- 4 - Ruminant blocks (Ethiopia)

Nevertheless in November 1990, PTA authorities asked INTER G to perform the animal food study on a cassava project upgrading in Burundi. This country was not selected in the first stage, and consequently there was no project identification study in this country.

A prefeasibility study was supposed to be performed. The animal food expert went to Burundi in order to collect the required technical and economical data but he also was in charge of identifying the project itself during this appraisal mission.

The expert mission appraisal showed that current situation in Burundi did not enable to plan any significant investment in the animal food sector for three reasons :

♦ A current animal food processing overcapacity

There already is a major animal food producer in Burundi - ALCOVIT - and ten local centers with little production capacity.

The total production is of 7 000 T/year, of which 50 % are produced by ALCOVIT.

ALCOVIT capacity (12 000 T/Y) is largely under utilized (35 %), the main reason being a significant lack of raw material. In fact this plant was designed to use bran and issues produced by the MURAMVYIA MILL, but this one has not been working regularly for the last three years. This situation has led the expert to recognize that the purpose was not identify a new project but to study the opportunity to improve the ALCOVIT position through a production increase linked to additional raw material supply.

♦ A significant lack of raw materials

The animal food industry is characterized by the use of raw material such as grain rejects (maize, sorghum, rice, ...), and screenings, as well as by-products from grain mills (maize bran and wheat bran) from oilseed mills (palm kernel cakes) from abattoirs (meat, and bone meal) and salt, limestone and vitamin premixes.

Industrial sub-products are locally produced besides premixes which are imported products.

Essential traditional raw materials available in Burundi for the animal food industry are rice, maize, wheat, sorghum and palm kernels. Starchy products are maize, sorghum, rice.

Following table illustrates the weak availability of raw material and grain and oilseeds by-products for the animal food industry. Raw material production is stationary and available resources after human self-consumption are very limited.

(tons)

Products	Production 1989	Householders Consumption	Available Surpluses
Rice	28.000	23.000	5.000
Maize	135.000	132.820	2.180
Cotton cakes	557	0	557
Rice Bran	176	0	176
Wheat Bran/Maize	0	0	0
Palm Kernels*	2.500	0	2.500

* FAO estimates

Source : ISABU 1989

To overcome the lack of traditional raw materials (maize, bran, ...) cassava supply conditions were studied within this framework in Burundi. Cassava is a food crop processed within traditional farms. The national production of 600 000 T is dedicated to rural households consumption. There are no intensive farming methods, attempts to improve yields are underway but are still to be implemented in the traditional sector.

In the Fifth plan, there is no specific project for cassava intensive production, the authorities considering that "cassava is a crop which acts as a buffer in case of lack of food crops. It is limited to the household level". Annual and local production irregularity lead to periodic surpluses which often are poorly upgraded.

However, surpluses random availability (location and period) hamper the implementation of permanent equipment to process those surpluses for later upgrading of foodstuff production.

En addition, it is relevant to emphasize that in less developed countries like Burundi, which suffers from food self-sufficiency, animal foodstuff can not compete with local population needs.

♦ A low increase of local animal foodstuff demand

Compound foodstuffs are mainly used for pigs, poultry and fish farming due to the productivity level of ruminant breeding is still too rudimentary to make the use of costly foodstuffs profitable.

In Burundi, due to high to population density and land scarcity, animal foodstuff demand for cattle is a little more important than in other African countries.

Nevertheless the major animal foodstuff consumers are poultry, fish and ruminants. The demand will be therefore heavily tied to this livestock development.

In 1990, stockfeed local production is estimated to about 7 000 Tons. It is limited by the raw material supply irregularity, expensive transport costs, the lack of distribution network and a low buying power of farmers. In 1985, local production was estimated to about 5 600 Tons therefore, the average growth is about 4 % per year.

Exports to neighbouring countries are very periodical and limited (1 080 T in 1988, 0 T in 1990). In fact, finish products have a low price and can not bear high transport costs otherwise they become non competitive.

Therefore it is made difficult to take into account regular exports for the project development. The domestic market is considered to be the major out lay for animal foodstuff producers.

1.2. PROJECT IDENTIFICATION AND RECOMMENDATIONS

The expert mission due to the local background has led him to concentrate its recommendations on ALCOVIT production conditions improvement through the increase of raw material supply and cut in production costs.

Indeed, the unit currently operates at only 35 % of installed capacity, and cassava limited and irregular available surpluses hamper the implementation of a new equipment which will not be profitable for the unit as a whole.

The installed capacity of the plant is 50 T/24 H. Currently, the plant operates at only 35 % of installed capacity, with about 18 T/24 H.

On the technical level, the plant built according to French standards by STOLZ is of good standards, with a complete and solid equipment. The plant, well designed, is a little too sophisticated.

In order to overcome :

- irregular (in quality and quantity) raw material supply,
- poor financial situation due to an undercapacity operation

The expert proposed to focus on :

- raw material supply conditions with affordable costs,
- cut in production costs

A technical assistance mission has been proposed to set up the required actions program. This program is designed based on three levels :

- ♦ A survey for raw material supply :

- investigations for the increase of raw material supply, and information campaign.

The aim is eventually to identify productions which are not marketed.

- a study to develop the consumption of unusual raw materials.
- ♦ Technical measures to lower production costs. A thorough study is required :
 - to analyse :
 - . operating conditions for pelletization,
 - . packaging costs.
 - to set up a maintenance program.
 - to define how to replace later delicate pieces of equipment : boiler, crumbler and press.
- ♦ A training program.

2 - EDIBLE OIL SECTOR

2.1. PROJECT BACKGROUND

At the end of project identification study (March 90), two recommendations were suggested to PTA authorities :

- 1 - ZIMBABWE = Multipurpose Oil Factory
- 2 - TANZANIA = Rehabilitation Program

This ranking was the result of a multicriterion analysis.

PTA authorities selected the multipurpose oil project in Zimbabwe. The project technical mission was conducted in Zimbabwe in December 1990.

The Cotton Marketing Board, whose main activity is cotton ginning, has projected since 1988 the implementation of a new multipurpose oil factory in Zimbabwe showing thus some interest in developing downstream activities like cotton oil expressing.

2.2. MARKET SURVEY

The plant capacity depends on :

- . The edible oil market
- . The available raw material
- . The current and forecast industry capacity

2.2.1. Edible Oil Market Survey

Local Market

Apparent local consumption in 1989/90 has been evaluated to 61 200 T/Y which corresponds to a consumption of 7,9 Kg/y per capita. But due to importations stopped for over 3 years this current consumption is below actual demand (In

1988/89, the consumption was 8,9 Kg/Y per capita).

Future local demand, in the year 2000, has been estimated to :

- . 92 800 T with a low hypothesis (3 % per year),
- . 103 600 T with a hypothesis including a high increase of the demand per capita (+ 4 % per year).

Subregional market

Exports from Zimbabwe have been stopped since 1986/87 due to government regulations. Intra PTA trade exchanges is of about 15 to 20 000 Tons.

Future demand of edible oil in neighbouring countries is likely to develop with population growth. However, disposal income for edible oil is very low in countries such as Malawi, Zambia and consumption is one of the lowest in African countries.

Other potential oil importers for Zimbabwe remain Botswana which is not an edible oil producer as well as Mozambique which after high political troubles produces very low edible oil quantities.

Zambia which has faced difficulties to meet national edible oil demand is also a potential edible oil importer since oilseeds production has suffered for various reasons (climatic conditions, poor quality seeds, diseases).

2.2.2. Raw materials

Due to poor climatic conditions, the last 3 years a strong decrease of raw material production has been registered. Forecasts were not achieved.

In 1990/91, a shortfall of about 100 000 tons of oilseeds is present compared to forecasted figures for all oilseeds cottonseeds, soyabeans and sunflowerseeds.

This shortfall is significant regarding cottonseeds (- 114 000 tons). To a less extent soyabeans deliveries are lightly below forecasts (- 17 880 tons). On the opposite sunflowerseeds deliveries exceed forecasts (+ 19 480 tons).

Production decrease is mainly due to :

- poor climatic conditions in 1989/90 and 1990/91 (erratic rains)
- diseases - poor yielding, in particular, for cottonseeds
- reduced cotton producer viability (low producer prices ; rising costs of inputs and transport bottlenecks).

Oilseeds production forecasts take into account the current situation. It appears that if CMB recovery program succeeds, and considering other oilseeds production forecasts, the oilseeds production will be as following :

(tons)	1995/1996	1999/2000
Soyabeans	145 800	177 300
Cottonseeds	238 500	284 400
Sunflowerseeds	45 000	50 600
TOTAL	429 300	512 300

2.2.3. Oil industry size and capacity

The edible oil industry is shared by four main oil expressors :

- . OLIVINE INDUSTRIES Ltd
- . LEVER BROTHERS Ltd
- . UNITED REFINERIES (ex. Blue Ribbon)
- . NATIONAL FOODS Ltd

The total oilseeds crushing capacity was estimated to 340 000 tons in 1988.

With programs extension completed by United Refineries it is now estimated to 365 000 tons/y.

The expansion program included :

- . a new solvent extraction unit/commissioned in 1988
- . an additional expeller line/commissioned at the end of 1989.

With a utilization rate maximum of 90 % the total actual crushing capacity is estimated to 330 000 t/y.

Some development programs are considered ; UNITED REFINERIES has obtained an import licence for a new refinery unit. This project is in obeyance because no financing plan has been drawn. This piece of information was confirmed by the Ministry of Industry.

OLIVINE Management team seems to start a program for renewing part of their equipment in regard to a factory extension to increase, inter alia, the solvent extraction capacity.

LEVER BROTHER seems also to foresee an expansion program.

These few projects are indeed forecasted but it seems difficult to estimate their implementation schedule, since they were not confirmed by the Ministry of Industry or financed yet.

2.3. PLAN LOCATION, CAPACITY and TECHNOLOGY

2.3.1. Projected Plant Capacity

If we consider figures hereabove mentionned, it appears that, from 1995, the crushing capacity will not meet the requirements for about 80 000 T.

In 1999/2000, the total crushing capacity must be of at least of 500 000 T, which represents an increase of current crushing capacity of 150 to 170 000 T.

The proposed plant capacity will be about 88 000 tons of oilseeds. The new unit will produce over 15 800 T/year of edible oil. i.e. 13 300 T of blended oil (cotton + soya) and 2 500 T of sunflower oil.

Based on this plant capacity, the total oil expressing capacity will be as follows :

	1993/1994	1994/1995	1995/1996
New plant	88 000 x 0.33	88 000 x 0.66	88 000
Existing plants	365 000	365 000	365 000
	395 000	425 000	453 000

These figures assume that existing plants capacity will remain in the same range over the 3 coming years.

The total oil expressing capacity will meet the oilseeds production requirements.

2.3.2. Site

The proposed plant site is near Kadoma in the grain cotton growing area.

The plant site is located along the railways and road between Harare (140 km) and Bulawayo (300 km).

The CMB is planning to build a new ginnery of 50 000 T/y of cottonseeds in Kadoma.

2.3.3. Technology

The proposed factory is a multipurpose oil expressing factory with various processes according to oilseeds decorticated.

Processes used are traditional and very performing with available equipment on the market.

Process includes :

- decortivating, cooking, pressing, filtration, chemical refining, solvent extraction, conditioning.

We have considered that there is no need for delinting cottonseeds. A detailed list of equipments is given in the prefeasibility report, as well as flow-diagrams.

Total investment costs (equipment, civil works, spare-parts, engineering, net working capital ...) is of 64.191.000 Z\$ or 25.075.000 US\$.

2.4. FINANCIAL, ECONOMIC ANALYSIS and CONCLUSIONS

The prefeasibility study has been conducted considering the CMB'S willingness to foster the cotton production which is a valuable cash crop for the national economy and the fact that the delay necessary to implement such a plant is of at least 4 years between the prefeasibility study and the first operation of the plant.

It has been considered that the project would be financed as follows :

- . equity : 7.075.000 US \$
- . loan : 17.000.000 US \$ with following loan conditions : interest 10 %, repayment period 10 years, and a delay period of 2 years.

Conclusions of the prefeasibility study are quite positive :

- The internal rate of return is of 15 % on a fifteen years basis. A sensitivity analysis as been conducted both on edible oil price and on oil seeds prices.
- The payback period is 7 years.
- Net profit become positive ont the third year of production.

Other economic aspects have to be considered :

At the national level :

- The upgrading of cottonseeds produced by the new ginnery in Kadoma,
- In the medium term the project will enable to meet the country's demand in edible oil with an additional production of 15 000 T of edible oil and to develop intra-PTA trade through the export of meals with over 40 000 T of meals produced

At the local level :

- The project will enable the involvement of the CMB in the whole cotton subsector (downstream activity),
- The employment development with 338 new positions in a rural area.

3 - GRAIN MILLING SECTOR

3.1. GENERAL OVERVIEW

The project identification study was performed within three countries : KENYA, TANZANIA and ZIMBABWE.

The aim was to identify the project most worthwhile for a prefeasibility study after an analysis of opportunities and requirements for product diversification and development the grain milling sector.

Recommendations suggested to the PTA authorities on March 1990, were :

1. TANZANIA - Project to upgrade products such as millet and sorghum as a substitute for wheat imports
2. TANZANIA - Project designed increase maize milling capacity
3. KENYA - Composite flour production

PTA Authorities selected at the end of 1990 the first project.

The expert, who performed the technical mission, was in charge of updating data collected in 1989 in order to achieve the prefeasibility study for the identified project.

When conducting the infield mission, the expert identified the need for a pilot project of mix flour production for the following reasons :

- ♦ Current potential capacities of industrial wheat and maize milling and paddy dehulling are much higher than requirements, if the industrial equipment used for this type of activity is refurbished and modernized. This concerns the implementation of the Economic Recovery Programm Policy and obtaining the financial and technical means, provided for in the World Bank and UNDP aid programs.

N.M.C., the National Milling Corporation, the most important processor of grains in Tanzania has a processing capacity of :

Maize	540 TN/hour
Wheat	420 TN/hour
Paddy	604 TN/hour

NMC increased its milling power with the recent implementation of three maize milling units with a capacity of 120 t/24 h each, and five rice milling units with a processing capacity of 2 t/h on paddy. Equipment was supplied by Buhler-Miag. The maize units have a unit cost of DM 3 millions and are at the following development level :

IRINGA :	Opening on July 24th
ARUSHA :	Currently receiving equipment
DAR ES SALAM :	Currently setting up equipment

Five rice mills are operational : two in the MWANZA region, two in the SHINYANGA zone and one in TABORA.

Most of the other equipments have a low rate of use of installed capacity :

- ♦ Milling in rural areas is carried out by Small Scale Industries (SSI) and households. It applies to maize, in competition with NMC and to millet and sorghum, for almost the whole production is used for self consumption and women's small trade. This sector receives confirmed and efficient aids of SIDO which noticeable example should be reminded and developed. This was acknowledged by UNDP, who is envisaging to give financial support to SSIs and to village women organizations.

- ♦ The efforts made by the Government to distribute red sorghum varieties, and specially the Serena variety, aim at intensifying this grain production in zones where rain level is between 500 and 800 mm. The Government wants, among other things, to encourage a 15 % substitution of maize flour by sorghum flour, hoping that surplus will be used by cattled feed industries.

Due to the high tannin content (0.65 %) of this variety the milling process must be adapted (introduction of dehulling) to improve palatalibility of flours extracted from this variety, and to allow its use in poultry feed.

The manual processing of this sorghum variety requises much more work than for other cereals.

- ♦ In the present bad condition of the road network, which improvement will take time, in spite of the measures taken by W.B. and taking into account the erratic price fluctuations in the present experimentation phase, apparently maize milling close to supply, to consumption regional centres and to local transportation is possible.

Consequently it was worthwhile identifying a project which could be reproduced in various areas of the country to meet local populations needs through semi-industrial production of mix flour.

The consultant identified required equipment to process sorghum as well as maize and studied profitability of a medium scale project. Such a project can be reproduced and benefit to other areas of the country integration market evolution.

3.2. CAPACITY, PLANT LOCATION, PROJECT ENGINEERING

3.2.1. Capacity

The identified pilot project could operate at potential two levels of production with maize flour only as well as with mix flour. The production capacity is estimated at 2 to 3 000 T/year for the basic option, at 5 000 T/year for the double option.

3.2.2. Pilot project location

The project location has to be set up close to maize and sorghum production locations and where surpluses are available.

The project should be located at the border of millet and sorghum area since maize production location is spread out all over the country.

3.2.3. Technology

For maize, process is a classical one, meanwhile since flour acceptability (Sembé) should only satisfy food requirement, it is not necessary to desprout grain before milling. Partial sprout separation will be done during sieving, when sprouts will go with bran, detached by abrasion, through the scourer, before milling.

For sorghum processing, a dehulling equipment must be added.

Total investment costs varies if there is sorghum dehulling or not :

. Option "Basic"	.. with maize only	US\$ 140.000
	.. with sorghum dehulling	US\$ 176.000
. Option "Double"	.. with maize only	US\$ 202.000
	.. with sorghum dehulling	US\$ 238.000

3.3. FINANCIAL, ECONOMIC ANALYSIS and CONCLUSIONS

♦ The prefeasibility study has been achieved on following hypothesis :

- Option "Basic" : sorghum will be the only processed raw material (excluding maize), in order to test this new production interest
- Option "Double" sorghum will be mixed with maize according to the following proportioning (sorghum 40 % and maize 60 %).

It has been considered that the project will be financed with the following breakdown : 40 % financed by equity and 60 % by foreign loan with 12 % interest rate, 8 years of repayment period and 1 year of grace period.

♦ The internal rate of return measures the financial interest of the project

Profitability of the project is sustainable with the higher level of production (5 000 T/year). With maize flour production, the IRR totals 22 % which is quite satisfactory based on a 11 years period.

With mix flour production, the IRR remains insufficient (6 %) unless sorghum flour price tends to be similar to maize flour price, in this case the IRR totals 14 %.

♦ The pay back period for option "double" with maize is less than 5 years.

♦ To complete this project evaluation, some economic considerations deserve to be mentioned.

- the project will supply the villages with sorghum and maize flour which is valuable with wheat or other cereals shortage,
- the project which can be reproduced can benefit to other areas of the region in integrating market evolution,
- the project enables to keep the local population in villages instead of moving to urban area,
- the project as a medium scale project is more adapted to local conditions and does not require high investments.

4 - SUGAR SECTOR

4.1. PROJECT BACKGROUND

Among recommendations suggested to the PTA Authorities, after the project identification study performed within KENYA and ZAMBIA, the proposed Nakambala project (Zambia) was selected by PTA Authorities.

The rehabilitation/expansion project of Nakambala is sponsored by the Zambia Sugar Company Limited (ZSC), company existing since 1964 and the only producer of centrifugal Sugar in Zambia.

ZDC is controlled by INDECO (78 % of share capital) Booker-Tate PLC (11 %) overseas shareholders (2 %) and local investors (9 %). Booker-Tate runs the estate and the refinery Nakambala estate, produced in 1990, 124 600 tons of sugar. This factory has a nominal level of 160 000 tons but due to shortage of foreign exchange in the last 80's serious deterioration led to a decline of sugar production.

The Zambia Sugar Company has a need to expand its sugar production to meet the growing demand of the local consumption and to explore the opportunities of facilitating sugar sales to PTA and neighbouring countries.

Two possibilities were considered :

- . The expansion in sugar production at Nakambala Estate,
- . The development of a second sugar estate

But it appeared that - due to the present equipment in Nakambala - it was economically quite clear that the investment per tonne of sugar would be much lower in Nakambala = one fifth to one fourth per tonne of sugar compared with a new estate.

4.2. MARKET SURVEY

4.2.1. Local consumption

According to available statistical information local consumption stands in the range of 100 to 120.000 Tons/years. i.e. an annual average consumption per capita of about 16 kg/capita. Then consumption is slightly above average for Africa (14,1 kg in 1988) but lower than Zimbabwe, a neighbouring state 29,7 kg and than Kenya with 19,3 kg and much higher than other neighbouring states as Burundi 3 kg, Tanzania 5,9 kg, Zaïre 3,7 kg.

It appears that the per capita consumption has been falling since 1981 due to the decline of real incomes.

Most of the local demand is for white sugar, the great majority being for household consumption.

To forecast future consumption, two hypothesis were selected (extension of growth rate recorded over last ten years, i.e. 2,5 %, or a consumption growth at 3,5 % par annum) and gave the following estimations :

(tons)	Hypothesis 1	Hypothesis 2
1995	131 000	139 000
2000	148 000	165 000
2010	190 000	233 000

4.2.2. Subregional Market

During last decade exports of sugar from Zambia have widely fluctuated. All exports have been to neighbouring countries namely to Burundi, Rwanda, Tanzania, Zaïre.

Due to its geographical position, and to the competitive freight rates, if Zambia is to secure a steady and permanent foothold in such markets, in the context of the promotion on intra-PTA trade, it appears that it could aim at supplying at least one-half of the requirements and thus provide, during the 1990's, for some 30 000 to 35 000 tonnes over and above its own estimated local consumption requirements.

Molasses are used for animal feed purposes locally and are also exported to Zimbabwe and to Europe.

The additional volume of 15 000 tonnes linked to the forecast sugar production growth could find its way into a more developed livestock sub-sector and into a local distillery in substitution of imported alcohol for blending, but the major part of it would be available for exports, thus earning foreign exchange for the country.

4.3. CAPACITY, LOCATION and TECHNOLOGY

4.3.1. Capacity

Considering forecasts of future sugar demand, and the technical options studied by Booker-Tate current managing staff, the option of a rehabilitation associated with a cost effective increase in factory capacity to reach a secure production level of 170 000 T of commercial sugar par annum, was considered as the most viable. The prefeasibility study has been achieved on this basis.

4.3.2. Location of the project

The Nakambala Estate and Sugar Factory are located between the Kafue river and the main Railway/Road at Mazabuka, in the Southern Province of the Republic of Zambia.

It is located at a road distance of 128 km to the South West of Lusaka and is 352 km North-East of Livingstone.

4.3.3. Technology

The estate operates with a classical technology for the production of cane sugar, with however the following process "SUCRO BLANCO DIRECTO" and Talodura which enable to increase yields and direct production of quality white sugar.

The appraisal mission and data collected from ZSC enabled to identify the main items in the development and rehabilitation program and then estimate the investment costs, here below presented :

. Fixed investment cost for the Estate	20.964.000 US\$
. Fixed investment cost for the farmers	5.310.000 US\$
. Increase in working capital	3.000.000 US\$

Therefore capital costs total is about 57.000.000 US\$

4.4. FINANCIAL, ECONOMIC ANALYSIS and CONCLUSIONS

According to ZSC estimates, it was assumed that the project should be financed by equity for 20 % and by foreign loans for 80 %.

Foreign loans could be contracted with large European financing agencies such as CDC the British lending agency or KFW the German one which have shown some interest in financing this project.

Following assumptions on loan conditions were made :

- . Interest rate : 10 %
- . Repayment periode : 10
- . Grace period : 2

Financial conclusions

As this project is an expansion project, the incremental internal rate of return takes account of incremental profits resulting from incremental production of the expansion project based on new investments.

In this case, the internal rate of return is of 15.3 %.

Pay back period is estimated to 7 years.

Economic aspects

To complete the project evaluation, some economic considerations deserve to be noted.

At the national level

- the project will enable to sustain employment level : more than 7 000 employees,
- the project will enable to meet the country's demand in sugar consumption,

- the project will facilitate Zambia involvement in the intra-PTA trade through sugar trade for 25 000 to 35 000 tonnes exported.

At the local level (for ZSC)

- the rehabilitation of the factory equipment will lead to a better use of existing equipments therefore a better profitability.
- export sales to neighbouring countries will enable to repay foreign loans annuities (see table 5.10).
- increase in cane production will lead to a surplus of bagasse which will not be burnt. Consequently, this volume could be eventually sold to farmers for animal feed production (bagasse-molasses mix) or used for craft paper production. One project was identified to produce 6 000 T/y of craft paper from bagasse pulp (about 30 000 T/y).

5 - PULP AND PAPER SECTOR

5.1. GENERAL OVERVIEW

According to the terms of reference of present study Pulp and Paper sector study would be a survey leading to a diagnostic on ongoing projects.

According to preliminary study two countries had to be visited Kenya and Zimbabwe, but as the consultant had the opportunity to get detailed information on a specific pulp project in Zambia. INTER G considered interesting to diagnostic also this project.

5.2. KENYA

Paper consumed in Kenya amounts to 135 000 T/year, with a national production capacity of 105 000 T/year. Imports amount to 30 000 T and exports are low. Imports and exports to and from countries of the PTA only represent a very small percentage of the national market.

Consumption forecasts give figures of 200 000 T/year in 1995 and figures greater than 300 000 T for the year 2000.

Fibrous raw materials that can be used to produce paper and board include a limited quantity of wood and abundant amounts of bagasse and straw. Cotton waste and waste paper are also available. These materials could allow the production of more than 500 000 T/year if they were entirely collected.

The survey showed that there are six mills in Kenya producing paper and board, and a few very small plants carrying out transformation. The following are the six main mills :

. Panafrican Paper Mill	: 70 000 t/year using wood
. Madhupaper Kenya Limited	: 11 000 t/year from waste paper
. Kenya Paper Mill	: 6 000 t/year from waste paper
. Kenya Matches Co	: 6 000 t/year from waste paper
. Chandaria Industries Ltd	: 4 000 t/year from waste paper
. Highland Paper Mill	: 3 000 t/year from waste paper and straw

Extension projects exist for all these paper mills, leading to a possible total production of 200 000 T/year in 1995, equal to consumption forecasts. A new paper company, Dino Industries, could be added very shortly to the list of paper producers.

The major projects are those of the Panafrican Paper Mill and the Kenya Paper Mill, intended for new pulp production processes and machines of fairly high capacity.

Excepting the two smallest mills, one can say that the projects are in the hands of persons possessing sufficient financial and technical facilities to achieve their targets. Difficulties however exist and recommendations are made.

5.3. ZIMBABWE

Paper and board consumption is around 80 000 T/year, equal to local production, imports and exports were in balance in 1987, amounting to about 10 % of consumption. Imports from the PTA are about 5 %, with low exports.

Consumption forecasts for the year 2000 reach 200 000 T/year.

To increase production, Zimbabwe possesses a few tree plantations, providing a potential paper production of more than 100 000 T/year. Adding the available bagasse, straw and cotton, the potential may vary from 400 to 800 000 T/year depending on the products, on condition of solving the problem of gathering.

There are three production mills :

- Hunyani Pulp and Paper : 47 000 T/year of bleached and unbleached paper made from wood and waste paper.
- Mutare Board and Paper Mill Ltd : 32 000 T/year of newsprint and paper board made from wood and waste paper.
- Kadoma Tissue Mill : 4 500 T/year of tissue paper made from waste paper.

Projects for extensions exist for all these mills, to which should be added a major project for the production of chemical pulp and paper by a new company - the Zimbabwe Pulp and Paper Mill Limited.

Total production of all these mills could reach 200 000 T/y equal to total consumption of the whole country expected for the year 2000.

The most important project is that put forward by the Zimbabwe Pulp Paper Limited : the final decision depends on the Government and on the results of discussions undertaken with foreign groups. A national consensus exists on the subject of the advantages and the urgency of producing unbleached pulp. There are a few differences of opinion on the subject of bleached pulp.

Other projects are put forward by Mutare Board and Paper Mill, Hunyani Mill, Kadoma Mill.

One can be reasonably optimistic on the implementation of these projects that are coordinated on the national scale and are adapted to the domestic market.

We make a few recommendations on technical assistance, training, production of pulp from cotton, the price of newsprint and afforestation.

5.4. ZAMBIA

Little data were obtained on the development of the paper industry in Zambia during a short stay in Lusaka. This country wasn't selected for a detailed investigation.

Paper consumption reached 33 000 T in 1981 but has significantly diminished because of the severe restrictions on imports due to economic conditions.

It is difficult to make forecast of consumption trends during coming years, and one can only hope that consumption will return to more than 33 000 T, a figure that might grow gradually to 50 000 T.

There is only one paper mill at present in Zambia, the Zambezi Paper Mill Ltd, that uses waste paper and imported pulp with a production capacity of more than 10 000 T/year.

Zambia however is able to call on a little wood, bagasse and straw production could be increased. Two projects have been listed, an extension of the Zambezi Paper Mill increasing production from 15 to 30 000 T of CTMP pulp mainly intended for newsprint, and the Country Wide Agro Industries project to produce 6 000 T/year of paper from bagasse pulp. An expert on the production of pulp from bagasse would be a great help to this latter project.

5.5. PRINCIPAL RECOMMENDATIONS

Technical assistance :

Kenya : A mission conducted by an expert specialized in high-yield bagasse pulp, to study the Chandaria Group's project and to advise the Kenya Matches Co.

Zimbabwe : A mission of an expert in pulp technology (neutral sulphite, CTMP) and paper machines to assist the Hunyani and Mutare companies.

Zambia : A mission of an expert specialized in high-yield bagasse pulp to study the Country Wide Agro Industries project.

Training :

Kenya : An employee of the Highland Paper Mill could be trained at the Zimbabwe paper institute.

Zimbabwe : Two teachers could be sent to give training at the National Paper Institute, one to give courses on modern pulp and paper technology, and the other to give courses on paper chemistry.

Financial partners searching :

Kenya : Dino Industries (1 250 T/Y of paper out of cotton) needs help to find a financial partner.

Zambia : Country wide agro industries (6 000 T/Y of paper out of bagasse pulp) needs also help to find a financial partner.

6. SYNTHESIS

6.1. ANIMAL FEEDS SECTOR

During the preliminary investigation on PTA animal foodstuff sector, it was noted that there were weaknesses in this industry :

- low importation of premixes and vitamins and therefore inadequate quantities were available for livestock ;
- some countries export animal feeds at the expense of local needs ;
- low farmer purchase power limits livestock feeding with high protein compoundfeed ;
- in most cases feeds for poultry, pig and fisheries were severely limited ;
- a high competition between animal feed and human food ;
- the lack of available raw materials.

Currently animal feeds industries face severe problems regarding raw material supply and an important part of imported feed supplements come from non PTA countries. However they account for very limited quantities.

Information on PTA animal foodstuff trade is very limited. This trade concerns :

- importations of premixes and vitamins, limited quantities, but with high value ;

- importation and exportation of cakes.

Intra PTA Trade is evaluated to 150.000 tonnes of which 130.000 tonnes of cakes and molasse exportations. Part of these exportations do not indicate a surplus of available raw material but is more likely to reflect the country's need for foreign exchange.

PTA compounds market is developing slowly because of the lack of raw materials, but also of the low purchase power level. There is however, in PTA countries, a market to limit feeds components imports and develop, domestically, processing of animal feeds by products into protein supplements.

It is worth stressing that cereal sub-products (bran, straw, ...) account for 50 to 70 % of animal feedstuff weight according to quality product and its final purpose. Those sub-products with a low added value cannot be charged with high transport costs (distance, weight). In consequence, intra PTA animal foodstuff trade development will essentially concern raw material as premixes, vitamins, meal cakes.

Four countries have been selected for a further investigation : Burundi, Ethiopia, Kenya and Tanzania. Production capacities in these countries have potential for exports within the PTA subregion.

It is relevant that current animal feed industry is seriously constrained by the lack of raw materials in all these countries. As the actual number of basic materials available are few flexibility in ration formulation is restricted, and many mills attempt to accommodate the lack of standard ingredients and produce feeds of widely different nutritional value. This problem is compounded by an often shallow knowledge of even the basic principles of applied animal nutrition.

In all these countries promotion of alternative sources of energy as sorghum cassava, vegetable waste, or protein crops as lupin, soya, sunflower is necessary.

Animal feed production is generally secured by large mills, most often operated at a very low percentage of installed activity. However an increasing number of animal producers from small-to-large capacity are beginning to produce their own feed. There are few sources of information on such producers and often the rations are formulated on trial and error basis dependent on material available. Large mills have more professional guidance on formulation and finished goods testing.

The survey showed up that some countries can also undertake the production of proteins as fish meal, offal hair and feathers processing, meat and bone meal ...

Due to the fact that these products have a high added value, their exportation is not so much hampered by transport cost than finished products which include a large part of cereal sub-products. So the development of protein sources in PTA countries will benefit to the whole PTA region. Opportunities for such investments exist in Kenya and Tanzania and have been recommended in the identification study.

Hereafter, we will present briefly main characteristics of animal food sector in the four countries visited.

Burundi

In 1990, stockfeed production was 7.000 tonnes which represented 20 % of potential demand. Production is limited by irregularity in supply of raw materials.

Current production is produced by ALCOVIT with a total installed capacity of 50 T/day but operated at 30 % of installed capacity and ten micro-scale units, also in overcapacity.

Recommendations have been proposed in order to improve the production unit operation and to cut down when possible production costs.

Ethiopia

Demand for animal feed in 1988 was estimated at 45.000 tonnes whilst production was 28.000 tonnes and production capacity was 77.280 tonnes/year. Several plants are planned for development in the future, but animal feed processing suffers from shortages of raw material, and in spite of it Ethiopia exported stockfeed raw material (cakes and molasse). Moreover there is a hard competition with humanfood requirements.

Recommendations made are :

- improve quality control and develop their own formulation ;
- develop local production of premixes and vitamins for which raw material are already available ;
- examine the possibility to develop use of ruminant blocks.

Kenya

Kenya's feed production is estimated at 280.000 tonnes in 1987 and requirements are forecast to double in the year 2000. Total milling capacity is evaluated at 1.200 t/day.

Manufacturing potential is well developed and of sufficient capacity.

But animal feed industry is seriously constrained by the lack of raw materials. Only larger mills enjoy sufficiency as they are also grain millers.

Recommendations made are :

- to encourage alternative sources of energy as cassava and sorghum or vegetable waste, ...
- to undertake production of additional fish meal ;
- processing of offal ;
- feather and hair processing ;
- use of brewers's yeast.

Tanzania

Tanzanian animal food market is grossly undersupplied as demand is estimated to be some 200.000 tonnes while production reaches 70.000 t/year. There is high underutilization of existing equipments and production is not always according to national standards. Poor transport and storage facilities affect utilisation of available raw material.

Main recommendations are :

- rehabilitation of TAFCO mills ;
- production of di-calcium sulphate ;
- production of fish meal ;
- utilisation of soya bean.

6.2. EDIBLE OIL SECTOR

The survey of PTA Edible Oil sector took place in an international context where competition is very hard, and in a regional context where demand in edible oil is not supplied by local or regional productions.

A study on african oils processors highlighted that, due to the pressure born on palm oil products by south east asiatics countries, african industries had better to center their activities on internal markets. Moreover, to be profitable, oil plants have to be multipurpose plants. Indeed due to erratic climatic conditions, crops can suffer strong decrease of production, then oil processors cannot base their production forecast on a single king of seed.

A preliminary examination of the situation in the PTA subregion indicated that there was a real need for increased production of oil crops by all member states in order to meet national and regional edible demand which is depressed due to insufficient production of raw material and then underutilization of existing capacity. Due to lack of currencies some countries had to limit, through government regulations imports.

PTA edible oil average consumption per capita is rather low and stands between 1 and 8 Kg/capita/year, this ratio including manual productions. PTA main oil processors, and with the highest consumption ratio are Kenya and Zimbabwe. Kenya still remains a net importer and Zimbabwe had to limit and even stop oil imports. A large number of PTA countries have a per capita consumption inferior to 2 Kg/capita/year.

PTA imports concern seeds and non refined or refined oil. Raw material imports are not very important. They are generally on occasional basis : occasional imports to face with severe raw materials shortages and then edible oil shortages.

Edible oil importations represent a trade relatively more important : in 1988 PTA subregion imported about 220.000 T of edible oil, 80 % of it being palm oil.

Intra PTA Trade has been evaluated thanks to statistics available at PTA headquarters : edible oil trade is in the range of 15.000 to 20.000 tonnes per year which represents about 10 % of total oil imports. Raw material trade exists but is very limited and on occasional basis.

Then it appears that there are great opportunities to develop oil industries in PTA, more specially as consumption is still very low in most of the countries, but this means an improvement in raw material crop production.

The selected countries for indepth analysis were Malawi, Tanzania, Uganda and Zimbabwe. A summary of the findings and recommendations is given below.

Malawi

Malawi current consumption in 1990 was 10.000 tonnes i.e. 1 Kg/capita/year and is forecasted to increase to around 16.000 tonnes by the year 2000.

Malawi has very little arable land and therefore can only increase yields. Total installed crushing capacity is 45.000 T/year while refining capacity is 16.000 T/year. Three major mills make the oil production, but there main constraint is the inadequate supply of raw materials.

The major recommendations was to increase raw material production by developing higher yielding varieties and invest in agronomical research.

Tanzania :

Local production does not satisfy demand. In 1986 production was 16.000 i.e. 1.5 Kg per capita per year whilst demand was 44.000 tonnes. Edible production is dominated by cotton seed and sunflower seed. Because of present bottlenecks in the processing industry, imports (soya bean and palm oil) increased during the 1980s. Demand forecasted for the year 2000 is estimated at 86.000 T.

Total installed capacity is estimated at 291.300 T/year but with a very low operating capacity : 30 %. Equipment is old and yields are low, most plants produce products which do not correspond to international standards. Only two mills have a solvent extraction plant, and four refineries a complete refining process. A lot of equipment is out of order.

Moreover oil industries are heavily hampered by the lack of raw materials, and frequent power failure.

It was recommended :

- to improve pricing mechanisms to impulse raw materials production,
- to popularize better farming and cropping methods,
- to rehabilitate crushing capacity.

Uganda :

Current edible oil demand is ranged from 14.000 Tonnes to 44.000 Tonnes (no recent statistics are available) with a per capita consumption of 1 Kg/capita/year (equivalent to 16.000 T). Demand is not expected to increase quickly because average income has fallen.

Prior to 1972, Uganda was an important oil exporter (60.000 T/year). To day main crops (groundnuts, soya bean, sesame seed) are very limited.

Edible oil industry faces three main constraints :

- lack of raw material,
- lack of suitable packaging material,
- shortage of hard currency and then maintenance and rehabilitation problems (80 oil mills were licensed in 1989 and 15 were operational).

Following recommendations were made :

- Promotion of raw material production, especially palm oil, Uganda has the capacity to supply some PTA member states.
- Rehabilitation of packaging sector.
- Training of manpower.
- Open lines of credit to the industry.

Zimbabwe :

The production of edible oil reached 56.000 T in 1988 from maize, soya beans, groundnuts, cotton, sunflower. Demand being limited by regulations, this production met the national needs. It is estimated that real demand was about 69.000 T in 1989 and is forecasted to reach 99.000 T in year 2000.

Cotton Marketing Board and Grain Marketing Board are responsible for selling raw material to millers. These last years, shortages were due to droughts.

Edible oil industry is made up of four oil expressors, the refining capacity is 60.000 T per year and crushing capacity 340.000 T.

Shortages of foreign currencies hamper the rehabilitation of out dated equipment, and additional refining capacities implementation.

Zimbabwe having a strong raw material potential it was recommended to install a multipurpose oil processing plant of 88.000 T/year.

Such a project would allow to meet the country demand but it would also develop intra PTA Trade, low quantities of edible oil, but 40.000 T/y of meals.

It is important to recall that due to the lack of raw material all PTA countries are coping with, it is not possible to contemplate in a short term a very large project essentially destined to exportation. First priority is to meet national demand.

Zimbabwe is in a short term the country which has the highest raw material potentialities and the best economical environment and that neighbouring countries import large quantities of edible oil.

6.3. GRAIN MILLING SECTOR

A preliminary investigation on PTA grain milling sector showed up that in PTA countries maize is a traditional staplefood. In 1988, PTA cereals consumption (wheat, maize, sorghum, millet) was of about 21 millions of tons i.e. 11,3 Kg per capita. Maize represents roughly 65 % of these cereals, wheat and sorghum respectively 15 %.

In 1988, 10 % of total cereals consumed, i.e. 2.1 millions of tons, were imported. On the basis of available statistics at PTA headquarters it was evaluated that intra PTA Trade stands between 250.000 and 400.000 tonnes. Although the available statistics were still incomplete, it stresses on the fact that a large part from the imports come from non PTA countries. If we consider PTA countries it appears that Kenya and Zimbabwe are the main providers and that main importers are in the PTA northern region Ethiopia and Somalia, and in the PTA southern part Mozambique and Swaziland.

Ethiopia, Somalia and Mozambique are the countries where goods scarcity is the most important.

Based on these preliminary findings studies were conducted in Kenya, Tanzania and Zimbabwe : the two main providers and a country with high potential.

In these three countries, sorghum, millet and cassava were found to be, besides maize crops, increasingly important industrial crops : governments have promoted these crops in order to widen the available food crops, decrease dependency on conventional cereals such as maize and wheat, reduce volumes of imported cereals and develop intra PTA exportations in order to comply with self sufficiency objective which is at the top of PTA priorities.

The studies conducted in each one of these countries lead to schematize current situations in two large categories :

- countries which already have large cereals crops and are or can become in a short term self sufficient and increase their exportations towards other PTA members. Beyond the incentive measures authorities have taken to help to cereals crop development, authorities and industrials are looking for developing new finished products incorporating a relatively high percentage of a secondary cereal or raw material as millet, sorghum, cassava, ... For example bread from wheat flour blended with cassava meal, production of composite flour from wheat and millet or sorghum, new valorisations of sorghum products (precooked flour, refined brown sorghum meals, ...). But at the moment the lack of public information (to overcome negative attitude from middle income citizens) and the complexity of these new processes make very difficult to get profitability for these new products.
- countries which are quite far from self sufficiency and industries of which are hampered by a rather difficult economical environment.

For these countries, first objecti' is a better valorization of current crops thanks to rehabilitation of existing mills storage and transportation facilities, but also by implementing small or medium scale mills located close to production and consumption areas.

Due to the fact that several PTA countries were in this position consultant proposed PTA Authorities to identify a project which could be reproduced in various PTA regions. In order to propose a profitable investment, it has been required that these small scale mills could operate different kind of grain and produce mix flour.

A prefeasibility study has been prepared on this basis.

Here after, are briefly presented main characteristics of grain milling sector in the three visited countries and the recommendations made.

Kenya :

In 1989, Kenya produced around 3 millions tonnes of cereals of which 2,5 millions are maize. Current processed grain consumption is 150 Kg par capita/year and is forecasted to rise by 10 % per year up to year 2000. Even if maize has the highest demand, wheat is the second most important food grain and due to the high growth in urban demand, the country now imports up to 45 % of its domestic demand and is expected to increase to 57 % by the year 2000. Kenya's grain processing industry is dominated by the National Cereals and Produce Board which has large storage facilities (1,3 million T) and markets cereals to private mills.

Grain processing is the single most important food processing activity in Kenya and has given rise to a well developed and closely integrated network of food processing activities.

Consultant has made following recommendations :

- Kenya requires to use better varieties of sorghum to produce composite flour with wheat and thus reduce importations.
- A wider range of products for exports to the subregion has to be tried using sorghum or other complementary cereals.

Tanzania :

Average cereals tonnage produced in 1988 was of 3,4 millions of tonnes, maize representing 70 %. The vast majority of Tanzania's grain is consumed in the rural areas, a very small percentage is commercialized. Current consumption is estimated to 100 Kg per capita, per year.

Imports are made to meet the demand 130.000 T in 1987.

The nation wide marketing authority is the National Milling Corporation main purchaser and processor of grains.

Tanzanian milling industry is suffering from :

- difficult access to raw material at financially viable prices,
- poor storage and transportation facilities,
- capitalisation and maintenance problems.

Following recommendations were made :

- four new flour mills should be financed,
- rehabilitate and expand storage facilities,
- develop composite flour using millet and sorghum for blending with wheat.

Zimbabwe :

Zimbabwe's cereal production rose to 2,3 millions tonnes in 1988/89 of which 2 millions of maize. Demand was met for maize but for wheat about 50.000 tonnes were missing.

Although maize is the basic food, wheat consumption increases as bread has become a common ingredient for urban diets. Projected demand year 2000 for maize would be 3,1 millions tonnes and 670.000 tonnes for wheat. Projected production would not meet these targets. On another hand it has been shown up that forecasted sorghum production was superior to demand.

In Zimbabwe grain milling is in private companies' hand. Current processing capacity is of 1.500.000 T/y.

Following recommendations were made :

- Zimbabwe should reduce imports of wheat by using composite flour based on sorghum or millet.
- Develop research in order to improve red sorghum variety.

6.4. SUGAR SECTOR

The survey of african sugar industry shows up that to-day only some countries can produce sugar at a competitive level.

International competition is so strong that about half of sugar plants are working under their capacity by lack of maintenance of processing and transport equipments, or by lack of competitive raw materials (cane production costs).

PTA offers the particular characteristic of assembling countries which are large producers and exporters of sugar and countries totally or partially dependent on sugar importations to satisfy their national needs.

Thus it is reported by the ISO that in 1988 for instance, PTA countries exported 1,4 MT mostly to EEC countries (Mauricius, Zwaziland and Zimbabwe representing 1,25 MT).

It is important to stress that if these three countries are the main exporters, they are also the main producers.

In 1988/89, their production represented 56 % of PTA sugar production. This intensive production enable these countries to market competitive products on local and foreign markets. These industries have reached a high degree of vertical integration, and automatization to get the best production costs.

PTA main importers are Angola, Bostwana, Tanzania, Mozambia, Burundi. Kenya has imported large quantities these last years, but there are occasional importations due to specific conditions. Owing to PTA present and future trade

regulations, and to the existence of a Clearing House PTA sugar importers should import from PTA sugar producers if these ones are enough competitive. In other respects, the existence of a large regional market will help PTA sugar industries to improve their production costs.

Intra PTA Trade in sugar is, at least to the extent that reports have been received at PTA Headquarters in the range of 100-125.000 tonnes of sugar. This trade is estimated to represent 20 à 30 % of the total area importations. Then PTA sugar industry has to improve its efficiency to win and keep this market.

The identification study led to examine existing sugar industry activities in both Kenya and Zambia :

Kenya :

Kenya is a country which has a large sugar production but which could not maintain self sufficiency in sugar.

Production of sugar was some 438.000 tonnes in 1988 while total consumption was of 460.000 tonnes.

Kenya's sugar industry comprise five large scale plants which have suffered deterioration in productivity by lack of maintenance in process or transportation equipment, but also by important problems in distribution of sugar through the country.

Each one of these large scale plants has planned rehabilitation and eventually expansion.

Kenya's sugar industry is to implement all planned rehabilitation and expansion projects, but socio-economic and financial environment (regulations ...) are still very coercitive. As soon as Kenya's sugar industry will recover from the present situation this country will be able to export sugar to PTA Northern importers as Burundi, Rwanda, Uganda, ...

Zambia :

Zambian sugar production was of about 124.000 tonnes in 1990. Zambia is used to export to PTA members surplus sugar with amounts varying between 5.000 to 37.000 tonnes per year. Because of the current low efficiency, exports were quite weak these last years.

Due to the old age of the equipment at the Nakambala factory production decreases every year. So Authorities contemplated rehabilitation and expansion of the unit to increase annual production from 130.000 to 190.000 tonnes. In addition to the fact that this project will enable to satisfy projected local sugar demand, it would also allow to develop sugar exportations and downstream industries (pulp and paper industry from bagasse for example) still non existent in Zambia.

Nakambala project was selected by PTA Authorities for the preferenceability study.

This project, will generate an intra PTA sugar trade of 25 to 35.000 tonnes with competitive prices more especially as Zambia neighbouring importers are land - locked countries and that they are very hampered by transportation costs.

Through the Clearing House, the importers will be able to avoid to withdraw hard currencies.

Total PTA sugar importations are estimated to represent 500.000 to 600.000 tonnes, of which only 120 to 125.000 tonnes are to-day imported from PTA members. Existant PTA sugar industries have to recover this important market getting more competitive prices.

6.5. PULP AND PAPER INDUSTRY

A real paper industry exists in those countries that are young and are in full growth. Although the technicians of this industry have been isolated from the great international meetings on the subject and from news of the paper industry, and in spite of the age of a great part of the equipment installed, the mill managers give proof of vitality and of dynamism.

We can assume that Kenya and Zimbabwe will be able to supply their own needs from their own resources until a data that we can approximately set at the year 2020. Thereafter, problems will arise in the supply of fibers although it will always be possible to plant fiber-producing species such as kenaf for annual crops, or trees for long-term afforestation.

One may assume that, until the year 2020, the paper industry will be able to make progress on the national scale. As we have seen above, mill extensions will not depend essentially on imports or customs tariffs. Beyond the year 2020, the problem will change completely and it would be more reasonable to plan for regions of great paper production in those areas most favourable to afforestation, with mills following the model of the present USUTU mill that targets exports.

The authorities of the PTA should study regions propitious to afforestation, perhaps through the Pulp and Paper Workshop, selecting two or three potential sites suited to the production of pulp. Work of planting should start in about the year 2000 with major afforestation projects designed to provide volumes annually of 1 to 2 million cubic meters of wood, with preferably a proportion of 2/3 softwood and 1/3 hardwood.

The selection of wood as raw material in preference to annual plants, is justified by the fact that the technology employed is presently centered on 90 % wood. The other resources represent secondary solutions that should only be adopted when there are no other sources of fibers. The long resinous fibers moreover represent an essential contribution in the production of nearly all papers, other types or fibers being often considered as additional.

With regard to the short term, the projects should be allowed to develop within the country in agreement with the plans made by the existing companies. Any aid would be essentially technical assistance and assistance in training.