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PRE - INVESTMENT STUDY

FOR

THE PROPOSED KAKAMEGA

FRUITS AND VEGETABLES

PROJECT

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T A B L E O F C O N T E N T S

KAKAMEGA FRUITS AND VEGETABLE PROJECT

EXECUTIVE SUMMARY

Kakamega Fruits and Vegetables (Factory) Project will be located in Western Province, Kakamega District. The proposed Factory site is in Kakamega Town.

Initially the project was intended to be a Fruit Canning Factory (processing Tomatoes, Pawpaw, Pineapple, Passion, Banana) but through our in-depth study, the project has changed drastically to a Fruit and Vegetables Processing Factory. The project location and Factory site have not changed.

Kenya Government policies on Rural Industrialization and Agricultural policies for rural areas have been key in our study besides the general economic policies of the Government. These have been largely covered in Chapters one and two of our main report. Nevertheless, the project's objective is to process and sell mainly to the Export market, products made from Tomatoes, Passion Fruits, French Beans, Peas. The project will also buy various traditional vegetables from the local farmers during the periods when there is glut production. It will preserve these through Freezing and re-sell them to the local market when there are shortages of these vegetables especially during the dry season.

The promoters of the project are Messrs Frost Enterprises Limited of Box 14253 Nairobi, a local private company. They intend to have 1000 acres of Nucleus Farm. This will be supplemented by produce from booster nucleus farm and outgrowers comprising of small scale farmers in Kakamega District. If it should be necessary, they may import the basic raw materials from the neighbouring districts as well as from Uganda. This study has spanned a period of twelve months, having been financed by both Messrs Frost Enterprises Ltd and UNIDO Vienna. It has received support from the Ministry of Commerce and Industry in terms of initial discussion of the concept paper.

After careful analysis, the Kakamega Fruit and Vegetables Project is an **Export** based project with EC market being the target. It is because of the requirements by this market that our products quality, specification and prices have been determined. It needs to be mentioned that our emphasis on exporting **preserved organically** grown and processed products reflects our thorough study of the EC market especially with reference to products from developing countries. To achieve the intended export sales of 70%, we have recommended that a **Foreign Partner** and an expatriate **Marketing Personnel** must be found to achieve our export market objectives. The export market share of specific products are detailed in Chapter 4.1 of the main report.

The basic raw materials will be passion fruits, tomatoes, french beans, peas, which will be grown in the project area ie. Kakamega District. There will be the nucleus Farm and its boosters besides the outgrowers. In the study, we have stressed that as these crops are not currently being grown in the project area especially on commercial scale, they will have to be introduced to the outgrowers or small scale farmers through a carefully designed Agricultural Education Programme. It is for this reason we have advocated for specific investment into the training. Besides, we do not expect to get any supplies from the outgrowers till after two years after launching the farmers education program. In the initial operation of the factory, the project will depend on its nucleus farm and institutional farms at Shikusa, Bukura, Kakamega Prison and Kakamega Research Station's farm. This is because it will be easier to control and manage the farming at these places than at the outgrowers. We have also recommended making available transport of the produce from the farmers to be collected from specific strategic collection points which the project will also assist in establishing through encouraging formation of a Co-operative for the outgrowers. Our average bill for these Basic materials is US$ 2,348,600

Other supplies include: packing materials, ingredients, labelling, tagging, utilities. Estimated annual requirements for these is US$ 271,000. In our classification, spare parts fall under Engineering and Technology section.

The Engineering design and Technology choice have been determined largely by the market choice. The market for our products is highly competitive and standards are high. As a result the potential suppliers of the Factory Machinery and Equipment are in Europe and not necessarily a single country. This is due to considerations of such factors as :- flexibility, interchangeability, efficiency, quality of products, availability of spare parts locally, adaptability especially in our local markets.

The main lines include:- processing equipment, filling machines, syrup preparation line, automatic extraction line, automatic extraction of tomatoes, homogenizer, steam boiler, air compressor, concentrating plant, seaming machines, and French beans canning. Total estimated cost of the machinery is US $ 547,697 inclusive of spare parts.

The Factory Building and Administration Building proposed will cost US $ 692315 inclusive of all civil works and installation of utilities and complete landscaping of the entire Plant Area. A provision has also been made for the septic tank for discharge of liquid waste and collection points of factory waste to cause the least environmental damage. All these are described in detail in chapter 5 of our main report. Further, it is possible to phase in the building of both the factory and Administration blocks but at future escalated costs.

Basic organisation suggested envisages:- project manager as overall person, the two critical departments are operations(Agriculture, Factory operation and laboratory) and sales and marketing. The Adminstration Section will provide the support needed. A total staff of 126 is expected to be ideal for optimal operation of the project. However, these will have to be hired at different periods leading to the start of production. An average wage bill of US $ 101,000 has been used in our cash-flow analysis. The only personnel who will require training will be the local marketing personnel who will be working with the expatriate marketing personnel. Other staff required are locally available. We have in chapter VI, given more details on the organisation and human resource.

Our study revealed a number of key factors regarding the project which impact the suggested implementation plan. Among these are:- that this project is not a small scale project as originally conceived. The reasons are that:

(a) the current farming culture in Western Province and Kakamega District will require to be changed in order to start producing the basic raw materials for use by the factory.

(b) while the local demand for horticultural produce cannot support profitable operation of such a fruit processing factory, the requirements by the export market require longer time preparations in order to come up with unique products that will make a breakthrough in the export market.

These two facts led us to come up with various suggestions on the approach to this project. It is imperative that the promoter secures the needed local funds by early 1994 and the foreign partner be identified and committed by mid 1994. This is because the capital outlay of the project is substantial and these negotiations have to be completed by mid 1994 if the factory operations is to start by 1996. Preparation of the outgrowers will require no less than two years of training and education. Tendering, construction, purchase of machinery and equipment ready to start production will require 2 years and hence our factory production will not take off until early 1996. The basic critical steps have been given in chapter 7 of our main report.

Arising from the data on our raw materials costs, Engineering and Technology, Marketing, Labour Costs and contingencies, we have prepared Financial Cashflow of the project indicating the following key information.

A. **Total Investment Costs:**	**US $ ('000)**
1. Land & Site Preparation	60.00
2. Design and Engineering	11.00
3. Buildings	693.00
4. Motor Vehicles	407.00

5.	Plant & Equipment	548.00
6.	Pre-production Expenses	232.00
7.	Contingencies	49.00
8.	Bank Overdraft	2613.00
		4613.00

B. **Financed as follows:**

1.	Equity	400.00
2.	Loans - Term loans	1600.00
	Overdraft	2613.00
	Total	4613.00

C. **Sources of Finance:**

1.	Equity - Local 60%	240.00
	Foreign 40%	160.00
		400.00
2.	Long Term Loans @ 40% p.a.	1600.00
3.	Bank Overdraft @ 30% p.a.	2613.00
	Total	4613.00

(Grace Period 2 years)

Also for our analysis we worked the following parameters:

(i)	Internal Rate of Return	37%
(ii)	Net Present Value	US$ 2167.2 (Over ten years)
(iii)	Pay Back period	7 YEARS

These were largely governed by our original cost of capital, assumed average cost of capital @ 35% rate of interest and the Net Cash Inflow. Our conclusions are nonetheless predicated on the viability of the project.

CHAPTER 1

KAKAMEGA FRUIT AND VEGETABLES PROJECT.

1.0 Introduction:

In 1992 Messrs Frost Enterprises Ltd, requested Mr. James Ngusi of Manpower Studies Institute for technical assistance in the preparation of a pre-investment study for a Fruit Canning Factory in Kakamega. The assistance was to include the following:-

a) preparation of a concept paper to be submitted to the Ministry of Industry in 1992.

b) presentation of the said paper and proposal as to how such study would advance to actual feasibility study state to be co-financed by the UNIDO.

c) complete the pre-investment study using available resources both from the Ministry of Industry, UNIDO Nairobi/Vienna and the promoter.

In response, a concept paper was prepared in October, 1992 and sent to the Ministry of Industry. This paper was approved and further instructions to proceed with the main study of the project were communicated to the consultant in February, 1993.

Field surveys and searches have since been undertaken by Manpower Studies Institute since early 1993. The contract between UNIDO/Vienna and Manpower Studies Institute was sealed on 15th. July, which requested for the study to be finalised in two months.

This report is the outcome of several months effort by MSI and have endeavoured to cover all facets of the Kakamega Fruit Factory. It is to be noted that due to changes in the economic performance of the Kenyan economy and the field information gathered in the main study, the original concept of a CANNING Factory has had to change. It became evident as the study proceeded that only **export market** could determine the viability of the proposed market. Due to the peculiarities of such markets, the study shifted the emphasis from **canning** to export of **preserved fruits and vegetables**, hence the change in title to KAKAMEGA FRUIT AND VEGETABLES FACTORY.

Another important feature of the project which changed is the estimated cost of the project. In the last one year, the shilling has depreciated considerably against the major currencies namely the $ dollar and sterling pound (£). In fact the depreciation has been in the range of three to five times. The result has been the steep rise in the cost of the project. Another factor that has contributed to the startling increase of the project cost has been the careful consideration of the source of the raw materials particularly in view of the need to have harmony between the raw materials and final product being produced. Agricultural support services proposed are necessary if this project is to be a sustainable development project.

The choice of technology inevitably was determined by the MARKET for the products. For the project products to make a breakthrough in the European market, they have to meet the set project specification and standards. The pass word here has to be QUALITY followed by the Price. As a result, the choice of technology seeks to give us the right product which can be used.

BACKGROUND

1.2.0 PROJECT CONCEPTION

Kenya's Development Sessional Paper No. 1 of 1986, marks a watershed in the overall development philosophy and strategies for the country. In particular and relevant to this study was the Government Restatement, in the said paper, regarding the need to encourage the private sector to invest in industries located in rural areas with access to low cost agricultural raw materials. It was emphasised that the investors were on one hand to demonstrate their potential to earn substantial profits and return on capital at least as great as in the other sectors while price incentives and other incentives would be provided by the government. The approach has been continued into the 1988 - 1993 planning period during which incentives have been provided to attract the location of new industries outside the large cities and at the same time small scale enterprises have been encouraged and supported through various mechanisms including provision of road infrastructure, water supply, rural electrification, export incentive scheme, remission on cost of plant and equipment, reduced income taxes.

Since then the Government has launched various programmes in support of the Rural Industrialisation policy. Among such programmes today are:-

- Small Industrial loan scheme by ICDC*
- Special Rural Development Program
- Industrial Training and Extension Services
- Small Business Development Corporation
- Kenya Industrial Estates Program
- Kenya Industrial Research and Development Institute
- Kenya Industrial Training Institute
- Small Scale Industries Division of the Ministry of commerce and Industry
- District Development Fund
- Kenya Small Scale Enterprises
- Kenya Rural Private Enterprises Program.

* ICDC - Industrial & Commercial Development Corporation - a parastatal organisation.

1.3.0 PROJECT KEY OBJECTIVE AND STRATEGY

It is within and against such background that KAKAMEGA FRUIT AND VEGETABLES FACTORY as a project has been conceived. It is a small scale Agro-based industrial project designed to, among other things:-

- seek to alleviate poverty
- generate raw materials for industrial processing
- generate employment
- increase farm incomes
- enhance the country's Foreign Exchange Earnings
- act as a catalyst to stimulate the needed economic growth in Kakamega district specifically and also in the country.
- provide economic incentives for farmers to protect their land, water and forest resources
- initiate sustainable development

These objectives will be achieved, through various ways including but not limited to:-

- avoiding unsustainable farming practices
- giving equitable prices for farm produce
- involving the people in decision making.
- having equitable trading practice.
- supporting programmes aimed at assisting the Farming community
- organising the farmers.

The choice and selection of this project has been based on a feasibility study that covered a period of slightly over six months. The criteria used included the following key aspects:

* an understanding of the market for the proposed final products
* techniques and technical questions on production
* agricultural culture of the people in Kakamega District and Western Kenya
* effects of climatic conditions
* transportation infrastructure
* cost-effectiveness of the investment
* the promoters commitment to the project.
* an enabling investment environment.

1.4.0 PROJECT CRITICAL OBJECTIVE AND STRATEGY

The project will aim at promoting the growing of Horticultural crops in Western Province particularly in Kakamega District. The raw materials will comprise of: tomatoes, passion fruits, papaws, bananas, french beans, and a variety of green vegetables. Kakamega Fruit & Vegetables Factory will rely on its own Nucleus Farm of 1000 acres for growing the above mentioned crops in order to insure against seasonal variations. Besides the promoters have already secured an undertaking from:- Kakamega Agricultural Research Station, Bukura Agriculture Institute, Kakamega Prison Farm, and Shikusa Prison Farm to act as its extended Nucleus Farm. This latter arrangement will boost the security of steady supplies of the raw materials to the factory. It is planned that the factory will concentrate on final processing especially for preserved Fruit products for export market as explained under the marketing section of the report. The factory is designed to start production at 1500 tons of horticultural produce, rising gradually to 3500 tons by year 2005.

1.5.0 THE SPONSOR

Frost Enterprises Ltd is an indigenous Kenyan registered company currently with a share capital base of Ksh. 3 million fully paid. It has been in operation since 1986 mainly dealing in the following lines of businesses:-

* buying and selling of agricultural and animal products

* import and exports of electrical and hospital pharmaceutical, telecommunications equipment. Since late 1990, it diversified its activities to include mixed farming in Kitale area where, on a 1,000 acre farm, they

have:-

- dairy cows
- poultry
- growing a variety of fruits
- growing maize and beans; all for the domestic market.

It is out of the experience gained in this business that it has launched into the fruit processing business for both the domestic and export market. Besides, the performance of the fruit processing industries in Kenya since 1980, demonstrates that there is great potential in the market both here in Kenya and outside for the processed fruit products. This report indicates and confirms the viability of this project besides delineating the existence of great economic opportunities within our agricultural sector. Indeed, in implementing this project, it will be a clear proof that the Kenya Government through its various support systems is fully concerned in the implementation of its policy on Rural Industrialization as well as the dispersion of industries in the Country.

The study confirms that there are substantial profits to be gained as well as reasonable return on capital investment. Further, there is great potential for revolutionising the current agricultural farming practices and culture in Western Kenya as set out in the subsequent pages of these reports especially under the section on Agriculture.
The sponsor financed part of the cost of this study and the remaining was financed by UNIDO/UNDP. For implementing the project, PTA Bank, ICDC, Kenya industrial Estate and Kenya Commercial Bank have been approached and responded favourably to the initial approach.

1.6.0 FIELD SURVEYS:

1.6.1 Other Comparable Firms

During the study, a survey of and visit to comparable manufacturers of canned/bottled fruits and juices was undertaken by the team. The following are among the leading companies that were carefully analyzed:-

Name	Location
Kenya canners	(Thika)
Kenya Orchards	(Machakos)
Kenya Fruit Processors	(Thika)
Kabazi Canners Ltd.	(Kabazi)
Trufoods (K) Ltd.	(Nairobi)
Kenya Sunshine Prod. Ltd.	(Nairobi)

Mashambani Industries	(Gambogi, Vihiga District)
Ershire Price Ltd	
Watamu Farm	(Nairobi)
Kenyoy Ltd	(Nairobi)
Premier Foods	(Nairobi)

Out of these (10) ten firms, only one, the Mashambani Industries is located in Western Province, in the neighbouring District to Kakamega District i.e. Project's Area. Besides it is significant to note that the Mashambani Industries has concentrated on one line, processing of Papaya from pawpaws.

Examination of each company covered the following aspects:-

- Capital structure
- Labour component (number of employees)
- Pricing and production capacity
- Marketing profiles
- Source of Raw Materials
- Technology in use, cost and its appropriateness.

1.6.2 Market for Horticultural crops in Western Province

A field survey for Horticultural crops market was undertaken in the course of the study of selected markets in Western Province. The choice of the markets was based on:- distance from one another and economic role of the market in the area. The visits were done during the peak period i.e. the marketing day for the market more specifically to determine the volume of Horticultural crops transacted or volume of trade for the products. Other information gathered included, prices, types of crops, source of the crops. The appendix No. 1, summarises some of the findings in a table form.

Significant conclusions drawn in this survey are:-

(a) Fresh Horticultural crops are not an important market activity at most of the markets in Western Kenya. Indeed the quantities traded are so low (insignificant) that it was not easy to quantify them.

(b) Citrus fruits on the markets are imported from outside the province (Western). For instance, Oranges came in from Kitale, Kisumu, and Naivasha. Cabbages, tomatoes, onions, from Nandi and Nakuru Districts.

(c) Prices of the horticultural crops seem to be high as the products are "imported" into the province.

When some of the people were asked why there was poor horticultural market, most said;

(i) Most families have one or two fruit trees they depend on if they need fruits at all.

(ii) Most families do not grow the fruits in plenty because there is no ready market for the crops.

(iii) Fruits are an insignificant aspect of their eating habits.

Table No. 1

HORTICULTURAL CROPS MARKET IN WESTERN KENYA - FIELD SURVEY.

Crop	Unit of sale	Price range	Estimated volume	Source area	Other remarks
Mangoes	1 each	50cts to 2/50	(Insignificant)	Siaya/ Kisumu	Fair/ quality
Tomatoes	(3 fruits)	5/= to 10/=	(Good)	Cheptais Mt Elgon	Good
Papaw	1 each	5/= to 10/=	(Insignificant)	Isukha/ Vihiga District	Not much on the market
Avocado	1 each	2/= to 5/=	(Insignificant)	scattered	-
Oranges	1 each	2/50 to 5/=	(Insignicant)	Kitale/ Naivasha	High quality
Lime/ Lemon	1 each	2/= to 3/50	(Insignicant)	Kitale/ Kisumu	Poor quality
Pine-apples	1 each	15/= to 25/=	(Average)	Kisumu district	High quality
French beans	per Kg	30/= to 45/=	(Good)	Vihiga	High quality
Bananas	per bunch	45/= to 80/=	(Good)	Kakamega Vihiga/ Busia/ Bungoma	Good quality
Passion Fruit	1 each	2/= to 4/=	(Insignificant)	Kitale/ Kisii	High quality
Ordinary beans	per Kg	20/= to 25/=	(Good)	Kakamega Busia/ Bungoma	High quality

The markets which were surveyed were:-

Kakamega District:-	Kakamega Municipal Market, Khayega, Shinyalu, Shikulu, Mumias.
Vihiga District:-	Wambale, Kiboswa and Luanda Markets.
Busia District:-	Busia Municipal Market
Bungoma District:-	Bungoma Municipal Market, Webuye.

1.7.0 NATIONAL ECONOMY

Generally the Kenyan economy has done badly for the last three years mainly because of

- generally poor management of the economy
- adverse economic situation in the developed countries
- bad weather in Kenya - prolonged drought condition
- suspension of foreign aid by donors
- low prices for coffee and tea which are Kenya's main exports.
- insecurity in the country leading to low tourist traffic and low economic activities.

Most of the causes of the poor economic situation are being addressed.

- political pluralism will encourage government accountability and increase general security in the country

- structural adjustment programme being implemented will ensure free competitive market operation and efficiency in the economy

- farmers will be free to bargain for realistic prices and therefore there will be incentives for the entrepreneurship.

ECONOMIC INDICATORS

	1988	1989	1990	1991	1992
Population (million)	22.4	23.2	24	24.8	25.7
Growth of GDP % (at constant prices)	5.1	5.0	4.3	2.3	0.4
GDP (at market price) (Kenya pound million)	7,560	8,643	9,939	11,316	13,421
Trade Balance KSHS (Kenya pound million)	-813	-1,219	-1,302	-1,094	-1,213
Money Supply KSHS (Kenya pound million)	2,141	2,418	2,902	3,587	4,827
Inflation rate %	-	-	15.8	19.6	27.5
Per Capita Income (Kenya pound million) (at constant prices)	172.27	174.77	176.14	174.05	168.91

KEY:

K£ = US Dollars 0.308.

M Means Million (1,000,000)

It is expected that the decline in the economy will bottom out in about 1995.

1.8.0 INDUSTRIALISATION

The Government of Kenya is committed to industrialisation as one way of increasing productivity and expanding exports in order to increase incomes of its citizens.

There are specific documents and policy pronouncements which shows the Governments' commitments which can be placed in the following categories and sub-categories:

1.8.1 THE LEGAL FRAMEWORK

a) The Trade Licensing Act: This regulates the conduct of trade.

b) The Factories Act: This deals with safety standards on the factory.

c) The Foreign Investments Protection Act.
The act protects foreign investments and specifies their rights so far as transfer of after-tax profits and the capital invested at the end of the project or when the entrepreneur feels he needs to move his investment to another country.

Due to the encouragement by the Government the GDP share of manufacturing sector has grown from nearly 5 to 13% from 1960s to 1992.

1.8.2 OTHER POLICIES

The Government has maintained certain policies intended to promote economic activities both in industry and agriculture. These policies have been spelt out clearly in Sessional Paper No 1 of 1986 as follows.

a) encouragement of mixed economy with well-defined roles for both the Government and the private sector.

b) a high priority to agricultural development while industrialisation is being undertaken.

c) an open economy that takes full advantage of the opportunities available in the world markets, and

d) concentration of Government on the provision of economic infrastructure and social services such as education, health and other basic needs.

In recent times the Government has added two dimensions on these policies;

a) reduction of Government in private sector by selling off non-strategic parastatals.

b) reduced emphasis on import substitution and removal of undue protection of local industries to force them to be more competitive.

c) District Focus for Rural Development whereby the District Development Committees are the decision makers on priorities of the district in the development effort.

The Government also recognises that the majority of Kenyans live in the rural areas and has encouraged industrialists to invest in the small towns and in the rural areas. In this regard the Government seeks to maintain a proper rural-urban balance which involves reduction of excessive concentration of population in the

large towns and promotion of lively economic growth of the secondary towns and smaller urban towns, market centres and local services centres. Another aim is to balance economic growth in all regions of the country so that even the "remote" areas can also share the general economic growth. To achieve this, the government has identified four main strategies:.

- concentrate scarce resources for urban infrastructure in selected small towns, designated as Rural Trade and Population Centres (RTPCs) designed to provide a range of basic physical infrastructure and other productive employment generating activities.

- strengthen local authorities to enable them to provide competent administration and management of growing rural centres, and provide them with sufficient resources to develop, operate and maintain them.

- provide customs duty rebates to manufacturers importing equipment for investments in the small towns of rural areas.

- promote the growth of productive non-farm employment opportunities in rural centres, primarily in small- scale manufacturing and commercial activities the bulk of which will be in the informal sector. In addition special programs such as:-

  - Rural Electrification.

  - Rural Telephone Network.

- Accessible all weather roads have been launched in many parts of the republic including Western Province.

1.9.0 AGRICULTURE

Kenya is basically an agricultural country - with agriculture contributing over 30% of the Gross Domestic Product while the manufacturing sector contributes only about 13%

Even though agriculture is the mainstay of the Kenyan economy only about one-quarter of the land is naturally arable, while the rest is semi-arid and arid.

The arable land is also severely under strain of population increase. This strain is exacerbated by land

tenure system which allows the successive members of the family to sub-divide their inherited land so that each member has his own plot. In many parts of Western, Nyanza, Rift-valley, Central and Eastern provinces we now have a situation where we have reached as low as a quarter of an acre plot per family of up to ten members. In such circumstances the land is intensively cultivated with resulting problems of environmental degradation, soil erosion and loss of soil fertility leading to low crop yields, poor economic returns and deficient nutrition for the majority of the rural inhabitants.

Nevertheless, agriculture continues to play an extremely pivotal role in the country's economy. The main foreign exchange earners are Coffee, Tea, horticulture crops and Pyrethrum. In the recent past, tourism has overtaken coffee as a leading single foreign exchange earner.

Agricultural earnings were significantly reduced in the last two years due to the following reasons:

- low international market prices for coffee and tea.
- severe drought in the country led to low productivity.
- poor management of the economy by the Government.

The Government is now undertaking World Bank encouraged Structural Adjustment Programme which will address some of the problems in Agriculture and it is expected to be competitive and efficient in the next two years.

1.9.1 HORTICULTURE

The Kenya Government has recognised the importance of the horticultural industry. To promote horticulture, the Government established the Horticultural Crops Development Authority to promote production, marketing and export of horticulture crops.

By and large horticultural crops are grown on commercial scale largely in Central, Eastern, Rift-valley and Coast provinces. In Western Provinces there has not been much horticultural activities due to the following reasons;

- low market demand and prohibitive distances to the export shipment points.
- low horticulture technology.
- poor transport facilities.

However, potential exists for such an activity because:-

a) horticulture often requires small scale farms and it's produce is of high value.

b) rising incomes and therefore demand around Mumias/Nzoia Webuye industrial complexes.

c) improved communication by road and air should facilitate to access to export shipment centres.

d) population growth.

e) presence of Eldoret town with an International Airport and Central Bank facilities within close vicinity.

Currently there is substantial horticulture activities in Western Province as shown by the figures below.

WESTERN PROVINCE
HORTICULTURAL CROPS PRODUCTION*
1990/1991

	Hectarage 1990/1991		Production (mts) 1990/1991		Value K£ 1990/1991	
Bananas	5520	2792	64450	36296	6,519,348	6,351,800
Citrus	1208	1127	9660	8302	4347000	3735900
Mangoes	215	253	1600	1706	480000	511800
Avocado	77	N/R	949	N/R	175152	N/R
Passion Fruit	50	108	445	648	160974	187920
Pineapple	892	930	13850	13632	1731081	3408000
Pawpaws	744	696	9936	7839	74200	2110180
Tomatoes	1910	N/R	34020	-	5619604	-
Kales	2990	2574	20090	15640	2804694	8602000
Onions	917	870	10366	10200	3348594	1,530,000
Carrots	37	49	108	144	15966	43200
Brinjals	21	35	94	180	37600	72000
Chillies	52	54	104	108	31200	43200

Most of the activities are carried out by the farmers on a personal interpreneural basis but without strong marketing network and support. Even under such - circumstances; we can see that in 1990 and 1991; 165,672 and 94,695 tons respectively were produced.

* Figures obtained from Ministry of Agriculture: Annual Report 1991.

1.10.0 INVESTMENT CRITERIA

The type of investment and the location of the investment are interlinked.

Western Province enjoys a very good climate throughout the year and has good fertile soils. Horticultural crops varieties are generally grown all over the province essentially for local consumption and local markets.

On the other hand, there is dense population in the area with each family owning on average 5 acres, at most. Intensive farming is essential for survival. There are few industries to absorb the growing population. The few industries at Mumias, Nzoia sugar and Pan-African Paper Mill are creating some middle income earners located in the three urban towns - Mumias, Bungoma and Webuye who are dependent on the market for their food products. In addition, there are many mushrooming market centres.

The Kenya Government is committed to encouraging development of industries in the peri-urban and rural areas to increase the incomes of rural people as well as discouraging population movement into the major cities. It is with this in mind that this project is expected to be located in Kakamega District, Western province.

Briefly the reasons for this investment are as follows.

- to encourage local farmers in Western Province to grow more horticultural crops and increase their incomes.

- horticultural crops have high value and can be grown on small farms such as are commonly available in Western Province.
  Horticultural crops have high returns per unit area compared to other crops.

- to diversify industry to the rural area and create employment.

- to make use of large cheap labour available in the region.

- to support the Kenya Government in its effort of employment creation.

- land is cheap in the area compared to other towns

- to obtain easy access to the PTA sub-regional market.

- increase foreign exchange earnings.

- current high dependence on targeted fruits and vegetables from neighbouring districts.

- the promoter will make profits and pay taxes to the government.

CHAPTER II

2.0.0 SITE AND ENVIRONMENTAL ASSESSMENT

2.1.0 INFRASTRUCTURE AND SERVICES

The Headquarters of Kakamega District is Kakamega town. It is also the Provincial Headquarters for Western Province. The immediate neighbouring district have their Headquarters also bearing the names of the Districts namely Busia town, Bungoma town, and Vihiga.

Kakamega town stands along the main tarmac road linking Kisumu (in Kisumu District) and Kitale in Trans-nzoia District. There is also a tarmac link road from Kakamega through Mumias to Bungoma. Besides there are many feeder all weather roads traversing the District. It is located 420 Kilometres West of Nairobi City.

The following infrastructral services are available:-

- an airstrip for light aircrafts
- Postal and Telecommunication services of International Standards
- 415 Voltage on three phase power
- Clean piped water supply
- Agriculture Research Station
- Provincial as well as District offices for all Government ministries
- Sewage and refuse disposal system managed by the municipality of Kakamega
- Industrial Estates site/park, well serviced
- Kakamega Forest
- close to 1700 shops (retail and wholesale).
- River Isiukhu
- An urban population.

The site location selection was hence biased by the availability of the above infrastructure and services.

2.2.0 PEOPLE:

The project area is located among the Luhya tribe comprising of the following sub-tribal groupings:-

- Abakakamega
- Maragolis
- Tiriki
- Kisa
- Batsotso

- Kabaras
- Tachoni
- Banyore
- Bukusu
- Marachi
- Samia
- Maramas
- Wangas

According to the unpublished census figures of 1989, Western Province has an estimated population of 7 million people. The percentage distribution of the Households by size is as follows:-

2.3.0 HOUSEHOLD MEMBERSHIP/SIZE*

1	2	3	4	5	6	7	Total
9.8	7.6	10.7	11.0	12.4	12.4	36.2	100%

* ECONOMIC SURVEY 1993

The general per capita income in Western Kenya is Kshs.538.9 per month. Wage employment over the last four years shows the following trend:-

1989	1990	1991	1992
816,000	924,000	937,000	944,000

This demonstrates the high dependency level in the project area. This is further accentuated by the fact that out of this level of wage employment only 5% found employment in the informal sector of the economy. The bulk of the population is engaged in peasant farming on very small holdings. Among the critical determinants of the small scale farming which is critical to the study and looked into are:- CLIMATE & SOILS in the project area:-

2.4.0 CLIMATE:

(a) RAINFALL

Kakamega District receives an annual average rainfall varying between 1000mm and 2400mm. In general the season

of the long rains occurs from early March to June with maximum rainfall occurring in April/May. The short rains occur from October to Mid December with maximum occurring in November. The rainfall is mainly in the form of afternoon showers and thunderstorms.

(b) TEMPERATURE/HUMIDITY

Varying between latitudes 0^0N, 1^0N and longitudes $34^0.15'$E, $35^0.15'$E with an altitude ranging from 1000metres to 2200 metres above mean sea level, hourly temperatures differ considerably between day and night. The mean maximum and mean minimum temperatures as well as relative humidity are given in the table that follows:-

KAKAMEGA METROLOGICAL STATION ALTITUDE 1585M

TEMPERATURE ^{0}C				RELATIVE % HUMIDITY	
MEANS				MEANS	
MONTH	MAXIMUM	MINIMUM	RANGE	9.000mm	3.00pm
JAN	28.5	14.0	14.5	67	40
FEB	28.9	14.3	14.6	70	39
MARCH	29.1	15.0	12.0	67	39
APRIL	27.0	15.0	12.0	78	56
MAY	26.1	15.0	11.1	81	61
JUNE	25.7	14.3	11.4	84	56
JULY	25.6	13.5	12.1	74	55
AUG	26.0	13.5	12.5	81	53
SEPT	26.9	13.4	13.5	75	60
OCT.	27.2	14.3	12.9	64	54
NOV.	26.7	14.5	12.2	70	56
DEC.	27.6	13.9	13.7	66	43

* The highest and lowest temperatures recorded during the past 9 years are 33.9^0C in March and 10.1^0C in February respectively.

The District does not however experience **humid heat** but it experiences marked daily range of **relative humidity**. It experiences more sunshine in the morning than in the afternoon.

2.5.0 CULTURE OF CULTIVATION

Prior to independence the people of Western Province of Kenya were predominantly subsistence peasant farmers whose preoccupation in agriculture was:-

- growing food crops for family consumption
- keeping livestock mainly as status symbol besides using them in settling the matrimonial requirement.

Cash crops or industrial crops were to be found sparsely scattered around missionary stations or on the farms of a few settler farmers. Such crops included Coffee, Tea, Sisal and Cotton. In any case, the soils are rich naturally ranging from loam soils, sandy, clay and in a few places have black cotton soils.

In the traditional farming culture, (which still is the prevalent **Farming culture** of the people in Western Province) the crops grown even today comprise of:-

- Maize
- Beans
- Sorghum
- Millet
- Bananas
- Peas
- Sweet Potatoes and a variety of traditional green vegetables. Among the livestock kept include:-
- cattle
- goats
- sheep
- poultry - chicken mainly.

Land in Western Kenya where the project is located is privately owned. Farm holdings are extremely small because of high population densities in the province and especially in Kakamega and now Vihiga Districts. On average every household in Kakamega lives on 2 acres of land. As a result, the productivity on land is very low and in most cases hardly enough to suffice even family food needs. Other factors that have contributed to this low productivity on land include:-

- high costs of preparing land and its upkeep
- high cost of farm inputs and equipment
- inadequate if not unavailable agricultural information and support services.
- misapplication of Fertilizers and pesticides which has given rise to high acidity levels in the soils.

Even in spite of these limitations it was noted during our field surveys and visit that there is emerging a new farming culture generally in the project area in which people are slowly shifting away from purely subsistence to cash crop farming. In most cases people are aware of the existence of the **Modern Market** and what role it plays in their general economic activities. Evidence of this new trend is the presence in the project are of such industrial crops as:- Tea, Sugar cane, cotton, Rice, Coffee, French beans.

During interviews with Government officers, administration officials, individual small scale farmers, it was clear that people in the project area are ready to begin growing the proposed horticultural crops if they can be assured, among other things, of:

- a steady market for the crops
- technical and financial assistance
- stable prices for the crops
- agricultural extension services that are effective
- transport and collection of their crops on timely basis
- supply of appropriate seed varieties and inputs.

2.6.0 ENVIRONMENT IMPACT STATEMENT

In our study we preferred the definition of environmental impact as "placing a burden on the Environment that it may not be able to handle i.e. something that results in change which will be determined by both the **nature of the activity** and the environment it is taking place". (Impact Assessment, in WARMER, August 1993 Bulletin).

According to the proposed Kakamega Fruit and Vegetable Factory(project) will generate impacts at:-

- the farm level
- the factory/plant site.

Our concern at the farm level led us to strongly discourage the application of chemical fertilizers and use minimum fungicides. In the case of the former, we have advocated use of organic manure not only to save the soils from high acidity levels but to ensure that the crops produced will have absence of such chemical elements. Our export market requirements have necessitated this approach.

During our field survey it was evident that most small scale farms have high acidity levels in the soils and will have to apply a lot of lime in order to regenerate the soils original fertility levels. By also discouraging the use of these

inorganic fertilizers we will be guarding against the seepage of the residues into the rivers. Among other measures recommended in the study are:- intercropping, rotation of crops and overall proper crop husbandry.

At the factory level, design and technology recommended ensures that the waste disposal is provided for by recommended septic tank which will be emptied by the Kakamega Municipal on regular basis. Noise, dust, odour, gas emissions will not exert any burden on the factory staff. The flow process of production guards against potential contamination of the final products. Laboratory tests of sample product will help in detecting any such contamination.

In all, precaution has been taken to preclude any adverse environmental impacts by the project.

CHAPTER III

3.0.0 RAW MATERIAL AND SUPPLIES

3.1.1 ISSUES CONSIDERED:-

In the course of carrying out the study we determined that the basic raw materials for the factory will be Fruits grown both by small farmers(who will constitute the OUT-GROWERS); booster farms at Shikusa, Kakamega Prisons Farm, Kakamega Research Station Farm, and Bukura Agricultural Institute. They will be supplemented by the 1000 acres of the Nucleus Farm owned by the Project Promoters.

The Fruits to be grown will include Passion, Tomatoes, French beans and Peas. It has been assumed that these will be grown in large quantities so as to keep the factory operating at an optimal level of 1500 tons per annum. As a result of our careful study, we examined each of the crops in detail covering many aspects such as:- **General information, Ecological requirements, Temperatures, water requirement, soil culture, varieties, crop husbandry, land preparation, planting season, basic inputs, diseases, yields and profitability levels.**

The structure of the report on sourcing of basic material is in accordance with the above aspects. What we wish to emphasise is that at the time of this study it was clear that the production of these crops on commercial scale will have to be introduced into the project area namely Kakamega District and generally in Western Province. However because it will require a long education period for the small scale farmers, initial supplies will come from the nucleus Farm and institutional booster farms mentioned at paragraph one above.

We further considered other future crops such as:- Pineapples, Bananas, pawpaws, Avocado and Mangoes. These are future crops which could be used in the project depending on the crops culture in the project area. We envisage the potential for these crops but they are not given great treatment in this report. Further the project is wholly driven by the Export Market needs and that too helped us in the choice of the basic raw materials.

While we are confident that these basic raw materials will be grown within the project area more specifically Kakamega District and the neighbouring Districts in Western Province, given the many agricultural parameters which can change drastically and affect the project (or

Factory Production). We are recommending that the project promoters should be ready to switch to other areas from when these materials can be obtained.

In this study, we identified the following areas which could readily supply the needed materials in the event of such need.

For Passion Fruit - Kisii District
Tomatoes - Kisumu District/Trans-Nzoia
French Beans/Peas - Nakuru and Trans-Nzoia Districts
Because of the location of this factory, it should be possible to source these crops even from Uganda. What will happen is that the transportation costs as well as the wastage due to long haulage will increase substantially.

We have simply identified these as alternative sources of the basic raw materials should our project and farming zone be hit by crop diseases, pests, such as locusts or even prolonged drought.

Other supplies critical to our project are classified as detailed here below:-

Packing Materials	Supplier
a) Cans	) Metal Box - located in Nairobi.
b) Metal Drum	)
c) Polythene paper	) East Africa Packaging, located
d) Cartons	) in Nairobi.

Labelling Materials

a) Tags	)-Firm printers
b) Trade Marks	)
c) Glue/Paste	
d) Inks	) CPC
e) Markers	) Printers

Ingredients into the Final Products

a) Vinegar	)
b) Garlic	)
c) Onions	) From various local industrial
d) Sugar	) manufacturers in Kenya
e) Benzoic acid	)
f) Citric acid	)

3.2.0 SUPPLY PROGRAMME:

The factory will function basically as a processor/preserver of the produce for export market mainly. The frozen indigenous vegetables will be marketed in the local market from October to February.

The production will proceed on single shift daily. programme. During the harvesting season the Factory will proceed in three shift programme for full utilization of the total installed capacity from the fourth year onwards. It is therefore expected that the production will start at 75%, grow to 80% to 100% by year four.

The products will initially be tomato products, passion fruit products, french beans, peas and vegetables as outlined in details under the section on marketing.

3.2.1 PRODUCTION PROGRAMME: FOR THE BASIC RAW MATERIALS

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec.
Tomatoes	xxx	xxx						xxx	xxxx	xxx	xx	xxx
French beans	xxx	xxx				xx	xxx	xxx	xxxx	xxx	xxx	xx
Green peas	xxx	xxx				xxx	xxx	xxx	xxx	xxx	xxx	xx
Passion fruits	xxxx	xxx				xxx	xxxx	xxx	xxx	xxx	xxx	xxx
Carrots	xx	xx	xxx	xx	xx	xx	xxx	xxx	xxx	xxx	xxx	xxx
Kales	xx	xx	xxx	xx	xx	xx	xxx	xxx	xxx	xxx	xxx	xxx
Cabbages	xx	xx	xxx	xx	xx	xx	xxx	xxx	xxx	xxx	xxx	xxx
Other Traditional Vegetables	xx	xx	xxx	xx	xx	xx	xxx	xxx	xxx	xxx	xxx	xxx

Footnotes

a) The above is based on the seasonal climatic changes in Kakamega District and generally Western Kenya.

b) March through June when there are long rains in the project area as outlined above, the factory will in the initial 2-3 years have to depend entirely on its own Nucleus Farm. However it might also consider importing the raw materials from other alternative Districts if the price will be right. Another point to be clarified is that when the factory will be operating at full capacity, the months of March and April will be left to facilitate maintenance and repair to the Factory.

3.3.0 ANALYSIS OF SPECIFIC CROPS

3.3.1 FRENCH BEANS (PHASEOLUS VULGARIS)

a) General Information

French beans are mainly grown for export purposes and are one of the country's most important export crops. In 1985 more than 7,000 tons of fresh French beans were exported. The prospects on export markets are good and there is also a demand for French beans by the processing industry. The local fresh market is, however, relatively limited.

French beans are labour intensive, especially at harvesting, which also requires well trained farmers as only high quality grades can be sold for export. This vegetable is grown by small and large scale farmers. However, small holder production in our study is recommended. Our large scale farms namely, Shikusa Kakamega Research Station, Bukura will nevertheless be used for larger production.

b) Ecological Requirements

Temperature:

The optimum temperatures range from 20 to 25 degrees centigrade. French beans develop a higher percentage of fruit in cooler weather, therefore areas with extremely high temperatures are not suitable. In the tropics, medium altitude areas from about 900 - 1000 metres are most suitable for the growing of this crop.

Water requirements/rainfall:

French beans have an optimum rainfall requirement of about 500mm per season. High rainfall towards the end of the growing period is undesirable, because it causes a high incidence of pests and diseases. The minimum rainfall requirement is around 300mm per cropping cycle.

Soils:

French beans will grow on silty loams to heavy clays. The optimum soil pH is 6.0 to 7.0 soils should be free draining with a high content of organic matter. Most of the soils in Kakamega are ideal for growing French beans.

c) Agronomy

Varieties:

At present, the varieties recommended for planting for this project are:-

- Monel (major variety)
- Primeur
- Garonel
- Vernandon

For a good result farmers should never produce the seed for French beans from the previous harvest.

Seed rate/seed preparation:

About 80kg/ha of seed are required. The seed should be dressed before sowing. Chemicals suggested are e.g. Aldrin or Dieldrin.

Land Preparation:

The land should be ploughed and harrowed. Shallow furrows are made where the seeds are planted directly. After sowing, the furrows are closed. French beans are generally grown as single crops.

Rotation:

French beans will be rotated for example with maize, potatoes, or cabbage.

Manure:

Compost manure be applied if the content of organic matter is low. In view of the comparatively short cropping period, only up to about 10 tons/ha of manure should be distributed per crop and for this project use of fertilizers particularly DAP will not be encouraged.

Planting times:

French beans will be grown throughout the year. The cultivation period of French beans is about 2 to 2 1/2 months. Harvesting starts about six weeks after sowing and continues for two to four weeks.

Spacing:

At present, the standard spacings are 30cm x 15cm.

Mulching:

No mulching is done.

Weeding:

The field should be kept clean. For large scale farmers the use of herbicides is probably advisable. Weeding should be done very carefully to avoid damaging the shallow roots.

Pests and Diseases:

Major Pests are:-

- Bean Fly (Melanagromyza phaseoli)
symptoms: Yellowing and subsequent dying of the plants. The bases of the stems become thickened and cracked.

- Bean Aphid (Aphis fabae)
  Symptoms: Black, sucking insects around growing points, stems and especially under the leaves. The plants can wilt and die.

- American Bollworm (Heliothis armigera)
  Symptoms: Circular holes in the sides of the pods; granular excreta at the point of damage.

For the control of bean fly, seed dressing is recommended with e.g. Dieldrin or Aldrin, in addition, carbofuran can be distributed at planting time.

The following precautions of bean fly are useful for the cultivation of French beans:
- crop rotation
- gathering and disposal of crop residues.
- removal of volunteer plants.

Major Diseases are:-

- Bean Rust (Uromyces appendiculatus)
  Symptoms: Small red pustules on the underside of the leaves; dark green spots surrounded by a small yellow circle usually appearing on the upper side of the leaf above each pustule. The disease can ruin the whole crop.

- Anthracnose (Colletotrichum Lindemuthiamun)
  Symptoms: Brown or black sunken lysins on leaves, stems pericles and pods.

- Bacterial Blight

Symptoms: Brown or almost black spots on leaves and pods; lesions are developed which have a water-soaked appearance and their centres sometimes fall out.

Bean rust can be controlled by:

- destroying crop residues and wherever possible, planting the beans at a distance from other legumes,

- farmers should not use the seed from the previous harvest.

To combat bacterial blight it is necessary:

- to plant healthy seeds,
- to burn infected plants immediately,
- to practice strict crop rotation.

Yields:

At present, farmers generally harvest about 2.5-3 tons/ha of French beans. Exceptional successful farmers will achieve yields of 6-10 tons/ha.

d) Harvesting and Marketing

Harvesting of French beans starts about 1.5 months after planting and continues for about 2-4 weeks. Regular picking is essential to achieve the high quality produce required for export market.

After picking, the pods are graded. There are two export grades:

- extra fine
- fine.

Since the former grade obtains much higher prices than the latter, every effort is made to harvest a high percentage of extra fine produce. Good farmers will usually harvest about 90% extra fine grade.

The harvested pods are graded and packed in special containers only suitable for French beans export. Extra fine pods are thin and have a minimum length of about 10cm, the seed development is just about to start, they are clean without any damage, fresh and well shaped.

To avoid shrivelling, French beans must not be exposed to excessive heat and should be transported to the airport within approximately 12 hours after harvesting. Road transport, particularly from distant growing areas, is best.

The export of French beans is controlled by legal export regulations which have to be observed at all times.

The demand for French beans on the local fresh market and for processing is still relatively low, but the latter is increasing and might become a major market outlet, in addition to the export market. Skill in marketing management is required for the domestic outlets, compared with that needed by farmers who export their produce, but the prices paid locally are of course much lower than for export. Nevertheless a farmer living near a canning factory might choose this outlet for his French beans because marketing is much simpler.

e) profitability of French Bean Production

The production of French beans is a highly profitable enterprise. According to various studies based on different methods of husbandry and locations, the gross margins range from Kshs 2,365 to Kshs 10,670 per cultivated hectare.

3.3.2 PASSION FRUIT (PASSIFLORA EDULTS)

a) General Information

Cultivation of passion fruit has a rather long tradition in Kenya. Since the 1920's, when passion fruits were introduced into the country, fruits have been processed for juice or extract. The production is based on the variety passiflora edulis var. 'Purple'. The location of the passion fruit production will be on the nucleus farm. As small scale farmers will find it difficult to manage crop husbandry. The production of the fruit require rather high capital investments.

b) Ecological requirements:

Temperature:

Depending on the variety passion fruit requires higher or lower temperatures. Passiflora edulis 'Purple' is produced in cooler highland areas (above about 1,200 m).

Optimum temperatures for 'Purple' should be between about 18 degrees centigrade to 25 degrees centigrade and for 'Flavicarpa' about 25 degrees centigrade to 30 degrees centigrade.

Water requirement/rainfall:

A well distributed rainfall of about 1,500mm to 2,000mm per year gives high yields of passion fruit; the minimum rainfall is about 900mm per year. These climatic conditions are present in the project area of Kakamega.

Soils

Fertile soils of different types are suitable for passion fruit cultivation. The pH has to be about 5.5 to 7.

c) Agronomy

i. Varieties:

Passiflora edulis 'Purple' is the major variety for fresh market and especially for processing. This is the variety that is recommended for the Kakamega Project.

ii. Establishment of a passion fruit plantation:

Seedlings:

Passiflora will be raised generatively. The seed is taken from healthy plants or if available, from the processing industry. Before sowing the seeds should be watered for 24 hours. The seed can be sown in seedbeds or planted into plastic bags. The latter method is recommended, since germination and growing of seedlings can be controlled adequately and therefore a better quality seedling is obtained.

For a cropping area of 1 hectare 1,650 bags are required, according to the recommended spacing of 2m between and 3m within rows. Since a number of seeds should be sown; for 1 hectare passion fruit about 2,000 bags should be prepared. Per bag 7 seeds should be sown, i.e. 14,000 seeds are required per hectare, which is equal to 250g of seed.

The seeds sown into the bags have to be covered with a layer of soil; the bags should be mulched with about 5cm of grass to keep the soil moisture. After germination,

the grass should be removed and the emerging seedlings thinned to three per bag. From sowing to planting it takes about 3 - 4 months. If grafting is practised another 3 - 4 weeks are required.

Grafting:

Since the major variety passiflora edulis 'Purple' is a weak growing variety, relatively susceptible to a number of pests and diseases, grafting is recommended for this variety. Seedlings have to be cultivated according to recommendations given below.

When the root stocks are about 40cm high, 10cm of the top should be cut off. The stems have to be split carefully length-wise for about 2cm to 3cm with a razor-blade. A scion has to be selected from healthy and vigorous mother plants. The scion is a small piece of young shoot with one bud. The scion is to be put into the rootstock and bound with any sort of sticky tape. After grafting the plants should be planted under polythene in a shady place. About three weeks later, the plants start growing and should be removed.

Land preparation

Deep ploughing and harrowing is necessary, if the land has not been previously used.

Rotation

Strict crop rotation should be practised to avoid build-up of soil borne diseases. Passion fruit should not be grown for more than 2 - 3 years on the same plot.

Spacing

The usually recommended spacing is 2m between rows and 3m within rows.

Planting/planting time:

The most suitable planting time is the beginning of the local rainy season. Planting holes about 40cm x 40cm x40cm should be dug and compost manure shall be deposited in each hole.

Before planting, all seedlings should be irrigated and just before they are planted into the field, the polythene bags should be removed. The plants are placed with the ball of soil into the planting holes. Then the top soil dug out of the planting hole is be filled in

first and the subsoil afterwards. The soil around the seedlings should be tramped down, but the soil should not be too firm.

After planting, the position of the seedlings has to be similar to that in the nursery and the grafting spot should not have any contact with the soil in order to avoid fungi infestation etc. Finally the seedling has to be irrigated to ensure a quick rooting and shooting of the plant.

Manure:

Depending on the organic matter content of the soil, up to about 10 tons of manure should be supplied at planting time.

Mulching:

After planting mulching around seedlings is recommended.

Trellising system:

Per hectare, 940 posts are needed of size: 240cm x 10cm in addition about 230 kg of 12/14 gauge galvanized steel fencing wire, 7kg of staple pins, 300 litres of preservation liquid and 208 anchors are required to build the trellising system.

The posts are placed at a spacing of 6m in lines with the passion fruit, thus alternating 1 post with 2 plants. The wire is fixed on top of the posts with staples and secured at both ends by anchors. The posts should be dug in about 40cm deep and before placing them into the soil they should be treated with a suitable chemical to prevent termite attacks.

iii. Maintenance of the passion fruit plantation

Training of young plants

Soon after planting the young plants are tied to training sticks (230cm long; 2 - 3 cm diameter) until they reach the wire at the top. Only two vines are allowed to grow, the weaker vines should be removed. Once the vines have reached the wire, the two are wound carefully around it in opposite directions. The secondary shoots should be pruned; while the plants are growing tied to the sticks secondary shoots appearing along the wire of the trellising system must be left. For the training of young plants 1,650 sticks and 25 kg of sisal are required.

Pruning

Old shoots which have produced fruit once are productive. These shoots and all old, dead wood must be removed. Besides this type of pruning, secondary shoots reaching the ground level have to be cut off about 5cm above ground the entangling tendrils should be removed to allow free air and light penetration.

Soil cultivation/weeding/mulching:

Intercropping with annuals is recommended; in particular vegetables are agronomically suitable. Suggested are e.g. potatoes, beans, all types of cabbages, tomatoes etc. Unsuitable are high growing crops like maize, further more cucumbers, squash etc. which are susceptible to the cucumber mosaic virus (see below). Intercropping can also help erosion control. However, the application rates of fertilizer have to be increased.

Weeding should be done regularly to ensure an easy collection of the ripe fruits lying on the ground.

Disentangling:

Disentangling aims for a free-hanging of secondary shoots; the vines should grow vertically, i.e. up and down to avoid a thicket of shoots. Distangling should be done in intervals of two weeks. As a result light and air will penetrate the shoots to increase yields and to reduce the danger of diseases and pests epidemics. Furthermore, the application of chemicals will be more effective.

Pests and diseases:

Pests are of minor importance for the cultivation of passion fruit. Red spider mites, stink bugs or fruit fly sometimes occur; only stink bugs have a certain importance since they are the vector for the woodiness disease of passion fruit. Suitable chemicals for control are:

- Red Spider Mites:	Dicofol or Chinomethionate
- Stink Bug:	Azinphosmethyl, Malathion or Trichlorfon
- Fruit Fly:	Fenthion, Malathion or Trichlorfon.

The major diseases are:

- Brown Spot (Alternaria passiflorae)
  Symptoms: Brown spots appear on fruits and leaves which eventually cause defoliation and dying of plants.

- Woodiness (Cucumber mosaic virus)
  Symptoms: Small fruits with scars (woodiness), which become hard and shrivelled.

The control of brown spot is possible by suitable fungicides like e.g. Azylalanines, Mancozeb, Propineb or Metiram. During rainy season they should be applied twice a month, and once a month during dry season.

Woodiness can only be controlled by preventative measures. If plants are infected they should be removed and burnt immediately. Since the cucumber mosaic virus is transferred by stink bugs, the bugs must be controlled carefully and cucurbits like cucumbers and squash must not be grown near passion fruit plants.

iv. Yields:

About 8 months after transplanting into the field, first yields can be expected. After about 12 months the crop will be at full maturity. The average yields amount to about 10.0 tons per hectare and year. In well kept plantations, yields of more than 15 - 20 tons per hectare and per year can be obtained.

v. Economic Lifespan of the Passion Fruit Plantation

The lifespan of the passion fruit plant varies under regular crop husbandry between 3 and 4 years. Normally the yields decrease significantly after three years, after that it is advisable to remove the plants.

d) Harvesting and Marketing

Ripe fruits should fall to the ground. For processing they should never be picked, while still hanging on the plant; this might cause unnecessary wounds followed by heavy infection of diseases. The dropped fruits must be collected every second day and stored in a cool place until they are marketed.

For fresh market supply passion fruits should be picked when they have developed their characteristic fruit

colour and are about to drop. As a sign of ripeness, the major variety passiflora edulis 'Purple' becomes purple in colour. For processing purposes, the fruits must be delivered to the factory; in some areas the produce is also collected by the industry itself. The passion fruits should be ripe, fresh, clean and undamaged when they reach the factory.

e) Profitability of Passion Fruit Production

In the following table the profitability of a passion fruit production has been calculated, based on the following assumption:

Due to the high investment costs for the trellising system the profitability of passion fruit production is rather low. The gross margin reaches a peak with 25,650 during the 3rd year and declines afterwards due to decrease of yields. The results can be improved if the trellising system as such or parts of it can be used for a second production period.

3.3.4 PEAS (PISUM SATIVUM)

a) General Information

Peas - also called green or garden peas - have become important over recent years. They are a very nutritious (carbo-hydrates and proteins in particular) and are often consumed as a vegetable with meat or used for vegetable curries by the Asian community in Kenya. Local fresh markets in the urban centres and the processing industry are the major market outlets for peas. However, in recent years, "snow peas" have been successfully exported to Europe, mainly to France.

b) Ecological Requirements

Temperature:

Peas prefer cooler temperatures and are therefore most suited to the highland areas where they can be grown between altitudes of about 1,200m to 2,000m approximately. The optimum temperature for cultivation of peas is from about 19 to 23 degrees centigrade, with a minimum of 5 - 7 degrees centigrade and a maximum of about 30 degrees centigrade.

Water-requirements/rainfall:

Relatively high and well-distributed rainfall is most suitable for peas. About 500mm of rainfall per cropping season is considered optimal; minimum requirements amount to about 400mm.

Soils:

Silty clay-loam soils are most suitable for pea production, although peas can be grown on a wide range of soils provided they are well-drained and sufficient water is available. The optimum pH is between about 6 to 7.7

Suitable areas in Kenya

Peas can generally be cultivated at altitudes of about 1,200 to 2,000m provided soils and water supply are adequate. Good quality peas can be produced in Kakamega.

c) Agronomy

Varieties: For the Kakamega Fruit and Vegetable Factory, the following varieties are recommended for production:-

- Alderman
- Green-peas
- Meteor
- Onward

Seed-rate:

Seed requirements may vary considerably depending on the variety spacing and drilling technique used (hand, machinery). At the extreme about 200kg/ha may be required but the average requirement is about 80-120kg/ha.

Land preparation

Deep soil cultivation by ploughing or hoeing to a depth of about 30cm is recommended followed by harrowing.

Rotation:

Peas should not be grown on the same land for two production periods in succession. As rotation, crops like maize, potatoes or kales for example can be planted.

Manure:

If the soil is low in organic matter up to about 20 tons per hectare of manure can be distributed.

Planting times:

It is recommended that planting be done from May to October.

Peas require about 3 months from sowing to maturity; picking will continue for 4-6 weeks.

Raising:

Direct sowing is generally practised for pea production. Seeds should be sown in rows into small furrows about 2-3cm deep. Peas are sometimes also planted on raised beds or ridges.

Spacing:

Double row spacing is usually recommended for fresh market supply. The spacing is 50cm (between double rows) x 10-12 cm (between the two rows) x 8-10cm (within rows). If peas are grown for processing, a spacing of 20 cm x 3-5cm should be used.

Staking:

In view of the labour input involved, staking is only advisable for small scale farmers supplying the fresh market.

Pests and Diseases:

The major pests are:

- American Bollworm (Heliothis armigera)
  Symptoms: Caterpillars feeding on pods, leaves and flowers.

- Nematodes: Meloidogyne spp.)
  Symptoms: Reduced growth/yields; development of root-knots.

Bollworm control is possible through:

- strict crop rotation and burning of crop residues when affected as preventive measures

- spraying of e.g. Endosulfan, Carbaryl, or Trichlorphon.

The same preventive measures are suggested for the control of nematodes. In addition nematicides such as e.g. Carbofuran, can be applied at planting time.

Sometimes aphids might also affect peas in which case the crop should be sprayed with Dichlorvos or Dimethoate when necessary.

The main diseases are:

- Powdery Mildew (Erysiphe polygoni)
  Symptoms: Fungal film on upper sides of leaves.

- Seed-Borne Diseases (Ascochyta et al)
  Symptoms: Damping off of seedlings; black spots on leaves, pods and stems (blight)

Yields:

Usually farmers will harvest about 4-6 tons of peas in pods per hectare. The corresponding pure pea yield ranges from about 1 to 2.5 tons/ha depending on the maturity of the peas at the time of harvest. However, yields of around 10 tons or more per hectare can be produced on the booster farms.

d) Harvesting and Marketing

Garden peas have to be harvested when the pods are still green and before the seeds become mature and hard. For processing sophisticated methods will be used to determine the right time of harvesting.

High quality peas are graded based on the size of the seed and if sold in pods, on the appearance of the pods. Seeds which are too small or too large are not acceptable as first grade peas. Pods should be free of any kind of damage.

Picking of peas by hand should be done carefully to void breaking the shoots or even pulling out the plants.

e) Profitability of Pea Production

According to various studies, based on different methods of husbandry and locations, the gross margins range from Shs.3225 to Shs.9892 per cultivated hectare.

3.3.5 TOMATO (LYCOPERSION LYCOPERSIUM)

a) General Information

The tomato is a basic ingredient in the human diet and is one of the most important vegetables grown commercially in Kenya. It is reasonably rich in vitamins and minerals. Tomatoes are in high demand throughout the country for both fresh consumption and processing.

b) Ecological Requirements:

Temperature:

The optimum temperatures for tomatoes are about 20 to 25 degrees centigrade during the day and 13 to 17 degrees at night. Night temperatures above 17 degrees may lead to malformed fruits which results in low yields. Generally, tomatoes can tolerate high temperatures rather than lower.

Water requirements/rainfall:

Tomatoes prefer medium rainfall areas with irrigation. Excessive humidity results in a high incidence of disease. Ideally, about 600mm of rainfall should be over the production period. During the first month after transplanting the crops should not face any drought. In areas with continuous sunshine water should be applied every 3-5 days. As temperatures drop and relative humidity increases the irrigation intervals should be extended up to 7-10 days.

Soils:

A wide range of soils is suitable for tomato cultivation. The soil must be well-drained and should not be too heavy; silty loams or clay loams with a high content of organic matter are preferable. The pH should be 5 to 7.5.

Suitable areas in Kenya:

Tomatoes can be grown almost everywhere in Kenya up to an altitude of about 2,000m. Areas with very high precipitation are unsuitable during the rainy season, since tomatoes are highly susceptible to fungal diseases. This applies in the high rainfall zones of Western Province.

c) Agronomy:

Varieties:

For fresh market supply the following varieties are recommended:

- Moneymaker
- Marglobe
- Beauty
- Marmande
- Bonny Best

The most important fresh market variety grown in Kenya is Moneymaker, of which a number of strains are available on the market.

The appropriate tomato variety for the specific area should be selected carefully, as the variety trials for all agro-ecological zones have not been finalized and the variation of yields between the different areas are remarkable.

Varieties suitable for processing are:

- Roma
- San Marzano
- Petomech
- Mecheast
- Heinze 1350 (also for fresh market)
- VF 134-1-2

Roma, San Marzano, and Heinze 1350 are probably the major varieties cultivated for the processing industry.

Seed rate:

The seed required per hectare depends on the method of propagation chosen. About 0.5kg of seed is necessary for direct sowing and if transplanting is practised, about 120-150 grams are required.

Land preparation:

Deep cultivation is recommended for tomatoes. First the site should be cleared of roots, stones etc., and then ploughed and harrowed to a depth of about 25cm, depending on the depth of the soil.

Rotation

Tomatoes must not be preceded nor followed by another solanaceous crop such as eggplant, potato or sweet pepper. If possible, tomatoes should only be planted on the same land every two to three years. Suitable crops for rotation with tomatoes are e.g. maize, beans, peas, cabbage but never other solanaceae such as brinjals.

Manure:

Manure should be applied in quantities of up to about 30 tons/ha if the soils are poor in organic matter.

Planting times:

Tomatoes can be planted throughout the year, but the rainy season is less suitable in regions of high precipitation. The cultivation period of tomatoes is about 5-6 months, depending on the variety.

Raising:

Tomatoes are either raised in a nursery and transplanted or sown directly into the field. The first method guarantees the cultivation of good plants only and furthermore, it requires less seed. In comparison with direct sowing however, the labour input is higher and the cultivation period is longer. Tomatoes are transplanted when about 8-10cm high, 4-6 weeks after germination.

In general, tomatoes for fresh market supply are usually transplanted, whereas varieties grown for processing are often directly sown. On farms where sufficient labour is available, such as small holdings, transplanting is always recommended.

Direct sowing:

The field should be dry on the surface after the first heavy rains or after irrigation. Seeds can be treated with a suitable dressant, after which 2 - 3 seeds should be applied per hole 0.5 - 1.0cm deep. First the seeds should be covered with wet soil then dry soil and pressed slightly. If possible irrigate immediately after sowing. Four weeks after sowing thinning is done to one plant per hole. Use excess healthy seedlings to replace the dead plants or establish a new area.

Transplanting:

First raise the plants in a nursery or shade or in the field in a smaller plot. If a nursery is available, the plants are raised in half tins (Kimbo), wooden boxes or plastic bags containing a soil mix composed of two parts river silt and one part sand. Sow seeds in rows and water them. When seedlings are a month old prepare the field and start the hardening process. When approximately 45 days old, transplant the seedlings in the field, taking maximum care not to injure the roots. After transplanting watering is required immediately. use disease free plants for transplanting only.

Spacing:

If the tomatoes are grown for processing 60-70cm x 40cm is recommended. For fresh market supply the spacing is usually 90cm x 60cm and 90cm x 30cm, depending on the variety grown and the location of the farm. Today however, it is no longer economic to use the wider spacing in general. Preference should be given to a narrow spacing.

Staking: (only for fresh market)

Staking can improve the quality of tomatoes by preventing contact with the soil. Plants may be staked single with sticks about 1.5 -2m long; the plants are tied to the stakes.

Mulching:

Soil moisture should be conserved especially during the dry season; grass mulch and also polythene mulch can be used.

Pruning:

Pruning by cutting out side shoots may be done as soon as the side shoots are formed; two main stems are left. If bacterial diseases are likely to affect the plants, they are best left un-pruned.

Weeding:

The field should be kept clean and therefore regular weeding is advisable.

Pest and diseases:

Major Pests are:

- American Bollworm (Heliothis armigera)
  Symptoms: Round holes in the fruit; granular excreta near the damage.

- White Fly (Bemisia tabaci)
  Symptoms: Leaf distortion and stunting; if the leaves are moved, a cloud of tiny white insects rises from the plant.

- Aphids: (Macrosiphum spp. and Aphis gossypiiz)
  Symptoms: Leaf distortion; aphids are to be seen on the leaves and the stem.

- Mites (Tetranychus spp.)
  Symptoms: Pale coloured spots appear on the leaves; on the underside of leaves a fine web with tiny red mites can be seen.

- Nematodes (Meloidogyne spp.)
  Symptoms: Growth retardation; deformation of leaves, stem and roots.

For the control of the first three pests named above, the following chemicals for example are recommended:

- Endosulfan, Trichlorphon, Carbaryl, Dichlorvos.

For the control of mites, the following are recommended e.g. Dicofol, Binapacryl.

To combat nematodes crop rotation is recommended as a preventive measure but control of this pest can also be effected with chemicals such as e.g. Carbofuran, Phenamiphos or Dazomet.

The major diseases are:

- Blight (Phytophthora infestans)
  Symptoms: Dark bluish-green patches appear on leaves; later brownish sunken patches also appear on the fruit. The whole crop becomes black, if not controlled by chemicals.

- Target Spot (Alternaria solani)
  Symptoms: Stem canker on seedlings; leaf spots with partial defoliation of the crop; premature fruit drop.

NOTE

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ONLY AND THERE IS NO LOSS IN THE TEXT.

e) Profitability of Tomato Production

The production of tomatoes is a highly profitable enterprise. According to various studies, based on different methods of husbandry and locations the gross margins range from Ksh. 930 to Ksh. 14,104 per cultivated hectare.

3.4.0 TRADITIONAL VEGETABLES

The project will buy traditional vegetables during the time when these are in plentiful supply from the local farmers. These vegetables will be FROZEN and re-sold to these people when there is critical shortage of the same especially in the projet area. The range of these vegetables shall be (ordinary cabbages,* sukuma,* kunde,* lisutsa,* Livokoi,* miro*)

* These are local names.

CHAPTER IV

MARKET ANALYSIS AND MARKETING STRATEGY

4.0.0 MARKETING OF PRESERVED FRUITS AND VEGETABLES

4.1.0 ISSUES

4.1.1 To lead a healthy life man must have a balanced diet throughout the whole year. Recent years have witnessed the growth of health consciousness, especially in developed countries where the healthy life styles are setting constantly higher demands on foodstuffs. The consumer demands "healthy" food of high quality.

4.1.2 Food cultures invariably differ from country to country and also between individuals. The era in which we live also has an influence on the composition of food. Three eras are easily identifiable.

a) **Preindustrial era** where people's primary goal is to eliminate hunger and therefore any food procured is consumed.

b) In the **industrial era**, people have to perform hard physical labour and thus sufficient amounts of fat and sugar are essential since the body uses so much energy.

c) In the **Post Industrial era** or in the so called **information era**, typical of most developed countries different kinds of foods are needed and in particular less fat and less sugar. There is fully grown awareness of the quality of food and health is foremost everyday topic.

4.1.3 These three distinct food needs have led to the art of preserving perishable foodstuffs which the proposed fruit factory intends to market in the following target markets:

a) Domestic market - this market is predominantly preindustrial

b) Export market - this market will feature the three areas:-

- PTA subregion - mainly preindustrial
- Middle East, Eastern Europe - mainly industrial era.
- Western Europe is predominantly in the post industrial era.

4.1.4 The highest demand for the products of the proposed fruit factory supported by requisite purchasing power will be in the target markets of Europe as a whole. The Domestic market and PTA subregion markets are unfortunately constrained by poverty and low level incomes. The demand for preserved food ingredients is therefore low and income elastic. In Western Europe the demand is income in-elastic, high and consistent through-out the year.

4.1.5 Horticultural produce consisting mainly of fresh seasonal tropical fruits and vegetables now rank third as Kenya's foreign exchange earner through ever increasing exports. A major constraint in the export of fresh horticultural produce has been insufficient air freight cargo space. The best alternative to surmount this is sea-freight of preserved fruit juices, concentrates, pulps and vegetables which also have a longer shelf life when they reach the target markets.

4.1.6 The planned products will consist of the following:

	PRODUCT	SITC
4.1.6(a)	Passion Fruit Concentrate	059-951-00
4.1.6(b)	Tomato Concentrate Puree	056-731-00
4.1.6(c)	Tomato Juice	059-920-00
4.1.6(d)	Tomato Ketchup	098-420-00
4.1.6(e)	Tomato canned	056-739-00
4.1.6(f)	Mixture of Fruit & Vegetable Juices	059-960-00
4.1.6(g)	Other Juices Single strength	059-959-00
4.1.6(h)	Mixture of Fruits	058-969-00
4.1.6(i)	Mixture of Fruits	058-970-00
4.1.6(j)	Mixture of Fruits	058-793-00
4.1.6(k)	French Beans	056-793-00
4.1.6(l)	Beans-shelled	056-109-10
4.1.6(m)	Frozen Vegetables	054-541-00
4.1.6(n)	Dehydrated vegetables	056-190-00

4.1.7 Altogether the factory will produce 1500 tons p.a of the above products for the markets as follows;

		Production (Tons)	Export (Tons)	Domestic (Tons)
a)	Passion Fruit Products	120	120	-
b)	Tomato Products	180	40	140
c)	Mixture of Juices	140	140	-
d)	French Beans	400	400	-
e)	Peas	140	100	40
f)	Shelled Beans	250	150	100
g)	Frozen Vegetables	190	40	150
h)	Dehydrated Vegetables	80	40	40
i)	Green Beans	20	-	20
		1520	1030	490
		100%	70%	30%

4.2.0 **An Overview of World Trade: Juices**

4.2.1 Developing country suppliers accounted for over 50% of world trade in fruit juices which grew steadily and peaked US$ 4000m in 1989.(Table 1) and reached an estimated US$ 5000m in 1990.

4.2.2 Given a conducive and enabling investment environment, the prospects of developing countries (Kenya included) increasing their share of trade are excellent. Better product adaptation, to market requirements and improved marketing activities will be critical factors for improved export performance.

4.2.3 According to 1988 statistics derived from COMTRADE Data Base of the United Nations statistical office, the major fruit juices traded in were:-

	Product	Value in US$	% of World Trade
a)	Orange Juice	2291m	59.0
b)	Grape Fruit Juice	154m	4.0
c)	Pineapple Juice	149m	3.5
d)	Other Citrus Fruit Juices	99m	2.5
e)	Tomato Juice	15m	0.4
f)	Juices of other fruits	875m	26.6
g)	Mixture of Juices	60m	2.2

4.2.4 In the statistics, Tropical Fruit Juices and Concentrates other than pineapple are covered under the heading "Juice of other fruit and vegetables" and "Mixture of Fruit or Vegetable Juices". World trade in these tropical fruit juices excluding pineapple is estimated at 150,000 tons in 1990 in single strength equivalent with a commercial value of US$ 150m or about 4% of World Trade.

The four most important Tropical Fruit Juices and concentrates other than pineapple being the Mango, Passion, Guava and Banana Fruits; which it is estimated account for 75% of processed tropical fruit products in world trade.

4.2.5 Amongst developing countries, Brazil is by far the largest exporter followed by Mexico and Argentina. Kenya is ranked eighth as supplier of pineapple and passion fruit juices.
Cote d'Ivoire is also mentioned for exports of Mango products.

4.2.6 The five top markets are:- (US$ millions)

United States	1119
West Germany	667
United Kingdom	413
The Netherlands	317
Canada	249

These markets took nearly 70% of world imports in 1990.

4.2.7 Other markets have over those years increased their imports.

For instance France doubled from US$ 125m in 1984 to US$ 246 in 1988 as Belgium doubled from 64m to US$ 124m. Japan's imports increased by about 216% over the period from US$ 36m to US$ 144 as Italy went up by 285% US$ 24m to US$ 86. Sweden rose from US$ 48m to US$ 77m but Saudi Arabia declined to US$ 70m due to falling oil revenue. Other markets which have shown considerable growth are Spain, Greece and Republic of Korea.

4.2.8 The most important markets for tropical fruit juices based on Mango, passion, bananas and papaya fruits are; The Netherlands, (also for reexport) Germany, UK, France Switzerland and Saudi Arabia.

4.3.0 MARKET POTENTIAL

The project promoters envisaged to export 70% of the products mainly to the EC, Middle East and PTA subregion countries. The domestic market will absorb 30% of the products. A review of the target markets is described in the following paragraphs.

4.3.1 The EEC Market.

4.3.1 a) General Observations

- The EEC market in Europe has a population of 342 million whose per capita consumption for fruit juices averages 25 litres. Consumption in some countries such as Austria, Netherlands and Germany ranges between 30-50 litres per person p.a. The growth potential in consumption is excellent in those countries where consumption is low.

- Imports of fruit juices into the EEC are set further to expand with the unification of Germany and the changing life styles in Eastern Europe and the Commonwealth of Independent States.

- In addition to this direct consumption; fruit juice raw materials are used more and more in other food products such as Yoghurt, Bakery products and in baby foods and as food flavours or colouring in confectionary.

4.3.1 b) The volume of imports into the EEC will be influenced by the following factors:-

- European Consumers have developed a strong preference for fresh food, particularly fruits and vegetables as this food is considered more healthy.

- European consumers are interested in high quality food products with less fat, sugar and calorie.

- Organically grown food products have become very popular.

- Various regulations have been imposed to ensure that imports of food products satisfied several strict health and environmental standards. Consumer awareness of these standards is prevalent.

- The consumption of fruit juices has become more socially acceptable as an alternative to alcoholic beverages on health grounds.

- The consumption of frozen fruit and vegetables at expense of canned products with food preservatives has become popular on health grounds.

- There is an upsurge in the consumption of tropical fruit juices and vegetables.

4.3.1 c) Table 5 is an overview of per capita consumption of fruit juices in major markets. What is striking about this table is that 11 of these countries are members of the EEC and growth in consumption of juices is evident in all of them.

4.3.2 Market Characteristics

4.3.2 a) **Industrial end users**

The project promoter has established that end uses of fruit juices, concentrates and pulps vary with the type of fruit and markets. However a few end uses are common to all markets.

The **Beverage industry** produces juices nectars, fruit juice drinks; dietetic drinks, diabetic drinks, multi fruit and multi vitamin beverages & syrups. In all markets all fruit juices offered must be 100% juice with no additives. However tropical fruit beverages with a 100% juice content are rarely sold on the retail market because of their high acidity content or excessively strong taste.

- A **Fruit nectar** consists of juice or pulp content ranging from 25% to 50%. e.g. Mango - 35%. passion and guava 25%. The definition for **fruit juice drinks** is less precise and may include such ingredients such as citric acid, ascorbic acid, essential oils, aromas, preservatives. These drinks contain little juice but absorb a considerable amount of raw material as they are sold in large volumes. Those sold as health drinks may contain 100% fruit juice content with vitamins added.

- **Multi-fruit** or **multi-vitamin** drinks mainly sold in Western Europe contain 10 or 12 different fruits including tropical ones.

4.3.2 b) The **Dairy Industry** produces such items as yoghurt, yoghurt drinks, ice cream, puddings, desserts and sauces. The market for these products has grown considerably and more of these products are prepared with a fruit base - e.g yoghurts have fruit content of 10% - 24% and are produced with bases prepared from fruit juices concentrate and pulp. Tropical fruit flavours have attracted interest in recent years.

4.3.3 **Consumer Habits and Product Preferences.**

Consumer habits and product differences vary from market to market.

4.3.4 **Packaging**

a) Bulk packaging

Depending on the end users, fruit juice raw materials comes in several different forms. The 200 litres aseptic drum are used for certain tropical products such as banana juice, mango pulp and passion fruit concentrates. Tropical fruit concentrates, pulp and puree are often hot packed in cans of 3-5kg or deep frozen in cartons of 20-25kg or in drums of 200ltrs.

b) **Consumer packs** - packing in liquid holding paper board cartons is now very popular and the sharp rise in consumption in Europe is attributed to this type of packaging and though the promoter has established that there is little demand for imports of juices with this kind of packaging and it will not be considered in this study for the export market.

4.3.5 **Importer's Requirements** - There is virtually no demand for fruit juices and nectars from developing countries in consumer packs due to high freight cost. Importers therefore prefer, single strength fruit juices, concentrates, pulps in bulk which are then reprocessed. The table No. 10 lists the most commonly traded fruit products and the specifications.

To ensure that these specifications are met, the project's promoters are in contact with importers and industrial end users through CBI to assist in product adaptation.

4.3.6 **Competition and prices**

The promoters are aware that they expect to face competition not only from Kenyan producers, but also from

other countries. To achieve a market share, the promoters will offer competitive prices and speciality products with advice of importers. Export/Import prices vary according to the type of juice, method of processing and packaging used and the source of supply. Table 9 at the end of this chapter shows that passion fruit products are the most expensive.

4.3.7 Distribution Channels

The project promoters through investigation finds that importers and blenders in one country e.g. Netherlands often supply bottlers and end users elsewhere in EC with fruit juice raw material. Thus the EC market is very much integrated. Tropical fruit juice and pulp will thus reach the market in small quantities through specialised importers and agents acting on behalf of blenders.

4.3.8 Market Access.

In the course of our study, it was observed that customs duties on fruit juices, concentrates, and fruit pulps vary considerably between markets and between products and between sources of supply.

In the EEC tariffs are high for some juices. Country's under the GSP e.g. Kenya are subjected to lower tariffs.

Since Kenya is a signatory to the Lome convention its products will enter the EEC duty free. See table 11 on tariffs for the products in the EEC.

4.3.9 Exports to the Middle East and PTA region

We have considered the potential for exporting to the Middle East and PTA subregion and disregard these markets for the first five years for the following reasons:

a) The EEC market will absorb all the available products of the factory for the export market.

b) The Middle East is already sourcing preserved fruits and vegetable products in consumer packs from Europe and competition is bound to be severe. Moreover export performance on this market in the past has been very poor according to available statistics.

c) The case for the PTA subregion is somewhat different. The demand for preserved fruits and vegetable products does exist especially in Ethiopia, Somalia and Sudan which have experienced

civil strife in recent years. Dietary improvements in these countries are necessary as there are serious food shortages of all types. Preserved vegetables would therefore be suitable for export to these countries. Unfortunately, we find that these countries cannot be reliable trade partners for the following reasons:-

i. Poverty and low level incomes.
ii. Lack of foreign exchange
iii. Reliance on adhoc orders for food supplies funded by Donors.

It was therefore not possible for the time being to develop a market strategy based on these countries.

During the late seventies and early eighties Uganda was a very good market for Kenyan products. The economic recovery which is being witnessed in Uganda in recent years has entailed a recovery of industrial activity and a rehabilitation of food processing industries. The country is agriculturally prosperous and in fact one Kenyan firm has advanced plans to set up a food processing complex based on the versatile horticultural products raw materials available. This market, too, cannot be relied upon.

4.3.10 **Domestic Market**

The outlook on the domestic market is somewhat dismal were we to determine the project viability on it and the reasons for this are:-

a) Food consumption patterns are vastly different with consumers preference for fresh fruits and vegetables rather than in their preserved form.

b) Due to poverty and general low level incomes, family monetary outlays on preserved fruits and vegetables is given a very low priority as this is considered a luxury.

The situation in the urban centres such as Nairobi where population growth is rated at 10% p.a. is somewhat different. There is a growing awareness of the need for healthy food intake particularly amongst the more affluent.

More recently, the cost of living has risen very sharply with resultant shift in food consumption patterns. The

consumption of alcoholic drinks has taken a nose dive in recent month due to sharp increases in the price of beer. An ordinary lager beer is now US$ 0.92 per litre as compared to orange juice at US$ 0.65 per litre and carbonated soft drinks at US$ 0.43 per litre. Moreover carbonated beverages and beer have to be consumed at once while orange juice has a longer shelf life after opening the container. The chances, therefore, are that more and more people will shift to the consumption of fruit juices and fruit drinks in the urban areas. Imported fruit drinks in consumer packs from Europe and South Africa are now available in most supermarkets in Nairobi. Although it is difficult to quantify actual demand or levels of consumption, we are safe in concluding that Nairobi and other urban centres will constitute a key market for the products of the factory in competition with other producers and imports.

The demand for green vegetables far outstrips the supply in some districts and would thus lead to higher consumption of preserved vegetables and legumes particularly in Western Kenya. Moreover the prices of meat products has risen sharply in recent months leading to greater reliance by consumers on vegetables which are still relatively cheaper when supplies are available.

According to forecasts in the 1988-1993 five year development plan, Kakamega district where the proposed factory will be located, the net annual deficit in vegetables was estimated at over 50,000 tons and for legumes over 15,000 tons. The Districts and its neighbours have for many years relied on imports from Nakuru and Nandi Districts.

The District has the potential to grow vegetables and legumes all year round but the need for preservation facilities is there.

In the absence of green vegetables during the dry season of December, January and February and the early rains growing period of March, April and May, severe shortages of green vegetables and legumes are experienced. It is during this period that preserved vegetables will find ready market.

Having considered the three target markets, we conclude that the EEC offers the best market opportunities for the project and should take 70% of the products to justify the setting up of a modern food processing facility leaving 30% for the domestic market.

4.4.0 DATA REQUIRED FOR MARKET ANALYSIS AND EVALUATION

The data presented (Tables 1-8 at the end of this chapter), in this study highlights the following:

4.4.1. Imports by value into World Markets in 1985-1989 listing the main importing countries - imports of fruit juices - Table 1.

a) The US, W. Germany, UK, Netherlands and France were the top 5 in World imports with over 64%.

b) 10 EEC member States imported close to 52% in value.

c) The Netherlands was the 4th largest importer in the world and the 3rd in EEC.

d) Growth in value of imports averaged 11% over the period.

4.4.2. Exports by value to World markets of Fruit Juices 1984 - 1988 - Table 2.

a) Brazil is by far the leading exporter of Fruit Juices followed by the US and the Netherlands and W.Germany accounting for nearly 62% of exports in 1988.

b) Growth in exports averaged 10% over the period.

c) The Netherlands was strikingly the 3rd largest exporter with domestic production rated at 10%.

d) Kenya is ranked 27th.

e) The exports from Netherlands and Kenya showed growth over the years.

4.4.3 Imports of Fruits and Vegetables Juices into the 15 largest markets by volume and quantity. (1985 - 1989 Table 3)

a) 10 EEC member states are amongst the top 15 importers in World Trade.

b) The Netherlands is ranked 4th.

4.4.4 Imports of Fruits and Vegetable Juices into the EEC in 1990 by value. Table 4.

a) W. Germany, the Netherlands, UK and France between them imported 80% of Fruit Juices.

b) The Netherlands is ranked 2nd with nearly 20%.

c) Unfortunately this table does not show the quantity and value of tropical fruit juices and the countries from which the imports were sourced.

4.4.5 Per capita consumption of fruit juices and Nectars in the various markets in 1975 - 1989 - Table 5.

a) The table reveals overall growth in consumption of fruit juice.

b) 7 EEC member states have per capital consumption of over 10 litres with Germany taking the lead. An average of nearly 23 litres.

c) The Netherlands is ranked 5th in per capita consumption.

4.4.6 Netherlands - Imports of Fruits and Vegetable Juices by quantity and value 1985-1989. Table 6.

a) Growth in quantity and value is highlighted.

b) Tropical juices such as passion papaya, guava are not highlighted so their growth potential cannot be shown.

4.4.7 Netherlands - Exports of Fruits and Vegetable Juices by quantity and value - 1985-1989 - Table 7.

a) Overall growth in exports is depicted.

b) More significant is the higher value in reexports indicative of value added whilst in transit due to reprocessing activities in the Netherlands. See table 8 below.

4.4.8 Relation between imports and exports 1985 - 1989.

a) Exports by volume averaged 45% whilst by value, the average was 82%.

b) Unfortunately there are no statistics for individual fruit juices.

The greatest limitation of all the data presented so far in the 8 tables is that they related to the years 1985-1989. The World economic order changed sharply due to recession in Europe and the US. The unification of Germany, the political and economic changes in Eastern Europe and the Commonwealth of Independent States all took place in 1990-1992

4.4.9 **Preserved Vegetables for Industrial Use**

Imports - Volume 1000Kg

Vegetables	1987	1988	1989
- Frozen	75166	61095	62434
- Intermediate	5681	9609	20314
- Dried	9005	8125	9705

Transit Trade - Reexports - Volume 1000Kg

Vegetables	1987	1988	1989
- Frozen	500860	100183	101231
- Intermediate	15624	15180	17119
- Dried	9005	8135	9705

Imports by value

Vegetables	1987	1988	1989
- Frozen	686.4	167.3	177.9
- Intermediate	12.3	15.6	15.0

nb: Data for the years 1990 to 1992 were unavailable at the time of this study.

4.4.10 Tables - 1-10 relate to exports of preserved fruits and vegetables products from Kenya for the years 1990-1992. Effort has been made to obtain statistical data on domestic consumption without success probably due to trading culture in the country. Exports in aircraft and ships relates to products to be consumed in commercial passenger aircraft using the two international airports and ships docking in Mombasa harbour.

Table 1

PASSION JUICE SITC 059-920-00 EXPORTS

Year	1990		1991		1992	
Exports to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Uganda	-	-	-	-	375	10956
Zaire	-	-	-	-	25	723
Switzer-	496	117260	11516	715456	78120	2816833
land	275004	12510181	199584	10684028	225246	18836370
Netherlands	-	-	132	10251	-	-
Japan	-	-	-	-	750	17310
UAE	822	46770	1303	50904	1613	101329
Air craft & ships						
Total	276322	12679211	212535	11460639	336129	21783521
Unit price	45.90		53.90		64.80	

The Netherlands is by far the largest importer of Passion fruit juice from Kenya having imported an average 240 tons p.a. between 1990 and 1992. Switzerland was an inferior second in imports. Belgium and Germany have expressed interest in passion fruit juices Average Sales Value US$ 215385 p.a. US$ 1 = Kshs 65.00

There is no indication in the statistics showing whether the juice was in single strength or concentrate, but both are processed in Kenya for export.

Table 2.

OTHER JUICES OF ANY SINGLE STRENGTH 059 959 00

Year	1990		1991		1992	
Exports to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Mozambique	-	-	48967	1779193	16517	50777
Mauritius	-	-	10	500	-	-
Somalia	30	3152	-	-	3280	99221
Sudan	30	677	7764	630243	-	-
Tanzania	12	108	331	7345	1831	86009
Uganda	1530	31391	2288	57592	1462	988873
Zaire	-	-	159	5664	36	1229
Netherlands	429195	11933239	511965	17681111	98804	3441341
Italy	-	-	49317	2057303	-	-
Yemen	12160	353070	-	-	-	-
UAE	-	-	10	185	-	-
Israel	-	-	-	-	402787	19181791
Aircrafts & Ships	2400	77925	2058	83598	2074	110808
Total	445857	12399572	622869	22272734	52691	19510049
Unit price		27.83		35.75		31.34

The Netherlands again is the major importer of this product but the imports declined to 98 tons from a high of 512 tons probably due to competition from other sources. Israel took, over the imports of other juices probably during period.

Average Sales US$ 169516.

Table 3

MIXTURE OF FRUIT & VEGETABLE JUICES SITC 059 960 00 - EXPORTS

Year	1990		1991		1992	
Exports to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Somalia	1475	47627	-	-	3242	104616
Sudan	442	36318	1731	179334	-	-
Rwanda	-	-	676	11220	-	-
Tanzania	6811	113008	733	19885	8865	302008
Uganda	5462	269799	417	6959	475	11481
Zaire	-	-	-	-	243	6350
Aircraft & ships	1841	70435	1620	66094	3522	219397
Total	16031	537187	5177	283492	16347	722052
Unit price		33.50		54.75		44.17

Minor quantities of this product was exported to the PTA subregion. Tanzania was the leading importer in 1992.

Table 4

TOMATO JUICE SITC 059 920 00 EXPORTS

Year	1990		1991		1992	
Exports to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Germany	4	160	-	-	-	-
Uganda	-	-	16	160	650	10598
Sudan	-	-	-	-	20	240
Tanzania	-	-	-	-	80	26880
Aircraft & Ships	315	31332	337	1369	474	165564
Total	319	31492	353	13799	1224	103282
Unit Price		98.72		39.09		84.38

Table 5

TOMATO PUREE - 056-731-00

Year	1990		1991		1992	
Exports to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Tanzania	9	1002	-	-	2934	138158
Germany	-	-	10	400	-	-
Somalia	-	-	-	-	50	1000
Aircraft & ships	2614	129794	4311	225793	2934	138158
Total	2623	130796	4321	226193	3945	285759
Unit Price		49.86		52.34		72.43

Table 4 & 5

Trade in these product is not significant Exports went out by way of aircraft or ships stores.

Table 6

TOMATO KETCHUP SITC 098-420-00

Year	1990		1991		1992	
Export to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Sudan	150	9497	-	-	260	7097
Tanzania	1834	30699	6989	133260	4061	431678
Uganda	18730	317600	5503	73461	850	8135
Yemen	10000	134173	-	1250	-	-
Zaire	-		75	-	450	18716
Somalia	-		-	8297	47	910
Rwanda	-		168		-	
Aircraft & Ships	3152	110361	1525	81701	2537	137623
Total	33866	602330	13850	277398	8205	604159
Unit price		17.78		20.02		73.63

The Volume of exports to the PTA subregion was poor but again Tanzania was the leading importer.

Table 7

BEANS - SHELLED SITC 056-792-00 EXPORTS

Year	1990		1991		1992	
Export	Kg	Kshs	Kg	Kshs	Kg	Kshs
Belgium	34570	9888187	-	-	-	-
France	1572493	65194880	1194690	64148323	1239591	95904066
Somalia		-	10000			
UK	-			100000	12	4234
USA		-	-			
	-	-	-	-	30621	1559885
Air-craft	-			-	13500	833740
ships						
	85	2494	12	240	162	27192
Total	1,507148	6618531	1204702	64248563	1283886	98379117
Unit Price		41.18		53.33		76.62

France is by far the leading importer of this product. Exports were as high 1572 tons 1990 but declined to 1239 tons in 1992. In spite of the overall decline the value of the exports remains high over the period. Belgium was the second largest importer in 1990.

Average exports by value US$, 1,155,114,
Average exports by volume 1365 tons p.a.

Table 8.

VEGETABLE PREPARATION & BEANS) SITC-056-793-00

Prepared or preserved otherwise than by Vinegar or Acetic Acid (Not frozen)

Year	1990		1991		1992	
Export to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Sudan	900444	9323256	-	-	-	-
Finland	681	1600	-	-	-	-
Belgium	933530	29693275	2440511	81827147	1081 650	41746567
.....Denmark	16320	561440	- 13324 60	-	1468 770	-
France	481068	17206701	- 6	50754301	- 815	65545801
UK	15360	616674		-		-
Tanzania	-	-	6 90	198	- -	25235
Uganda	-	-	-	350	26	-
Zaire	-	-	513336	1500	65280	-
Somalia	-	-	45008	-	143500	170
Germany	823539	20094548	-	15585948	-	2173991
..... Netherland	-	-		1573862	50	6397762
Switzerland	-	-	33	-		2385473
Air-craft ships	47	1844		2541		2320
Total	3170989	77499338	4,331,450	149745847	2,810,887	118276919
Unit Price	24.44		34.57	43.07		

France is the leading importer of canned french beans from Kenya. Exports to France tippled over the period 1990-1991 from 481 tons in 1990 to 1468 tons in 1992.

Belgium was the second largest importer and imports to German declined sharply to 65 tons over the period.

Average exports by volume - 3438 tons p.a
Average exports by value US$ 1,7771,908

Table 9

OTHER FRUITS & EDIBLE PARTS OF PLANTS PREPARED & PRESERVED SITC 058-969-00 - EXPORTS
(Fruits Salads)

Year	1990		1991		1992	
Exports to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Somalia	560	30720	-	-	-	-
Netherland	62	1705	-	-	-	-
s	72	1910	-	-	-	-
UK	-	-	571	50915	280	36000
Ethiopia	-	-	70830	992298	-	-
Germany	-	-	-	-	150	6545
Tanzania	-	-	-	-	200	24667
Uganda	1353	61891	200	11520	1057	61295
Aircraft & ships						
Total	2047	96226	71601	1054733	1687	128507
Unit Price		?47.00		14.73		76.17

Table 10

MIXTURE OF FRUITS & OTHER EDIBLE PARTS OF PLANTS SITC 058-970-00

Year	1990		1991		1992	
Export to	Kg	Kshs	Kg	Kshs	Kg	Kshs
Somalia	-	-	-	-	770	68274
Netherlands	-	-	-	-	150	5625
Aircraft & craft	105	6932	-	-	66	4942
Total	105	6932	-	-	986	78841
Unit Price		66.01				79.96

Export trade in these products is not significant.

Overall these statistics reveal that the greatest potential in exports is in French Beans, Shelled Beans and Passion fruit juices. Planned Production has taken this order into account. The project promoters believe that export market is not fully exploited and yet Kenya is advantageously positioned as compared to China which exports large volumes of canned beans to Europe.

All the data presented in this study reveal growth potential in consumption, exports by volume and value, imports by volume and value.

We have made extensive references to studies undertaken at the International Trade Centre (ITC/UNCTAD) in Geneva and the Centre for the Promotion of Imports from Developing Countries (CBI) at the Hague. These studies are positive that there is a market for preserved fruits and vegetables in the EC in general which can be exploited by producers in tropical developing countries with exotic fruit and vegetable products.

The market share targeted by the Kakamega Fruit Factory cannot be quantified. Whatever quantity that will be produced and adapted to meet the stringent EEC requirements will be absorbed in the market. Moreover European importers for products that the factory plans to produce are always looking for sources of new suppliers provided quality specification are met and the price is competitive. According to CBI studies annual average imports of preserved fruits and vegetables was 2253m. Kg of preserved vegetables and 1929m Kg of Fruit Juices in 1991.

As stated earlier, consumption statistics in the domestic market are difficult to come by. Due to steeply rising costs of living in Kenya; food consumption patterns are geared to shift in favour of preserved fruits and vegetables particularly in fast growing urban centres.

From the foregoing analysis, it is clear to us that all products to be produced by the factory will be sold at a reasonable profit margin in both the export and domestic market through out the life of the project.

We shall illustrate this assertion by analyzing the prospects of Passion Fruit Concentrate exports to the Netherlands.

According to CBI news bulletins of June 1992 an upsurge in fruit juices and drinks consumption was evident in 1991, increasing no less than 10% to 380m litres or a per capita consumption of 23.3. litres. The growth in consumption is primarily claimed by fruit drinks from which the turnover increased by 30% to 85m litres. The increase for fruit juices showed a mere 6% increase in comparison.

The report adds that the Netherlands is a pivotal point in the international trade in fruit juices. The import and re-export of fruit juices and fruit juice concentrates is acquiring increasingly large proportions, parallel to increased consumption, both at domestic level and in other EC countries.

An indication of the Netherlands role as a redistribution of fruit juices to other countries is provided by an examination of export statistics. Over the five years. Period 1985 - 1989, the total

export value increased from US$ 137m to almost US$ 247m (up 74%) with exports by weight increasing from nearly 97000 tons to nearly 150,000tons (up 48%).

Exports by weight averaged slightly more than 47% of imports over the period. In value terms exports as a percentage of imports averaged 82%. This disparity signifies that there was a significant element of value added in the Netherlands due to activities such as storage, repacking, blending, agents commissions and other costs associated with export servicing.

Major exports markets were the EC countries in order of size were W.Germany the UK, France, Italy, Sweden, Belgium - Luxembourg, Switzerland, Denmark and Spain.

The CBI news bulletin for June 1992 adds that, the Netherlands imported at least 313,000 tons of fruit juice concentrates in 1991. This was a 25% increase over 1990 and nearly 9% more in comparison with 1989. The value of imports in 1991 came to US$376 million. If this strong growth is assumed to have continued through 1992, 1993 then the following table can be derived:

Imports in tons

1989	1990	1991	1992	1993
285000	235000	313000	391000	489000

Thus imports will average 342,000 tons per year between 1989 - 1993. The orange juice concentrate in frozen form from Brazil was the principle juice traded, followed by apple juice.

Demand for pineapple and other tropical juices is expected to increase as part of the overall expansion of the market. All the major bottlers are planning to include tropical juices in their products development programmes.

The CBI news bulletin of June 1992 does not give statistics for other juices but nonetheless the project promoters are able to derive certain assumptions from it.

The promoter assumes that 10% of the imports consisted of exotic fruit concentrates such as passion, mango, guava, papaya and tomato. Thus imports in volume could have averaged 34200 ton over that period.

The second assumption he makes is that nearly 80% of this tonnage originated from developing countries i.e. 27360 tons.

In the years, 1990-1992, Kenya exported 232 tons p.a of passion fruit products and 313 tons p.a of other juices in single strength

juices. It is not clear what proportion of the passion products was exported as concentrate, and so the promoter makes another assumption that 50% was in the concentrate form i.e. 116 tons representing 0.4% imports from developing countries.

The promoter is convinced that Kenya can do better than this on this market with this product by supplying up to 5% annually over the next 5 years or 1370 tons p.a. The promoter projects that even if the existing exporters in Kenya increased their export volume 10 times over the next two years there would still be a gap of 210 tons to be supplied by another processor/exporter.

It is this gap that the proposed fruit factory should take. The factory thus aims to produce 300 tons of passion fruit concentrate in the first 5 years of operation.

The project promoter has used the same approach in analyzing all the other products for the export market and derived that the factory will process and preserve speciality products as follows:

Product	Year1	Year2	Year3	Year4	Year5	Year6-10
			(T o n s)			
Passion Concentrate	120	150	180	240	300	1500
Tomato Concentrate	40	50	60	80	100	500
Other juice Concentrates	140	180	220	290	360	1800
French Beans	400	500	600	700	800	4000
Peas	100	150	200	250	300	1500
Shelled Beans	150	180	210	240	300	1500
Frozen Vegetables	40	50	60	70	80	400
Other (Dehydrated)	40	50	60	70	80	400
Total Exports	1030	1410	1640	1940	2320	11600

On the domestic market, the volumes derived are as follows:-

Product	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-10
			(T o n s)			
Tomato Products						
Sauce	20	30	40	50	60	300
Paste	20	30	40	50	60	300
Ketchup	20	30	40	50	60	300
Canned peeled	30	40	50	60	70	350
Canned unpeeled	30	40	50	60	70	350
Tomato Juice	20	30	40	50	60	300
Other Beans						
Green Beans	20	30	40	50	60	300
Peas	40	60	80	100	120	600
Shelled Beans	100	120	140	160	180	900
Frozen Vegetables	150	180	210	240	270	1350
Dehydrated Vegetables	40	60	80	100	120	600
Total volume (Domestic)	490	650	810	970	1130	5650
Grand Total	1520	2030	2510	3030	3670	18350

Tables 11 (a), (b), (c) and (d) represent Sales Programmes.

Table 11 (a) represents Sales Programme for 10 years. These programmes assume that the price of passion fruit and papaya concentrates will be US$4000 and US$2200 per ton respectively in a 70% export and 30% domestic market scenario. Alternative market strategies depicting the following scenarios are represented in Sales Programmes 11(b), 11(c) and 11(d).

In 11(b) we have reduced the price of passion fruit and papaya concentrates to US$2500 and US$1570 respectively but maintained a 70% export and 30% domestic market.

In 11(c) the strategy is to market 50% export and 50% domestic with the prices of passion fruit and papaya concentrates at US$2500 and US$1570 respectively.

In 11(d) the strategy is to market 30% export and 70% domestic with the prices of passion and papaya concentrates as in 11(b) and 11(c).

On the basis of these sales programmes, we have derived four cash flow projections in the Financial Analysis chapter as CFA1, CFA2, CFA3 and CFA4.

It is evident that the sales programme to be pursued by the project promoter is 11(a) with its related cash flow projections of CFA1.

4.5.0 MARKETING STRATEGY

4.5.1 Target Markets.

The overall strategy is that the fruit and vegetable processing factory shall export 70% of its products to the EEC through the Netherlands whilst the domestic market will absorb 30%. The rationale for this strategy is based on the following considerations.

a) It became evident in the course of our investigations that the success of the project is highly dependent on a consistent market with the requisite purchasing power to purchase high quality products.

b) The domestic market is riddled with widespread poverty and low level incomes such that there is insufficient purchasing power to support the kind of project envisaged in this study.

c) Food consumption patterns in Kenya are more concerned with elimination of hunger as compared to the EEC culture which over the recent years has swiftly adjusted to healthy food awareness.

d) The demand for vegetables far outstrips the supply particularly in Kakamega where the factory will be located.

e) The demand for tropical fruit juices and their derivatives does exist in Europe provided producers in Kenya are able to adapt their products to the stringent EEC requirements.

4.5.2 The Netherlands & EEC

The choice of the Netherlands as the entry point into the lucrative EC market is based on:

a) The National Demand for preserved fruit and vegetable products.

b) Reexport Trade where the Netherlands plays an important role in the redistribution of fruits juices and vegetables with an added value. Indeed agents and importers in other EC countries prefer to import their products through Netherlands for distribution into Europe.
The Netherlands is ideally situated to be the distribution centre for goods throughout Europe.

Rotterdam is by far the most important harbour in Europe for goods transported by ship. Amsterdam International Airport 'Schiphol' is the 4th largest distribution centre for air-freighted cargo in Europe. Dutch importers do focus on entire European Market.

There are 200 million people living within one day's drive from Amsterdam. London, Paris, and the Industrial Ruhr Area lie within a 500km radius. 25% of all overseas goods shipped to the EC go through Dutch Sea ports with Rotterdam accounting for nearly, 80%.

4.5.3 Market Characteristics

Industrial end Users

Within the domestic market the major uses of fruit juice and concentrates is the beverage industry. Some quantities are used in the yoghurt, dairy and baby foods industries.

Blending companies use large quantities of imported fruit juice concentrates and produce blended juices primarily for export. Domestic consumption in Netherlands is estimated at 10% of total production.

Tropical juices, nectars and drinks are viewed by the trader as a growing sales item albeit a minor one. Multiflavoured and two flavoured tropical drinks can be seen on retailers shelves, in the Netherlands and consumers have accepted them fairly readily. The trader believes that the major obstacles to an expansion in this market are the fluctuations in tropical juice prices and consumer price - consciousness in the Netherlands. Acto serum is a new product which is very popular and its

additives are tropical fruit concentrate. It is perceived as high in nutritional value and is associated with health, fitness and sport.

The Netherlands has always been a forerunner in the development of new drink products and remains so. We found that major beverage companies include tropical juices in their research development programmes.

4.5.4 Marketing, Packaging and Labelling Requirements

Fruit juice concentrate are imported into the Netherlands in three basic forms of package.

a) In bulk in specially designed ships and discharged into tank farms.
b) In 20 ton road tankers
c) In 200 litre drum with double polyethylene lining.

Labelling on imported concentrates, pulps and puree are standard for all EC countries with information on product specification, source, weight, date of packaging, name of producer, and degrees brix. In addition, labelling will be in accordance with QUID (Quantitative Ingredient Declaration). This is a compulsory requirement to make known the content of certain ingredients or constituents. Specific labelling requirements such as dilution requirements are normally given to the supplier.

4.5.5 Competition and Prices.

The Netherlands is essentially an entry port for the rest of Europe and is therefore an extremely competitive market for potential suppliers.

The blenders who are the major users purchase directly or through agents from producers in the country of origin. The blenders compete with similar companies in other countries and they must therefore source products at the best prices. Competition exists for tropical fruit juices and the reason for targeting the Netherlands is its volume of transit trade as prices are almost uniform in Europe.

4.5.6 Distribution Channels

These activities are very much limited because blenders in Netherlands purchase directly from producers in country's of origin.

4.5.7 Blending Houses

The Netherlands has some of the largest blending companies in Europe. For example **Euro citrus** specialises in citrus fruits and tropical juices, **Argil** in citrus and other fruit juices. **Mondi** in tropical fruit juices, **SVZ** in tropical juices and red fruit. All are supplied direct from source or tank farms in Rotterdam.

They compete against each other and other blending companies in throughout Europe notably in Germany and Belgium. The main role is to import raw materials of various sorts and to blend them into bases for the manufacturer of a wide range products like fruit juices, fruit juice drinks, ice creams yoghurts, and baby foods. The value added by these blenders is considerable as seen in earlier statistic. Blenders are a major element in the fruit juice industry in the Netherlands and Europe.

The project promoters are therefore targeting these blenders and they will ensure they will supply container loads of good quality products and as per specification.

4.5.8 The Domestic Market

Western Kenya and Kakamega district in particular suffers from deficit supplies of green vegetables and legumes. This captive market there should thus take all the products that will be targeted for it. Potential areas with high consumption rates include the Mumias and Nzoia Sugar complex, Webuye Paper Complex, the Army units bases near Eldoret, numerous Boarding Secondary Schools and tne fast growing market centres.

4.5.9 Product Standards

The market for fruit in syrup/water is declining every year because of the consumer interest in fresh products. Canned vegetables in competition with fresh and frozen products do not seem to be expanding any more.

However, the role of preserved fruits and vegetables in the gastronomical culture of Netherlands is important since the appearance of modern trends involving convenience meals. Health food of high quality is the critical factor. Organically grown fruits and vegetables, which carry a costly price tag command only a small share of market. According to CBS statistics sales of Fruits and Vegetables in the Netherlands in 1991 reached US$ 3.3 billion, whereas in 1987 it was US$2.7 billion. Fruit and vegetables have gained popularity during recent years. In 1987 figure spent on foodstuffs in the Netherlands was US$71.1 billion but in 1991

that had risen to US$18.3 billion. The % growth of Fruits and Vegetables 22.4% was greater than the % growth achieved by foodstuffs in general 16%.

The annual increase in sales of preserved vegetables was 3.4% in money terms is primarily attributed to the extended number of packaging sizes particularly the small ones as well as the introduction of 'new' and luxury varieties such a maize and red kidney beans.

4.5.10 With this scenario the promoters are faced with two alternative courses of action affecting product characteristics.

Either offer standard products at competitive prices.
Or develop speciality products which trade in Europe will accept as **"something special"** owing to consumer demand for organic foods coupled with the development of a new market for these products. Accordingly, the promoters will adopt the regulations on production and labelling of these foods published in 1991 for organic foods.

The second alternative will obviously be more difficult to pursue and yet offers the project the best marketing prospects with higher profit margins. To succeed into the EEC market with this strategy, the promoters plan to:-

i. Adapt to changed EC consumer tastes and habits with strong preference for organically grown products which have become extremely popular.

ii. Before the harmonisation process of the standards is complete adopt the highest standards set by the strictest EC member states as their products norm- namely those standards applicable in the Netherlands, Germany and the UK.

iii. Product and producer certification is priority for the promoters. The promoters aim at achieving the ISO 9001-9003 which is a guarantee that they have complied with the highest standards for processing, quality control and management.

As this will give their products a competitive advantage in the EC over other products and that failure to obtain these certificates will lead to the eventual exclusion from trade and industry as suppliers.

Product and producer standards will play an important role as a factor in competition between different suppliers to the EC in the 1990s and beyond. With this awareness, the promoters shall closely monitor developments in this field and develop

their own codes of products and processing standards.As of July 1993,a regulation came into force on the certification of certain food products.Its official title is Council Regulation No,2082/92 on certificates of specific character for agricultural products and foodstuffs.Promoters will have to comply with this regulation.

The promoters starting point is thus the standards set by the **Codex Alimentarius Commissions** for preserved fruits and vegetable products, together with **Methods of Analysis and Sampling** products set out below for the product mix chosen.

The promoters are thus committed to Total Quality Management being implemented. Everywhere production will be geared to "Zero defect".

4.5.11 **THE PRODUCT MIX**

The proposed product mix will be as follows:-

	Product	SITC No.	Packaging
4.5.11(a)	Passion Fruit Concentrate.	059-951-00	Bulk
4.5.11(b)	Tomato Concentrate/Puree	056-731-00	Bulk
4.5.11(c)	Tomato Juice	059-920-00	Consumer
4.5.11(d)	Tomato Ketchup	098-420-00	Consumer
4.5.11(e)	Tomato canned	056-739-00	Consumer
4.5.11(f)	Mixture of Fruit & Vegetable Juices	059-960-00	Consumer
4.5.11(g)	Other Juices Single strength	059-959-00	Consumer
4.5.11(h)	Mixture of Fruits	058-969-00	Consumer
4.5.11(i)	Mixture of Fruits	058-970-00	Consumer
4.5.11(j)	French Beans	056-793-00	Consumer
4.5.11(k)	Beans-shelled	056-109-10	Consumer

4.5.12 **Codex Alimentarius Standards and Kenya Bureau of Standards.**

The processing and preservation of the above products will be in accordance with two standards namely:

a) **Codex Standards** - will apply for products which are targeted for the export Market.

b) **Kenya Bureau of Standards** - which are derived from Codex Standards will apply for products which are targeted for the domestic Market.

The Codex standards and KBS cover the following aspects:-
- Essential Composition and Quality factors
- Contaminants
- Hygiene
- Weights and Measures
- Labelling
- Methods of Analysis and Sampling.

4.5.13 THE SPECIFICATIONS, QUALITY AND PACKING OF THE PRODUCTS

We are in full agreement with the promoter that the products to be produced should be fully defined and described in this study.

a) PASSION FRUIT CONCENTRATE:

. Description

Concentrated passion juice will be the unfermented product capable of fermentation after reconstitution preserved exclusively by physical means from the raw materials. It will be turbid.

. Process Definition

The process of concentration will consist of the physical removal of water until the product has a passion solid content of not less than 50% m/m as determined by the refractometer at 20^0C uncorrected for acidity and read as 50^0 Brix on the International Sucrose Scales.

The raw material from which this product will be obtained will be unfermented but fermentable passion juice obtained by a mechanical process from sound ripe passion fruits of the purple variety.

. Essential Composition and Quality Factors

. Requirements for the Juice after Reconstitution.

The passion juice to be obtained by reconstituting passion fruit concentrate will comply with the provisions of the Codex Standard for passion fruit juice Preserved Exclusively by physical means. The soluble passion solids shall not be less than 50% m/m.

. - Sugars.

One or more solid sugars as defined by the Codex Alimentarius Commission will/not be added. If added the total quantities will not exceed 50g/kg in the product

obtained by reconstituting the concentrated passion juice to 50^0 Brix.

- Contaminants Maximum Level

-	Arsenic (As)	0.2mg/kg
-	Lead (Pb)	0.3mg/kg
-	Copper (Cu)	5mg/kg
-	Zinc (Zn)	5mg/kg
-	Iron (Fe)	15mg/kg
-	Tin (Sn)	250mg/kg
-	Sum of copper, zinc and iron.	20mg/kg
-	Sulphur dioxide	10mg/kg

- Mineral impurities insoluble in 10% hydrochloric acid shall not exceed 25mg/kg.

- Hygiene

This product will be prepared in accordance with International Code of Hygienic Practice for Canned Fruits and vegetables products (Ref No CAC/RCP 2 - 1969) and the General principles of Food Hygiene (Ref No CAC/RCP-1-1969 Rev 1) recommended by the Codex Alimentarius Commission.

When tested by appropriate methods for sampling and examination this product shall:-

- be free from micro-organisms capable of development under normal conditions of storage.

- not contain any substances originating from micro-organisms in amounts to represent a hazard to human health.

- not contain mould filaments in a quantity indicative of unsuitable raw materials or unsanitary processing lines. This will be determined by a mould count using the Howard Method. (Ref:AOAC(1970) 40.085-molds(25) Official Final Action, and 40.002 not in excess of 30% positive fields.

- Weights and Measures

Fill of container.

- Aseptically Hot packed containers of either 20Kg or 200 Kg.

- The concentrated juice shall occupy not less than 90% v/v of distilled water capacity at 20^0C which the sealed container will hold when completely

filled.

- Labelling

  In addition to sections 1,2,4 and 6 of the Codex General Standard for the labelling of Prepackaged Foods, the following provisions will apply:-

  - Name - Passion Fruit Concentrate.
  - Ingredients - Nil
  - Net Contents - This will be declared by weight in metric terms.
  - Name and Address - Either the name of manufacturer or Importer will be declared.
  - Country of Origin - Kenya
  - Lot Identification - Each container will be embossed in code to identify the producing factory and the lot.
  - The passion fruit will be the only pictorial representation on the label.
  - There will be information regarding storage requirements.
  - Degree of concentration - instruction for dilution will be given on the container by stating the percentage of soluble passion fruit solids by weight as determined by the refractometer. At 20^0C uncorrected for acidity and read as 50^0 Brix on International Sucrose Scale.

- Methods of Analysis and Sampling

  See part 4.5.13 of this study.

b) **PASSION FRUIT JUICE.**

- Description

  This product will be the unfermented but fermentable juice intended for direct consumption obtained by a mechanical process from the endocarp of sound, ripe passion fruits (pessiflora edulis sims)) preserved exclusively by physical means.

- Essential Composition and Quality Factors

  - Soluble solids - the soluble passion fruit solids content of passion juice shall not be less than 28% m/m as determined by the refractometer at 20^0C, uncorrected for acidity and read as 28^0 Brix on the International Sucrose Scale.

  - Sugars - the following sugars will be added - sucrose, dextrose and glucose. If added the total

sugars added will not exceed 50gm/kg.

- Ethanol Content - shall not exceed 25gm/kg.

- Volatile Acids - some traces of volatile acids will be allowed.

- Essential oils - if any shall not exceed 10m/kg.

- Organoleptic Properties - the product shall have the characteristic colour, aroma, and flavour of passion fruit juice.

. Contaminants — Maximum levels

- Arsenic (As)	0.2mg/kg
- Lead (Pb)	0.3mg/kg
- Copper (Cu)	5mg/kg
- Zinc (Zn)	5mg/kg
- Iron (Fe)	15mg/kg
- Tin (Sn)	250mg/kg
- Sum of copper, Zinc & iron	20mg/kg
- Sulphur dioxide	10mg/kg

. Hygiene

This product will be prepared in accordance with International Code of Hygienic Practice for Canned Fruit and Vegetable Products (Ref No CAC/RCP 2-1969) and the General Principles of Food Hygiene Ref No CAC/RCP 1-1969 Rev 1) recommended by the Codex Alimentarius Commission.

. Weights and Measures

- Fill Container - the juice will be packed in either bottle jars or aluminium containers of 80 - 200ml.

- The juice will occupy not less than 90% v/v of the distilled water capacity of the container at 20^0C which the sealed container will hold when completely filled.

. Labelling

In addition to section 1,2,4 and 6 of the Codex General Standard for labelling of prepackaged foods (Ref No Codex Standard 1-981) the following

provisions will apply:-

- Name of product - Passion Juice.
- Ingredients - if any will be listed.
- Net Contents - will be given.
- Name & Address - Address of manufacturer or Importer will be given.
- Country of Origin - Kenya
- Lot Identification - Each container shall be embossed to identify the factory and the lot.
- Pictorial representation - only the passion fruit to appear on the label.
- Storage requirements - will be given.

. Methods of Analysis

See part 4.5.13 of this study.

c) **TOMATO JUICE** (Preserved Exclusively by Physical Means)

. Description

This product will consist of the unfermented but fermentable juice intended for direct consumption, to be obtained by a mechanical process from sound, red or reddish tomatoes (Lycopersicum esculentum L) preserved exclusively by physical means. The juice will be strained free from skins, seeds and other coarse part of tomatoes and from other hard substances and impurities.

. Essential Composition and Quality Factors

Soluble Tomato Solids content of tomato juice exclusive of added salt shall not be less than 4.5% m/m determined by a refractometer at 20^0C, uncorrected for acidity and read as degrees 45^0 Brix on the International Sucrose Scale.

Salt may/may not be added.
Organoleptic properties - the product shall have the characteristic colour, aroma and flavour of tomato juice.

. Contaminants		Maximum level
- Arsenic	(As)	0.2mg/kg
- Lead	(Pb)	0.3mg/kg
- Copper	(Cu)	5mg/kg
- Zinc	(Zn)	5mg/kg
- Iron	(Fe)	15mg/kg

- Tin (Sn) 250mg/kg
- Sum of Copper, Zinc & iron 20mg/kg
- Sulphur dioxide 10mg/kg
- Mineral impurities insoluble in 10% hydrochloric acid shall not exceed 25mg/kg.

. Hygiene

- This product will be prepared in accordance with International Code of Hygienic Practice for Canned Fruits and Vegetables Products (Ref:No CAC/RCP-2-1969) and the General Principles of Food Hygiene (Ref: No. CAC/RCP 1-1979) as recommended by the Codex Alimentarius Commission.

- When tested by appropriate methods for sampling and examination, the product shall,
  - be free from micro-organisms capable of development under normal conditions of storage.
  - not contain any substances originating from micro-organisms in amounts which may represent hazard to human health.
  - not contain mould filaments in a quantity indicative of unsuitable raw materials or unsanitary processing lines. Mould count as determined by the Howard method (Ref AOAC(1970) 4-.085 - molds(25) Official Final Action, and 40.002(m) not in excess of 30% positive field will be done.

. Weights and Measures

- Fill of container - the product will be filled in bottle jars or aluminium containers of 80 ml - 200 ml.
- The juice will occupy not less 90% v/v of the distilled water capacity of the container at 20^0C which the sealed container will hold when completely filled.

. Labelling

In addition to section 1,2,4 and 6 of the Codex General Standard for the labelling of prepackaged Foods (Re: No CODEX STAN1-1981) the following provisions will apply:

- Name of Product - Tomato Juice
- Ingredients - will be listed if any e.g. Salt in descending order of proportion.
- Met contents - in metric units as either 80ml or 200ml.

- Name & Address - manufacturer or Importer.
- Country of Origin - Kenya
- Lot Identification - each container shall be embossed to identify the producing factory and the lot.
- Pictorial Representation - will consist of tomato fruit only.
- Storage - Storage requirements will be given.

. Methods of Analysis and Sampling

See part 4.5.14 of this study.

d) **TOMATO PUREE (PASTE) (CONCENTRATE**

. Description

- Tomato Puree will be the unfermented product which is capable of fermentation after reconstitution preserved exclusively by physical means and obtained by the process of concentration. The product may be turbid or clarified.

- The process of concentration will consist of the physical removal of water until the product has a soluble solids content of not less than 4% m/m as determined by the refractometer at 20^0C uncorrected for acidity and read as degrees Brix on the International Sucrose Scale.

- The raw material from which this product will be obtained will be unfermented but fermentable tomato juice obtained by a mechanical process from sound, red and reddish tomatoes. (**Lycopersicum esculentum** L)

. Essential Composition and Quality Factors

Requirements for juice after reconstitution.

- The product to be obtained by reconstituting the concentrated tomato juice in accordance with degree of concentration(see below) shall comply with the provisions of Codex Standard for Tomato juice preserved exclusively by physical means.

- Tomato Puree will be tomato concentrate containing not less that 8.5% of natural tomato soluble solids and not more than 25% total solids by weight.
- Tomato Paste will be tomato concentrate containing 25% or more by weight of natural tomato soluble solids.

. Contaminants

The limits of contaminants will not exceed those laid down in the Codex Standard for Tomato Juice preserved exclusively by physical means.

. Hygiene

- This product will be prepared in accordance with the International Code of Hygienic Practice for Canned Fruits and Vegetable Products and the General Principles of Food Hygiene as recommended by the Codex Alimentarius Commission.

When tested by appropriate methods of sampling and examination the product shall;

- be free from micro-organisms capable of development under normal conditions of storage.
- not contain any substances originating from micro-organism in amounts which may represent a hazard to human health.

. Weights and Measures

- Fill of container will be in 20kg or 200 kg aseptically hot packed drums.

- The concentrate shall occupy a minimum fill of 90% v/v of the distilled water capacity of the container at 20^0C which the sealed container shall hold when completely filled.

. Labelling

- In addition to sections 1,2,4 and 6 of the Codex General Standard for the labelling of prepackaged Foods (REf: No CODEX STAN 1 - 1981) the following provisions shall apply:

  - Name of Product - Tomato concentrate or Puree or Paste
  - Net Contents - 20Kg or 200 kg in Metric weights
  - Name and Address - manufacturer or Importer
  - Country of Origin - Kenya.
  - Hot Identification - Each container shall be embossed to identify producing factory and the lot.
  - Pictorial Representation - with tomato fruit only
  - Storage conditions - will be given.

- Degree of concentration - instructions for dilution shall be given on container by stating the percentage of soluble tomato solids by weight as determined by refractometer at 20^0C uncorrected for acidity and read as degrees Brix on the International Sucrose Scale.

. Methods of Analysis and Sampling

See part of 4.5.14 of this study.

e) **CANNED TOMATOES**

. Description

- This product will be prepared from clean ripe, red or reddish, sound tomatoes from the fruit **Lycopersicum esculantum L** to be processed by heat before or after sealing in a container without water as a packing medium. The tomatoes will have the stems and calices removed and shall be cored. The tomatoes shall be in either peeled or unpeeled form. The tomatoes will consist of a whole tomato of any size in which the colour would not have been altered by coring and trimming. They shall not be cracked or split to the extent of having material loss of the placenta.

- The tough and fibrous textured core material will be cored out. Fruits contrasting in colour with normal ones will be removed. The canned tomatoes will exclude totally extraneous plant material such as leaves, stems and calyx bracts.

- "Peeled" tomatoes will mean tomatoes in which the skins have been removed whereas "unpeeled" tomatoes will refer to the tomatoes in which the skins will remain intact.

- The styles of pack will be in the following forms:

  - Whole
  - Whole and pieces
  - Pieces
  - Dices
  - Slices
  - Wedges

- The types of pack will consist of:

  - Regular Pack - with a liquid medium added other than water.

- Solid Pack - without any added liquid medium.
- Flavoured or seasoned pack - with permitted vegetable ingredients such as onions, peppers and celery, not exceeding 10% m/m of the product.

. Essential Composition and Quality Factors:

- Colour - Drained tomatoes shall have a normal red or reddish colour characteristic of tomatoes that have been properly prepared and processed without artificial colouring matters.

- Flavour - canned tomatoes shall have a normal flavour and shall be free from flavour foreign to the product. Flavoured or seasoned packs shall have a flavour characteristic of that imparted by tomatoes and the ingredients used.

- Wholeness - canned potatoes of a 'whole' style shall consist of not less 80% m/m of drained tomatoes in whole units.

- Requirements for the Packing Media

The following packing media will be used:-

- Juice - unconcentrated, undiluted liquid from ripe, sound, tomatoes.
- Residual material - liquid strained from the residue from preparing tomatoes for canning.
- Puree or pulp - unconcentrated tomato juice
- Paste - highly concentrated tomato juice

  - The packing media shall have a pH of 4.3 or lower. Firming Agents will be any of - food grade calcium chloride, calcium sulphate, calcium citrate, mono calcium phosphate. The total quantity of such conditioners shall not exceed 0.26% of the weight of the finished product and will be expressed as calcium ion content.

  - Salt, Spices, Flavourings, and seasonings may or may not be added. Where added, the salt content shall not exceed 0.6% of the weight of product. Acetic, citric, lactic, lic, and tartaric acids will be used as acidifying agents.

. Weights and Measures

- Solid Pack - without any added liquid medium.
- Flavoured or seasoned pack - with permitted vegetable ingredients such as onions, peppers and celery, not exceeding 10% m/m of the product.

. Essential Composition and Quality Factors:

- Colour - Drained tomatoes shall have a normal red or reddish colour characteristic of tomatoes that have been properly prepared and processed without artificial colouring matters.

- Flavour - canned tomatoes shall have a normal flavour and shall be free from flavour foreign to the product. Flavoured or seasoned packs shall have a flavour characteristic of that imparted by tomatoes and the ingredients used.

- Wholeness - canned potatoes of a 'whole' style shall consist of not less 80% m/m of drained tomatoes in whole units.

- Requirements for the Packing Media

The following packing media will be used:-

- Juice - unconcentrated, undiluted liquid from ripe, sound, tomatoes.
- Residual material - liquid strained from the residue from preparing tomatoes for canning.
- Puree or pulp - unconcentrated tomato juice
- Paste - highly concentrated tomato juice

  - The packing media shall have a pH of 4.3 or lower. Firming Agents will be any of - food grade calcium chloride, calcium sulphate, calcium citrate, mono calcium phosphate. The total quantity of such conditioners shall not exceed 0.26% of the weight of the finished product and will be expressed as calcium ion content.

  - Salt, Spices, Flavourings, and seasonings may or may not be added. Where added, the salt content shall not exceed 0.6% of the weight of product. Acetic, citric, lactic, lic, and tartaric acids will be used as acidifying agents.

. Weights and Measures

Fill of the Container

- The product will be packed in Tin plate cans of 280ml or 400ml.

- The product will occupy not less than 90% of distilled water holding capacity at 20^0C which the sealed container will hold when completely filled.
- Drained weight of the contents shall not be less than 60% of the net weight of the container.

. Contaminants Maximum

- Arsenic	(As)	0.5 ppm
- Lead	(Pb)	1.0 ppm
- Copper	(Cu)	10.0 ppm
- Zinc	(Zn)	20.00 ppm
- Tin	(Sn)	250.00 ppm

. Hygiene

- The products shall be prepared in accordance with the International Code of Hygienic Practice for Canned Fruits and Vegetable Products and the General Principles of Food Hygiene recommended by the Codex Alimentarius Commission.

- When tested by appropriate methods of sampling and examination the product shall:

- be free from micro-organisms capable for development under normal conditions of storage.
- not contain any substances originating from micro-organism in amounts hazardous to human health.
- not contain mould filaments in a quantity indicative of unsuitable raw materials or unsanitary processing lines.

- Microbiological limits shall be:

- Total Viable counts	-	10 per gm
- Yeasts and moulds	-	Nil
- Eschirichia Coli	-	Nil
- Salmonella	-	Nil

- In the Howard Count the product shall not contain mould filaments in excess of 40% positive fields.

. Packing

- Canned tomatoes shall be packed in tins plate cans, or bottle jars or aluminium cans, with a food grade acid resistant lacquering material that shall not affect the

quality of the product.

- The interior of the CAN shall not show any black discolouration, rusting or pitting.

. Labelling

- Labelling of the products shall be done in accordance with section 1,2,4 and 6 of the Codex General Standard for the labelling of Prepackaged Foods (Ref No Codex Stan 1-1981) plus the following provision.

  - Name of the Product - Canned Tomatoes.
  - Name and Address of manufacturer - Kakamega Fruit Factory
  - Country of Origin - Kenya
  - Net Weight in grams - will be given in metric weights
  - List of Ingredients - will be given
  - Date of manufacture and lot- each container will be embossed to identify producing factory and the lot.
  - 'Sell by .....' date - will be given.
  - Storage requirements - will be given.
  - Instructions on Usage - will be given.

. Methods of Analysis

See Part 4.5.14 of this study.

f) **TOMATO SAUCE AND KETCHUP**(Highly Seasoned Tomato Products)

. Description

- This product shall be prepared from sound, ripe, red or reddish tomatoes and will be highly seasoned characteristic of the ingredients to be used such as pepper, onions, vinegar, and sugar in quantities that will materially alter the flavour, aroma and taste of the tomato component.

- The Tomato Sauce will be the concentrated product prepared from the liquid extracted from sound, ripe whole tomatoes as a by product of canned tomatoes or tomato juice extraction or a combination of these two. The product may or may not contain added edible salt, spices, nutritive sweetening agents, vinegar, onion, garlic, or other vegetable ingredients and permitted thickening agents. The product shall contain not less that 25% total solids and not less than 8.5% natural tomato soluble solids by weight.

- Tomato Ketchup will be the concentrated product prepared from the liquid extracted as a result of canning tomatoes as a by product. The product will contain not less than 28% total solids and not less than 8.5% natural tomato soluble solids by weight.

- Additives- Benzoic acid shall be used as a preservative.

. Essential Composition and Quality Factors

Colour - the product shall have a reddish colour of highly seasoned tomato products derived from ripe and sound tomatoes without artificial colouring agents.

Flavour - the product shall have a characteristic tomato flavour of tomatoes with added ingredients and shall be free from foreign flavours.

Texture - highly seasoned tomato products shall have a good body with an evenly divided texture.

Defects - the product shall be free from the following defects:
- dark sects or scale-like particles
- seeds or other objectionable particles of seeds.
- tomato peels.
- harmless plant materials other than permitted additives.

. Fill of Container

- Tomato Sauce and Ketchup will be filled in plastic bottles of sizes 400gm, 800gm.

- Highly seasoned tomato products shall occupy a fill of not less that 90% of distilled water at 20^0C, holding capacity of the container when it is completely filled.

. Compositional Requirements

Characteristic	Requirement
- Total Solids content as % by ss, min	
Sauce	25
Ketchup	28
- Natural Tomato Soluble Solids content % by ss min	8.5
- Edible Salt % by ss, min.	0.6

- Benzoic Acid content x 750 ppm

- pH - not higher than 4.3

. Contaminants Maximum Levels

- Arsenic	(As)	0.5 ppm
- Lead	(Pb)	1.0 ppm
- Copper	(Cu)	10.0 ppm
- Zinc	(Zn)	50.0 ppm
- Tin	(Sn)	250.0 ppm

. Hygiene

- The product shall be prepared in accordance with the International Code of Hygienic Practice for Canned Fruits and Vegetable Products and the General Principles of Food Hygiene recommended by the Codex Alimentarius Commission.

- When tested by appropriate methods of sampling and examination the product shall:

  - be free from micro-organisms capable of development under normal conditions of storage.

  - not contain any substances originating from micro-organisms in amounts hazardous to hun health.

  - not contain mould filaments in a quantity indicative of unsuitable raw materials or unsanitary processing lines.

  - The Howard count shall not contain mould filaments in excess of 40% positive fields.

- microbiological limits:

i. Total viable counts - 10per g.
ii. Yeast and moulds - Nil
iii. Escherichia Coli - Nil
iv. Salmonella - Nil

. Packing

Highly seasoned tomato products will be packed in plastic containers that shall not affect the quality of the product.

- Labelling

  As for canned tomatoes

- Methods of Analysis and Sampling

  See part 4.5.14 of this study.

4.5.14 METHODS OF ANALYSIS AND SAMPLING

1. Taking of a sample and Expression of results as m/m.

According to the IFJU method no.1 1968 determination of relative density and IFJU General Sheet, 1971. Conversion of analytical results m/v (g/l, mg/l) to m/m (g/Kg, mg/kg) and the reverse.

2. Test of Fermentability

According to the IFJU method no 18, 1974 Fermentation, Test. Results are expressed as 'positive' or 'negative'.

3. Determination of Apparent Viscosity

According to the AOAC (1970) method (Official Methods of analysis of the AOAC, 1970, 22.008-22.010: Apparent Viscosity (consistency) (5) - Official Final Action) Results are expressed in seconds.

4. Determination of L - Ascorbic Acid

According to IFJU method no 17, determination of L - Ascorbic acid or micro-fluorometric method of AOAC (Official methods of Analysis of the AOAC 1975) 43.056-43-062. Results are expressed as mg L-Ascorbic acid/Kg.

5. Determination of Carbon Dioxide

According to the IFJU No. 42, 1966, Determination of Carbon dioxide results are expressed as g carbon dioxide/kg.

6. Determination of Essential Oils

According to the AOAC(1970) method (Official methods of analysis of the AOAC 1970 22.096 - 22.097 and 19.117 Essential Oil(37) - Official First Action. Results are expressed as ml essential oils/kg.

7. Determination of Ethanol

According to IFJU method No. 2 1968 Determination of alcohol (Ethyl Alcohol) 1/ Results are expressed as g ethanol/kg.

8. Determination of Honey.

Should be evident in the course of project implementation.

9. Determination of Hydroxymethyl/furfural (FMF)

According to the IFJU method No 12 1968 Determination of HMF, as amended according to postel (Deutsch Lebensm Rundseh; 1968, 64 318) Results are expressed as mg HMF/kg rounded off to the nearest whole number.

10. Determination of the minimum content of Fruit Ingredient

Will come later.

11. Determination of Added Salt

According to IFJU method No 37 1968, Determination of chloride(potentiometric micro-method). The determination of sodium is not necessary. Results are expressed as % m/m Nacl.

12. Determination of Soluble solids

According to the IFJU method No.88 1968. Estition of soluble solids, indirect determination of Analysis of the AOAC 1975, 22.019, 31.009 and 52.010. Results are expressed as % m/m Sucrose (degrees Brix) with correction for temperature to the equivalent at $20^{0}C$.

13. Determination of Sugars

According to IFJU method No 4, 1968. Determination of Sugar (Lust-School Method) Results are expressed as % m/m.

14. Determination of Total Titrable Acids

According to IFJU method No 3 1968. Determination of titrable acid (total Acid). Results are expressed as g anhydrous citric acid/kg.

15. Determination of Volatile Acids

According to the IFJU method No 5 1968. Determination of volatile acids. Results are expressed as g acetic acid/kg.

16. Determination of water capacity and fill of container

According to method published in the Almanac of the canning, freezing, preserving industries 58th Edition 1970 p. 131-1322 E.E Judge and sons. Westminster MD(USA).

17. Determination of Arsenic

According to the IFJU method No 47 1973 Determination of arsenic (method No. A36/F) of the "Office International de la vigne et du vin". Results are expressed as mg arsenic/kg

18. Determination of Copper

According to the IFJU method No. 13 1964, Determination of copper (photometric method). Results are expressed as mg/cu/kg.

19. Determination of Iron

According to the IFJU method No 15 1964 Determination of Iron (photometric method). The determination shall be de after dry ashing as described in section 5 - rerk (b). Results are expressed as mg iron/kg.

20. Determination of Lead

According to IFJU method No. 14, 1964 Determination of Lead (Photometric method). Results are expressed as mg lead/kg.

21. Determination of Mineral Impurities Insoluble in hydrochloric Acid.

According to the AOAC (1975) method (official methods of analysis of AOAC 1975 22.025 pera 1, 31.012 and 30.008 Ash insoluble in acid. Official Final Action. The exact concentration of HCI to be used is not critical. Results are expressed as mg mineral impurities insoluble in HCL acid/kg.

22. Determination of Sulphur Dioxide

According to the IFJU method No. 7 1968. Determination of total sulphur dioxide. Results are expressed as mg S_02/kg.

23. Determination of Tin

To be elaborated

24. Determination of Zinc.

According to AOAC (1975) method (official methods of Analysis of the AOAC 1975, 25.136-25.142. Zinc- Official First Action colorimetric method (26)

4.6.0 MARKET ACCESS EEC AND SALES PROMOTION

4.6.1 Trading conditions in EC will change rapidly over the next few years as a consequence of three important developments.

First is the process of the realisation of the internal Market of the European Community. Two effects easily discernible for the realisation of EC internal Market with particular reference to fruits are:

i. effects on the Common Agricultural Policy which has the following components relevant to Kenya as they will distort trade.

- High tariffs for imports from third countries.

- Import restrictions on imports from third countries, including countervailing duties, import quotas, import licences and voluntary export restraints.

ii. effects of regulations introduced or prepared by the Commission in the context of the programme for the realisation of the internal market. Prior to the harmonisation of standards the Kakamega fruit and vegetable project will have to adopt the standards of the strictest EC member states namely the Netherlands, Germany and UK. After harmonisation, a product accepted by a member state will automatically qualify for trade in the entire EC. The products shall have to adapt in all respects - quality, packaging labelling, and to fit in with the logistical system of European distributors.

The second development will arise from the consequences of the final outcome of the GATT Uruguay Round of Trade negotiations which will have effect on the EC trade regimes. The EC offer on processed Tropical Fruits and Vegetable is very limited as for instance on processed passion fruit, guavas and tamarinds with tariffs varying from 12 to 16%. The outcome of the Uruguay Round will not however, bring about major changes to the GATT codes on standards.

Current tariff rates which might be affected are listed herewith as table 9.

The third development will arise from the rapid development and closer economic cooperation between EC countries and the countries of Eastern Europe. EC will favour products from Eastern Europe. At the same time the overall market in Europe will expand.

Table 1 Imports of fruit and vegetable juices, by major market, 1985-1989
(in millions of United States dollars)

Importing country/area	1985 Value	1985 % of total	1986 Value	1987	1988	1989 Value	1989 % of total
United States	822.77	31.1	868.97	974.30	1,119.35	899.85	23.0
Germany, Fed. Rep.	359.85	13.6	416.95	530.45	667.83	636.95	16.3
United Kingdom	243.63	9.2	225.36	323.67	418.77	385.76	9.9
Netherlands	165.66	6.3	177.85	245.93	316.52	304.54	7.8
France	131.43	5.0	135.19	185.27	246.47	292.12	7.5
Canada	240.55	9.1	206.31	228.55	249.19	250.26	6.4
Japan	79.36	3.0	61.42	78.02	114.37	162.89	4.2
Belgium-Luxembourg	69.23	2.6	56.52	98.55	123.93	120.30	3.1
Italy	32.84	1.2	43.67	67.53	85.79	95.55	2.4
Saudi Arabia	121.19	4.6	89.31	73.55	71.63	70.56	1.8
Sweden	44.80	1.7	47.02	59.43	75.71	70.05	1.8
Austria	41.85	1.6	47.47	52.04	56.53	62.29	1.7
Switzerland	38.55	1.5	39.85	52.34	65.12	57.53	1.5
Spain	8.67	0.3	11.60	22.45	40.24	51.34	1.3
Korea, Rep. of	7.53	0.3	4.53	10.35	22.86	49.80	1.3
Denmark	30.60	1.2	33.73	44.12	58.73	48.56	1.2
Australia	18.02	0.7	10.94	6.65	27.26	35.17	1.0
Finland	14.04	0.5	14.03	21.10	31.72	32.59	0.8
Israel	22.02	0.8	21.21	31.18	56.90	25.85	0.7
Norway	19.00	0.7	21.87	30.56	27.72	27.68	0.7
Greece	2.64	0.1	4.16	6.61	17.90	23.05	0.6
New Zealand	10.59	0.4	6.56	14.14	14.83	19.04	0.5
Ireland	12.03	0.5	14.54	14.95	18.71	17.83	0.5
Singapore	5.91	0.2	9.01	9.93	14.42	17.44	0.4
Hong Kong	8.79	0.3	10.42	12.44	14.83	17.05	0.4
Taiwan Province (Ch	4.76 a/	0.2	5.51 a/	7.50 a/	11.62 a/	10.53 a/	0.3
Kuwait	12.00 b/	0.5	11.00	10.00 b/	10.00 b/	10.00 b/	0.3
Portugal	1.27	0.1	1.81	3.12	7.52	9.59	0.2
USSR	13.43 a/	0.5	17.97 a/	16.26 a/	3.00 a/	[illegible] c/	0.2
Panama	5.72	0.2	5.84	8.85	5.77	7.19	0.2
China	..	..	..	..	..	6.45	0.2
Poland	6.36	0.2	6.12	6.04	6.00 b/	6.00 b/	0.2
Yugoslavia	3.02	0.1	3.90	4.90	5.85	4.60	0.1
Venezuela	3.73	0.1	2.73	4.95	4.07	4.00 b/	0.1
Barbados	2.24	0.1	3.23	3.11	5.02	3.60 b/	0.1
Others	39.35	1.5	41.32	61.63	50.67	47.77	1.2
TOTAL	2,648.65	100.0	2,712.14	3,337.12	4,065.70	3,904.90	99.9
% Growth	-		2.4%	23.0%	21.8%	-4.0%	

Source: UNSO/ITC Comtrade Data Base System.

a/ Based on export figures of major world suppliers.

b/ ITC estimates.

Table 2 Exports of fruit and vegetable juices, by major suppliers, 1984-1988 a/
(in millions of united states dollars)

Origin	1984		1985	1986	1987	1988	
	Value	% of total	Value	Value	Value	Value	% of total
Brazil	1,258.21	45.2	1,028.36	923.36	1,180.27	1,538.21	38.3
United States	250.16	9.0	244.20	205.20	256.94	323.08	8.1
Netherlands	125.49	4.5	148.86	166.37	238.50	308.21	7.7
Germany, Fed. Rep. of	156.79	5.6	159.08	227.63	261.00	307.41	7.7
Israel	164.09	5.9	195.40	150.50	210.59	270.84	6.8
Italy	128.39	4.6	145.12	158.30	193.12	193.82	4.8
Belgium-Luxembourg	51.75	1.9	57.45	91.20	96.63	115.80	2.9
Mexico	60.62	2.2	13.84	33.26	58.80	98.15	2.4
Argentina	50.68	1.8	52.91	57.31	84.68	92.80	2.3
Austria	44.32	1.6	51.12	60.43	75.45	65.97	1.6
Spain	31.74	1.1	39.05	39.99	47.93	60.86	1.5
France	28.12	1.0	36.11	50.28	56.32	57.62	1.4
Poland	21.48	0.8	20.53	48.94	46.38	48.17	1.2
Morocco	15.17	0.5	25.25	22.26	11.37	41.62	1.0
Philippines	31.43	1.1	36.11	39.93	40.60	40.23	1.0
Denmark	29.45	1.1	23.50	33.18	37.52	39.30	1.0
Thailand	13.02	0.5	17.68	22.40	22.46	34.05	0.8
South Africa	23.36	0.8	24.03	27.55	21.86	31.93	0.8
United Kingdom	14.35	0.5	15.70	17.04	22.57	27.85	0.7
Hungary	9.65	0.3	14.89	20.16	35.37	24.24	0.6
Belize	11.53	0.4	11.79	11.49	15.04	22.84	0.6
Switzerland	19.14	0.7	12.38	23.78	26.69	20.78	0.5
Yugoslavia	12.56	0.5	12.93	12.57	17.38	17.36	0.4
Japan	81.63	2.9	61.54	41.78	23.47	16.04	0.4
Australia	3.84	0.1	6.10	12.58	16.48	15.55	0.4
Chile	5.39	0.2	5.95	13.85	15.10	15.46	0.4
Canada	14.62	0.5	12.65	18.13	14.90	15.30	0.4
Kenya	9.20	0.3	9.71	11.22	11.95	12.49	0.3
New Zealand	5.57	0.2	5.49	10.13	8.81	11.41	0.3
Turkey	4.20	0.2	5.71	4.57	10.66	10.45	0.3
Greece	14.01	0.5	14.11	8.15	10.74	8.93	0.2
Korea, Rep. of	1.30	0.0	2.10	5.08	6.76	8.44	0.2
Colombia	3.59	0.1	2.37	2.36	6.17	7.95	0.2
USSR	0.93	0.0	2.56	5.22	6.04	7.56	0.2
Cyprus	6.24	0.2	6.24	7.87	6.01	7.11	0.2
Peru	3.43	0.1	4.96	5.61	5.19	6.66	0.2
Portugal	2.67	0.1	2.04	3.51	4.46	5.63	0.1
Cuba	2.48	0.1	1.76	3.03	1.63	5.50	0.1
India	8.62	0.3	8.75	5.30	5.01	4.81	0.1
Czechoslovakia	2.17	0.1	2.77	4.05	5.94	4.40	0.1
Ireland	9.33	0.3	6.16	3.59	4.17	4.37	0.1
Bulgaria	3.50	0.1	3.13	7.33	5.52	4.05	0.1
China (Taiwan Province)	4.47	0.2	4.66	2.93	3.56	3.41	0.1
Jamaica	4.24	0.2	4.29	3.54	3.76	3.35	0.1
Egypt	7.86	0.3	3.71	3.40	2.61	3.37	0.1
United Arab Emirates	3.39	0.1	3.43	3.25	3.91	3.30	0.1
Singapore	3.40	0.1	3.22	4.16	2.97	2.71	0.1
Ecuador	0.30	0.0	1.63	2.62	2.08	2.49	0.1
Sweden	1.02	0.0	1.25	1.77	1.96	2.37	0.1
Others	25.33	0.9	44.13	26.92	34.42	37.50	0.9
Total	2,784.89	99.7	2,625.60	2,668.03	3,289.24	4,011.37	100.0

Source: COMTRADE Data Base of the United Nations Statistical Office
a/ Based on import figures

Table 3 Imports of fruit and vegetable juices into the 15 largest markets, 1985-1989

Quantity (Q): tons
Value (V): $'000

Importing country/area	1985 Q	1985 V	% of V	1986 Q	1986 V	1987 Q	1987 V	1988 Q	1988 V	1989 Q	1989 V	% of V
United States a/b/	2,859,719	922,779	31.1	3,906,686	868,974	3,894,470	974,307	3,270,836	1,119,360	2,767,[illegible]	899,[illegible]	23.0
Germany, Fed. Rep.	381,097	359,851	13.6	445,311	416,925	492,717	530,457	508,455	667,235	550,[illegible]	636,[illegible]	15.3
United Kingdom	217,285	243,691	9.2	239,595	226,360	259,056	323,673	247,976	412,998	273,[illegible]	385,[illegible]	9.9
Netherlands	213,185	165,669	6.3	252,012	177,293	282,491	245,924	286,129	316,521	286,[illegible]	304,[illegible]	7.8
France	156,900	131,430	5.0	172,286	138,199	174,931	182,278	217,220	246,475	337,[illegible]	293,[illegible]	7.5
Canada a/	157,977	240,569	9.1	173,139	206,815	185,711	238,525	141,238	249,194	145,[illegible]	250,[illegible]	6.4
Japan	35,754	79,389	3.0	30,661	61,423	33,997	78,023	41,057	114,370	67,[illegible]	165,[illegible]	4.3
Belgium-Luxembourg	69,021	67,281	2.6	105,694	86,523	107,869	98,559	111,125	123,937	121,[illegible]	120,[illegible]	3.1
Italy c/	34,483	32,848	1.2	46,752	43,678	70,407	67,535	66,576	85,781	109,[illegible]	93,[illegible]	2.4
Saudi Arabia	154,050	121,192	4.6	111,396	89,315	94,745	78,561	70,816	71,604	71,[illegible]	70,[illegible]	1.8
Sweden	33,406	44,800	1.7	39,092	47,034	41,493	58,435	43,605	76,717	46,[illegible]	70,[illegible]	1.8
Austria	50,346	41,857	1.6	54,617	47,475		62,043		56,533		68,[illegible]	1.7
Switzerland	..	38,555	1.5	..	37,852		52,341		65,129		57,[illegible]	1.5
Spain	7,793	8,673	0.3	12,203	11,605		22,454		40,348		51,[illegible]	1.3
Korea, Rep. of d/	4,132	7,536	0.3	3,716	4,586		10,351		22,860		49,[illegible]	1.3
Others	..	240,528	9.1	..	248,093	..	313,654	..	396,738	..	337,[illegible]	8.7
TOTAL VALUE		.. 2,648,650	100.2		.. 2,712,140		.. 3,337,120		.. 4,065,700		.. 3,904,[illegible]	99.9

Source: UNSO/ITC Comtrade Data Base System
a/ Figures for quantities are taken from national import statistics.
b/ Quantities in thousand litres.
c/ in 1986, figure for quantity is taken from national import statistics
d/ in 1986 and 1989, figures for quantities are taken from national import statistics

Table 4 European Economic Community: Imports of fruit and vegetable juices, 1990

Quantity (Q): tons
Value (V): $'000

Importing Country/Area	Total: All Fruit and Juices Q	V	% of Value
German, Fed. Rep.	567,349	799,434	29.9
Netherlands	401,073	519,077	19.4
United Kingdom	273,365	448,302	16.7
France	345,764	373,025	14.0
Belgium-Luxembourg	176,238	230,834	8.6
Italy	131,143	117,071	4.4
Denmark	41,127	60,914	2.3
Spain	57,025	59,624	2.2
Ireland	17,842	28,919	1.1
Greece	14,007	26,784	1.1
Portugal	4,514	11,324	0.4
TOTAL EEC	2,029,447	2,677,309	100.1

Source: Statistical Office of the European Communities (Luxembourg).

Note: Exchange rate between the European currency unit (ECU) and the United States dollar ($), according to statistical Office of the European communities, External Trade Monthly Statistics, 5/1991 (Luxembourg): ECU 1 = $1.2784(1990).

Table 5 Per capita consumption of fruit juice and nects in various markets.
1975-1988
in litres

Country	1975	1980	1985	1986	1987	1988	1989
German, a/	18.5	19.4	25.2	28.5	31.3	33.5	36.2
Switzerland	16.6	19.4	23.3	25.2	30.7	33.0	34.0
United States	22.0	24.0	25.1	26.2	26.5	30.1	31.0
Austria	7.7	12.6	16.5	18.5	22.1	23.0	24.0
Netherlands	12.6	18.3	18.3	20.4	21.5	21.3	22.0
Sweden	15.9	20.1	19.2	17.5	19.7	19.3	19.0
Denmark	13.0	13.5	15.7	17.6	19.0	19.3	19.0
United Kingdom	3.4	7.4	12.0	15.1	16.3	16.5	18.0
Belgium	4.9	9.3	10.2	10.1	11.9	13.3	14.0
Norway	3.8	9.1	10.5	13.0	15.0	12.5	14.0
Finland	10.0	13.4	9.6	10.1	13.0	13.5	13.0
Spain	4.2	5.0	6.3	6.6	7.2	8.9	10.0
Italy	2.2	3.2	4.7	5.3	6.0	7.3	8.0
Ireland	2.5	3.6	5.3	6.4	7.1	7.2	7.2
France	2.2	2.9	4.2	4.4	4.9	5.9	7.0
Greece	0.5	0.5	1.3	2.0	2.5	3.1	3.0
Portugal	0.6	0.8	0.6	0.7	0.8	1.1	1.2

Source: Verband der deutschen Fruchtsaft-Industrie e.V.(Bonn).
a/ Figures refer to the Federal Republic of Germany only.

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Table 6 Netherlands: Imports of fruits and vegetable juices, 1985-1989

Quantity (Q): tons
Value (V): f.'000

Product CCCN 20.07 (1985-1987) NS 20.09 (1988-1989)	1985			1986		1987		1988		1989		
	Q	V	% of V	Q	V	Q	V	Q	V	Q	V	% of V
A. Specific gravity > 1.33 at 20 c of which:	15,115	41,563	7.6	17,207	46,662	10,569	26,548	18,585	35,462	18,774	40,702	6.3
Grape juice (incl. grape must)	255	638	0.1	131	180	132	253	497	774	208	500	0.1
Apple juice	a/	a/	-	a/	a/	a/	a/	11,006	23,017	12,961	28,897	4.2
Pear juice	a/	a/	-	a/	a/	a/	a/	717	1,516	335	831	0.1
Apple/pear juice (incl. mixt.)	12,525	32,408	5.9	15,196	38,467	9,528	22,258	51 b/	110 b/	35 b/	190 b/	0.0
Orange juice	259	841	0.2	317	908	306	910	4,702	5,303	3,442	4,123	0.6
Grapefruit juice	c/	c/	-	c/	c/	c/	c/	555	938	775	1,178	0.2
Other citrus fruit juices (excl. mixt.)	73	230	0.0	105	318	90	418	156	514	195	662	0.1
Pineapple juice	d/	d/	-	d/	d/	d/	d/	436	902	-	-	-
Other fruit and vegetable juices	2,003	7,446	1.4	1,458	6,789	513	2,709	400	2,256	626	5,096	0.8
Mixtures of other juices	d/	d/	-	d/	d/	d/	d/	65	132	197	1225	0.2
B. Specific gravity > 1.33 at 20 c of which:	198,070	505,823	92.4	234,807	386,790	271,601	469,855	267,372	586,954	270,957	605,968	93.7
Grape juice (incl. grape must)	10,214	11,079	2.0	9,872	11,068	9,920	10,816	9,974	10,587	11,315	11,723	108.0
Apple juice	254	102	0.0	344	152	319	131	70,511	63,857	58,552	55,331	8.6
Pear juice	-	1	0.0	-	3	-	-	317	528	304	514	0.1
Apple or pear juice e/	68,451	58,557	10.7	68,702	65,851	69,269	63,696	f/	f/	f/	f/	-
Mixtures of apple and pear juice	5	5	0.0	9	30	-	-	-	-	-	-	-
Orange juice	91,719	337,621	61.7	123,275	220,780	154,307	290,210	146,212	401,282	156,508	417,777	64.6
Grapefruit juice	3,213	10,999	2.0	4,334	10,161	5,669	13,269	5,769	15,568	6,215	16,842	2.6
Lemon juice q/	12	51	0.0	9	26	-	-	241	474	131	305	0.0
Other citrus fruit juices	3,513	15,167	2.8	4,029	11,973	4,475	11,341	4,024	11,364	3,700	11,992	1.9
Pineapple juice	10,100	31,980	5.8	11,752	25,957	13,963	27,855	16,430	31,652	18,136	34,514	5.3
Tomato juice	2,623	2,498	0.5	2,608	2,301	3,002	2,497	2,689	2780	2,437	2,788	0.4
Other fruit and vegetable juces	6,930	35,849	6.6	8,522	36,013	8,780	45,420	8,828	43,661	10,342	47,173	7.3
Mixtures of citrus fruit juices and pineapple juice	-	-	-	1	2	-	-	-	-	-	-	-
Mixtures of other juices	1,030	1,814	0.3	1,350	2,473	1,897	4,420	2,380	5,001	3,317	7,009	1.1
TOTAL (A+B)	213,185	547,386	100.0	252,014	433,452	282,170	496,403	285,957	622,416	289,731	646,670	100.0
TOTAL VALUE IN $'000		164,806			176,919		245,053		314,892		304,932	

Source: Centraal Bureau voor de Statistiek: 1985-1988, Maandstatistiek van de Buitenlandse Handel per Goederensoort: 1989, Jaarstatistiek van de Buitenlandse Handel (The Hague)

a/ Included in "apple/pear juice".

b/ Mixtures only.

c/ Included in "other citrus fruit juices".

d/ Included in "other fruit and vegetable juices"

e/ From 1985 to 1987 this item includes only juices of a value exceeding 18 ECU per 100 Kg net weight.

f/ From 1988 onwards, this item is split and included in "apple juice" and "pear juice".

q/ Lemon juice of a value exceeding 30 ECU per 100 Kg net weight is included in "other citrus fruit juices".

Note: IMF annual market rate according to International Financial Statistics (Washington, D.C., December 1990):
£1 = f. 3.3214 (1985); f. 2.4500 (1986); f. 2.0257 (1987); f. 1.9766 (1988); f. 2.1207 (1989).

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Table 7 Netherlands: Exports of fruits and vegetable juices, 1985-1989

Quantity (Q): tons
Value (V): f.'000

product CCCN 20.07 (1985-1987) HS 20.09 (1988-1989)	1985			1986		1987		1988		1989		
	Q	V	% of V	Q	V	Q	V	Q	V	Q	V	% of V
A. Specific gravity > 1.33 at 20 c	13,385	42,886	9.4	14,759	49,523	7,671	28,360	8,537	31,121	11,272	39,363	7.5
of which:												
Grape juice (incl. grape must)	75	323	0.1	48	234	64	239	42	198	-	-	-
Apple juice	a/	a/	-	a/	a/	a/	a/	5,975	12,670	9,137	19,841	3.8
Pear juice	a/	a/	-	a/	a/	a/	a/	620	1,565	404	1,013	0.2
Apple/pear juice (incl. mixt.)	10,987	27,208	6.0	12,398	32,861	6,011	14,833	80 b/	214 b/	64 b/	128 b/	0.0
Orange juice	86	188	0.0	148	441	43	168	316	1,026	333	1,129	0.2
Grapefruit juice	c/	c/	-	c/	c/	c/	c/	23	148	-	-	-
Other citrus fruit juices (excl. mixt.)	696	2,500	0.6	702	2,635	569	2,120	490	1,987	-	-	-
Pineapple juice	d/	d/	-	d/	d/	d/	d/	46	309	162	1,190	0.2
Other fruit and vegetable juices	1,541	12,667	2.8	1,463	13,352	984	11,000	925	12,828	1,172	16,062	3.1
Mixtures of other juices	d/	d/	-	d/	d/	d/	d/	20	176	-	-	-
B. Specific gravity > 1.33 at 20 c	83,492	411,243	90.6	96,755	293,754	132,223	393,210	125,494	481,812	133,020	483,756	92.5
of which:												
Grape juice (incl. grape must)	1,075	1,555	0.3	847	1,463	974	1,396	597	819	693	1,011	0.2
Apple juice	987	396	0.1	666	406	1,049	866	4,235	7,623	5,176	8,325	1.6
Pear juice	9	25	0.0	17	28	-	-	-	-	38	118	0.0
Apple or pear juice e/	3,508	5,408	1.2	3,626	5,683	3,770	5,503	f/	f/	f/	f/	-
Mixtures of apple and pear juice	27	147	0.0	87	147	-	-	141	234	90	218	0.0
Orange juice	44,392	243,428	53.6	56,345	152,269	84,121	232,477	74,399	295,718	76,617	281,926	53.9
Grapefruit juice	2,762	9,438	2.1	3,125	9,264	4,530	13,485	4,061	14,514	3,693	13,606	2.6
Lemon juice g/	1	5	0.0	1	2	-	-	39	102	-	-	-
Other citrus fruit juices	2,030	8,134	1.8	1,782	7,952	1,832	6,764	1,328	5,276	1,380	5,032	1.0
Pineapple juice	7,427	29,507	6.5	8,305	24,774	11,945	31,117	14,300	37,826	14,967	40,653	7.8
Tomato juice	725	914	0.2	606	821	659	852	453	755	472	768	0.1
Other fruit and vegetable juces	6,472	39,351	8.7	6,558	36,311	7,160	40,812	6,514	39,392	7,110	40,966	7.8
Mixtures of citrus fruit juices and pineapple juice	57	108	0.0	21	68	26	105	59	163	-	-	-
Mixtures of other juices	14,020	72,827	16.0	14,769	54,566	16,157	59,833	19,368	79,390	22,784	91,133	17.4
TOTAL (A+B)	96,877	454,129	100.0	111,514	343,277	139,894	421,570	134,031	512,933	144,292	523,119	100.0
TOTAL VALUE IN $'000		136,728			140,113		208,111		259,503		246,673	

Source: Centraal Bureau voor de Statistiek: 1985-1988, Maandstatistiek van de Buitenlandse Handel per Gooderensoort: 1989, Jaarstatistiek van de Buitenlandse Handel (The Hague)

a/ Included in "apple/pear juice".

b/ Mixtures only.

c/ Included in "other citrus fruit juices".

d/ Included in "other fruit and vegetable juices"

e/ From 1985 to 1987 this item includes only juices of a value exceeding 18 ECU per 100 Kg net weight.

f/ From 1988 onwards, this item is split and included in "apple juice" and "pear juice".

g/ Lemon juice of a value exceeding 30 ECU per 100 Kg net weight is included in "other citrus fruit juices".

Note: IMF annual market rate according to International Financial Statistics (Washington, D.C., December 1990):

$1 = f. 3.3214 (1985); f. 2.4500 (1986); f. 2.0257 (1987); f. 1.9766 (1988); f. 2.1007 (1989)

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Table 8 Relation between imports and exports. 1985-1989

	1985		1986		1987		1988		1989	
	Q	V	Q	V	Q	V	Q	V	Q	V
Imports	213.2	164.8	252	176.9	282.2	245.1	286	315	289.7	304.5
Exports	96.9	136.7	111.5	146.1	139.9	206.1	134	259.5	144.9	246.7
Exports as % of imports	45.5	82.9	44.2	79.2	49.6	84.9	46.9	82.4	50.0	81.0

Source: Central Bureau voor de Statistiek. 1985-1988: Maandstatistiek van de Buitenlandse Handel per Goederensoort; 1989: jaarstatistiek van de Buitenlandse Handel (The Hague).

TABLE 9
Market Requirements.

The table below depicts some tropical fruit juices in bulk and related market requirements in Jul 1991.

Product/ Origin	Normal Norm	Strength (Brix)a/	Hot-packed frozen aseptic	Indicative price ($CIF/tonb/
A. TROPICAL FRUIT VEGETABLES.				
Passion-fruit Brazil, Colombia, Peru, Sri Lanka, Equador, Venezula, Costa-Rica. Kenya, Bu kina Faso, Indonesia.	Juice, Single/ strength	12^0-15^0	Hot-packed/froz.	1,700-1,900[c/]
	Concent.	24^0-30^0	Frozen.	3,300-3,500
	Concent		Frozen.	5,000-5,500
Mango Brazil, India Mexico, Phillipines, Colombia cote d'Ivoire, Peru, Mali, Qualemala, Venezula, Thailand.	Pulp	13^0-18^0	Hot-packed/froz. Aseptic	700(15^0), 900(18^0)
	Concent	28^0-30^0	Froz./aseptic	1,300
Guava Talwan Prov. China), India Phillipines, S.A, Mexico, Brazil, Peru Colombia, Venezuela, Thailand.	Pulp	8^0-14^0	Hot-packed/froz Aseptic	700(12^0)
Pineapple Thailand, Phillip. Brazil Coted, Ivoire S.A, Kenya, U. (Hawali).	Juice, Single-strength	14^0-18^0	Hot-packed/Fr Aseptic.	700-800 (16^0)
		6^0	Frozen/Aseptic.	2,300

Mexico,Swaziland, Venez. Honduras, Indonesia, Botsw.				
Papaya				
India Malaysia, Taiwan, Prov.(China)	Pulp	10^0-13^0	Aseptic/Hot-packed/froz.	700
	Concentr	25^0		2,200
Mexico,Brazil Colombia, Costa Rica.				
Banana				
Hondura. Quatemala, El Salvador, Nicaragua, China,Thailand Phillipines, Panama, Costa-Rica,Brazil, Equador, Peru India	Pulp	20^0-22^0	Hot-packed Aseptic/ Frozen.	900
Cherimoya				
Mexico, Venezula, Phillipines,Brazil, Colombia, Equador.	Pulp	14^0	Hot-packed	1,300
Acerola(Barbados) cherry				
Brazil, the Caribbean	Puree	7^0-8^0	Frozen	-
	Concent	16^0	Frozen	
Kiwi				
New-Zealand, U.S.(california),France Italy,Spain, Chile, Israel,	Pulp & Puree	12^0-14^0	Frozen	700-600(sin str)
		45^0-65^0		2,500 (45^0)
Slices			IQF	2,500

Pomegranate				
Peru, Brazil, Colombia, Mexico, the Caribbean.	Pulp Concent	14^0) 50^0)	Hot-packed and Frozen	
Naranjilla/ lulo				
Brazil, Peru Colombia, Equador.	Pulp Concent	15^0) 6^0)	Hot-packed & Frozen.	-
Umbu Brazil	Puree	3^0-11^0	Frozen	-
Caja Brazil	Puree	9^0-12^0	Frozen	-
B. OTHER JUICES				
Orange	Concentrate (fcoj)	65^0-66.5^0	Frozen	1,350-1,400
Grapefruit	Concentrate (fcgi)	55^0-58^0	Frozen	1,500-1,600
Lemon	Concentrate	45^0 400GPL[d/]	Frozen	1,450-1,800
Lime	Concentrate	40^0-325 350GPL[d/]	Frozen	1,100
Apple	Concentrate	71^0 35GL[e/]	Frozen	1,200 1,300
Apricot	Concentrate.	- 30^0-32^0	Hot-packed/ and frozen	900

Source: Trade sources in Europe.

a/ Concentration in per cent of sugar by weight according to the Brix scale.
b/ For one ton of concentrate.
c/ Prices for passion-fruit juices (July 1991) are considered by the trade to be unusually high.
d/ Gramacidity per litre.
e/ Gram per litre.

TABLE 10

INDICATIVE RATES OF CUSTOMS DUTIES ON SELECTED FRUIT JUICES AND PULPS IMPORTED INTO EEC
(In percentage ad valorem)

Product description	General tariff[a/]	ACP and overseas countries/ territories[b/]	GSP[d/]
A. Of a denisty exceeding 1.33g/cm^3 at 20^{0}c			
Orange juice	42%	Free	
Grape juice	42%	Free	28%
Other citrus fruits juices	42%	Free	
Pineapple juice	42%	Free	
Grape juice	50%	Free[f/]	
Apple juice	30%	Free	
Passion-fruit and guava juices	21%	Free	8%
Mango, kiwi, lychee juices	42%	Free	8%
Mixtures of apple and pear juices	42%	Free	
Mixtures of pineaple papaya and passion-fruit juices	42%	Free	
Mixtures of mango, kiwi lynchee juices	42%	Free	8%

. Of a density of 1.33 /cm^3 or less	at 20^{0}c		
Orange juice	19%	Free	
Grapefruit juice	12-15%	Free	7%
Lemon juice	18-19%	Free	
Other citrus fruit Juices	18-19%	Free	13-15% (excl. China)
Pineapple juice	19-20%	Free	17% (excl. China)
Grape juice	28%	Free	
Apple juice	18%	Free	12%[f/]
Passion-fruit and guava juices	15%	Free	8%
Mango, kiwi, lychee juices	21-22%	Free	8%
Mixture of citrus and pineapple juices	19-20%	Free	
Mixtures containing either separately or over 25% of grape, citrus fruit, pineapple, apple pear, tomato, aprico or peach juices	21-2 %	Free	7-18% excl.China)[f/]
Mixtures of pineappl papaya and passion-fruit juices	21%	Free	
C. Pulp (no sugar added)			
Tropical fruit pulp, frozen	18%	Free	
Tropical fruit pulp, canned	23%		

Source: Commission of the European Communities, Integrated Tariff of the European Communities (TARIC) (Luxembourg, 1 April 1990).

a/ Rate applicable to imports from countries which do not enjoy preferences under b/,c/, d/or e/.

b/ Rate applicable to imports from the developing countries listed on page 272

c/ Rate applicable to imports from the least developed countries listed on page 273.

d/ Rate applicable to imports from developing countries not granted preferential treatment under b/,c/ or e/.

e/ Rate applicable to imports under other preferential arrangements: CY = Cyprus; DZ= Algeria; IL = Israel; MA = Morocco; MT = Malta; TN = Tunisia; TR = Turkey.

f/ Not in all cases.

Note EEC consists of 12 member countries, i.e., Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Spain, Portugal and the United Kingdom.
Spain and Portugal joined EEC on 1 January 1986. During a transitional period of seven years, the customs duties of these countries will be progressively harmonized with those of EEC>

TABLE II

SALES PROJECTIONS - FOR 10 YRS

VOLUME IN TONS

VALUE IN '000 US DOLLARS

I. EXPORT SALES	1996		1997		1998		1999		2000		2001 TO 2005	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Passion Concentrate	120	180	150	660	180	864	240	1272	300	1740	1500	11963
Tomato Concentrate	40	36	50	50	60	66	80	96	100	130	500	894
Other Juices- Conc.												
Papaya	120	264	150	360	180	468	240	696	300	960	1500	6600
-Vegetable Juices	20	14	30	21	40	360	50	50	60	66	300	545
French Beans	400	216	500	300	600	396	700	511	800	640	4000	4400
Peas	100	88	150	146	200	214	250	295	300	390	1500	2682
Frozen Vegetables	40	18	50	26	60	34	70	44	80	55	400	370
Dehydrated Vegetables	40	16	50	23	60	28	70	37	80	46	400	319
Shelled Beans	150	189	180	250	210	321	240	403	300	555	1500	3812
Total Sales Export	1020	1021	1310	1835	1590	2751	1940	3404	2320	4582	11600	31593
II. DOMESTIC SALES												
Tomato Products												
-Sauce	20	10	30	17	40	25	50	34	60	45	300	310
-Paste	20	37	30	60	40	80	50	110	60	146	300	1003
Ketchup	20	39	30	65	40	96	50	132	60	173	300	1188
Canned Sealed	30	51	40	75	50	104	60	136	70	175	350	722
Canned Unsealed	30	51	40	75	50	104	60	136	70	175	350	722
Tomato Juice	20	24	30	39	40	57	50	79	60	104	300	713
Other Beans												
-Green	20	25	30	41	40	60	50	83	60	110	300	756
-Peas	40	38	60	63	80	92	100	127	120	169	600	1148
Shelled	100	127	120	168	140	216	160	270	180	335	900	2302
Frozen Vegetables	150	139	180	184	210	235	240	295	270	365	1350	2510
Dehydrated Vegetables	40	37	60	61	80	87	100	123	120	162	600	1115
Total Sales - Domestic	490	578	650	848	810	1156	970	1525	1130	1959	5650	12489
GRAND TOTAL SALES	1520	1899	1960	2683	2400	3907	2910	4929	3450	6541	17250	44082
Sales Expenses 20% , 15% , 10% of Sales Revenue		380		537		781		739		981		4408

Table II (b)

SALES PROJECTIONS - FOR TEN YEARS

QUANTITY IN TONNES
70% Export and 30% Domestic VALUE IN '000s US DOLLARS

I. EXPORT SALES	1996		1997		1998		1999		2000		2001 TO 2005	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Passion Concentrate	120	300	150	413	180	545	240	799	300	1078	1500	8236
Tomato Concentrate	40	36	50	50	60	66	80	96	100	130	500	894
Other Juices- Conc.												
-Papaya	120	180	150	248	180	327	240	479	300	659	1500	4944
-Vegetable Juices	20	14	30	21	40	360	50	50	60	66	300	545
French Beans	400	216	500	300	600	396	700	511	800	649	4000	4400
Peas	100	88	150	140	200	214	250	295	300	390	1500	2692
Frozen Vegetables	40	18	50	26	60	34	70	44	80	55	400	378
Dehydrated Vegetables	40	16	50	22	60	28	70	37	80	46	400	319
Shelled Beans	150	189	180	250	210	321	240	403	300	555	1500	3812
Total Sales - Export	1030	1057	1310	1476	1590	2291	1940	2714	2320	3629	11600	26212

II. DOMESTIC SALES												
Tomato Products												
-Sauce	20	10	30	17	40	25	50	34	60	45	300	319
-Paste	20	37	30	60	40	80	50	110	60	146	300	1003
-Ketchup	20	33	30	55	40	76	50	132	60	173	300	1188
-Canned - Pealed	30	51	40	75	50	104	60	136	70	175	350	722
-Canned - Unpealed	30	51	40	75	50	104	60	136	70	175	350	722
-Tomato Juice	20	24	30	39	40	57	50	79	60	104	300	713
Other Beans												
-Green	20	25	30	41	40	60	50	83	60	110	300	756
-Peas	40	38	60	63	80	92	100	127	120	169	600	1148
-Shelled	100	127	120	168	140	216	160	270	180	335	900	2302
Frozen Vegetables	150	139	180	184	210	235	240	295	270	365	1350	2510
Dehydrated Vegetables	40	37	60	61	80	87	100	123	120	162	600	1115
Total Sales - Domestic	490	572	650	848	810	1156	970	1525	1130	1959	5650	12489
GRAND TOTAL SALES	1520	1625	1960	2324	2400	3447	2910	4239	3450	5588	17250	38701
Sales Expenses 20%, 15%, 10% of Sales Revenue	380		537		781		739		981		4408	

SALES PROJECTIONS - FOR TEN YEARS

50% Export and 50% Domestic

QUANTITY IN TONNES
VALUE IN '000s US DOLLARS

I. EXPORT SALES	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6-10	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Passion Concentrate	120	300	150	413	180	545	240	799	300	1095	1500	8238
Tomato Concentrate	40	26	50	50	60	66	80	96	100	130	500	813
Other Juices- Conc.												
-Papaya	60	90	70	116	80	146	90	180	100	220	500	1854
-Vegetable Juices	20	14	30	21	40	31	50	42	60	56	300	419
French Beans	300	162	400	233	500	327	600	431	700	550	3500	4947
Peas	50	44	60	58	70	75	80	94	100	129	500	968
Frozen Vegetables	30	14	40	20	50	27	60	36	70	46	350	414
Dehydrated Vegetables	30	12	40	16	50	24	60	32	70	41	350	369
Shelled Beans	100	126	120	165	150	229	150	302	210	338	1050	2912
Total Sales - Export in volume & value	750	793	960	1100	1180	1470	1440	2012	1710	2661	8550	20736
II. DOMESTIC SALES												
Tomato Products												
-Sauce	20	10	30	17	40	25	50	34	60	45	300	282
-Paste	20	37	30	60	40	80	50	110	60	146	300	912
-Ketchup	20	39	30	65	40	78	50	132	60	173	300	1080
-Canned - Pealed	30	51	40	75	50	104	60	136	70	175	350	656
-Canned - Unpealed	30	51	40	75	50	104	60	136	70	175	350	656
-Tomato Juice	20	24	30	37	40	57	50	77	60	104	300	648
Other Beans												
-Green	20	25	30	41	40	60	50	83	60	110	300	637
-Peas	100	95	120	125	150	173	180	223	210	292	1050	2189
-Shelled	150	191	180	252	210	323	240	409	280	525	1400	3938
Frozen Vegetables	300	278	400	408	500	561	600	740	700	950	3500	7126
Dehydrated Vegetables	40	37	50	61	80	87	100	123	120	162	600	1614
Total Sales - Domestic in volume & value	750	833	990	1213	1340	1670	1490	2210	1750	2357	8750	19188
TOTAL SALES IN VOLUME & VALUE	1500	1626	1950	2313	2520	3140	2930	4222	3460	5519	17300	39913

Table 11 (d)

SALES PROJECTIONS - FOR TEN YEARS

70% Domestic and 30% Export

QUANTITY IN TONNES
VALUE IN '000s US DOLLARS

EXPORT SALES - 30%	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6-10	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Passion Concentrate	120	306	150	413	180	545	240	799	300	1099	1500	8250
Papaya Concentrate	50	75	60	99	70	127	80	160	100	226	500	1650
French Beans	300	162	400	238	500	327	600	431	700	553	3500	4148
Total Export Sales in volume and value	470	537	610	750	750	999	920	1390	1100	1372	5500	14048
DOMESTIC SALES - 70%												
Tomato Products												
-Sauce	30	15	40	22	50	30	60	40	50	59	400	440
-Paste	30	56	40	81	50	112	60	148	80	217	400	1628
-Ketchup	30	59	40	86	50	118	60	156	80	229	400	1714
-Canned - Pealed	30	51	40	75	50	104	60	136	80	200	400	1497
-Canned - Unpealed	30	51	40	75	50	104	60	136	80	200	400	1497
-Tomato Juice	30	36	40	53	50	73	60	96	80	141	400	1056
Other Beans												
-Green	50	63	60	83	70	106	80	133	100	163	500	1373
-Peas	200	190	220	230	240	276	260	329	300	416	1500	3132
-Shelled	200	254	220	307	240	369	260	440	300	553	1500	4185
Frozen Vegetables	400	371	500	510	600	673	700	864	800	1086	4000	8140
Total Domestic Sales in volume and value	1030	1146	1240	1522	1450	1965	1660	2478	1930	3291	9900	24682
TOTAL SALES IN VOLUME AND VALUE	1500	1683	1850	2272	2200	2964	2580	3868	3030	5163	15400	38710

Year 1-5 price increases by 10%.
Year 6-10 price increase year 6; - 20%
times a factor 1.50 to obtain
year 10 prices.
Year 6 price plus year 10 price divide by 2
gives average price applied for years 6-10.

CHAPTER V

ENGINEERING AND TECHNOLOGY

The selected technology was based on our priority products as indicated in the proceeding chapters. The machinery chosen is to process Tomato, Passion fruit, French beans, peas and shelled beans and the option of expansion and/or adoption for processing other products such as pineapple, guava, mangoes and bananas as and when they become available to the factory down the years.

The prices of the equipment are current and like the general trend of prices in the world, it is expected that they would rise steadily over the years. To avoid adverse effect on the economics of the plant we recommend that when the decision is taken to invest, the whole machinery be purchased and installed immediately.

Furthermore the technology used here is similar to the one used in some of the current food industries in Kenya which are highly export oriented, which are producing products acceptable to the European market which is our assumed main market.

The general layout of the plant and the buildings assumes high manufacturing and hygienic standards to meet the requirement of the market.

We envisage however that there is enough space within the designed buildings to be used in the initial stages in order to avoid expenditure on the office block until later in the operations.

At the end of this chapter, there are layout sketches of the machinery and equipment. The descriptive section after the summary cost of the machinery gives the item reference number which corresponds to the particular section of the machine/equipment in the sketch diagrams. Also the proposed factory building as well as administration building layout plans are included at the end of this chapter.

ITEM	QTY	DESCRIPTION	PRICE NET ($) U.S DOLLARS
		PRICE SUMMARY	
		1. SECTIONS A,B AND L	
		Fruit Processing equipment for papaya, passion fruit and tomato.	52310
		2. SECTION C	
		FILLING MACHINES	
		ALT.I Pre Pak	18460
		ALT. II. Pre Pak	7690
		ALT III Pre Pak	15385
		ALT IV. Can	15385
		3. SECTION D	
		SYRUP PREPARATION LINE	7690
		OPTIONAL EXTRAS	
		4. SECTION E	
		Automatic extraction of Passion fruits.	
		5. SECTION F	
		Automatic Extraction of tomatoes.	53850
		6. SECTION G	
		Homogenizer	23080
		7. SECTION H	
		Steam Boiler	153846
		8. SECTION I	
		Air Compressor	7690
		9. SECTION J	
		Concentrating plant	61538

10. **SECTION K**	
Seaming Machines	92308
11. **SECTION M**	
French Beans Canning	80000
* **FACTORY MACHINES** ----------	547697
12. **SECTION N.**	
Building-Factory	507700
13. **SECTION O**	
Building-offices	184615
* **BUILDINGS** ----------	692315

SECTION A: FRUIT PROCESSING

ITEM	QTY	DESCRIPTION
01-001	1	PREPARATION TABLE Application: To sort, peel and de-stone the fruit. Motor: 0.5Kw
01-002	1	WASHING MACHINE WITH ELEVATOR. Application: To wash and/or transport the fruit to the next stage. Motor: 0.36Kw Water Consumption: 300 l/h
01-003	1	PRE-CRUSHER AND CONTINUOUS COOKER Application: to crush and cook the fruits. Motors: 1.5Kw, 0.5Kw. Steam Consumption: 300kg/h
01-004	1	PULPER, REFINER MACHINE Application: To separate the juice and fine edible pulps from foreign materials (undesirable skins and fruit stones). Motor: 3.0Kw.
01-005	1	HELICOIDAL EXTRACTOR Application: To extract and refine the juice and the fruit
01-006	1	COLLECTING BIN Application: To collect the Juice from the refiner machine and the Helicoidal Extractor.
01-007	1	POSITIVE JUICE PUMP Application:To pump the juice to the mixing tanks. Motor: 0.37Kw.
01-008	1	POSITIVE JUICE PUMP Application: To pump the juice from the helicoidal extractor to the refinery. Motor: 0.27 Kw

SECTION B: JUICE MIXING AND PASTEURIZATION LINE

ITEM	QTY	DESCRIPTION
		MIXING TANK
002-001	2	Application: To store juice and to prepare final nectar juice by adding sugar, citric acid and other additives
		Vol: 1000 Litres complete with Agitator
		Motor: 0.37kw
002-02	1	FEED PUMP Application: to pump the final juice from the mixing tank to the homogenizer.
		Motor: 0.55 Kw
002-03	1	PLATE HEAT EXCHANGER
		Application: Continuous Pasteurization and cooking of the Juice. Complete with temperature regulation.
02-04	1	FEED PUMP
		Application: recirculation of hot water produced in the plate heat exchanger.
		Motor: 0.55kw.

SECTION C FILLING MACHINES

ITEM	QTY	DESCRIPTION
03-001	1 set	**ALTERNATIVE I** Hand Form - Fill seal machine (pure pak cartons) consisting of - 2 BASE FORMING MACHINE Application: To form and seal the bottom of pure pak cartons of different sizes. -2 FILLING AND TOP SEALING MACHINE. Application: Top fill top forming and to seal the cartons. Out put capacity: Totally about 1,200 cartons/h
		ALTERNATIVE II
03-002	2	HAND PACKING INTO DRY-PACK BAGS Application: To manually fill/seal into pre-fabricated & Printed polythene bags. Output capacity: Totally about 1,200 bag/hr 250cc.
03-003	1	**ALTERNATIVE III** AUTOMATIC PACKING PRE-PAK BAG Application: To manufacture bags from printed polythylene sheets, to fill and doze the juice, to hermetic seal the bags, to cut the sealed bags. Capacity - 1,200 bags/h Motor 4.0kw.

		produced in the plate heat exchanger. Motor: 0.55kw.

SECTION C FILLING MACHINES

ITEM	QTY	DESCRIPTION
03-001	1 set	**ALTERNATIVE I** Hand Form - Fill seal machine (pure pak cartons) consisting of - 2 BASE FORMING MACHINE Application: To form and seal the bottom of pure pak cartons of different sizes. -2 FILLING AND TOP SEALING MACHINE. Application: Top fill top forming and to seal the cartons. Out put capacity: Totally about 1,200 cartons/h
		ALTERNATIVE II
03-002	2	HAND PACKING INTO DRY-PACK BAGS Application: To manually fill/seal into pre-fabricated & Printed polythene bags. Output capacity: Totally about 1,200 bag/hr 250cc.
03-003	1	**ALTERNATIVE III** AUTOMATIC PACKING PRE-PAK BAG

		Application: To manufacture bags from printed polythylene sheets, to fill and doze the juice, to hermetic seal the bags, to cut the sealed bags. Capacity - 1,200 bags/h Motor 4.0kw.
		ALTERNATIVE IV
03-004	4	HAND PACKING INTO CANS Application: To manually fill/seal into prefabricated cans of various sizes. Output Capacity: Totally about 300cans/h, 390ml
		SECTION D SYRUP PREPARATION
04-00	1	MIXING TANK Application: To mix sugar and water. Volume: 1000 Lb.
04-00	1	Centrifugal Pump Application: To pump the syrup through the filter to the product mixing tanks.
04-00	1	Filter Application to filter the syrup.
		OPTIONAL EXTRAS FOR AUTOMATIC EXTRACTION OF THE FRUITS.
		SECTION E
05-00	1	BELT ELEVATOR Application: To transport the fruit from the

		washing unit to the Passion fruit extractor.
		Motor: 0.25Kw
05-002	1	PASSION FRUIT EXTRACTOR
		TYPE: PASSY PRESS
		Application: To extract the juice and seeds from the passion fruits.
		Motor: 1.5kw
		SECTION F
06-001	1	WASHING MACHINE
		Application: to wash by scrubbing and rinsing the tomatoes.
		Motor: 0.25 Kw
		Water consumption - 100L/h
06-002	1	BELT ELEVATOR
		Application: To transport the Tomato from the washing unit to the crusher.
		Motor: 0.3kw
06-003	1	TOMATO CRUSHER.
		Application: To break up the tomato
06-004	1	MONO PUMP
		Application: To pump the Tomato Juice through the heat exchanger to the pulper
		Motor: 1Kw
06-005	1	HEAT EXCHANGER

		Application: To increase the temperatures for effective extraction on the pulper
06-006	1	PULPER Application: To extract the juice and throw out the seeds and skin. Motor: 4 kw
		SECTION G HOMOGENIZER
07-001	1	HIGH PRESSURE HOMOGENIZER Application: To produce a homogeneous nectar juice. Pressure: Max - 300 bar Motor: 11kw
		SECTION H STEAM BOILER
08-001	1	STEAM BOILER PLANT Application: To supply steam to the factory Capacity: 500kg/hr Pressure: 150 Psi
		SECTION I
09-001	1	COMPRESSED AIR PLANT Application: To supply compressed air to the temperature regulating systems. Comprising 1. Air compressor of piston type complete with air receiver. Working pressure: 10 bar F.A.D - 30lb/sec

10-001	1	**SECTION J** Concentrating Plant for Tomato, Passion Fruits. Application: To concentrate raw juice on basis of 15,000lb per eight hour day to an end product Output capacity: 4,500kg.
		SECTION K
11-001	1	**SEAMING MACHINES** Application: To seam cans after, filling Make: Angelus Capacity: 270 cans per min Motor - 4kw
		SECTION L: MISCELLANEOUS EQUIPMENT
12-001	1 set	**SPARE PARTS** The set will cover spare parts as well as wear and tear parts for 5000hrs according to experience and normal wear and tear. Detailed spare parts list will be designed during the final engineering.
12-002	1	**LABORATORY EQUIPMENT** The laboratory equipment consists of utensils to perform the following test: - Brix degree - PH value - Balance

12-002	1	WORKSHOP EQUIPMENT The set includes - Hand tools - Electrician's tools - Drilling machine and drills
12-004	1	FLOOR SCALE Application: To weigh various ingredients to the final products. Capacity: 50Kg
12-005	1	CLEANING EQUIPMENT The set includes - Brushes and bucket - Hoses
		SECTION M
13-001	1	SALTING CONVEYOR APPLICATION To transport beans to the elevator while rotten beans, leaves are removed. Motor: 0.55kw
13-002	1	ELEVATOR APPLICATION Transport beans to soaking and washing m/c Motor size - 0.55kw
13-003	1	WASHING MACHINE Application: To wash the beans ready to be transported to the snipers. Motor: 1kw Water Consumption: 250l/hr

13-004	1	GRADER Application: To size the beans to ensure right sizes only. Motor:1.1kw
13-005	1	ELEVATOR Application: To transport the graded beans and elevating them to the infeed section of the snipers. Motor: 0.55kw
13-006	2	SNIPERS Application: To cut the ends of the beans. Motor: 0.55kw
13-007	1	BELT CONVEYOR Application: To transport the waste from the snipers to the waste collecting outside the factory. Motor: 0.55kw
13-008	2	BELT CONVEYOR Application: To collect the snipped beans from the snipers and along which the un-snipped beans are sorted.
13-009	1	ELEVATOR Application: To receive beans from the snipers, transporting them to the short piece remover. Motor: 0.55kw

13-010	1	SMALL PIECE REMOVER Application: To remove undersized beans (length wise) Motor: - 1.5kw Shaker- AJAX 10CF
13-011	1	BLANCHER Application: For softening the beans (pre-cooking) before packing into the cans (containers) Consists of: - Blanching pump 0.75kw - cooling pump - 3 Nos. - product belt - 0.18kw - filter belt - 0.25kw - water consumption - 100l/hr - steam - 7 bar.
13-012	1	WEIGHING SECTION Consists of belt for transporting the blanched beans from the blanchers to the section for weighing. - Manually picking the beans from the belt onto weighing table. Motor: 0.55kw
13-013	1	WASHER - For cleaning the cans before packing the products. - Motor: 0.75kw - water - 250l/hr - steam - 4 bar - compressed air - 2 bar

13-014	1	PACKING SECTION - consists of two conveyors for carrying empty cans on top and below weighed beans. 2 motors - 0.55kw
13-015	1	FILLING SECTION Application: Topping cans with Brine Consists of - Conveyor - Steam - 4 bar. - compressed air - 2 bar.
13-016	2	SEAMERS Application: Seals cans after packing motor: 4kw
13-017	1	STERILIZING MACHINE Application: For sterilizing the canned products. - Motor - 4kw - Steam- 6 bars - Cold water - 150l/hr - Compressed air - 6 bars.

ITEM	QTY	DESCRIPTION
14-001		**SECTION N**
		RAW MATERIAL REQUIREMENT
		1. Passion fruit Concentrate
		Output 60,000Kg Juice Requirement 180,000Kgs Raw Fruit 540,000Kgs per yrs.
		2. Passion fruit Juices
		Output 60,000Kg Raw fruit - 180,000Kg
		3. Tomato Puree
		Out put - 60,000Kg, Juice requirement - 250,000Kg
		raw fruit - 3000,000Kg
		4. Tomato Juice
		Out put - 60,000Kg, Raw fruit - 80,000Kg
		5. Tomato products
		Out put - 100,000Kg Raw fruit - 110,000Kg
		6. French beans
		Out put - 400,000 Raw material - 480,000
		7. Shelled beans -
		Out put - 400,000Kg Raw material - 420,000Kg

ITEM		QTY	DESCRIPTION
13-018	1		LAYOUT ACTIVITY NAMES DRAWING NO. 004 Receiving, weighing and unpacking area 1. Selection belt 2. Elevator 3. Washing Machine 4. Grader 5. Conveyor elevator to snipper 6. Snipers 7. Waste removal belt 8. Un-snipped beans removal belts. 9. Conveyor. 10. Elevator to the small pieces remover 11. Small pieces remover m/c 12. Blanching m/c 13. Weighing Section 14. Can Washing m/c 15. Packing m/c 16.A Preservative filling 16.B Conveyor 17. Seamer 18. Sterilizing machine

ITEM	QTY	DESCRIPTION
	1	**SECTION P** **POTENTIAL SUPPLIERS OF MACHINES.** In the choice of machinery, several proposals were considered including: ALTERNATIVE 1 - Possibility of acquiring whole plant from a single supplier or manufacturer. In this regard, various manufacturers were considered from various countries. These included: - ALTA-LAVAL of Sweden - APV Gaulin International of Halland - FMC Corporation from California U.S.A - OFFICINE - AVE SPA FORNA Industrials of Italy all of whom are reputed manufactures of whole plant and or equipment. Each manufactures design concept and work ability including interchange ability of the plant to take different types of fruit were considered. - The total cost was evaluated - The availability of spare parts locally, and time frame of importation where necessary was considered. - Their operation requirements, i.e. personnel to commission and run the plant effectively looked into - The time frame of importation considered ALTERNATIVE 11 Manufacturers who supply single machinery to any specification required were considered, and these included; - IMECA TECHNOLOGIES Centre Meridional of France.

- ROSSI Catell, Parma of Italy.

- Hentri Biaugeand SA of France.

Their respective cost compared to the purchase of whole plant considered and the availability of spare/change parts,

- On comparison of Alternatives 1 and 11 bearing in mind cost implication, technology application and different variety of products to be manufactured, and the possibility of growth of plant to take other fruits not considered, it was imperative to go for alternative 11 to have machinery imported from different companies based on their experience in country and their back up service locally

In this regards the choices were made as follows

1. Washing macnines and elevators.

   Hentri Baugenda SA
   45 Avenue.
   Aristide, Briand
   94 114 ARCUEX
   Codex
   FAX 42-531126

   FRANCE

   Choice:-(i)Simplicity in design inco-operating agitation, scrubbers and rinsers all in one.

   (ii) Better offer in terms of overall cost maintenance parts can be got locally.

2. CRUSHERS, COOKERS AND PULPER Refiners and Extractors.

   ALFA-LAVAL
   Food and Diary International
   Telex 32145
   allundi.

HOLLAND

Offers latest, technology with possibilities of interchangeability of products other than the pre-mentioned.

3. Pumps

ALFA-LAVAL
Food and Diary International
Telex 32145
Allundi

HOLLAND

Offers durable pump with a back up service locally which stocks most of the consumable parts.

4. FILLING MACHINES.

OFFICIE AVE SPA

30030 Maerne Venezia Italy
ZONa Industrale Oimo
Via Selvanese 2
Telefax (041)54 60040

ITALY

- Offers a wide range product use
- Uses principal of piston fill
- easily commissioned and operated.
- lower operations cost.
- better bargain price.

. HOMOGENIZER

APV Gaulin Internation SA
P.O. Box 58, 1200 AB Hilversum Holland

Telefax (035) 218047

- Parts available locally from main agents.

GERMANY

6. STEAM BOILER

STONE DANKS LTD.
TIVIDALE WARLEY WEST MIDLANDS.
B69 3HR
TELEX 335711

- Burner parts are available locally.
- Agents are locally available to service parts.

U.K.

7. CONCENTRATING PLANT

IMECA TECHNOLOGIES
Centre Meridional D'oenologie
BP 94 - Zone Industrial
Clermont - L - Hevault
FAX: 67.96.91.01

FRANCE

Incoporated Enzymatic liquetaction microfiltration and Aroma recovery the fruit choice given.

- can be commissioned in house
- fair price.

8. GRADER, SNIPERS, STERILIZERS

FEMIA
225/231 RUEDELA GEREME
BP811
92008 NANTERDE CEDEX
TELEX 4780 8686
FRANCE

- wide experience in the country, providing the above machinery.

- parts easily available

9. BLANCHER

CABIN PLANT & INTERNATIONAL ROESBJERGVEJ 9
OK-5683 HAARBY
FAX 4564731253
DENMARK.

DESIGN CONCEPT

FACTORY BUILDING

The preliminary designs has been based on the following:

1. Different machine sizes and functioning of the industry.

2. Aesthetic Considerations and safety.

3. Hygiene

4. Efficiency.

5. Low cost

It was decided to assume a minimum plot size of approximately 4 acres within Kakamega Industrial Estates Ground to include septic tanks, parking and effluent treatment plant. The modalities of these will be worked out later.

The machine sizes determined a typical go-down of 60x25m (3 Nos) to include the following functions.

- production area
- storage
- laboratory
- offices.

The U-shape of the building has been arrived a to give a fairly domestic look hence breaking away from the massive industrial look. This has been enhanced further by the roof type and height to keep lower ambient temperature in fruit receipt, processing and storage.

The office block assumes that initially only a few departments will be needed viz.

- Administration
- Purchasing
- Accounts

However the building has been designed such that both vertical and horizontal growths are taken care of.

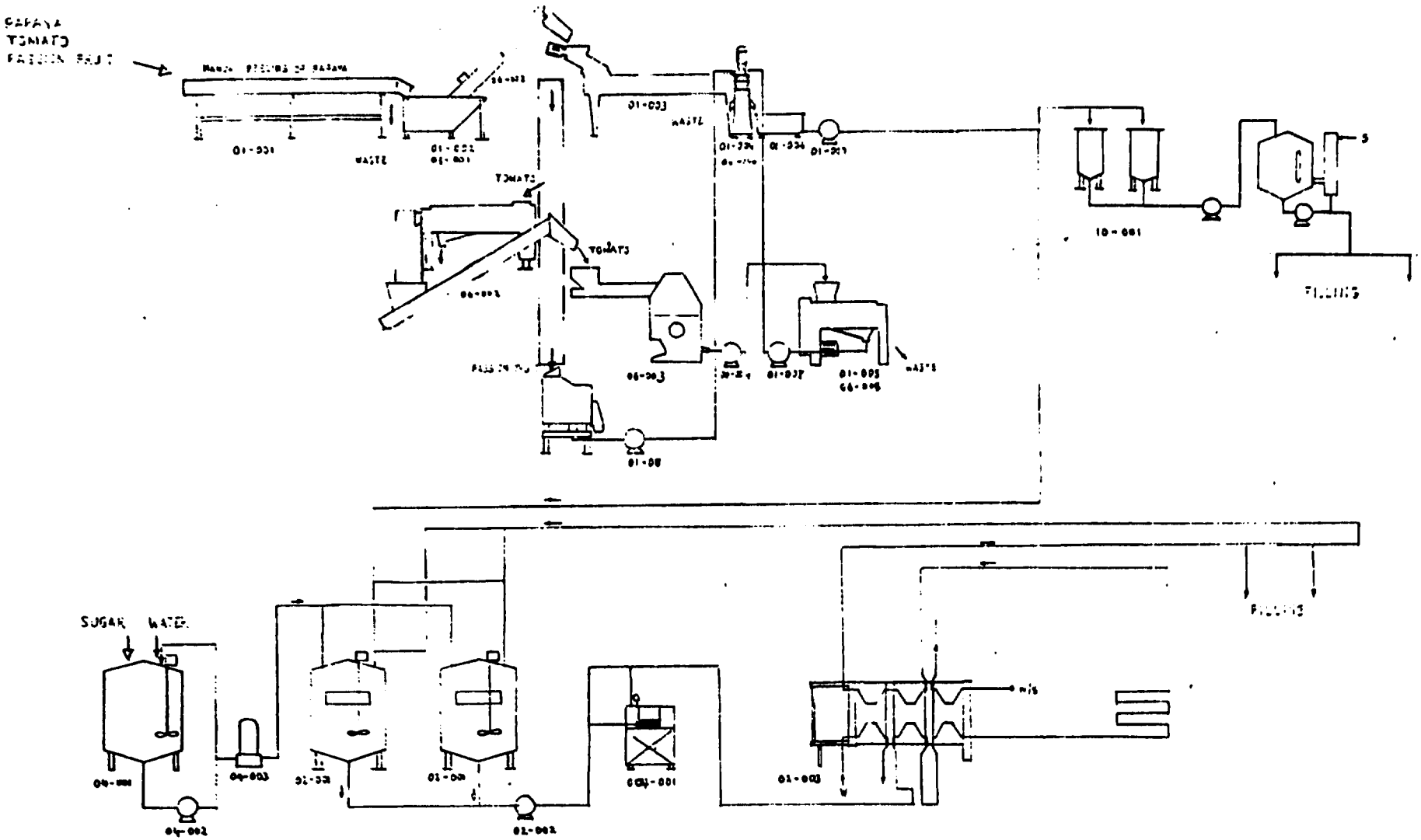
All in all the factory can also grow side ways by putting up similar blocks side by side as already proposed on the site plan.

The height envisaged of 6m plinther level too into account

- normal air draft flow
- lower temperature in the room
- machine heights.

The width of 25m took into consideration
- less obstruction of floor area
- smooth flow of products movement

Other aspects of ventilation, floor design and reinforcement shall be given in detail in the structural drawings.

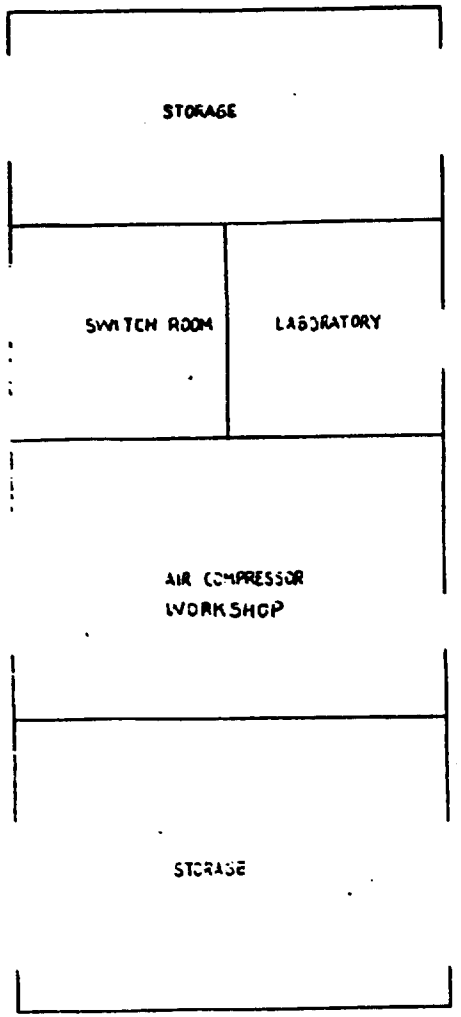


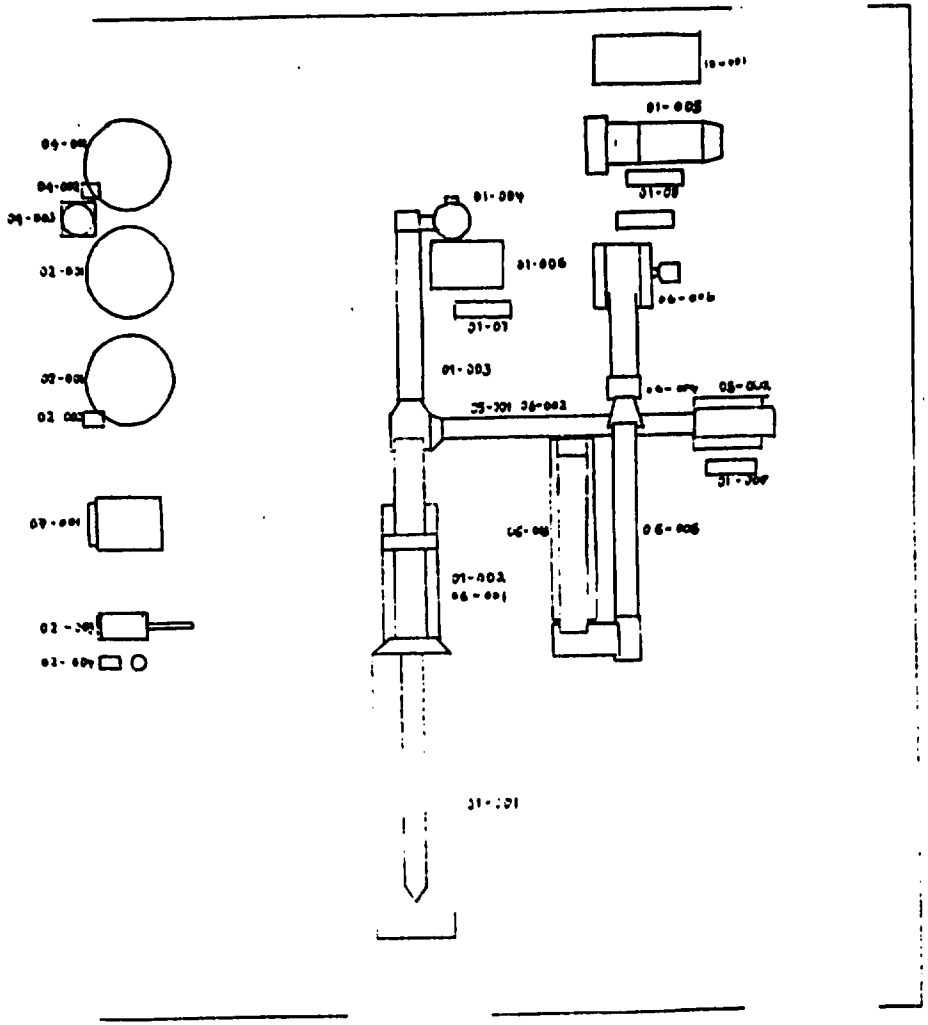
Rev	Qty	Description	Date	by

PRODUCT FLOW CHART PROPOSAL

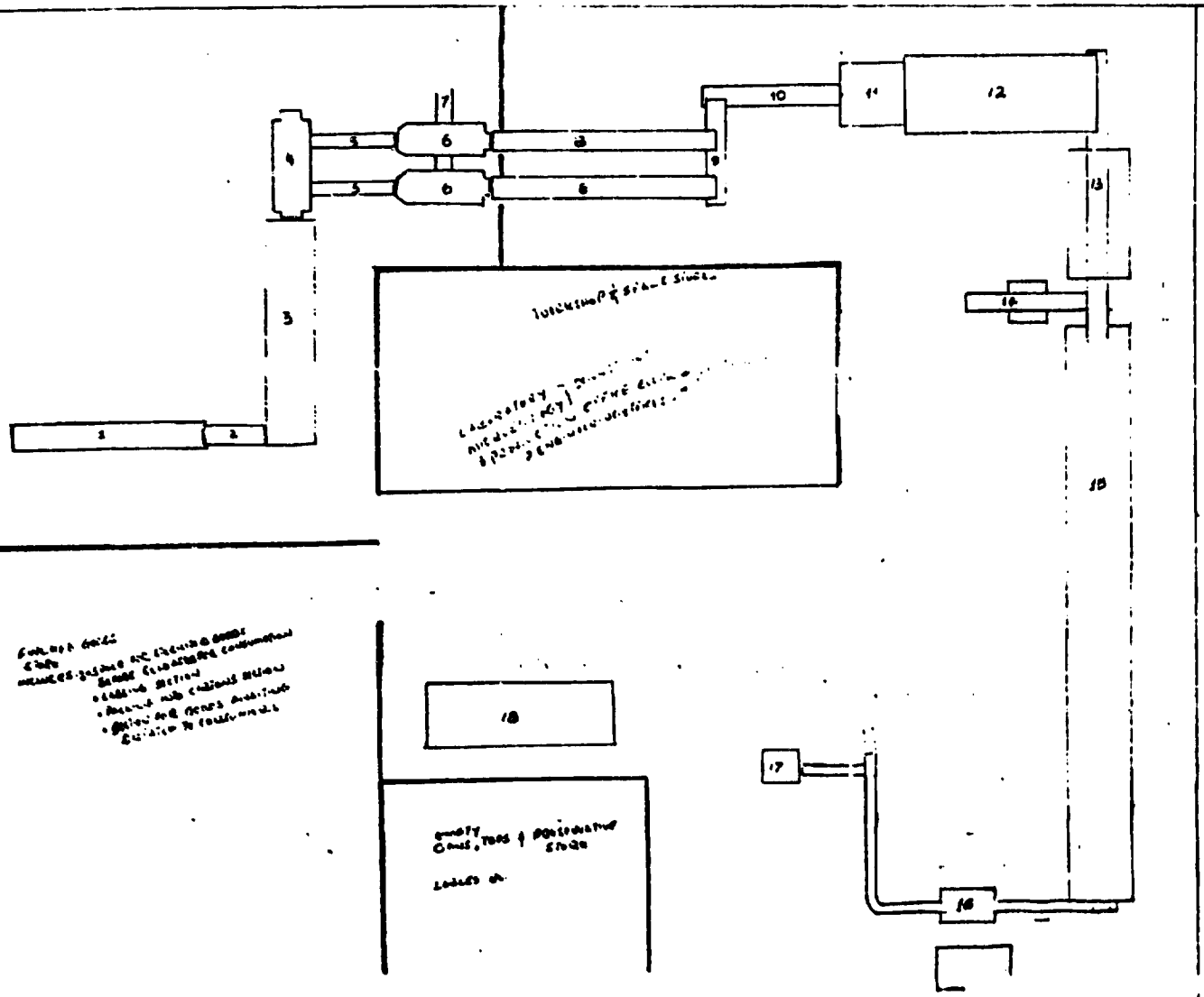
KAKAMEGA FOOD INDUSTRY

scale NTS

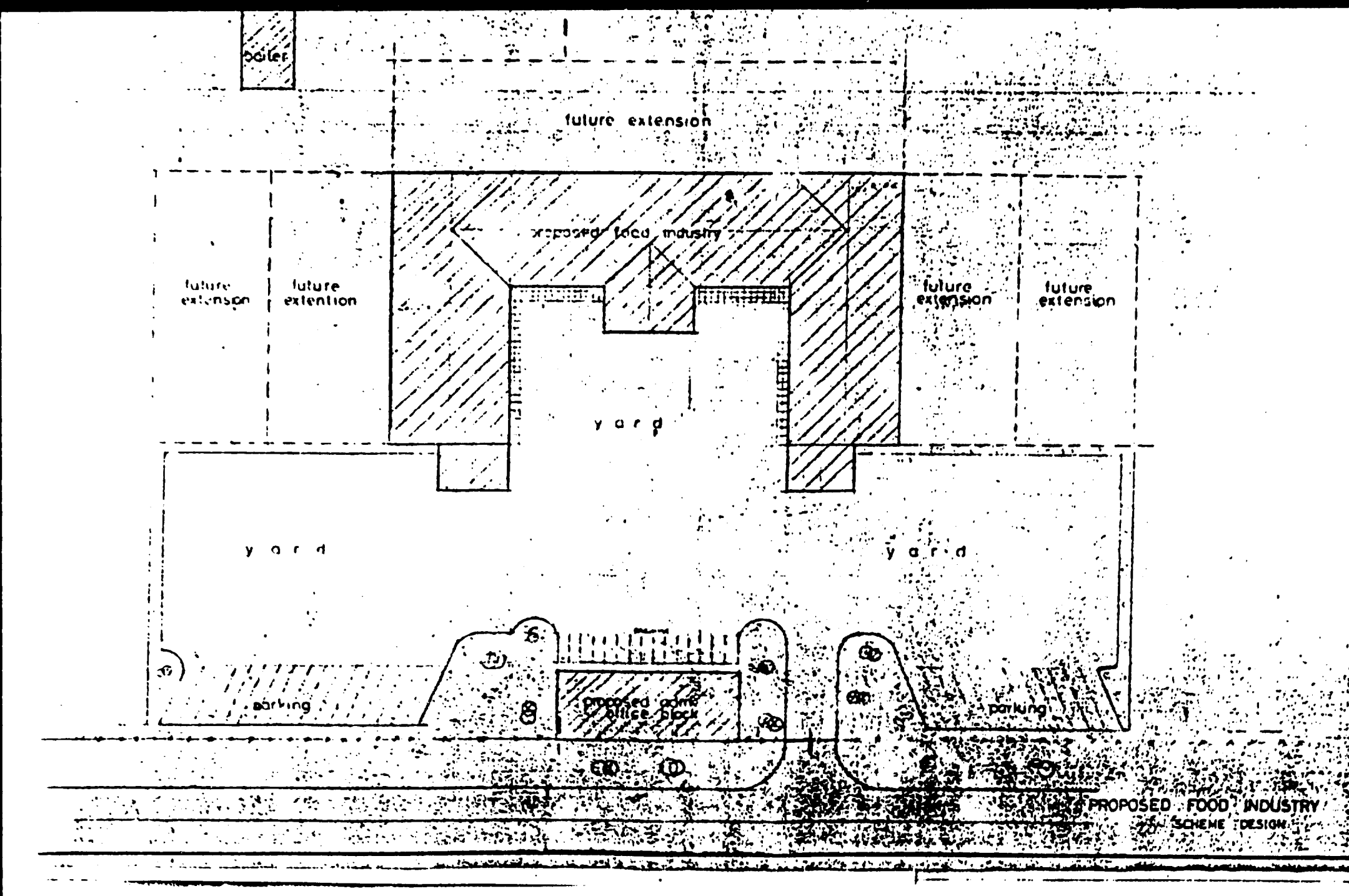


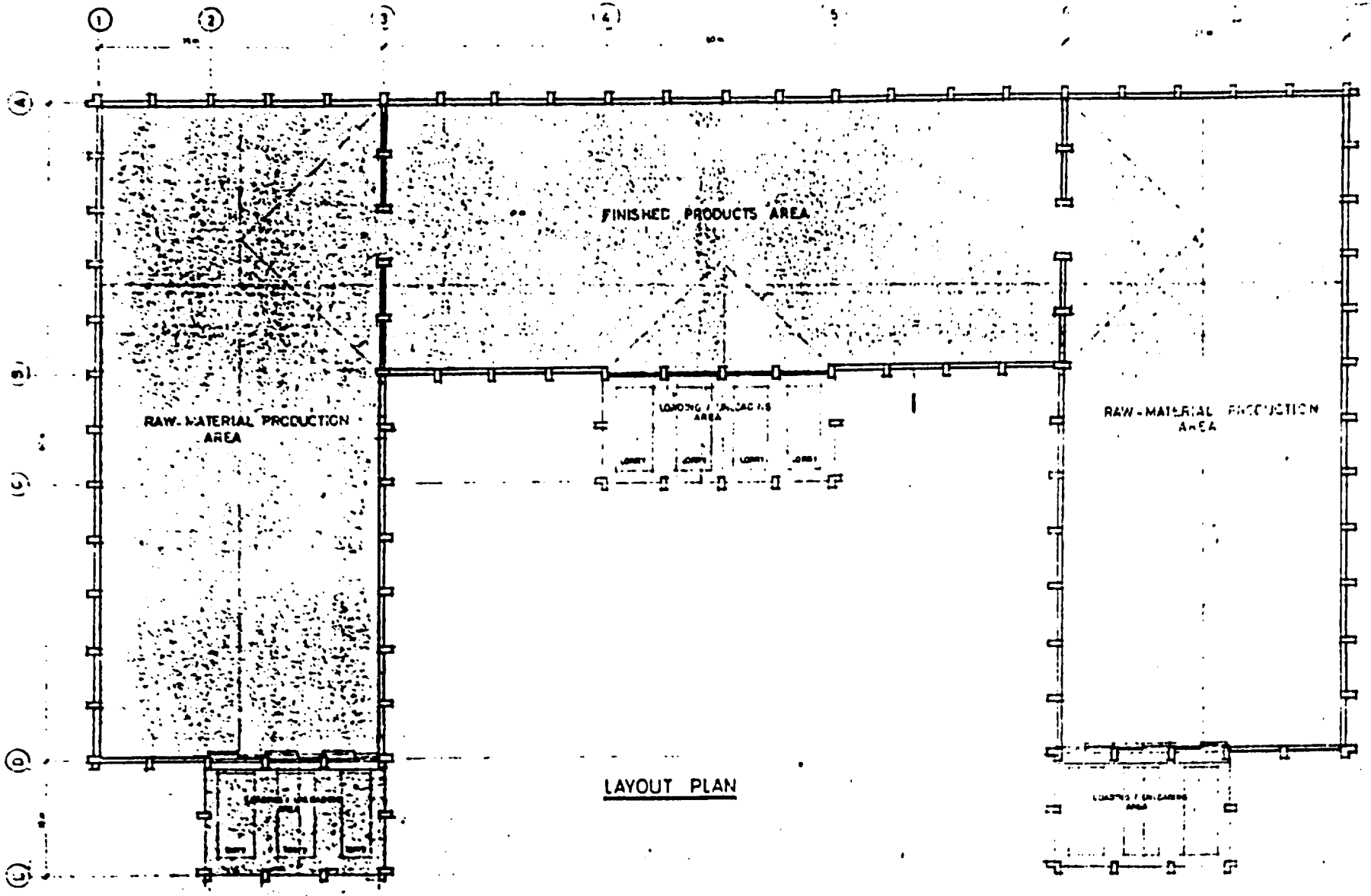


MACHINERY LAYOUT PROPOSAL
KAPANEC- FOOD INDUSTRY



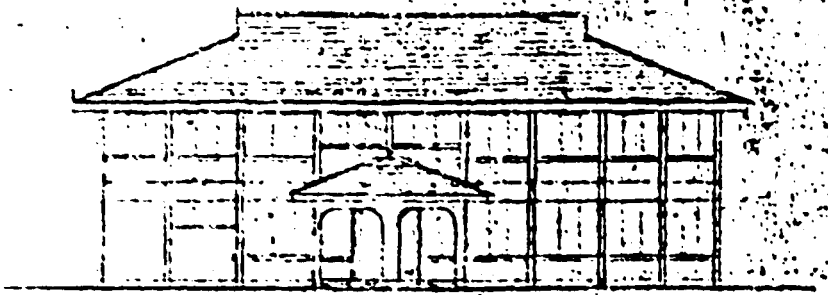
MACHINERY FLOOR LAYOUT PROPOSAL
FRENCH BEAN
KAKAMEGA FOOD INDUSTRY


boiler
future extension
proposed food industry
future extension
future extention
future extension
future extension
yard
yard
yard
parking
proposed admin office block
parking
PROPOSED FOOD INDUSTRY
SCHEME DESIGN

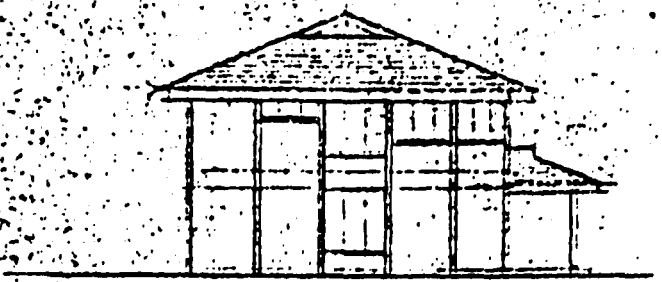


LAYOUT PLAN

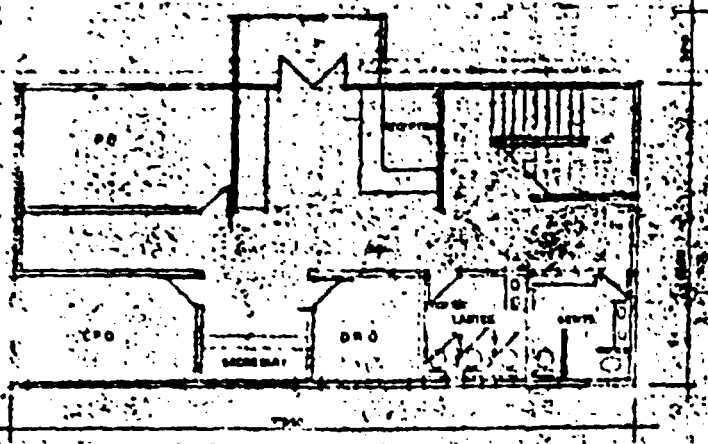
PROPOSED FOOD INDUSTR
SCHEME



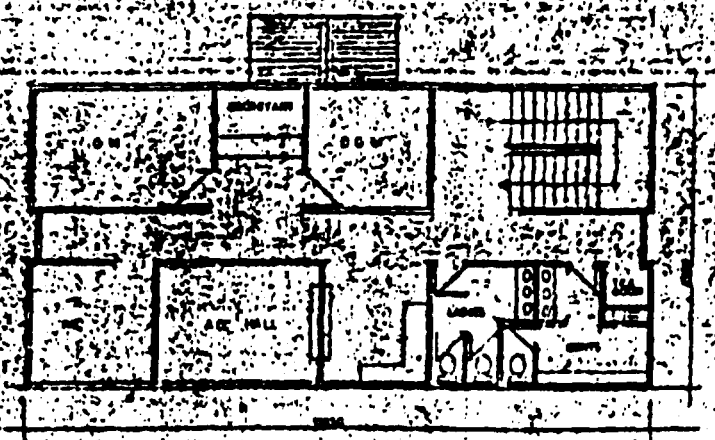
Front elevation



Side elevation

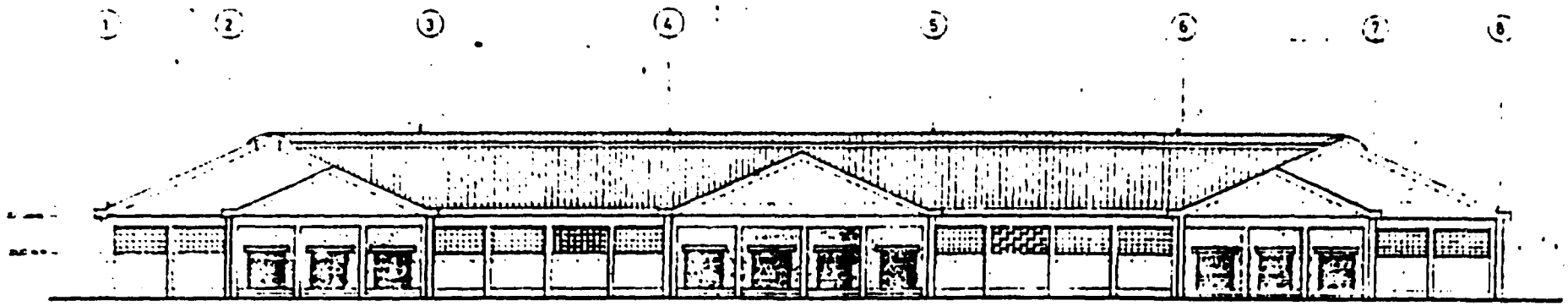


Ground floor

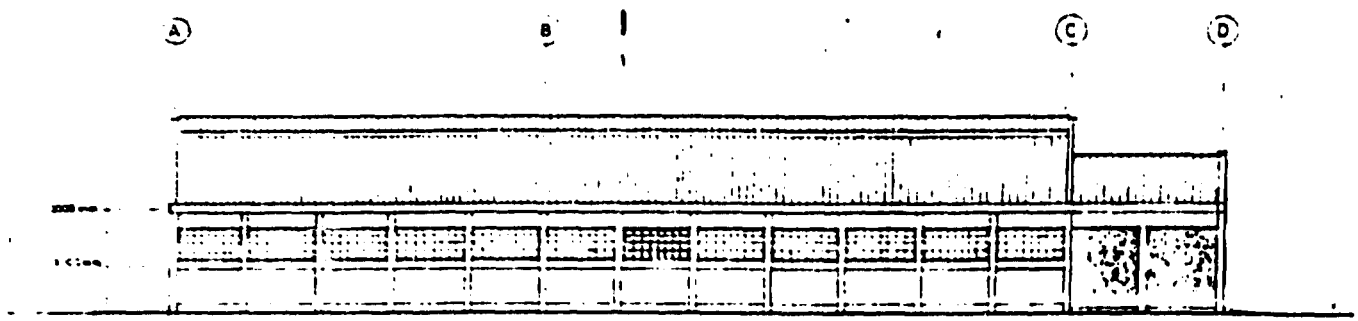


First floor

PROPOSED ADMINISTRATION BLOCK (FOOD INDUSTRY)



FRONT ELEVATION



SIDE ELEVATION

PROPOSED FOOD INDUSTRY
SCHEME DESIGN

CHAPTER VI

6.0.0 ORGANIZATION AND HUMAN RESOURCE

The project has various sections which we consider critical in determining the staff requirement. The section considered in this study are:-

- Nucleus Farm
- Outgrowers Department
- Factory Production line
- Factory Maintenance Crew
- Laboratory Section
- Transport Section (includes Drivers)
- Marketing Department
- Administration Department

6.1.0 The Organisation Chart: (proposed)

PROJECT MANAGER

OPERATIONS DEPT. — SALES & MARKETING DEPT. — ADMINISTRATION DEPT.

(Nucleus Farm)
(Outgrowers Dept.)
(Factory Maintenance)
(Laboratory)

Accountant | Personnel Officer | Transport Officer

We have further classified the employees as follows:

6.2.1 The Management Personnel (6)

- Project Manager 1
- Factory Manager 1
- Food Technologist 1
- Agriculturist 1
- Sales & Marketing Specialists 2
  (Foreign - 1)
  (Domestic - 1)

Approximate salary US $ 4000.00 p.a.

6.2.2 **Skilled Personnel** (9)

- Food Technician	1
- Mechanical Technician	1
- Electrical Technician	1
- Assistant Agriculturist	2
- Accountant	1
- Transport Officer	1
- Secretaries	2

Approximate salary US $ 3000.00 p.a.

6.2.3 **Semi-skilled Personnel** (11)

- Drivers	3
- Clerks	3
- Typists	3
- Telephonist	1
- Security Officer	1

Approximate salary US $ 2000.00

6.2.4 **Unskilled Personnel** (100)

- Farm Labourers	60
- Factory Labourers	30
- Cleaners	3
- Watchmen	6
- Messager	1

Approximate salary US $ 1000.00

6.3.0 **HIRING PROCESS**

While the foregoing labour force assumes operating the factory at full capacity, it should be noted from our implementation programme and marketing strategy that all the staff will not be engaged at the beginning of the programme. We foresee that:-

6.3.1 Unskilled labour at the factory will be hired towards the end of 1995.

6.3.2 Unskilled labour at the Nucleus Farm will be hired at end of 1994.

6.3.3 The marketing personnel for export market should be hired in the last quarter of 1995 before production starts in 1996. The local counterpart should be hired at the beginning of 1994 in order to develop the marketing strategies.

6.3.4 We recommend that the Technical skilled personnel especially those in the management level should be hired in second quarter of 1994 to be part and parcel of the plant installation, machinery and other factory development in order to guide the rest of the work in the factory when operation commences.

In our cash-flow analysis however we have maintained full labour costs.

6.4 AVAILABILITY OF STAFF:

Given the high unemployment level in Kenya there will be no problem in having readily available both the casuals, semi-skilled as well as the skilled technical personnel for the project. What we are aware of is that the project has to be careful in the salary they will be offering especially for the skilled Technical personnel (Engineers and the Food Technologist). It is for this reason that we have given the salary range shown in the proceeding paragraph.

For the position of the Marketing Personnel especially for the overseas market we recommend hiring an expertriate for years 1,2,3 who will probably work closely with the overseas partner. His local counterpart will need further training especially on Export Market and should be given an opportunity to participate in the overseas promotional exhibitions in Europe. This will equip him in the long run.

There should otherwise be no problem in hiring the rest of the project staff since Kakamega is becoming more and more urbanised and the issue of rural life will not be an issue.

CHAPTER VII

7.0.0 IMPLEMENTATION PLANNING

7.1.0 SIGNIFICANT INFORMATION FOR PROJECT IMPLEMENTATION

7.1.1 Because of the Export Market orientation of the project, it is critical that a FOREIGN PARTNER be identified as early as possible otherwise it will be difficult to make a successful entry into the European market. It is for this reason that we recommend that through EDC, and UNIDO, the PROMOTER be assisted in identifying such a partner preferably by or before JUNE 1994. Such partner will be influential in commencing the marketing arrangements within the EC markets. Our preliminary search indicates that additional funds might be sought for this function.

7.1.2 Precisely for the same reason on the market, the potential suppliers of the machinery must be contacted and possibly place and secure the order for the supply of the plant machinery and equipment by early part of 1994. It might be possible again to use the services of EDC in the identification of such suppliers besides the once recommended by our consulting Engineer. We treat the prices as holding till we get responses from these suppliers as we have already written to them. We are awaiting responses from ITC & CBA.

7.1.3 A well tailored Agricultural Education program for the outgrowers has to be launched as early as June 1994. It is expected that it will require 2 to 3 years of such a program before the introduction of the said crops in the project area succeeds. The study has placed a high premium on this aspect of the outgrowers education and must be done for the success of the project.

7.1.4 It is possible to stagger the building program for both the Factory and Administration Buildings. This might be an easy option but certainly it will be delaying and overall costs will shoot up tremendously. It is for this reason that in this study, the proposed factory capacity is the most optimal and needs to be implemented in its entirety within the first two years as proposed in the programs.

7.1.5 A ten year tax holiday has been assumed as this is an export based project. In our cash flow analysis this tax has not been included for the said first ten years.

Our recommended implementation programme therefore has

been based on such significant observations by the study team. The project as in stands has potential in:-

a) creating increased incomes for the small scale farmers from sale of the proposed horticultural crops to the Kakamega Factory. Our raw materials cost US $ 1,641,000. Out of this we estimate small scale farmers will earn over $800,000 annually when at full operation.

b) Direct employment at the factory is estimated at 60 people.

c) Proper farming practices will help in regenerating the soils in Kakamega.

d) The project promoters will earn substantial profits and start paying taxes to the government after the grace period.

7.2.0 PROMOTER'S PREPARATIONS

Frost Enterprises Ltd. has been involved in business since 1986 as outlined in the introductory notes in this report. It has capable partners with both experience and technical knowledge especially in the field of Agriculture.

Further, it has been involved directly with the Government Department concerned with industry and trade, not only here in Kenya but, also in Europe. At the National level, Frost limited has:-

- discussed at length the project with the Ministry of commerce and Industry right from the project conception stage up to the completion of the feasibility study stage. It has managed to secure part financing of the investment study from UNIDO/UNDP.

- discussed with the DDC/Kakamega regarding the project location and site and has an undertaking for them jointly with municipal council of Kakamega to allocate 2 1/2 acre industrial plot for the factory.

- retained the services of Manpower Studies Institute for consultancy services both in project design as well as promotion.

- approached the local banking community -Kenya Commercial Bank, EADB, IDB and PTA for Financing and there are encouraging responses.

- obtained an offer (from one of the partners) of 1000 acres of land along the Kakamega/Trans-Nzoia District as a nucleus farm for the factory.

- discussed with Kakamega Prisons, Bukura Training Institute, Kakamega Agriculture Research Station and Shikusa Prisons officials regarding being boosters of the nucleus farm for the project by being extensions.

At International level, Frost Limited has sought, through ITC and CBI, for a suitable partner in Europe who will spearhead the entry of the products into the European Market.

7.3.0 STRATEGIES

The ensuing implementation plan however is based on two critical factors namely:- the availability of the raw materials and the opening up of trading partnership in the European market. It will be in place from 1st. January 1994 and that the factory production will start 1st. January 1995. In order to stay within this course, the following strategies have been recommended and costed:-

7.3.1 RAW MATERIALS

a) The sources of the horticultural crops will be:-

i. from a nucleus farm of approximately 1000 acres owned and managed directly by the factory establishment.

ii. use Kakamega Agriculture Research Station Farm, Kakamega Prisons farm, Shikusa Prisons farm, and Bukura Institute Farm as boosters of the Nucleus Farm base.

iii. outgrowers farm who will be assisted financially and technically to produce the required crops at the specified times.

7.3.2 ESTABLISHMENT

The Kakamega Fruit and Vegetable Project establishment will be made up of:-

a) The outgrower department
b) The nucleus farm
c) The factory

7.3.3 THE OUTGROWER DEPARTMENT

The objective of the outgrower department will be to recruit farmers, train them and supervise the production of desired crops which will be the raw material for the Kakamega Fruit

and Vegetable Project.

To meet this objective the outgrower department will have five employees in its initial stage.

a) 1 Agricultural expert - crop
b) 1 Agricultural expert - Engineering
c) 1 Driver
d) 1 Technical Assistance
e) 1 Secretary.

Capital Outlay:

It is expected that to develop sufficient outgrower suppliers will cost Kshs. 50million over the period of 5 years.

7.3.4 ORGANISATION OF OUTGROWERS

a) Acquisition and contracting of outgrowers.

b) Support Services provided by the Kakamega Fruit & Vegetable Project, including transport and collection centres organisation.

c) Crops harvesting and payment to the Farmers.

7.3.5 ACQUISITION AND CONTRACTING OF OUTGROWERS

a) The Management of Kakamega Fruit and Vegetable Project will have in its management structure a section in charge of outgrowers activities. It is expected that the outgrowers team will consist of the following positions. (See employees on previous page)

b) The outgrowers section will visit locational 'barazas' in identified areas and seek the support of the local administration.

- they will identify the potential farmers and available acreage.

- available land should be secured by a lease.

7.3.6 SUPPORT SERVICES PROVIDED TO FARMERS BY KAKAMEGA FRUIT & VEGETABLE PROJECT:

The support given by the Kakamega Fruit Factory will aim at achieving the following.

a) Sustainable horticultural crops production in the area.
b) Strong and stable farmers' income.

These objectives will be achieved through the following activities of the outgrowers section of establishment:

i) Provision of financial support to the farmers by paying for and preparation and providing technical assistance in crop husbandry, harvesting and collection of crops and delivery to the factory.

ii) Organisation of training and promotional seminars for all farmers in order to educate them in the husbandry and trade of horticultural crops and business.

Special emphasis will be placed on women's groups and small farmers in providing both educational and financial support.

7.3.7 CROPS HARVESTING AND PAYMENT TO FARMERS.

The harvesting of the crops will be planned by the outgrowers section in the production schedule of the factory.

The factory will provide a suitably trained persons who can handle the crops as is required by the set standards.

The crops will be weighed on the farm and recorded for each grower and again weighed at the factory.

Careful and accurate records will be kept by the outgrowers section.

Payment to the outgrowers will be made at the earliest convenient time in order to motivate the farmers to continue supporting the enterprise.

As a process of sustaining the investment an outgrowers association may be formed so that in the long run the activities of the outgrower section of the factory are transferred to such as association or cooperative.

7.3.8 MONITORING AND EVALUATION

The evaluation plan for the Kakamega Fruit &Vegetable Project includes both monitoring and evaluation. Monitoring will basically cover the on-going internal project activities to assess whether the project resources and processes are being administered and used as intended and whether they are producing intended outputs. Evaluation will consist of project reviews at intervals throughout the life of the project (even beyond the five years) in which project experiences are analyzed out through management meetings (biannual/annual) and public monitoring will consist of the following:-

a) **Performance Monitoring**

i. Farming Community

- Community organization, motivation and Training.
- Plot/farm preparation
- Transport to the factory
- Assessment of farmers attitudes on horticultural crops.

ii. At factory level will be done by the Management's

- review of production schedules and output
- examination of costs and revenues.

Evaluation will be carried out on quarterly and annual basis.

In general this will serve as an on-going function, raising and resolving issues before they adversely affect the project's goals and objectives. As much as possible, all phases of project monitoring and evaluation will involve the participation of the community, government officials and the management of Kakamega Fruit & Vegetable Project.

It is emphasised that operation and maintenance evaluation will cover both financial and physical systems to determine facets such as:-

- efficiency of the project in production and marketing
- acceptance by the farmers
- any misuse.
- technical and physical condition of the project
- review of the records

Further the evaluation report will contain the following information:-

- annual farm management survey of farmers income and cost
- an attitude survey of the farmers
- market survey to monitor the movement of particulary spirits of the horticultural product Kenya, in particular, sales for the Kakamega.
- Sales performance.

NOTE

PAGE 127 AND 128 OMISSION IS A NUMBERING ERROR ONLY AND THERE IS NO LOSS IN THE TEXT.

partner	
(b)Procster seeks Funds for accessing the Foreign Partner	
5. Receive Funding Agreement from Local Financiers	
6. Apply for Forsal Project Approved by the Kakamega DDC including allocation of the Industrial Land in Kakamega	
7. Prepared Detailed Building Plans,Engineering Drawings, Civil Works & Submit for Approval	
8. Prepare and award tenders for Civil works, Machinery supply and other suppliers	
9. Start Construction works	
10.Advertise and start staff Recruitment	
11.(a) Prepare the Nucleu Farms and Booster Farms	
(b) Commence Farmers Education (Small Scale)	
12.Start Planting Crops on Nucleu Farms / Booster Farms	
13. Install the factory with Machinery & Equipment	
14. Test the factory and prepare for Commissioning	
15. Fill the Critical Positions for the Factory as well as Administration	
16. Purchase the raw materials & other supplies as required	

SECTION 1

	2001	2002	2003	2004	2005	TOTAL
						400.00
						1600.00
	8693.00	8816.00	8816.00	8816.00	8816.00	63223.00
						60.00
						11.00
						693.00
						348.00
						407.00
						602.30
	80.00	80.00	80.00	80.00	80.00	4.00
	1200.20	1200.20	1200.20	1200.20	1200.20	9022.00
	2669.00	2669.00	2669.00	2669.00	2669.00	20000.00
	173.70	173.70	173.70	173.70	173.70	1553.80
	8.00	8.00	8.00	8.00	8.00	61.40
	8.00	8.00	8.00	8.00	8.00	61.40
	348.00	348.00	348.00	348.00	348.00	3480.00
	48.00	48.00	48.00	48.00	48.00	480.00
	801.40	801.40	801.40	801.40	801.40	7434.00
	200.00	200.00	200.00	200.00	200.00	1600.00
	320.20	240.00	160.00	80.00	0.00	3519.80
	717.60	329.40	0.00	0.00	0.00	3487.90
	24.00	24.00	24.00	24.00	24.00	289.00
	6600.10	6131.70	5722.30	5642.30	5562.30	53314.40
	-2391.70	-296.80	2387.50	5481.20	8654.90	
	2094.90	2684.30	3093.70	3173.70	3253.70	11908.60
	-296.80	2387.50	5481.20	8654.90	11908.60	

SECTION 3

MONEY IN US $ '000s (DOLLARS)

	SEP	OCT	NOV	DEC	1996 TOTAL	1997	1998	1999	2000	2001	2002	2003	2004	2005	TOTAL
					400.00										400.00
					1600.00										1600.00
	153.00	153.00	153.00	153.00	1485.00	2284.00	3356.00	4173.00	5485.00	7562.00	7740.00	7740.00	7740.00	7740.00	55363.00
	153.00	153.00	153.00	153.00	3485.00	2284.00	3356.00	4173.00	5485.00	7562.00	7740.00	7740.00	7740.00	7740.00	57363.00
					60.00										60.00
					11.00										11.00
					693.00										693.00
					548.00										548.00
					407.00										407.00
	2.00	2.00	2.00	2.00	24.00	27.00	38.10	48.60	64.00	80.00	80.00	80.00	80.00	80.00	603.30
	-	-	-	-	4.00	-	-	-	-	-	-	-	-	-	4.00
	22.95	22.95	22.95	22.95	259.75	348.60	517.05	635.85	839.70	1161.03	1161.03	1161.03	1161.03	1161.03	8406.10
	51.00	51.00	51.00	51.00	535.00	774.66	1148.99	1412.99	1865.98	2580.04	2580.04	2580.04	2580.04	2580.04	18637.81
	9.10	9.10	9.10	9.10	118.20	120.00	132.00	145.20	159.70	175.70	175.70	175.70	175.70	175.70	1553.60
	0.20	0.20	0.20	0.20	2.40	3.00	4.00	5.00	7.00	8.00	8.00	8.00	8.00	8.00	61.40
	0.20	0.20	0.20	0.20	2.40	3.00	4.00	5.00	7.00	8.00	8.00	8.00	8.00	8.00	61.40
	29.00	29.00	29.00	29.00	348.00	348.00	348.00	348.00	348.00	348.00	348.00	348.00	348.00	348.00	3480.00
	4.00	4.00	4.00	4.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	480.00
	30.60	30.60	30.60	30.60	521.00	464.80	517.05	635.85	839.70	774.02	774.02	774.02	774.02	774.02	6840.50
	-	-	-	-	0.00	-	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	1600.00
	53.30	53.30	53.30	52.30	639.60	640.00	560.00	480.00	400.00	320.20	240.00	160.00	80.00	0.00	3519.80
	16.90	18.70	20.40	22.20	152.00	288.40	530.30	745.50	913.80	983.30	727.80	318.20	238.30	842.80	5760.60
	2.00	2.00	2.00	2.00	73.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	289.00
	221.25	223.05	224.75	226.55	4446.35	3090.26	4071.49	4733.79	5716.88	6710.29	6374.59	5884.99	5725.09	6269.59	53003.31
	-677.75	-746.00	-816.05	-887.80		-961.35	-1767.61	-2485.10	-3045.90	-3277.80	-2426.09	-1060.68	794.33	2009.24	
	-68.25	-70.05	-71.75	-73.55	-961.35	-806.26	-717.49	-560.79	-231.88	851.71	1365.41	1855.01	2014.91	1490.41	4299.69
	-746.00	-816.05	-887.80	-961.35	-961.35	-1767.61	-2485.10	-3045.89	-3277.78	-2426.09	-1060.68	794.33	2809.24	4299.65	4299.69
	-18.65	-20.40	-22.19	T. Sales	1635.00	2324.00	3447.00	4239.00	5590.00	7740.20	7740.20	7740.20	7740.20	7740.20	
					-288.40	-530.20	-745.53	-913.77	-983.33	-727.83	-318.20	238.30	842.77		

Sales 70% Export
30% Domestic

Payback Year 9.

SECTION 2

CASH FLOW ANALYSIS (CURRENCY IN U.S. DOLLARS)

								1996	1997	1998	1999				
JAN	FEB	AUG	SEP	OCT	NOV	DEC	TOTAL								
							400.00								
							1600.00								
120.00	120.00	153.00	153.00	153.00	153.00	153.00	1485.00	2278.00							
120.00	120.00	153.00	153.00	153.00	153.00	153.00	3485.00	2278.00							
							60.00								
							11.00								
							693.00								
							548.00								
							437.00								
2.00	2.00	2.00	2.00	2.00	2.00	2.00	24.00	27.80							
							4.00								
18.00	18.00	22.95	22.95	22.95	22.95	22.95	259.75	367.70							
40.00	40.00	51.00	51.00	51.00	51.00	51.00	535.00	772.66							
9.10	9.10	9.10	9.10	9.10	9.10	9.10	119.20	120.00							
0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40	3.00							
0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40	3.00							
29.00	29.00	29.00	29.00	29.00	29.00	29.00	343.00	348.00							
4.00	4.00	4.00	4.00	4.00	4.00	4.00	48.00	48.00							
24.00	24.00	30.60	30.60	30.60	30.60	30.60	521.00	463.60							
-	-	-	-	-	-	-	0.00	-							
53.30	53.30	53.30	53.30	53.30	53.30	53.30	639.60	643.00							
11.60	13.60	15.30	16.90	18.70	20.40	22.20	152.00	289.40							
2.00	2.00	2.00	2.00	2.00	2.00	2.00	73.00	24.00							
193.40	195.20	219.65	221.25	223.05	224.75	226.55	4636.35	3086.16							
-462.50	-535.90	-611.10	-677.75	-746.00	-816.05	-887.80		-961.35							
-73.40	-75.20	-65.65	-69.25	-70.05	-71.75	-73.55	-961.35	-808.16							
-535.90	-611.10	-677.75	-746.00	-816.05	-887.80	-961.35	-961.35	-1769.51							
-13.40	-15.20	-16.94	-18.65	-20.40	-22.19	T. Sales	1636.00	2318.00							
							-288.40	-530.85							

Sales - 50% Export
50% Domestic

SECTION 3

CASH FLOW ANALYSIS - CURRENCY IN US $ '000s (DOLLARS)

	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1996 TOTAL	1997	1998	1999	2000	2001	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
								[illegible]										
								1600.00										
[illegible]	120.00	120.00	160.00	160.00	160.00	160.00	160.00	1520.00	2246.00	2906.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	120.00	120.00	160.00	160.00	160.00	160.00	160.00	3520.00	2246.00	2906.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
								60.00										
								[illegible]										
								693.00										
								548.00										
								407.00										
[illegible]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	24.00	27.80	38.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	-	-	-	-	-	-	-	4.00	-	-								
[illegible]	18.00	18.00	24.00	24.00	24.00	24.00	24.00	265.00	340.80	444.60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	40.00	40.00	53.33	53.33	53.33	53.33	53.33	546.65	757.33	987.99	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	9.10	9.10	9.10	9.10	9.10	9.10	9.10	118.20	120.00	132.00	145.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40	3.00	4.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40	3.00	4.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	29.00	29.00	29.00	29.00	29.00	29.00	29.00	348.00	348.00	348.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	48.00	48.00	48.00	[illegible]	48.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	24.00	24.00	[illegible]	32.00	32.00	32.00	32.00	328.00	454.40	444.60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	-	-	-	-	-	-	-	0.00	-	200.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	53.30	53.30	53.30	53.30	53.30	53.30	53.30	639.60	640.00	560.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	11.60	13.4	15.30	16.90	18.50	20.20	22.00	151.40	284.90	526.50	783.20	1046.30	1150.85	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	73.00	24.00	24.00	[illegible]	24.00	[illegible]	[illegible]	[illegible]	[illegible]	26.00	[illegible]
[illegible]	193.43	195.20	224.43	226.03	227.63	229.33	231.13	4469.66	3051.23	3761.79	[illegible]	[illegible]	5878.84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-452.50	-535.90	-611.13	-675.53	-741.56	-809.19	-878.52		-949.66	-1754.89	-2610.69	[illegible]	-3836.08	[illegible]	[illegible]	[illegible]	1611.46	
[illegible]	-73.40	-75.20	-54.43	-66.03	-67.63	-69.33	-71.13	-949.66	-805.23	-855.79	[illegible]	-481.88	646.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-535.90	-611.10	-675.53	-741.56	-809.19	-878.52	-949.65	-949.66	-1754.89	-2610.68	[illegible]	-3836.08	3189.92	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-13.40	-15.20	-15.99	-18.54	-20.23	-21.96	-23.74	1683.00	2272.00	2964.00	3868.00	5163.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
								-284.90	-526.47	-783.20	-1006.26	-1150.92	-955.92	[illegible]	[illegible]	[illegible]		

Sales - 70% Domestic
30% Export.

SECTION 4

7. Commission the Factory	
8. Harvest the Farm Produce and deliver same to the Factory	
9. Commence Production and Maintain it.	
10. Market the Produce as appropriate	
11. Carry out Preliminary Factory assessments	
12. Prepare Performance Report	
13. Start repaying the Bank Loans	
14. Prepare annual Report for the Project	
15. Prepare the crops on the Outgrowers farms	

SECTION 5

CHAPTER IX

CONCLUSIONS AND ANALYSIS

In the process of carrying out the survey in this project the following facts became very clear.

1. Western Province is not a Fruit and Vegetable garden waiting for a factory to be placed in its midst to process such fruits and vegetables.

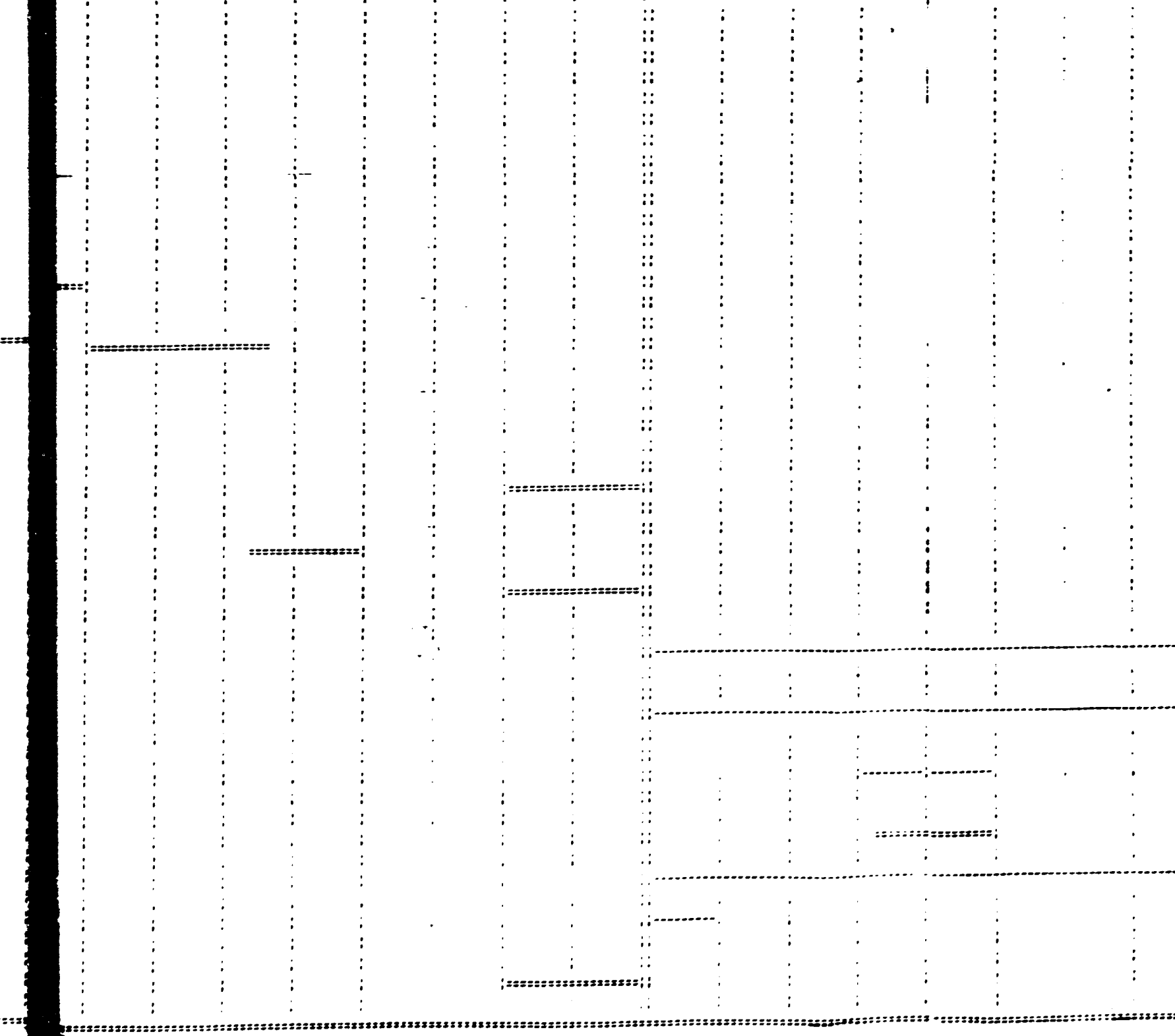
2. Western Province has good climate and suitable soils for growing of variety of horticultural crops.

3. Cultivation behaviour of the inhabitants of Western Province is such that practically every homestead has some kind of a fruit tree including bananas, papaws, guava, mango and passior fruit. These are cultivated in very informal way either as intercropped or shade trees in the homesteads. Additionally a variety of vegetables are grown for home consumption and marginally for sale on the markets. Such vegetables include cabbages, carrots kales, beans and a variety of other local type vegetables. There is no large scale, well organised marketing system for horticultural crops in Western Province.

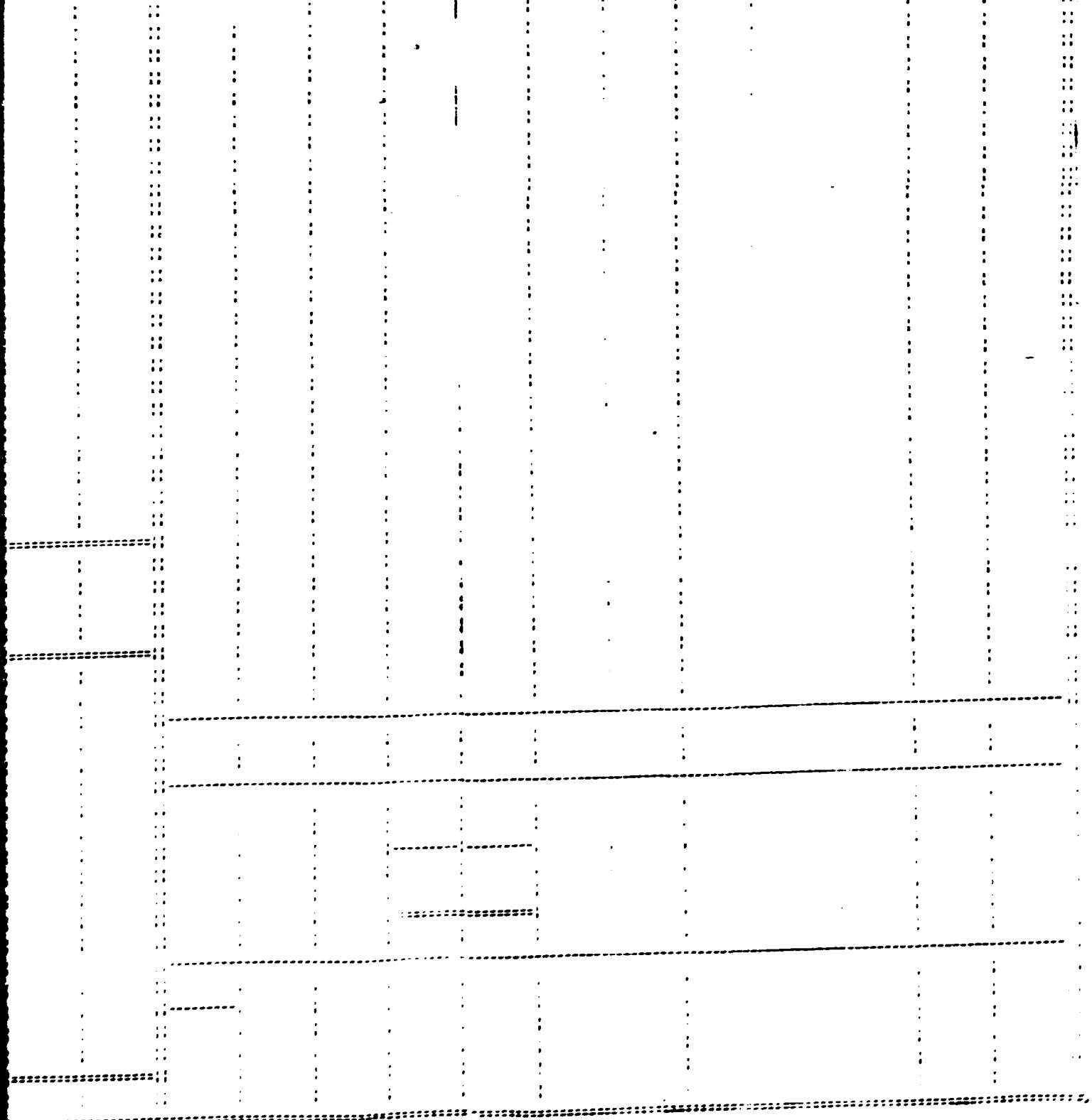
   We perceived this phenomena is a contributory factor to poverty in that part of Kenya and consider that re-organisation and improvement of horticultural activities would contribute significantly to the improved standard of living of the inhabitants of Western Province.

4. Indeed Western Province has the second lowest per capita income compared to other provinces in Kenya. Nyanza Province has the lowest per capita income. Western province has the lowest per capita expenditure compared to other provinces in Kenya. Western Province also has the second lowest wage employment in Kenya, compared to other provinces. Western Province is the most densely populated compared to other

SECTION 6



SECTION 7



SECTION 8

CHAPTER VIII

8.0.0 FINANCIAL ANALYSIS

To prepare the ensuing Financial analysis, we were governed principally by the **Original Investment** of capital employed in the project. In the cash flow analysis schedule this is approximately US $2,000.000. The cost of the capital used in our analysis is the average of the interest Rates which worked out to be 35%.

We generated a series of sales figures based on the market share of 30% Domestic and 70% Export market. Our project life span has been taken to be 10 years after the grace period of two years. However, the project will continue beyond 10 years.

Arising from the cashflow analysis as depicted in the schedule that follows, we drew the following parameters.

i. PAYBACK PERIOD- defined in this study as "number of years required to return the original investment" (P.291, J.Fred Weston, Eugene F.Burghan, Managerial Finance, Sixth Edition); is 7 **(seven years)**

ii. NET PRESENT VALUE of the project defined as "present value of future returns discounted at the cost of capital, less the cost of the investment"(Ibid).According to our prefered mode **CFA1**,NPV is US$ 2168 (see page 129).

iii. IRR - in our study defined as "interest rate which equates the present value of future returns to the investment outlay" (Ibid). In our cash flow analysis the rate that approximate this equality is 35%.

iv. Two year grace period on loaned capital.

8.1.0 CASH FLOW PROJECTIONS AND SENSITIVITY ANALYSIS

It is to be noted that our cash flows are based on a strong Export market. Accordingly, we have in our analysis considered three scenarios to reflect cash-flow when:-

a) the market share is 70% export and 30% domestic (This is our first preference)
b) same as (a) above but with reduced prices for two products.
c) the market share is 50% export and 50% domestic.
d) the market share is 30% export and 70% domestic.

In the first scenario where export market share is 70% while domestic market share remains 30%, the prices for passion and papaya concentrates were US$ 4000 and US$ 2200 per ton respectively which results into the cash flow analysis **CFA1**. While holding the same market structure, we have changed prices of the two commodities (according to forecasts in Market Information News Service in Geneva, July 1993) to US$ 2500 and US$ 1570 per ton respectively. This results into the cash flow analysis **CFA2**.

In the second scenario where export and domestic market share are each 50% at the lower prices and results into the cash flow analysis **CFA3**.

In the third scenario where export market share is 30% while domestic market share ie 70% at the lower prices and results into the cash flow analysis **CFA4**.

The following comparative data is thus revealed.

	CFA1	**CFA2**	**CFA3**	**CFA4**
Cash Breakeven	Yr2000	Yr2001	Yr2001	Yr2001
Positive Bank Balance	Yr2002	Yr2003	Yr2004	Yr2004
Closing Bank Balance	11908.60	4499.70	3621.05	3462.20
Highest Bank Overdraft	2613.00	3277.80	3495.40	3836.05

The Cash Flow CFA1 based on 70% export and 30% domestic market yields the best results followed by Cash Flow CFA2 which again is 70% export oriented with lower prices.

The Cash Flow CFA4 with 30% export and 70% domestic market projects the poorest results for the project. The net present value for the four scenarios also reflect similar results with positive NPV of US$ 2168 in CFA1 and a negative NPV of US$ 788.20 in CFA4 as depicted in the table below.

SENSITIVITY ANALYSIS
NET PRESENT VALUE IN '000 US DOLLARS

(A)		(B)		(C)		(D)	
70%E 30%D		70%E 30%D		50%E 50%D		30%E 70%D	
Year	NPV	YEAR	NPV	YEAR	NPV	YEAR	NPV
1996	-321.0	1996	-336.47	1996	-336.47	1996	-332.38
1997	-301.0	1997	-282.19	1997	-282.86	1977	-281.83
1998	-194.4	1998	-251.12	1998	-282.33	1998	-299.53
1999	- 98.2	1999	-196.28	1999	-216.45	1999	-260.23
2000	77.5	2000	- 81.16	2000	-105.29	2000	-168.66
2001	733.2	2001	298.10	2001	237.10	2001	226.16
2002	939.5	2002	477.89	2002	398.94	2002	398.01
2003	1032.8	2003	649.25	2003	546.64	2003	545.43
2004	1110.8	2004	705.22	2004	738.61	2004	737.77
2005	1138.8	2005	521.64	2005	569.46	2005	647.77
NCF	4168.0	NCF	1504.88	NCF	1267.35	NCF	1211.77
Less		Less		Less		Less	
OC	2000.0	OC	2000.00	OC	2000.00	OC	2000.00
NPV	2168.0	NPV	-495.12	NPV	-732.65	NPV	-788.21

Footnote
E stands for Export
D stands for Domestic
NCF stands for Net Cash Flows
OC stands for Original Capital
NPV stands for Net Present Value

The price of passion concentrate and papaya concentrate is US$ 4000.00 and US$2200.00 respectively in (a) whilst lower prices of US$ 2500.00 and US$ 1570.00 respectively are used in (b), (c) and (d).

The payback period according to Sales Programme 11(a) is 7 years. For Sales Programme 11(b), (c) and (d), the payback period is not acceptable as it is over 7 years.

It is therefore clear that if prices were to drop by between 10% and 20% even in these products, the effect on the overall market performance would be less severe since in the above analysis, we have allowed the prices of these two commodities to drop by between 38% and 29%.

nb: *The relevant CFA tables are attached.*

The following summaries have been prepared:

8.1.0 **INVESTMENT** ('000 US $)

a)	Land and Site Preparation	60.0
b)	Design & Engineering	11.0
c)	Buildings	693.0
d)	Motor Vehicles	407.0
e)	Plant & Equipment	548.0
f)	Preproduction Expenses	232.0
g)	Contingencies	49.0
h)	Working Capital	2613.0
		4613.0

8.2.0 **CAPITAL STRUCTURE**

a)	Equity - Local 60%	240.0	
	- Foreign 40%	160.0	
			400.0
b)	Long Term Loans @ 40%p.a.		1600.0
c)	Bank Overdrafts @ 30%p.a.		2613.0
			4613.0

GRACE PERIOD 2 YEARS

8.3.0. **WORKING CAPITAL.**

According to the Cash Flow Analysis, the bank borrowing achieves a maximum of US $ 2,613,000 as the closing balances in year 1999.In this project our study has recommended that the minimum working capital required will be that which will ensure that the project operatios can continue unimpeded for a period of at least **six months** for it to be secure.This is the amount of funds that must be available for the Project to be able to:-

i) Pay salaries for employees for six months.
ii) Buy raw materials enough for the Project to continue in operations for six months.
iii) Pay for the basic supplies for a period of six months.
iv) Pay for the utilities i.e power,water,etc for six months.

The closing balance of US $ 2,613,000 is for a period of 48 (Forty Eight) months.The resulting working capital for six months is one eighth (1/8) of this closing balance which works to US $326,625.This is in line with the realisation that this is an agro_based factory which is subject to extreme seasonal variations.

SECTION 1

CASH FLOW ANALYSIS - CU

PARTICULARS	1994	1995	1996 JAN	FEB	MARCH	APR	MAY	JUN	J
1. CASH INFLOW									
Owners Equity	400.00	-	-						
Longterm Loans	560.00	1040.00	-						
Sales Revenure	-	-	-	150.00	150.00	150.00	150.00	150.00	
Any Other	-	-	-						
2. TOTAL INFLOWS	960.00	1040.00	0.00	150.00	150.00	150.00	150.00	150.00	
3. CASH OUTFLOWS									
Land & Site Preparations	60.00	-							
Design & Engineering	11.00	-							
Building Construction	392.00	301.00							
Plant & Equipment	348.00	200.00							
Motor Vehicles	107.00	300.00							
Consumables	-	-	2.00	2.00	2.00	2.00	2.00	2.00	
Utilities & Services	-	4.00	-	-	-	-	-	-	
Office Furniture & expenses	-	19.00	23.00	23.00	23.00	23.00	23.00	23.00	
Raw Materials	-	-	50.00	50.00	50.00	50.00	50.00	50.00	
Salaries and Wages	-	9.00	9.10	9.10	9.10	9.10	9.10	9.10	
Repairs and Maintenance	-		0.20	0.20	0.20	0.20	0.20	0.20	
Packaging Materials	-		0.20	0.20	0.20	0.20	0.20	0.20	
Vehicle Expenses	-		29.00	29.00	29.00	29.00	29.00	29.00	
Utilities	-		4.00	4.00	4.00	4.00	4.00	4.00	
Marketting Expenses	-	200.00	30.00	30.00	30.00	30.00	30.00	30.00	
Loan Repayment	-	-	-	-	-	-	-	-	
Interest on Long Term Loans-40%	-	-	53.30	53.30	53.30	53.30	53.30	53.30	
Interest on O/Draft-30%	-	-	5.10	5.20	6.70	8.10	9.70	11.20	
Contigencies	42.00	7.00	2.00	2.00	2.00	2.00	2.00	2.00	
Pre - Operational Interests									
4. TOTAL CASH OUTFLOWS	960.00	1040.00	207.90	208.00	209.50	210.90	212.50	214.00	22
OPENING BANK BALANCE	0.00	0.00	0.00	-207.90	-265.90	-325.40	-386.30	-448.80	-51
SURPLUS / DEFICIT			-207.90	-58.00	-59.50	-60.90	-62.50	-64.00	-7
CLOSING BANK BALANCES			-207.90	-265.90	-325.40	-386.30	-448.80	-512.80	-59

NALYSIS - CURRENCY IN US $ '000s (DOLLARS)

	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1996 TOTAL	1997	1998	199
								400.00			
.00	150.00	150.00	170.00	170.00	170.00	170.00	170.00	1600.00 1750.00	2460.00	3809.00	484
.00	150.00	150.00	170.00	170.00	170.00	170.00	170.00	3750.00	2460.00	3809.00	484
								60.00			
								11.00			
								693.00			
								548.00			
								407.00			
.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	24.00	27.80	38.10	4
	-	-	-	-	-	-	-	4.00	-	-	-
.00	23.00	26.00	26.00	26.00	26.00	26.00	26.00	313.00	402.00	586.00	73
.00	50.00	57.00	57.00	57.00	57.00	57.00	57.00	642.00	893.00	1301.00	164
.10	9.10	9.10	9.10	9.10	9.10	9.10	9.10	118.20	120.00	132.00	14
.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40	3.00	4.00	
.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40	3.00	4.00	
.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	348.00	348.00	348.00	34
.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	48.00	48.00	48.00	4
.00	30.00	34.00	34.00	34.00	34.00	34.00	34.00	584.00	537.00	586.00	73
	-	-	-	-	-	-	-	0.00	-	200.00	20
.30	53.30	53.30	53.30	53.30	53.30	53.30	53.30	639.60	640.00	560.00	48
.70	11.20	12.80	14.80	16.40	17.90	19.60	21.20	148.70	275.00	533.30	69
.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	73.00	24.00	24.00	2
.50	214.00	229.60	231.60	233.20	234.70	236.40	238.00	4666.30	3320.80	4364.40	512
.30	-448.80	-512.80	-592.40	-654.00	-717.20	-781.90	-848.30		-916.30	-1777.10	-233
.50	-64.00	-79.60	-61.60	-63.20	-64.70	-66.40	-68.00	-916.30	-860.80	-555.40	-28
.80	-512.80	-592.40	-654.00	-717.20	-781.90	-848.30	-916.30		-1777.10	-2332.50	-261

SECTION 2

will then provide the market in the late 20th century and early 21st century.

Not withstanding these observations, the study reveals the great potential the project has in the area. We are convinced that if implemented it will significantly impact on the areas cited above. In specific terms we are convinced that this project will:-

a) be a major milestone in implementing the stated government policy on rural industrialisation with special focus in Western Kenya.

b) help small scale farmers (the outgrowers) estimated to be 20,000 families in Kakamega increase their farm incomes through sale of horticultural crops to Kakamega Fruit and Vegetable Project.

c) help stabilise the prices of crops

d) diversify the farming culture of the people in Kakamega District, a major shift from subsistence farming to commercial farming.

e) increase the share of horticultural crops on the immediate local markets.

f) help in restoring the soil fertility through the proper farming practices.

g) strengthen local institutional capacity through agriculture training and education proposed and formation of the cooperative for the small scale farmers.

h) earn a equivalent of US $ 4,300,000 p.a, in foreign exchange from sale of the produce.

In other words, we see this a peoples' project while not forgetting the interests of the PROMOTER as indicated in the cash flow analysis. It is on these grounds that we conclude that this is a viable project which should be undertaken.

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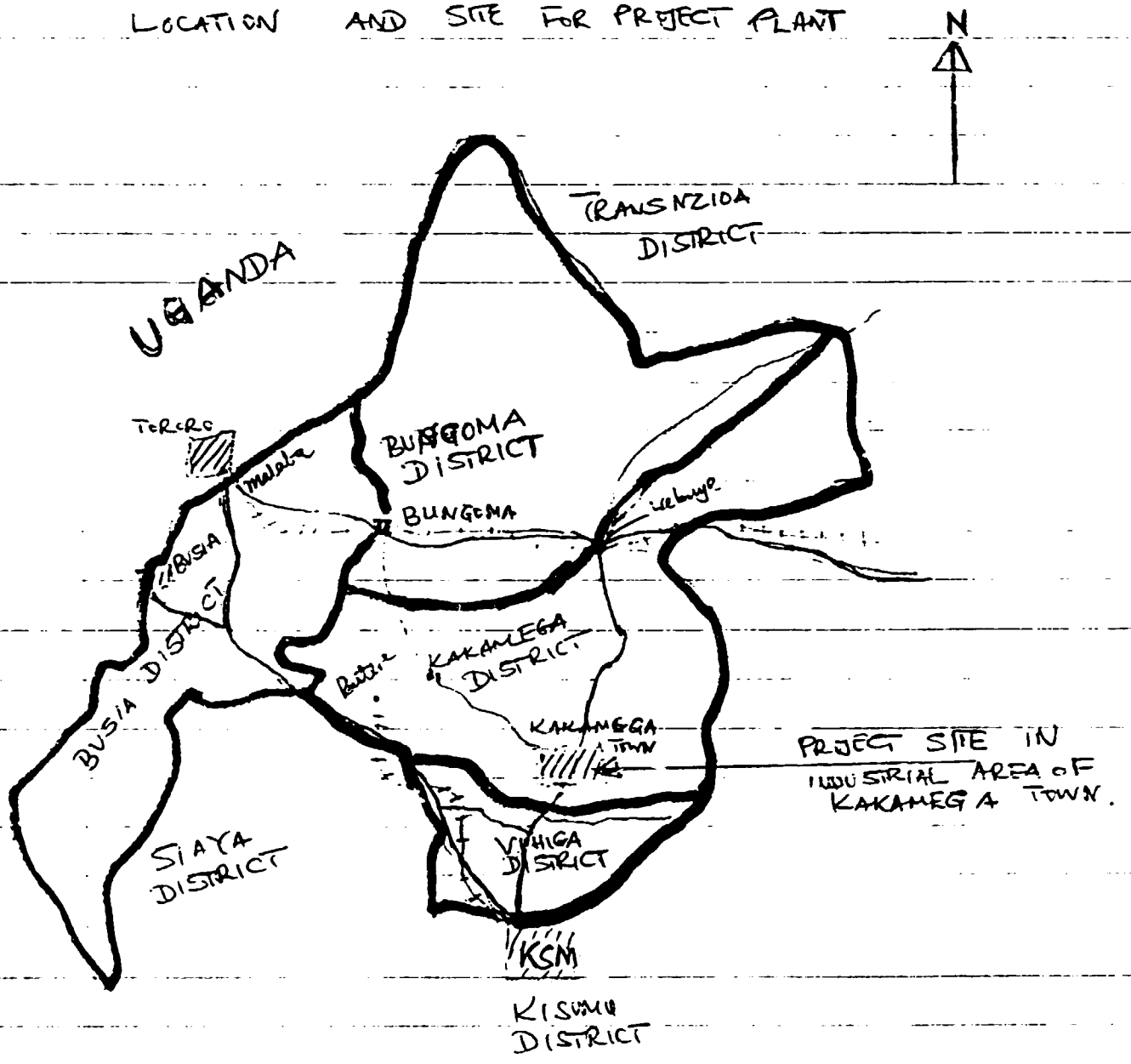
LOCATION AND SITE FOR PROJECT PLANT



WESTERN PROVINCE.

KEY.

- District Boundaries
- Railway
- Tarmac Roads
- Big towns especially District Hqrs.