Fruits and Vegetables Sector Profile

ACRONYMS

COMESA Common Market for Eastern and Southern Africa
DFID Department for International Development (UK)
DWD Directorate of Water Development
EU European Union
FORRI Forestry Resources Research Institute
GOU Government of Uganda
HORTEXA Horticulture Exporters Association
HPOU Horticultural Promotional Organization of Uganda
IRR Internal Rate of Return
ITC International Trade Centre
KARI Kawanda Agricultural Research Institute
MAAIF Ministry of Agriculture, Animal Industry and Fisheries
MT Metric Tones
MWE Ministry of Water and Environment
NAADS National Agricultural Advisory Services
NARO National Agricultural Research Organization
NOGAMU National Organic Agricultural Movement of Uganda
NPA National Planning Authority
NPV Net Present Value
PAP Prosperity for All Programmes
PEAP Poverty Eradication Action Plan
PH Acidity and Alkalinity Measure
PMA Plan for Modernization of Agriculture

TEDDO Teso Diocese Development Organization
UEPB Uganda Export Promotion Board
UGX Uganda Shillings
UIRI Uganda Industrial Research Institute
UNBS Uganda National Bureau of Standards
UNCTAD United Nations Commission for Trade and Industry
UNIDO United Nations Industrial Development Organization

I.0 BACKGROUND INFORMATION ON THE SECTOR

1.1 Overview of the sector

Uganda is the number one fruit producing nation in Africa. The country is suitable and has abundant potential to produce mangoes, citrus, pineapples, tomatoes and a host of other vegetables. The fertile soils and conducive climate guarantee fruit and vegetable production for the greater part of the year. Despite this great production potential, the processing of fruits and vegetables is low and is mainly limited to extraction of juice, drying, bottling and labeling.

Most fruits and vegetables can be produced organically in Uganda but maximum benefits and guaranteed results can be realized if modest investments are put into the enterprise. This profile presents a case for Fruit Farming and processing. It presents and analyses the viability and profitability of an integrated enterprise of pineapples and mangoes produced on 500 hectare nucleus farm under irrigation. It also presents the viability and profitability of a minimum of 2.8 million to 3.6 million US dollars, excluding investments in the working capital and cash reserves of the businesses, in the processing of fruits and vegetables.

Commercial fruit production for domestic consumption and export was successfully undertaken in the 1960s. Government run schemes were established at Kiige (Kamuli District), Ongino (Kumi District), Odino (900ha in Soroti District) and Labori (800ha in Soroti District). These schemes produced various citrus fruits that supplied Nairobi Kenya, Kampala, Rwanda and Burundi. Production on these schemes went on until the mid -1970s when the political climate then made it hard to continue with meaningful management. In the initial plan the schemes were developed to use irrigation such that there is all – year - round production. These schemes' massive and extremely productive land is still under government control and could be availed for reviving commercial fruit production.

There is still great room for investments in the fruit processing sector. Within the sector, the number of companies involved in fresh fruit juice processing is still very low with four major companies. During the last financial year, the leading player in the fresh fruit juice industry was able to report an annual turnover of up to 6 million US dollars, while the other had an average of 1.4 million dollars. The leading player projects in the next five years, the company will have realized a 120 percent growth in market share, which will result in a 12-15 million US dollars annual turnover.

1.2 Current activities

Current fruit production is purely in the hands of smallholders centered in the Southern, Central and Eastern regions. Pineapples are by far the most developed and widely grown commodity in the fruit crop

range and value chain in Uganda. Current production is estimated at 5000 acres (2000ha) on 2500 smallholdings in Luwero and Kayunga where pineapples are grown as a sole crop or intercropped with bananas. In Uganda, there are no large scale fruit growers at the moment and until recently; fruits are produced exclusively as a smallholder crop. Mangoes are by far the most common fruit country-wide. Mangoes grow wild by gift of nature and adapt to all ecological zones of Uganda, dry or humid lowland, montane and Lake Shoreline. Production has been increasing over the years with increasing demand on the local and export markets. The government's call on households to produce high value and marketable crops has been headed and there are now many fruit farmers in the country. Most fruits and vegetables are grown all under rain-fed conditions and this seasonality in production has often affected supply.

However the government is rising to the challenge of seasonal production and is revamping irrigation schemes. Two projects are now being implemented to provide water for irrigation. Under the Farm Income Enhancement and Forest Conservation (FIEFOC) Project, the Government has secured Loan funds to rehabilitate four old schemes (Mobuku, Doho, Agoro and Olweny) and under the Water for Agricultural Production Project four other schemes will be rehabilitated (Kiige, Odina, Labori and Atera). This gives credence to the proposed fruit production project under irrigation.

There are few players in the fruit processing sector. The current players in the fruit processing sector have made some backward linkages signing production agreements with most fruit farming societies but this has been largely minimal. As a result most of the processed juice consumed in Uganda is imported to meet the local demand.

1.3 Current capabilities and markets

Currently the demand for fruits and vegetables from Uganda has been moderate and high for organic and value added products. However, most companies or producer associations exporting fresh fruits and vegetables from Uganda are small to medium with little or no investment capacity to scale up the production and take advantage of the market demand, and hence have been unable to explore the export of value added products currently on demand in Europe and other International markets. Most of the current exports have been in raw fruits and vegetables and largely to the wholesale markets where competition is growing and prices going down. Besides, access to financial credit to facilitate investment has been limited for such companies; yet it requires some substantial capital to invest in appropriate infrastructure, if they are to take advantage of the value added market for fruits and vegetables, which attracts high demand and prices.

Currently, there are over 15 companies exporting fresh fruits and vegetables largely to the EU and, to a less extent, to the COMESA region, although the latter is largely informal. On average, the existing companies each exports 2 – 15 tonnes of fresh fruits per week, largely to the wholesale markets in Europe.

1.4 Competitiveness

Uganda's competitiveness rests with soils, climate, irrigation opportunities, government policies and labour factor prices. Uganda has unmatched comparative advantage for growing fruits and vegetables due to its warm, less humid tropical climate, plentiful rainfall and vast opportunities for irrigation. Soils of pH 5 to 6.5 are most ideal for the fruits (such as oranges, mangoes and pineapples) and vast areas of

this type obtain in Uganda. These soils are rare in the world. Uganda's climate is summer all year round: moderate temperatures (15 -30ºC) throughout the year with a bi-modal rainfall pattern. The soils have low levels of contamination due to prolonged periods of minimal use of chemical fertilizers, pesticides and herbicides creating natural quasi-organic conditions in most areas. The November to February harvest period in Uganda coincides with the northern hemisphere winter - a period of peak demand for fresh fruits and vegetables in Europe.

Suitable Government owned land free of squatters, for commercial estate type production, is available at Odina former citrus farm (950 hectares) and Labori former irrigation scheme (800 ha). Finally Government policy is highly supportive to fruit production as a strategic export. All schemes put together provide a total of over 3000 hectares (Odino, Ongino, Labori, and Mobuku). One additional point which favours Uganda is the fact that, overtime, the key European countries re-exporting fruit products into Africa will increasingly have to produce without EU subsidies.

1.5 Rationale behind the proposed project

There is plenty of land in the country that can be devoted to fruit farming. The government owned irrigation schemes can provide ample land. Besides there is an increasing number of out growers complimenting the raw material supply effort. The out growers however may be supported with skills, implements. An investor in fruit farming has the option of irrigating the fruit farms to ensure all year round production.

The demand for fresh fruits on a year-round basis is increasing, and consumers are willing to pay higher prices for out-of-season fresh fruits. Given EU market entry barriers, Uganda would rather target domestic, border and regional markets. Currently, there is an existing trade within the region supplying Southern Sudan, Kenya and Rwanda. The current production levels of fruits are yet to satisfy the domestic, border and regional demand. It is strategic to strengthen the existing trade which is not satisfied and yet expanding.

Over one third of the country (Uganda) has unmatched resource endowment for growing fruits, particularly the Eastern Region. These include soils, climate, water bodies for irrigation, factor prices for land, labour save to a greater extent know-how and entrepreneurship.

The preferred location for fruit processing factory would be in the central region of the country being at the centre of strategic production areas to allow raw materials from all areas to converge at the centre. Location of the plant in the central region will allow access to markets, access to production areas and infrastructure.

2.0 INVESTMENT OPPORTUNITIES IN THE FRUIT AND VEGETABLE FARMING AND PROCESSING SECTOR

The proposed investment opportunities in this sector include undertaking one or a combination of the following:

- Fruit farming
- Pineapple farming
- Mangoes farming
- Citrus fruit farming
- Fresh fruit juice processing
- Dried fruits processing
- Minimal processing of fruits and vegetables
- Fruit pulp processing
- Fruit tomato paste processing

2.1 Fruit farming

Purpose of the project

The proposed Fruit farming project is a flag bearer to potential investors within and outside Uganda as to how competitive and attractive fruit farming in Uganda actually is. The project derives from one of the core challenges identified by the Government of Uganda (GOU) for poverty eradication (Production, Competitiveness and Incomes) under its Poverty Eradication Action Plan (PEAP). It is being designed to support GOU's Plan for Modernisation of Agriculture (PMA) which is aimed at increasing productivity and incomes of farmers. It also aims at putting to effective use otherwise dormant, poorly used but highly productive resources such as the former irrigation schemes for fruit production at Odina and Labori on the shores of Lake Kyoga in the Teso Region and Mobuku in Kasese district. The project design is hinged on a core investor joint venture with Government and out-growers within the catchment area of the estate. It is envisaged that investment options will include single or a combination of fruits on a single estate. The project will direct its efforts towards using a combination of large and small-scale irrigation facilities and improved soil fertility management practices to produce and market high value products paying due regard to value addition at various links of the fruits value chain. Training and improvement in institutional capacity and monitoring of effects and outcomes will sustain project outputs.

The cropping programme targeting the combination of the three fruit enterprises is based on a 500 hectare nucleus farm to cover: Mangoes 100 ha; Oranges 200 ha; and Pineapples 200 ha, under irrigation.

Projected capacities, sales and preferred technology

Project output of fresh fruits per year (MT)

Enterprise	Output (MT)					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Mango (100 ha)	Establishment	_____	_____	2,880	4,320	5,760
Oranges (200ha)	Establishment	_____	_____	6,000	9,000	12,000
Pineapples (200 ha)	Establishment	_____	_____	10,400	10,400	10,400

Potential export markets

The easiest and largest market to target will be the domestic, border and regional markets. The current production levels of fruits are yet to satisfy this area demand. It is strategic to strengthen the existing trade which is not satisfied and yet expanding. The major exporters of fruits to this market are Egypt, Zimbabwe, Swaziland but their potential has been on the decline and this is a gap that can be filled with supplies from Uganda.

Technological needs and possible sources

Uganda has introduced some of the high yielding fruit varieties for which the technology required to multiply improved varieties, is being adopted by the growers. The National Agricultural Research Organization (NARO) is taking a lead in the production of grafted planting materials. Private Nursery operators are complementing NARO to increase the supply of grafted planting materials.

Estimated total investment costs

Description of investment item	Cost (US$ '000)
Fixed Assets	2,015
Land and Irrigation (Acquisition and Clearing 1000 hectares)	750
Buildings	575
Office Equipment	40
Agricultural Equipment and Tools (Including Cold room &Trucks)	650
Preliminary Expenses	25
Working Capital	300
Total investment	**2,340**

Organization and management aspects

Proposed manpower structure

The proposed manpower structure provides for: a Chief Executive (1); Finance and Administration Manager (1); Marketing Manager (1); Farm Managers/Supervisors (11); Farm assistant Managers (40), Farm laborers (100); Drivers and security guards (6). This manpower force may be reviewed and fine

tuned at Feasibility Study stage. Given the level of negotiation and paper work that goes into a joint venture arrangement, the pre-implementation lead time may be between 12-18 months.

The three fruit enterprises (Pineapples, oranges and mangoes) take about the same gestation period, if grown under irrigation (18-30 months). The maiden harvest can be 24-30 months after planting. For pineapples, full production is expected within 30 months and continues thereafter for the next three years before replanting, if the right variety is grown. For Mangoes and oranges, full production can be reached during the fourth year after planting. Critical considerations to assure project success are mainly three: acquisition of planting materials of improved varieties; irrigation; and linking and integrating production to markets.

Project implementation plan

Much of what is needed to implement the project will involve linking the proposal to investors and getting the government to mediate and facilitate the partnership. Constituent activities that relate to the implementation plan are indicated in the table that follows.

Project implementation plan

	Activity	Timeline (Months)
1	Linking opportunity to core Investors	6-12
2	Negotiating joint venture with Government	3-6
3	Feasibility Study	3-6
4	Establishment of nurseries and bulking planting materials	6-24
5	Developing estate infrastructure	3-6
6	Land clearing and irrigation infrastructure	3-12
7	Planting and maintenance	Continuous

Project profitability and sensitivity analysis

The table that follows summarizes project viability in terms of rates of return, payback period and sensitivity to changes in factor costs and prices. On the basis of the analysis, the project has a payback period of 3 years, Internal Rate of Return (IRR) of 28 percent. At 20% change in factor prices and costs, the project remains viable and profitable. If this level of viability is re-confirmed at feasibility study stage, the investment shall prove to be extremely attractive.

Cash flow analysis for 5-Year project implementation period (Years 1-5)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US$)
Bank Balance B/f(US$)	1,000	2,189,757	1,422,795	3,597,400	7,258,226	1000
Inflows						
Revenue receipts(US$)	(1,200,381)	2,738,952	5,638,667	7,059,192	8,515,264	22,751,694
Equity Injection	1,700,000	0				1,700,000
Development Bank Loan	6,800,000					6,800,000
Total	**7,300,619**	**4,928,700**	**7,061,461**	**10,656,603**	**15,773,490**	**31,252,694**
Outflows						
Capital Expenditure	1,647,143					1,647,143
Purchases	1,481676	892,990	1,002,238	1,068,474	1,097,465	5,542,841
Operating expenses (excl. Depreciation)	562,228	562,228	562,228	562,228	561,828	2,843,140
Accrued Creditors					0	0
Long term loans						0
Interest payments	664,259	535,185	384,074	232,963	81,852	1,898,333
Loan repayments	755,556	1,511,111	1,511,111	1,511,111	1,511,111	6,800,000
Taxation						0
Total	**5,110,862**	**3,505,915**	**3,464,051**	**3,398,376**	**3,252,256**	**18,731,460**
Balance C/f	2,189,757	1,422,795	3,597,410	7,258,226	12,521,235	12,521,235

Profitability (NPV Analysis)

Parameter	Year 1	Year 2	Year 3	Year 4	Year 5
Cash flows (US$)	2,189,757	1,422,795	3,597,410	7,258,226	12,521,235
Discount Factor					20%
NPV (US$)					**13,426,990**

Payback period

Period	Investment (US$)	Net cash-flow (US$)	Balance on investment (US$)	Average	Rate of return on investment
Year 1	8.500,000	2,189,757	6,300,243	1	97%
Year 2		1,422,795	4,887,448	2	106%
Year 3		3,597,400	1,290,138	3	255%
Year 4		7,258,226	(5,968,188)	4	328%
Year 5		12,521,235	(18,489,423)	5	404%
Pay Back Period:	3 years				**199%**

Risk analysis (Sensitivity analysis)

Fall in farm gate prices by -20%		Fall in Yield by -20%	
NPV	8,492,457	NPV	11,295,955
Average rate of return	148%	Average rate of return	172 %
Payback period	4 Years	Payback period	4 years
Average net profit margin	73%	Average net profit margin	77.6%
		Fall in farm gate price by Fall in yields by Rise in loan interest rate by	20%, 20% 25%
Rise in loan interest rate by	25%	NPV	5,802,182
NPV	12,441,543	Average rate of return	127%
Average rate of return	199%	Payback period	6 years
Payback period	4 years	Average net profit margin	69,2%
Average net profit margin	77%		

2.2 Pineapple farming

Purpose of the project

The proposed Pineapple production project is a flag bearer to potential investors within and outside Uganda as to how competitive and attractive pineapple producing in Uganda actually is. The project design is hinged on a core investor joint venture with Government and out-growers within the catchment area of the estate. The project will direct its efforts towards using a combination of large and small-scale irrigation facilities and improved soil fertility management practices to produce and market high value products paying due regard to value addition at various links of the pineapple value chain. Training and improvement in institutional capacity, monitoring of effects and outcomes will sustain project outputs. The cropping programme is based on a 500 hectare nucleus farm under irrigation.

Projected capacities, sales and preferred technology

Planned products

The project is designed and intended to put on the market fresh and processed pineapple products. It is envisaged that about 10% of total annual output will be sold in domestic, regional and export markets in fresh form while the balance will feed into fruit processing industry proposed to be part of the nucleus farm of 500-1000 hectares. Processed products will mainly be fruit pulp (concentrate) and juice.

Based on the maturity period of pineapples, all the 500 hectares will reach full yield levels in the 7th year when 100 hectares are planted each year. Output for the initial 7 year period is projected as shown in the table that follows.

Annual planting program and production of pineapples per year (MT)

Area Planted in Hectares	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
1st Planting	100								
2nd Planting		100							
3rd Planting			100						
4th Planting				100					
5th Planting					100				
Total Acreage	100	100	100	100	100	0	0	0	0
Cumulative Acreage	100	200	300	400	500	500	500	500	500
Production (MTs)	-	-							
1st Planting			52,000	52,000	52,000				
2nd Planting				52,000	52,000	52,000			
3rd Planting					52,000	52,000	52,000		
4th Planting						52,000	52,000	52,000	
5th Planting							52,000	52,000	52,000
Total Yield	0	0	52,000	104,000	156,000	156,000	156,000	104,000	52,000

The easiest and largest market to target will be the domestic, border and regional markets provided purchasing power rises. The current production levels of pineapples are yet to satisfy this area demand. It is strategic to strengthen the existing trade which is not satisfied and yet expanding. There is a serious decline in the supply of pineapples to the world market which Uganda needs to take up. On the other hand, the import bill of pineapples for Sudan; Zambia; Mauritius; Seychelles and Kenya has been on the increase.

Technological needs and possible sources

For the envisaged scale of commercial pineapple production, there are not enough supplies of planting materials and of a type that may be needed for a variety mix as would provide the needed products for different market segments. There will be need for importing germ-plasm for EU market pineapple varieties.

Estimated total investment costs (US$)

Description of investment item	Cost (US$)
Fixed Assets	1,622,143
Land and Irrigation (Acquisition and Clearing 1000 hectares)	357,143
Buildings	575,000
Office Equipment	40,000
Agricultural Equipment and Tools (Including Coldroom&Trucks)	650,000
Preliminary Expenses	25,000
Working Capital	300,000
Total investment	**1,947,143**

Organization and management aspects

Proposed manpower structure

The proposed manpower structure provides for: a Chief Executive (1), Finance and Administration Manager (1); Marketing Manager (1); Farm Managers/Supervisors (11); Farm assistant Managers (40), Farm laborers (100); Drivers and security guards (6). This manpower force may be reviewed and fine tuned at Feasibility Study stage. Given the level of negotiation and paper work that goes into a joint venture arrangement, the pre-implementation lead time may be between 12-18 months.

Pineapple production has a gestation period of 24-36 months if grown under irrigation. The maiden harvest can be 24-30 months after planting. Pineapples reach full production during the third year after planting. Critical considerations to assure project success are mainly three: acquisition of planting materials of improved varieties which are not currently available in commercial quantities; irrigation, linking and integrating production to markets.

Project implementation plan

Much of what is needed to implement the project will involve linking the proposal to investors and getting the government to mediate and facilitate the partnership.
Project implementation plan

Activity	Timeline (Months)
Linking opportunity to core Investors	6-12
Negotiating joint venture with Government	3-6
Feasibility Study	3-6
Establishment of nurseries and bulking planting materials	6-24
Developing estate infrastructure	3-6
Land clearing and irrigation infrastructure	3-12
Planting and maintenance	Continuous

Project profitability and sensitivity analysis

The table that follows summarizes project viability in terms of Rates of return, payback period and sensitivity to changes in factor costs and prices. On the basis of the analysis, the project has a payback period of 4 years, an average Net Profit Margin of 41% and an average Return on Investment of 850% over the first 5 years. At 20% change in factor prices and costs, the project remains viable and profitable. If this level of viability is re-confirmed at feasibility study stage, the investment shall prove to be extremely attractive.

Project profitability analysis

Item of Profitability	Year 1 (US$)	Year 2 (US$)	Year 3 (US$)	Year 4 (US$)	Year 5 (US$)	Total (US$)
Net Revenue (after Direct Costs)	(2,400,952)	358,810	15,215,952	15,215,952	44,882,619	87,991,429
Pineapple	(2,400,952)	358,810	15,215,952	29,935,000	44,882,619	87,991,429
Total Operating Expenses	686,121	676,552	664,542	673,372	640,383	3,340,969
Net Profit or (Loss)	-3,087,073	-317,742	14,551,411	29,261,628	44,242,236	84,650,459
Interest Charges	664,259	535,185	384,074	232,963	81,852	1,898,333
Net Profit After Interest	(3,751,332)	(852,927)	14,167,336	29,028,665	44,160,384	82,752,126
Cumulative Net Profit After Interest	(3,751,332)	(4,604,260)	9,563,077	38,591,741	82,752,126	-
Return On Investment	-193%	-44%	728%	1491%	2268%	850%
Net Profit Margin	156%	-238%	93%	97%	98%	41%

Feasibility analysis for 5-Year

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US$)
Bank Balance B/f	1,000	69,910	(3,611,11)	7,716,124	33,756,222	1,000
Inflows:						
Revenue receipts	(2,400,9)	358,810	15,215,952	29,935,000	44,882,619	87,991,429
Equity Injection	1,700,000	-	-	-	-	1,700,000
Development Bank Loan	6,800,000	-	-	-	-	6,800,000
Total(US$)	**6,100,048**	**428,719**	**11,604,842**	**37,651,124**	**78,638,841**	**96,492,429**
Outflows						
Capital Expenditure	1,647,143	-	-	-	-	1,647,143
Purchases	2,400,952	1,426,905	1,426,905	1,565,000	1,474,524	8,294,286
Operating expenses (Excl. Depreciation)	562,228	566,628	566,628	585,828	561,828	2,843,140
Interest payments	664,259	535,185	384,074	232,963	81,852	1,898,333
Loan Repayments	755,556	1,511,111	1,511,111	1,511,111	1,511,111	6,800,000
Total(US$)	**6,030,138**	**4,039,829**	**3,888,718**	**3,894,902**	**3,629,315**	**21,482,902**
Balance C/f	69,910	(3,611,110)	7,716,124	33,756,222	75,009,527	75,009,527

NPV analysis (Years 1-5)

Items	Year 1	Year 2	Year 3	Year 4	Year 5
Cash flows (US$)	69,910	(3,611,110)	7,716,124	33,756,222	75,009,527
Discount Factor	20%				
NPV (US$)	48,439,581				

Payback period analysis (Years 1-5)

Payback Period	Investment (US$)	Net Cash flow(US$)	Balance on Recovery of Investment(US$)
Year 1	8,500,000	69,910	8,430,090
Year 2		(3,611,110)	12,041,200
Year 3		7,716,124	4,325,076
Year 4		33,756,222	(29,431,146)
Year 5		75,009,527	(104,440,673)

Return on investment analysis (Years 1-5)

		Year 1	Year 2	Year 3	Year 4	Year 5	Average
	Annual return on investment	-193%	-44%	728%	1491%	2268%	850%

Risk analysis (Sensitivity analysis)

Fall in farm gate prices by	20%	Fall in Yield by	-20%
NPV		NPV	
Average Rate of Return		Average Rate of Return	
Pay Back Period		Pay Back Period	
Average Net Profit Margin		Average Net Profit Margin	
		Fall in Farm Gate Price by	20%
		Fall in yields by	20%
		Rise in Loan Interest Rate by	25%
Rise in loan interest Rate by	25%	NPV	
NPV		Average Rate of Return	
Average Rate of Return		Pay Back Period	
Payback period		Average net Profit margin	
Average Net Profit Margin			

2.3 Mango farming project

Purpose of the project

The proposed Mango production project is a flag bearer to potential investors within and outside Uganda showing how competitive and attractive investing in commercial mango producing in Uganda actually is. The project design is hinged on a core investor joint venture with Government and out-growers within the catchment area of the estate. The project will direct its efforts towards using a combination of large and small-scale irrigation facilities and improved soil fertility management practices to produce and market high value products paying due regard to value addition at various links of the mango value chain. Training and improvement in institutional capacity, monitoring of effects and outcomes will sustain project outputs. The cropping programme is based on a 500 hectare nucleus farm under irrigation.

Projected capacities, sales and preferred technology

Planned products

The project is designed and intended to put on the market fresh and processed mango products. It is envisaged that about 10% of total annual output will be sold in domestic, regional and export markets in fresh form while the balance will feed into the mango processing industry proposed to be part of the nucleus farm of 500-1,000 hectares. The sources of these mangoes are:-

- National Seed Centre, Namanve
- Kawanda Agricultural Research Institute

And the varieties of mangoes are:-

- Tommy Atkins; and

- Alphonso,

Both varieties can be used to make Juice; Keite; Dried and whole fruit

Based on the maturity period of mangoes, all the 500 hectares will reach full yield levels in the 9th year when 100 hectares are planted each year. Output for the initial 10 year period is projected as shown in the table that follows.

Annual planting program and production of mangoes per year (MT)

Area Planted in Hectares	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1st Planting	100									
2nd Planting		100								
3rd Planting			100							
4th Planting				100						
5th Planting					100					
Total (ha)	**100**	**100**	**100**	**100**	**100**					
Production in Metric Tonnes										
1st Planting			3,000	4,500	6,000	6,000	6,000	6,000	6,000	6,000
2nd Planting				3,000	4,500	6,000	6,000	6,000	6,000	6,000
3rd Planting					3,000	4,500	6,000	6,000	6,000	6,000
4th Planting						3,000	4,500	6,000	6,000	6,000
5th Planting							3,000	4,500	6,000	6,000
Total MT(US$)			**3,000**	**7,500**	**13500**	**19,500**	**25,500**	**28,500**	**30,000**	**30,000**

Potential export markets

The easiest and largest market to target will be the domestic, border and regional markets. The current production levels of mangoes are yet to satisfy this area demand. It is strategic to strengthen the existing trade which is not satisfied and yet expanding. There is a serious decline in the supply of mangoes to the world market which Uganda needs to take up. On the other hand, the import bill of mangoes for Sudan; Zambia; Mauritius; Seychelles and Kenya has been on the increase.

Technological needs and possible sources

For the envisaged scale of commercial mango production, there is not enough supply of planting materials and of a type that may be needed for a variety mix as would provide the needed products for different market segments. There will be need for importing germ-plasm for varieties targeting different uses and market segments. This is likely to take time doing adaptation trials and bulking for supply to commercial growers.

Estimated Total Investment Costs (US$ '000')

Description of Investment Item	Cost (US$)
Fixed assets	1,622,143
Land and irrigation (Acquisition and clearing 1000 hectares)	357,143
Buildings	575,000
Office equipment	40,000
Agricultural equipment and tools (Including cold room & trucks)	650,000
Preliminary expenses	25,000
Working capital	300,000
Total Investment	**1,947,143**

Organization and management aspects

Proposed manpower structure

The proposed manpower structure provides for: a Chief Executive (1), Finance and Administration Manager (1); Marketing Manager (1); Farm Managers/Supervisors (11); Farm assistant Managers (40), Farm laborers (100); Drivers and security guards (6). This manpower force may be reviewed and fine tuned at Feasibility Study stage. Given the level of negotiation and paper work that goes into a joint venture arrangement the pre-implementation lead time may be between 12-18 months.

Mango production has a gestation period of 30-36 months if grown under irrigation. The maiden harvest can be 30 months after planting. Mangoes reach full production during the fifth year after planting. Progression of yield from maiden harvest is in the table that follows. Critical considerations to assure project success are mainly three: acquisition of planting materials of improved varieties which are not currently available in commercial quantities; irrigation; linking and integrating production to markets.

Project implementation plan

Much of what is needed to implement the project will involve linking the proposal to investors and getting the government to mediate and facilitate the partnership.

Project implementation plan

	Activity	Timeline (Months)
1	Linking opportunity to core Investors	6-12
2	Negotiating joint venture with Government	3-6
3	Feasibility Study	3-6
4	Establishment of nurseries and bulking planting materials	6-24
5	Developing estate infrastructure	3-6
6	Land clearing and irrigation infrastructure	3-12
7	Planting and maintenance	Continuous

Project profitability and sensitivity analysis

The table that follows summarizes project viability in terms of rates of return, payback period and sensitivity to changes in factor costs and prices. On the basis of the analysis, the project has a payback period of 5 years. At 20% change in factor prices and costs, the project remains viable and profitable. If this level of viability is re-confirmed at feasibility study stage, the investment shall prove to be extremely attractive.

Project Profitability Analysis

Item of Profitability	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Net Revenue (Nett of Direct Costs)(US$)	0	0	857,143	6,171,429	8,228,571	15,257,143
Mango fruits	0	0	857,143	6,171,429	8,228,571	15,257,143
Total Operating Expenses(US$)	686,121	676,552	664,542	673,372	640,383	3,340,969
Net Profit or (Loss)(US$)	-686,121	-676,552	192,601	5,498,056	7,588,189	11,916,173
Interest Charges(US$)	547,037	440,741	316,296	191,852	67,407	1,563,333
Net Profit After Interest	-1,233,158	-1,117,292	-123,695	5,306,205	7,520,781	10,352,840

Cash flow analysis (US$)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Bank Balance B/f	1,000	2,215,894	(338,491)	(2,127,526)	1,483,445	1,000
Inflows						
Revenue receipts	0	0	857,143	6,171,429	8,228,571	15,257,143
Equity Injection	1,400,000	0				1,400,000
Development Bank Loan	5,600,000					5,600,000
Total (US$)	**7,001,000**	**2,215,894**	**518,652**	**4,043,902**	**9,712,016**	**22,258,143**
Outflows						
Capital Expenditure	1,647,143					1,647,143
Purchases	1,406,476	302,571	518,810	538,333	549,357	3,315,548
Operating expenses (Excl. Depreciation)	562,228	566,628	566,628	585,828	561,828	2,843,140
Interest payments	547,037	440,741	316,296	191,852	67,407	1,563,333
Loan Repayments	622,222	1,244,444	1,244,444	1,244,444	1,244,444	5,600,000
Total (US$)	**4,785,106**	**2,554,385**	**2,646,178**	**2,560,458**	**2,423,037**	**14,969,164**
Balance C/f	2,215,894	(338,491)	(2,127,526)	1,483,445	7,288,979	7,288,979

NPV analysis (Years 1-5)

	Year 1	Year 2	Year 3	Year 4	Year 5
Cash flows (US$)	2,215,894	(338,491)	(2,127,526)	1,483,445	7,288,979
Discount Factor	20%				
NPV (US$)	4,024,981				

Payback period analysis (Years 1-5)

Payback Period	Period	Investment (US$)	Net cash flow US$)	Balance on recovery of investment (US$)
	Year 1	7,000,000	2,215,894	4,784,106
	Year 2		(338,491)	5,122,597
	Year 3		(2,127,526)	7,250,124
	Year 4		1,483,445	5,766,679
	Year 5		7,288,979	(1,522,300)

Return on Investment Analysis (Years 1-5 in US$)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Average
Annual Return on Investment	-35%	-35%	10%	282%	390%	122%

2.4 Citrus fruit farming

Purpose of the project

The proposed Citrus production project is a flag bearer to potential investors within and outside Uganda and it shows how competitive and attractive commercial citrus production in Uganda actually is. The project design is hinged on a core investor joint venture with Government and out-growers within the catchment area of the estate. It is envisaged that investment options will include single or a combination of Citrus fruits on a single estate. The project will direct its efforts towards using a combination of large and small-scale irrigation facilities and improved soil fertility management practices to produce and market high value products paying due regard to value addition at various links of the fruits value chain. Training and improvement in institutional capacity, monitoring of effects and outcomes will sustain project outputs. The cropping programme targeting a mix of citrus fruits (oranges, lemons, tangerines and lime) is based on a 500 hectare nucleus farm under irrigation.

Projected capacities, sales and preferred technology

Planned products

The project is designed and intended to put on the market a variety of Citrus fruits to be sold in fresh or processed form. It is envisaged that about 10% of total annual output will be sold in domestic, regional and export markets in fresh form while the balance will feed into the fruit processing industry proposed to be part of the nucleus farm of 500-1000 hectares. Processed products will mainly be fruit pulp (concentrate) and juice. Based on the maturity period of Citrus fruits, all the 500 hectares will reach full yield levels in the 9th year when 100 hectares are planted each year. Output for the initial 9 year period is projected as shown in the table that follows.

Annual Planting Programme and Production of fresh fruits per year (MT)

Area Planted (Hectares)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1st Planting	100									
2nd Planting		100								
3rd Planting			100							
4th Planting				100						
5th Planting					100					
Total Acreage	**100**	**100**	**100**	**100**	**100**	**0**	**0**	**0**	**0**	**0**
Cumulative Acreage	100	200	300	400	500	500	500	500	500	500

Oranges: spacing is 300 trees per hectare, maturity 24-36 months, yield (yr1 100kg per tree, yr2 150kg per tree, yr3 and thereafter 200kg per tree)

Production in (MTs)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1st Planting			3,000	4,500	6,000	6,000	6,000	6,000	6,000	6,000
2nd Planting				3,000	4,500	6,000	6,000	6,000	6,000	6,000
3rd Planting					3,000	4,500	6,000	6,000	6,000	6,000
4th Planting						3,000	4,500	6,000	6,000	6,000
5th Planting							3,000	4,500	6,000	6,000
Total Yield	**0**	**0**	**3,000**	**7,500**	**13,500**	**19,500**	**25,500**	**28,500**	**30,000**	**30,000**

Potential export markets

The easiest and largest market to target will be the domestic, border and regional markets. The current production levels of citrus fruits are yet to satisfy this area demand. It is strategic to strengthen the existing trade which is not satisfied and yet expanding. There is a serious decline in the supply of citrus fruits to the world market which Uganda needs to take up. On the other hand, the import bill of citrus fruits for Sudan; Zambia; Mauritius; Seychelles and Kenya has been on the increase.

Technological needs and possible sources

Uganda has only recently revived introduction of some of the citrus cultivars for which the technology required to multiply improved varieties is relatively new to the growers. Although substantive research has been done by NARO/FORRI on fruit cultivars which are high yielding, and evaluations are on going on cultivars ecologically suited to the various agro-ecological zones, there is serious lack of grafted planting materials. Major sources in the country for quality grafted citrus available to growers are limited. There are efforts by NARO to increase the capacity of existing private nurseries to produce sufficient and quality planting materials.

Estimated total investment costs (US$)

Description of Investment Item	Cost in US$
1. Fixed Assets	
Land	357,143
Buildings	575,000
Office Equipment	40,000
Agriculture Equipment	650,000
Subtotal of Fixed Assets	1,622,143
2. Preliminary Expenses	25,000
3. Working Capital	300,000
Total Investment	**1,947,143**

Organization and management aspects

Proposed manpower structure

The proposed manpower structure provides for: a Chief Executive (1), Finance and Administration Manager (1); Marketing Manager (1); Farm Managers/Supervisors (11); Farm Assistant Managers (40), Farm laborers (100); Drivers and security guards (6). This manpower force may be reviewed and fine tuned at Feasibility Study stage.

Given the level of negotiation and paper work that goes into a joint venture arrangement the pre-implementation lead time may be between 12-18 months.
Citrus fruit production has a gestation period of 18-30 months if grown under irrigation. The maiden harvest can be 24-30 months after planting. Oranges reach full production during the fourth year after planting. Critical considerations to assure project success are mainly three: acquisition of planting materials of improved varieties; irrigation; linking and integrating production to markets.

Project implementation plan

Much of what is needed to implement the project will involve linking the proposal to investors and getting the government to mediate and facilitate the partnership.

Project implementation plan

	Activity	Timeline (Months)
1	Linking opportunity to core Investors	6-12
2	Negotiating joint venture with Government	3-6
3	Feasibility Study	3-6
4	Establishment of nurseries and bulking planting materials	6-24
5	Developing estate infrastructure	3-6
6	Land clearing and irrigation infrastructure	3-12
7	Planting and maintenance	Continuous

Project profitability and sensitivity analysis

The table that follows summarizes project viability in terms of Rates of return, payback period and sensitivity to changes in factor costs and prices. On the basis of the analysis, the project has a payback period of 9 years, an average Return on Investment for the first 5 years of 14% and average Net Profit Margin of 25%. At 20% change in factor prices and costs the project remains viable and profitable. If this level of viability is re-confirmed at feasibility study stage, the investment shall prove to be extremely attractive.

Project Profitability Analysis

Item of Profitability	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US$)
Net revenue (after netting off direct costs)	(600,000)	(654,286)	252,143	1,841,552	3,826,970	4,666,379
Oranges	(600,000)	(654,286)	252,143	1,841,552	3,826,970	4,666,379
Total operating expenses	686,121	676,552	664,542	673,372	640,383	3,340,969
Net profit or (Loss)	-1,286,121	-1,330,837	-412,399	1,168,180	3,186,587	1,325,410
Interest charges	664,259	535,185	384,074	232,963	81,852	1,898,333
Net profit after interest	-1,950,380	-1,866,023	-796,473	935,217	3,104,735	-572,924
Cumulative net profit after interest	-1,950,380	(3,816,403)	(4,612,876)	(3,677,659)	(572,924)	
Return on investment	-66%	-68%	-21%	60%	164%	14%
Net profit margin		285%	-316%	51%	81%	25%

Feasibility Analysis

Cash Flow Analysis for 10-Year Project Implementation Period (Years 1-10 in US$)

Item		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Bank Balance B/f	1,000	6,853,857	3,671,814	(249,681)	(3,278,637)	(4,604,006)	(3,926,287)	(1,610,229)	4,513,876	11,709,410
Inflows:										
Revenue receipts		(600,000)	(654,286)	252,143	1,841,552	3,826,970	5,870,252	7,896,538	8,967,967	9,503,681
Equity Injection	1,700,000		0							
Bank Loan	6,800,000									
Total	**8,501,000**	**6,253,857**	**3,01zz7,529**	**2,461**	**-1,437,085**	**-777,037**	**1,943,966**	**6,286,309**	***13,481,843***	***21,213,091***
Outflows										
Capital Expenditure	1,647,143									
Purchases		600,000	654,286	819,286	837,019	994,459	1,094,033	1,210,605	*1,210,605*	*1,210,605*
Operating expenses (Excl. Depreciation)		562,228	566,628	566,628	585,828	561,828	561,828	561,828	*561,828*	*561,828*
Loan Interest payments		664,259	535,185	384,074	232,963	81,852	1,898,333	0	*0*	*0*
Loan Repayments		755,556	1,511,111	1,511,111	1,511,111	1,511,111	0	0	*0*	*0*
Total(US$)	**1,647,143**	**2,582,043**	**3,267,210**	**3,281,099**	**3,166,921**	**3,149,250**	**3,554,195**	**1,772,433**	***1,772,433***	***1,772,433***
Balance C/f	6,853,857	3,671,814	(249,681)	(3,278,637)	(4,604,006)	(3,926,287)	(1,610,229)	4,513,876	*11,709,410*	*19,440,658*

NPV Analysis

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Cash flows (US$)		6,853,857	3,671,814	(249,681)	(3,278,637)	(4,604,006)	(3,926,287)	(1,610,229)	4,513,876
Discount Factor			10%						
	NPV		8,008,769						

Payback Period Analysis

Payback Period	Investment	Net Cash flow (US$)	Balance on Recovery of Investment (US$)
Year 1	1,947,143	3,671,814	4,828,186
Year 2		(249,681)	5,077,867
Year 3		(3,278,637)	8,356,505
Year 4		(4,604,006)	12,960,511
Year 5		(3,926,287)	16,886,797
Year 6		(1,610,229)	18,497,026
Year 7		4,513,876	13,983,150
Year 8		11,709,410	2,273,740
Year 9		**19,440,658**	**(17,166,919)**

Return on Investment Analysis

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Average
Annual Return on Investment	-66%	-68%	-21%	60%	164%	14%

2.5 Fresh fruit juice processing

Purpose of the project

This is a comprehensive value chain for fresh fruit products that includes the processing of mangoes, oranges, passion fruits, apple bananas and pineapples into juice products

Average Estimated Total Investment Costs (US$)

No.	Infrastructure & Civil works	Amount (US$)
1	Land (1-Acres)	75,000
2	Site preparation and development	120,000
3	Civil works, structures and buildings *(refer to section on infrastructure required at proposed site)*	312,000
4	Plant and Equipment *(for detailed breakdown refer to section on Equipment)*	*868,900*
5	Auxiliary service and plant equipment *(for detailed breakdown to section on equipment)*	*260,000*
	Incorporation expenses 1% of capital investments	23,846
	Pre-production expenditures (5% Staff, operational and Administration costs)	37,410
6	Working capital requirements	748,200
	Average Estimated Total Investment Costs	**2,445,856**

Selected Factor Costs

Infrastructure required at proposed site Land and Space Requirements

No	Infrastructure & Civil works	Qty	Cost/unit	Amount (US$)
1	Land (1-Acres)	1	75,000	75,000
2	Site preparation & development (4000 sqm) x 30 USD	4,000	30	120,000
	Civil works, structures and buildings (USD 250 per square meter minimum area required) 1,250sqms			-
3	Plant (800sqms)	800	250	200,000
4	Offices (150 sqm)	150	250	37,500
5	Housing for management (300 sqms)	300	250	75,000
	Total investment infrastructure & civil works			**507,500**

Breakdown of estimated cost of raw materials

	Product	Requirement per month (tones)	No required for 4 months of business cycle (tones)	Average Price per ton (US$)	Total (US$)
1	Pineapple	58	232	200	46,400
2	Apple bananas	64	256	500	128,000
3	Oranges	64	256	312.5	80,000
4	Passion	112	448	500	224,000
5	Mangoes	80	320	400	128,000
	Average	**378**	**1,280**	**382.5**	**606,400**

Estimated operational and factory overheads cost

Item	Units	Amount (US$)	Total (US$)
Operational costs (average industrial)	12	8,333.3	100,000
Administration Costs (average industrial)	12	16,667	200,000
Sub-total			**300,000**
Working capital requirements (4 months)			
Operational costs (average industrial)	1.00	33,333	33,333
Administration Costs (average industrial)	1.00	66,667	66,667
Working capital requirement			**100,000**

Estimated personnel/labour cost of production

Type	Working capital requirement (US$)	Annual cost (US$)
Labour requirements	41,800	125,400
Factory supplies and over heads	100,000	300,000
Raw materials	606,400	1,819,200
Total estimated production cost	**631,400**	**2,244,600**

Estimated annual sales revenues

The average annual revenues (for the low and high ended sector player) in this industry stands at about US$ 1.6 million to about 6 million US$ for the higher end producers/market leaders. The lower end players in the industry have been able to register an average growth in their output of at least 10% over the last 5 years, which shows a high potential of sales growth in the fruit juice industry. (Source: RECO industries).

Indicative time schedule for project implementation

Pre investment phase (should be able to take between 2 weeks to 1 month)

- Incorporation period (registration of business, obtaining investors licences, carrying out feasibility studies).

Investment phase (should be able to take up to 5 months)

- Acquisition of land;
- Building infrastructure; and
- Step of equipment.

Production phase (should be able to take between 1 to 2 months)

- Recruitment and trail of plants.
- Start of actual production.

Financial analysis: Approximate payback period, approximate rates of return

Assumption underlying the financial analysis

- A daily production output of 8,000 litres of fresh fruit juice will be produced per day.
- 240 days of production are costed per year.
- An annual increment in the production rate of 10% is projected per year.
- For the five categories of fruits, 5 fruit juice brands will be produced in equal proportions of 20%.
- An annual inflation factor has been built in of 10% for all expenses.

Summary of profitability analysis of the fruit juice processing project

Profitability Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US$)
Sales revenue	2,688,000	3,548,160	3,902,976	4,293,274	4,722,601	19,155,011
Less: manufacturing costs	1,743,400	2,092,080	2,092,080	2,092,080	2,092,080	10,111,720
Gross profit	944,600	1,456,080	1,810,896	2,201,194	2,630,521	9,043,291
Less: production overheads	805,105	802,457	783,593	775,917	776,209	3,943,280
Net profit (Loss) before Interest & tax	139,495	653,623	1,027,303	1,425,276	1,854,312	5,100,011

Note: Corporation tax is 30%

Feasibility analysis for the fruit juice project over 5 Years

NPV analysis	Year 1	Year 2	Year 3	Year 4	Year 5
Yearend Cash flows(US$)	4,809,241	35,574,834	73,025,753	108,173,044	162,599,717
Discount factor	20%				
NPV	188,484,684				

Payback period analysis

Payback Period	Investment	Net cash flow (US$)	Balance on recovery of investment (US$)
Year 1	**2,445,856**	**4,809,241**	**(2,363,385)**
Year 2		35,574,834	(37,938,219)
Year 3		73,025,753	
Year 4		108,173,044	
Year 5		162,599,717	

2.6 Dried fruits processing

Purpose of the project

The purpose of this project is to increase the exploitation of excess demand for Uganda's dried fruits (apple bananas, mangoes and pineapples) in the international market, and increase (scale up) the flow of revenue to businesses and small holder farmers engaged in fruit production and processing.

Projected capacities, sales and preferred technology

a) Planned products and services

- A range of dried fruits can be handled by the same processing plant, but this project will target the three most highly demanded dried fruits from Uganda, which include: dried pineapples, dried mangoes and dried apple bananas.
- Other product lines (such as dried Bogoya, dried jack fruits, dried papaya, dried tomatoes etc) shall be added on later to enrich the product range and diversify what is offered on the market.
- For purposes of competitiveness, given Uganda's geographical advantages, focus will be more on organic dried fruits. Based on current demand enquiries (NOGAMU, 2009), 60% of the processing capacity will be devoted to pineapples, 30% on Apple bananas and 10% on mangoes.
- Up to 20 tonnes of dried fruits will be produced per month at the processing plant, once sufficient equipment is installed.

Average estimated total investment costs (US$)

Investment Item	Amount (US$)
Land, site and building development	507,500
Land and site development	195,000
Building development	312,500
Equipment and machinery	560,000
Multi drier equipment (two drier Units @ 150,000)	300,000
Incubator (for ripening fruits)	200,000
Continuous packing line	60,000
Auxiliary and service plant equipment	380,000
Biogas digester (to convert waste into biogas and manure)	100,000
Refrigerated truck	50,000
Cold storage (2)	100,000
Basic laboratory	50,000
Extra sanitary installations (Related HACCP certification)	50,000
Change over generator	30,000
Incorporation expenses (1% of total investment)	14,475
Pre-production expenditures (5% staff, operational and administration costs)	24,420
Working capital requirements (4 months)	
Raw materials (1304 tonnes in four months)	329,600
Staff salaries	58,800
Operational costs	33,333
Administration costs	66,667
Sub-total	488,400
Total investment (including working capital)	**1,974,795**

Main production inputs locally available

Raw materials

The raw materials required can be locally obtained. The production of the fresh fruits; namely apple bananas, mango and pineapple is dominated by small scale farm holder producers, and is easily available.

S/N	Product	Average cost per ton (US$)
1	Pineapple	200
2	Apple bananas	400
3	Mangoes	400

Selected Factor Costs

Infrastructure available at proposed site

No.	Infrastructure & civil works	Qty	Cost/unit (US$)	Amount (US$)
1	Land (1-Acres)	1	75,000	75,000
2	Site preparation and development (4000 sqms) x 30 US$	4,000	30	120,000
3	Plant (800sqms)	800	250	200,000
4	Offices (150 sqm)	150	250	37,500
5	Housing for management (300 sqms)	300	250	75,000
	Total investment infrastructure & civil			**507,500**

Food processing plant layout

- The plant shall not be located where there is a possibility of production of pollutants as well as swampy areas likely to be sources of hazards like flooding and any unhygienic bearing on the food processing plant.
- All food processing plants should have hygienically designed easily accessible and cleanable premises that are constructed in such as a way as to prevent contamination of products.
- To avoid cross contamination, it is therefore essential that raw materials are received in a separate area and stored in a separate cold room. From here, the sequence of processing operations should be as direct as possible. This layout minimizes the risk of re-contamination of a semi-processed product.
- There should be clear physical segregation between “clean” and “unclean operation” areas. “Unclean” areas are those where raw materials are handled and the “clean operations” e.g. sorting of dried fruits, packaging and storage of final products etc. The separation between the clean and unclean areas must be complete.

Preliminary financial viability analysis of the proposed investment

Estimated capital costs of selected projects, taking into account the following:

- Land and space requirements

Refer to section on infrastructure available above.

- Technology

The technology for drying is simple and involves dehydration of the fruits. The equipment is readily available.

- Equipment

Overall investment in equipment is substantial, but the equipment that meets the hygienic and food safety standards is readily available in

Europe or USA

Equipment	Amount (US$)
Multi drier equipment (two drier Units @ US$ 150,000)	300,000
Incubator (for ripening fruits)	200,000
Continuous packing line	60,000
Sub total investment in equipment and machinery	**560,000**
Auxiliary & service plant equipment(utilities, sanitation)	
Biogas digester (to convert waste into biogas)	100,000
Refrigerated truck	50,000
Cold Storage(2)	100,000
Basic Laboratory	50,000
Extra Sanitary installations (Related HACCP certification)	50,000
Change over generator	30,000
Subtotal on auxiliary and service plant equipment	**380,000**
Total Investment in equipment & machinery	**940,000**

Working capital requirements

Raw materials are procured from the local farmers with preference for those who are organic certified.

#	Product	Requirement per month (tones)	No. of tons required for 4 months of business cycle	Average Price per ton (US$)	Total (US$)
1	Pineapple	240	960	200	192,000
2	Apple bananas	36	144	400	57,600
3	Mangoes	50	200	400	80,000
	Total cost				**329,600**

Personnel and labor costs

Personnel category	Units	Unit cost (US$)	Quantity	Annual cost (US$)
Managerial	3	750	12	27,000
Technical	2	600	12	14,400
Skilled	4	400	12	19,200
Unskilled	30	110	12	39,600
Total				**100,200**
Working capital requirement				33,333.33

Factory supplies and over heads

The overheads are costed on the industrial average of the three major processors in the country for a period of 12 months. It is assumed that maximum trading period that the processor will allow is 90 days to recycle or recover all the funds on sales, such that a maximum cash flow of 4 months would be sufficient to cover the working capital requirement of the business/plant.

Factory supplies and over heads

Item of overhead	Unit	Qty	Unit Cost (US$)	Cost (US$)
Operational costs (average industrial)	Months	12	8,333.3	100,000
Administration costs (average industrial)	Months	12	16,667	200,000
Sub-total				**300,000**
Working capital requirements (4 months):				
Operational costs (average industrial)		1.00	33,333	33,333
Administration costs (average industrial)		1.00	66,667	66,667
Working capital requirement				**100,000**

Indicative time schedule for project implementation

Investment Phase (should be able to take up to 5 months)

- Acquisition of land and
- Build infrastructure
- Step of equipment

Production Phase (should be able to take between 1 to 2 months)

- Recruitment and trail of plants
- Start of actual production.

Financial analysis

Profitability analysis

Profitability Item	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue (US$)	2,212,000	2,919,840	3,211,824	3,533,006	3,886,307
Processing costs (US$)	906,400	1,087,680	1,087,680	1,087,680	1,087,680
Gross profit (US$)	1,305,600	1,832,160	2,124,144	2,445,326	2,798,627
Overheads (US$)	803,030	800,322	784,361	777,416	777,061
Net profit before interest and tax (US$)	502,570	1,031,838	1,339,783	1,667,910	2,021,566
Development loan interest expense (US$)	192,494	155,090	111,300	67,510	23,720
Net profit/(Loss) before tax (US$)	310,076	876,748	1,228,483	1,600,401	1,997,847
Taxation (30%) (US$)	93,023	263,025	724,592	480,120	599,354
Net profit/(Loss) after tax (US$)	217,053	613,724	503,891	1,120,280	1,398,493
Accumulated profit (Loss) (US$)	217,053	830,777	1,334,668	2,454,949	3,853,441
Net profit margin	10%	21%	16%	32%	36%
Return on investment(After tax)	9%	25%	20%	45%	57%

Feasibility analysis

Item	Period 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Bank Balance B/f(US$)	0	488,400	1,686,426	3,375,353	5,385,455	7,742,949	0
Inflows:							0
Sales	0	2,212,000	2,919,840	3,211,824	3,533,006	3,886,307	15,762,977
Miscellaneous revenue							0
Equity cash injection	492,639						492,639
Loan capital injection	1,970,556						1,970,556
Total(US$)	**2,463,195**	**2,700,400**	**4,606,266**	**6,587,177**	**8,918,461**	**11,629,256**	**18,226,172**
Outflows							0
Capital expenditure	1,974,795						1,974,795
Overheads		602,530	637,922	652,521	670,101	689,439	3,252,512
Loan interest payments		192,494	155,090	111,300	67,510	23,720	550,114
Loan repayments		218,951	437,901	437,901	437,901	437,901	1,970,556
Taxation							0
Total(US$)	**1,974,795**	**1,013,974**	**1,230,913**	**1,201,722**	**1,175,512**	**1,151,060**	**7,747,976**
Net cash flow	488,400	1,686,426	1,688,927	2,010,102	2,357,494	2,735,247	10,478,196
Balance C/f(US$)	488,400	1,686,426	3,375,353	5,385,455	7,742,949	10,478,196	10,478,196

NPV analysis

NPV Analysis		Year 1	Year 2	Year 3	Year 4	Year 5
Year end Cash flows (US$)		28,668,379	3,375,353	5,385,455	7,742,949	10,478,196
Discount factor		10%				
NPV		44,692,556				
Pay back		Investment	Net Cash flows	Balance	Payback	
	Year 0	1,974,795	0	-1,974,795	0	
	Year 1		1,686,426	-288,369	1	
	Year 2		1,688,927	1,400,558	2	

2.7 Fresh and minimally processed fruits and vegetables

Purpose of the project

The purpose of this project is to increase the competitiveness of fresh fruits and vegetables exports from Uganda by investing in production of value added (Minimally processed) fresh fruits, including, pre-cut, sliced, portioned and pre-packed in consumer retail packs and exploiting the currently high demand of organic and fair traded fruit and vegetable products from Uganda.

Projected capacities, sales and preferred technology

Planned products and services

The project is planned to process and export value added, minimally processed, fresh fruits and vegetables for the retail market. A range of fresh fruits and vegetable products will be handled by the same handling facility, but this project will target the four most highly demanded fruits from Uganda which include: Pineapples, Apple bananas, Passion fruits and Hot peppers. Pineapples will be peeled, sliced and packed in ready to eat consumer packs, while apple bananas, passion fruits and hot peppers will be washed and pre-packed in consumer retail packs, instead of the usual bulk packages, using cartons. Other fruit and vegetable products will be added on the range as demand arises. It is possible to process an average minimum of 20 tonnes of fresh fruits and vegetables per day (400 tonnes per month) at a single handling facility, once sufficient infrastructure is installed. This implies an annual projected minimum capacity of 4,800 tonnes of value added fresh fruits and vegetables, largely in the organic quality, and some in the conventional quality, depending on prevailing demand and competitiveness.

Projected annual exports of minimally processed fresh fruits and vegetables from the project

Product	Projected annual exports (tonnes)				
	Year 1	**Year 2**	**Year 3**	**Year 4**	Year 5
Pineapples	2,000	2,400	2,400	2,400	**2,400**
Apple bananas	800	960	960	960	**960**
Passion fruits	800	960	960	960	**960**
Hot pepper	400	480	480	480	**480**
Total	4,000	4,800	4,800	4,800	4,800

Projected sales

A survey carried out in 2008 by NOGAMU in Uganda indicated that Fresh organic pineapples fetch an average of $0.90/kg for organic apple bananas $1.7/kg for organic passion fruits and an average of $1.3/kg for conventional hot peppers. All prices are Free On Board. Accordingly, basing on the average, a projected capacity of 400 tonnes value added fresh fruits and vegetables per month from the processing facility will be realized. Given that the facility will handle 50% pineapples, 20% passion fruits, 20% apple bananas and 10% hot peppers, the projected total sales of $4,404,000 per annum can be realized.

Projected annual sales for minimally processed fresh fruits and vegetables

Product	Daily sales (US$)	Total annual sales projection (US$)				
		Year 1	Year 2	Year 3	Year 4	Year 5
Hot pepper	2,600	520,000	686,400	755,040	830,544	913,598
Passion fruit	6,720	1,344,000	1,774,080	1,951,488	2,146,637	2,361,300
Pineapple	9,100	1,820,000	2,402,400	2,642,640	2,906,904	3,162,456
Apple banana	3,600	720,000	950,400	1,045,440	1,149,984	1,264,982
Total Sales	**22,020**	**4,404,000**	**5,813,280**	**6,394,608**	**7,034,069**	**7,702,337**

The projection is based on the export quantities specified earlier and on the projected annual price increment of 10%

Average estimated total investment costs (US$)

Investment item	Cost (US$)
Land, site and building development	877,500
Land and site development (2-Acres)	390,000
Building development (Production and administration)	487,500
Equipment and machinery	570,000
Fruit processing line equipment	370,000
Incubator (for ripening fruits)	200,000
Auxiliary and service plant equipment(utilities, sanitation	420,000
Biogas digester (to convert waste into biogas and	100,000
Refrigerated trucks	90,000
Basic laboratory	50,000
Cold storage (2)	100,000
Extra sanitary installations (Related HACCP	50,000
Change over generator	30,000
Incorporation expenses (1% of total investment)	18,675
Pre-production expenditures (5% Staff, operational and	35,140
Working capital requirements (4 months)	702,800
Raw materials (1600 tonnes for four months)	544,000
Staff salaries	58,800
Operational costs	33,333
Administration costs	66,667
Total investment	**2,624,115**

Main production inputs locally available

Raw materials

The raw materials required can be locally obtained, that is, the production of the fresh fruits namely: apple bananas, passion fruits, pineapple and hot peppers, dominated by small scale farm holder producers, and are easily available.

#	Product	Average cost per ton (US$)
1	Pineapple	200
2	Apple bananas	500
3	Passion fruits	400
4	Hot pepper	600

The capacity for local small holder farmers to double or triple their production capacity is very possible in a period of 2- 3 years.

Selected factor costs

Infrastructure available at proposed site

No	Infrastructure & civil works	Qty	Cost/unit	Amount (US$)
1	Land 2-Acres)	2	75,000	150,000
2	Site preparation and development (8000 sqm) x 30 US$	8,000	30	240,000
3	Plant (1500sqms)	1500	250	375,000
4	Offices (150 sqm)	150	250	37,500
5	Housing for management (300 sqms)	300	250	75,000
	Total investment infrastructure & civil works			**877,500**

Preliminary financial viability analysis of the proposed investment

Estimated capital costs of selected projects

These will take into account the following factors:

Land and space requirements

Refer to section on infrastructure.

Technology

The technology for processing ready to eat value added fresh fruits and vegetables involves simple cleaning , cutting/slicing and packing under very hygienic conditions.

Equipment

Overall investment in equipment is substantial, but the equipment that meets the hygienic and food safety standards is readily available in Europe.

Civil engineering works

- The civil works required include the preparation and landscaping of the site.
- Civil works to prepare the ground for building of the infrastructure.
- Building of the infrastructure to the specifications required to house the equipment and the auxiliary

service centers and points.

Working capital requirements

Raw materials will be procured from the local farmers with preference for those who are organic certified, as projected below:

Working capital requirements

#	Product	Requirement per month (tones)	No. of tons required for 4 months of business cycle	Average Price per ton (US$)	Total (US$)
1	Pineapple	200	800	200	160,000
2	Apple bananas	80	320	500	160,000
3	Passion fruits	80	320	400	128,000
4	Hot pepper	40	160	600	96,000
	Average cost per 4 months	**400**	**1600**		**544,000**

Personnel and labour costs (refer to section on labour requirement)

Type	Units	Unit cost	Quantity	Annual cost (US$)
Managerial	3	1000	12	36,000
Technical	4	750	12	36,000
Skilled	8	400	12	38,400
Unskilled	50	110	12	66,000
Sub-total				**176,400**
Working capital requirements	4 Months			58,800

Factory supplies and over heads

Overhead item	Units	Qty	Unit cost (US$)	Cost (US$)
Operational costs (average industrial)	Months	12	8,333.3	100,000
Administration Costs (average industrial)	Months	12	16,667	200,000
Sub-total				**300,000**
Working capital requirements (4 months)				
Operational costs (average industrial)		1.00	33,333	33,333
Administration Costs (average industrial)		1.00	66,667	66,667
Working capital requirement				100,000

Indicative time schedule for project implementation

Pre investment phase (should be able to take between 2 weeks to 1 month)

- Incorporation period (registration of business and obtaining investors licenses).

Investment phase (should be able to take up to 5 months)

- Acquisition of land
- Build infrastructure
- Step of equipment

Production phase (should be able to take between 1 to 2 months)

Financial analysis

Profitability analysis

Item		Year 1	Year 2	Year 3	Year 4	Year 5
Revenue(US$)		4,404,000	5,813,280	6,394,608	7,034,069	7,702,337
Manufacturing costs(US$)		1,591,570	1,909,884	1,909,884	1,909,884	1,909,884
Gross profit (US$)		2,812,430	3,903,396	4,484,724	5,124,185	5,792,453
Overheads (US$)		934,990	965,074	961,711	969,678	984,389
Net profit before interest and tax (US$)		1,877,441	2,938,323	3,523,013	4,154,507	4,808,064
Development loan Interest expense (US$)		400,440	312,270	224,099	135,929	47,759
Net profit/(Loss) before tax		1,477,001	2,626,053	3,298,914	4,018,577	4,760,305
Taxation (30%)	30%	0	0	2,220,590	1,205,573	1,428,092
Net profit/(Loss) after Tax		1,477,001	2,626,053	1,078,323	2,813,004	3,332,214
Accumulated profit (Loss)		1,477,001	4,103,053	5,181,377	7,994,381	11,326,595
Net profit margin		34%	45%	17%	40%	43%
Return on investment(after Tax)		56%	100%	41%	107%	127%

Feasibility analysis (US$)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
	0	3,207,172	7,567,723	12,536,516	18,166,722	0
Sales	4,404,000	5,813,280	6,394,608	7,034,069	7,702,337	31,348,294
Equity cash injection	524,823					524,823
Loan capital injection	2,099,292					2,099,292
Total (US$)	**7,028,115**	**9,020,452**	**13,962,331**	**19,570,585**	**25,869,059**	**33,972,409**
Capital expenditure	2,624,115					2,624,115
Overheads	717,490	787,954	817,020	851,050	886,726	4,060,239
Interest payments	246,084	198,266	142,285	86,304	30,323	703,263
Loan repayments	233,255	466,509	466,509	466,509	466,509	2,099,292
Total (US$)	**3,820,943**	**1,452,729**	**1,425,815**	**1,403,864**	**1,383,559**	**9,486,909**
Balance C/f	3,207,172	7,567,723	12,536,516	18,166,722	24,485,500	24,485,500

NPV analysis

Item	Year 1	Year 2	Year 3	Year 4	Year 5
Year end cash flows	65,963,633	7,567,723	12,536,516	18,166,722	24,485,500
Discount factor	10%				
NPV	103,251,810				
Pay back		Investment	Net cash flows	Balance	Payback
	Year 0	2,624,115	0	-2,624,115	0
	Year 1		3,207,172	583,057	1
	Year 2		4,360,551	4,943,608	Payback-2
	Year 3				

2.8 Fruit pulp processing for export

Purpose of the study

The purpose of this project is to increase the supply and availability of fruit pulp for industrial and retail use and explore the excess demand especially for organic fruit pulp as a way of increasing value addition to the abundantly available fresh fruits, but at the same time create a market for thousands of smallholder producers involved in fruit production (apple bananas, mangoes and pineapples, passion fruits).

Projected capacities, sales and preferred technology

Planned products and services

The project is planned to process fruit pulp for industrial and retail use. A range of fruit pulp products can be handled by the same processing plant, but this project will target the four most highly demanded fruit pulp products from Uganda, which include; Pineapple pulp, Mango pulp, Apple banana pulp and Passion fruit pulp. Other pulp products such as papaya, guava etc may also be produced additionally as and when a demand arises.

An average of 8 tonnes of fruit pulp will be produced per day (160 tonnes per month) at the project processing plant, once sufficient equipment is installed. 50% of this will be pineapple pulp, 30% apple banana pulp, 10% Passion fruit pulp and 10% Mango pulp.

Projected annual production of fruit pulp by the project

Product	Projected annual production (tonnes)				
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Pineapple pulp	800	960	960	960	960
Apple banana pulp	480	576	576	576	576
Passion fruit pulp	160	192	192	192	192
Mango pulp	160	192	192	192	192
Total (US$)	**1600**	**1920**	**1920**	**1920**	**1920**

Projected sales

Organic fruit pulp exported from Uganda is currently selling at US$ 2.1/kg (Pineapple pulp), US$1.9/kg (Apple banana pulp), US$2.8/kg (Passion fruit pulp) and US$2.8/kg (Mango pulp). All prices are FOB. Accordingly, basing on the average projected capacity of 1,600 tonnes in the first year and 1,920 tonnes `per annum in the subsequent years, the projected minimum sales from the fruit pulp processing plant will be a total of $3,483,200 per annum.

Projected annual sales for the fruit pulp project

Product	Total annual sales projection (US$)*				
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Pineapple pulp	1,680,000	2,217,600	2,439,360	2,683,296	2,656,463
Apple banana pulp	907,200	1,197,504	1,317,254	1,448,980	1,593,878
Passion fruits pulp	448,000	591,360	650,496	715,546	787,100
Mangoes pulp	448,000	591,360	650,496	715,546	787,100
Total Sales (US$)	**3,483,200**	**4,597,824**	**5,057,606**	**5,563,367**	**5,824,541**

Average estimated total investment costs (US$)

Land, site and building development	**507,500**
Land and site development(1-Acres)	195,000
Building development (Production and administration)	312,500
Equipment and machinery	796,500
Pulp processing line equipment	596,500
Incubator (for ripening fruits)	200,000
Auxiliary and service plant equipment(utilities, sanitation etc)	380,000
Biogas digester (to convert waste into biogas and Manure)	100,000
Refrigerated truck	50,000
Cold storage (2 separate storage rooms)	100,000
Basic laboratory	50,000
Extra sanitary installations (Related HACCP certification)	50,000
Change over generator	30,000
Incorporation expenses (1% of total investment)	16,840
Pre-production expenditures (5% Staff, operational and	30,960
Working capital requirements (4 months)	
Raw materials (1,920 tonnes for four months)	454,400
Staff salaries	64,800
Operational costs	33,333
Administration costs	66,667
	619,200
Total investment (US$)	**2,351,000**

Main production inputs locally available

Raw materials

The raw materials required can be locally obtained, the production of the fresh fruits; namely apple bananas, mango, passion fruits and pineapple is dominated by small scale farm holder producers, and is easily available.

	Product	Average price per ton (US$)
1	Pineapple	200
2	Apple bananas	400
3	Mangoes	400
4	Passion fruits	500

Selected factor costs

Infrastructure available at proposed site

No.	Infrastructure & civil works	Qty	Cost/unit	Amount (US$)
1	Land (1-Acres)	1	75,000	75,000
2	Site preparation and development (4000 sqm) x 30 US$	4,000	30	120,000
	Civil works, structures and buildings (US$ 250 per square meter minimum area required) 1,250sqms			-
3	Plant (800sqms)	800	250	200,000
4	Offices (150 sqm)	150	250	37,500
5	Housing for management (300 sqms)	300	250	75,000
	Total investment infrastructure & civil (US$)			**507,500**

Preliminary financial viability analysis of the proposed investment

Land and space requirements

Refer to section on infrastructure

Technology

The technology required in fruit pulp production is readily available readily available in Europe and China

Equipment

Overall investment in equipment is substantial, even if low-cost extracting and processing equipment can be found.

Equipment	Amount (US$)
Pulp processing line equipment	596,500
Incubator (for ripening fruits)	200,000
Sub-total investment in equipment and machinery	**796,500**
Auxiliary & service plant equipment	
Biogas digester (to convert waste into biogas)	100,000
Refrigerated truck	50,000
Cold storage (2 separate cold rooms)	100,000
Basic laboratory	50,000
Extra sanitary installations (Related HACCP certification)	50,000
Change over generator	30,000
Sub-total on auxiliary & service plant equipment	**380,000**
Total investment in equipment & machinery(US$)	**1,176,500**

Working capital requirements

Raw materials that are procured from the local farmers with preference for those who are organic certified

Product	Requirement per month (tones)	No to required for 4 months of business cycle	Average price per ton (US$)	Total (US$)
Pineapple	160	640	200	128,000
Apple bananas	96	384	400	153,600
Mangoes	48	192	400	76,800
Passion fruits	48	192	500	96,000
Total(US$)		**1,408**		**454,400**

Personnel and labour costs (refer to section on labour requirement)

Type	Units	Unit Cost	Quantity	Annual cost (US$)
Managerial	3	1500	12	54,000
Technical	4	750	12	36,000
Skilled	8	400	12	38,400
Unskilled	50	110	12	66,000
Total				**194,400**
Working capital requirement				64,800

Factory supplies and over heads

The overheads are costed on the industrial average of the three major processors in the country for a period of 12 months. It is assumed that maximum trading period that the processor will allow is 90 to recycle or recover all the funds on sales, such that a maximum cash flow of 4 months would be sufficient to cover the working capital requirement of the business/plant.

Factory supplies and over heads

Overhead item	Units	Qty	Cost (US$)
Operational costs (average industrial)	12	8,333.3	100,000
Administration costs (average industrial)	12	16,667	200,000
			300,000
Working capital requirements (4 months)			
Operational costs (average industrial)	1.00	33,333	33,333
Administration costs (average industrial)	1.00	66,667	66,667
Working capital requirement			100,000

Indicative time schedule for project implementation

Pre investment phase (should be able to take between 2 weeks to 1 month)
Incorporation period which involves: registration of business, obtaining investors' licenses and carrying out feasibility studies.
Investment phase (should be able to take up to 5 months)

- Acquisition of land
- Build infrastructure
- Step of equipment

Production phase (should be able to take between 1 to 2 months)

- Recruitment and trail of plants
- Start of actual production

Financial analysis

Profitability analysis (US$)

	Year 1	Year 2	Year 3	Year 4	Y
Revenue	3,483,200	4,597,824	5,057,606	5,563,367	5,824
Processing costs	1,249,600	1,499,520	1,499,520	1,499,520	1,499
Gross profit	2,233,600	3,098,304	3,558,086	4,063,847	4,325
Overheads	954,780	962,951	947,812	944,369	934
Net profit before interest and tax	1,278,820	2,135,353	2,610,275	3,119,478	3,390
Development loan interest expense	232,116	187,013	134,209	81,405	28
Net profit/(Loss) before tax	1,046,705	1,948,341	2,476,066	3,038,073	3,361
Taxation (30%)	314,011	584,502	742,820	911,422	1,008
Net profit/(Loss) after tax	732,693	1,363,838	1,733,246	2,126,651	2,353
Accumulated profit(Loss)	732,693	2,096,532	3,829,778	5,956,429	8,309
Net profit margin	21%	30%	34%	38%	
Return on investment(after tax)	25%	46%	58%	72%	

Feasibility Analysis (US$)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US$)
Balance b/f	*619,200*	*2,899,287*	*6,019,352*	*9,629,014*	*13,770,104*	0
Inflows						0
Sales	0	3,483,200	4,597,824	5,057,606	5,563,367	5,824,541	24,526,539
Equity cash	594,040						594,040
Loan capital	2,376,160						2,376,160
Total	**2,970,200**	**4,102,400**	**7,497,111**	**11,076,959**	**15,192,381**	**19,594,645**	**27,496,739**
Outflows							
Capital expenditure	2,351,000						2,351,000
Overheads		706,980	762,711	785,700	812,836	827,927	3,896,153
Long-term loans:							0
Interest payments		232,116	187,013	134,209	81,405	28,602	663,345
Loan repayments		264,018	528,036	528,036	528,036	528,036	2,376,160
Total	**2,351,000**	**1,203,113**	**1,477,759**	**1,447,944**	**1,422,277**	**1,384,565**	**9,286,658**
Net cash flow	*619,200*	*2,899,287*	*3,120,065*	*3,609,662*	*4,141,090*	*4,439,976*	*18,210,081*
Balance C/f	*619,200*	*2,899,287*	*6,019,352*	*9,629,014*	*13,770,104*	*18,210,081*	*18,210,081*
NPV analysis							
		Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	
Year end cash flows		50,527,838	6,019,352	9,629,014	13,770,104	18,210,081	
Discount factor		10%					
NPV		78,855,685					
Payback							
		Investment	Net cash flow	Balance	Payback		
	Year 0	2,351,000	0	-2,351,000	0		
	Year 1		2,899,287	548,287	**1**	**Payback**	
	Year 2		3,120,065	3,668,352			

2.9 Tomato paste processing

Purpose of the Project

The objective of this project is to establish a value chain for tomato products, by creating opportunities in the processing of raw tomato into tomato paste products

Description of technological options and preferred choice, sources and costs
It is possible to produce up to 8 tonnes of tomato paste per day at a single processing plant, once sufficient equipment is installed. This represents an equivalent of 240 tonnes of tomato paste per month. The average industrial production requires access of 8 to 30 tonnes of fresh tomatoes daily over the year to be produced in Uganda at a single processing plant, once sufficient equipment is installed. Technologies/equipment for processing tomato paste can easily be sourced outside from Europe or Asia. Equipment from India and China can be secured at a low cost of about ½ to ¾ the price of the equipment from Europe. The sector technical personnel required for the processing of tomato paste is easily available in the country.

Average estimated total Investment costs (US$)

No	Infrastructure & civil works	Amount (US$)
1	Land (1-Acres)	75,000
2	Site preparation and development	120,000
3	Civil works, structures and buildings (refer to section below on infrastructure required at proposed site)	312,000
4	Plant and equipment (for detailed breakdown refer to section below on Equipment)	868,900
5	Auxiliary service and plant equipment (for detailed breakdown to section below on equipment)	260,000
6	Incorporation expenses 1% of capital investments	14,779
7	Pre-production expenditures (5% Staff, operational and Administration costs)	24,448
8	Working capital requirements	488,956
	Average estimated total investment costs	**2,006,083**

Selected factor costs

Infrastructure required at proposed site land and space requirements

No	Infrastructure & civil works	Qty	Unit Cost (US$)	Amount (US$)
1	Land (1-Acres)	1	75,000	75,000
2	Site preparation & development (4,000 sqm) x 30 USD	4,000	30	120,000
	Civil works and buildings (USD 250 per square meter minimum area required) 1,250sqms			-
3	Plant (800sqms)	800	250	200,000
4	Offices (150 sqm)	150	250	37,500
5	Housing for management (300 sqms)	300	250	75,000
	Total investment infrastructure & civil works			**507,500**

Raw materials and additional supplies

The wastage in the tomato process ranges between 6 to 10 % therefore it will require up to 1.11 metric tonnes of fresh tomato to produce 1 metric ton of tomato paste. The raw materials required are costed based on the projected output of 8 tonnes of tomato paste per day, which would require an average of 8.89 tonnes of fresh tomatoes per day. It is assumed that maximum trading period that the processor will allow is a 90 day cycle to allow recovery on all credit sales, such that a maximum cash flow of 4 months would be sufficient to cover the working capital requirement of the business/plant. Raw materials and additional supplies will be locally procured.

Breakdown of estimated cost of raw materials

Product	Requirement per month (tonnes)	No required for 4 months of business cycle (tones)	Average Cost per ton (US$)	Cost (US$)
Tomatoes	178	711	500	355,556

Factory supplies and over heads

The overheads are costed on the industrial average of the two major processors in the country for a period of 12 months. It is assumed that maximum trading period that the processor will allow is a 90 day cycle to recover all the funds on sales, such that a maximum cash flow of 4 months would be sufficient to cover the working capital requirement of the business/plant.

Estimated operational and factory overhead cost

Cost Item	Units	Quantity	Unit Cost (US$)	Cost (US$)
Operational costs (average industrial)	Months	12	8,333.3	100,000
Administration Costs (average industrial)	Months	12	16,667	200,000
Sub-total				**300,000**
Working capital requirements (4 months)				
Operational costs (average industrial)		1.00	33,333	33,333
Administration costs (average industrial)		1.00	66,667	66,667
Sub-total on working capital requirement				**100,000**
Total				**400,000**

Personnel and labour requirements and costs

To establish a medium sized tomato processing plant in Uganda, one would approximately employ an average of 39 people with about 14% of these being in management, technical and sales and the rest working as casual unskilled labour. Casual labour will mainly be required to sort and peel the fruits.

Estimated personnel/labour cost of production

Type	Units	Quantity	Annual cost (US$)
Managerial	3	12	27,000
Technical	2	12	14,400
Skilled	4	12	19,200
Unskilled	30	12	39,600
Sub-total			**100,200**
Working capital			33,400

Estimated production costs

Type	Working capital (US$)	Annual cost (US$)
Labour requirements	33,400	100,200
Factory supplies and over heads	100,000	300,000
Raw materials	355,556	1,066,667
Total estimated production cost	**488,956**	**1,466,867**

Estimated annual sales revenues

The average annual revenues for the low and high ended sector player in this industry stands at about US$ 1.6 million to about 6 million US$ for the higher end producers. The trend for such players in the last 5 years indicates a net increase in the level of production of tomato paste, from 616 tonnes of tomato paste per annum to 940 tonnes per annum a growth of 53%, which is an average of 10.5% per annum. This justifies that the market is growing and there is also increased interest in the market within the East African community and the wider COMESA.

The annual volume of sales of tomato paste is projected to be at 1,920 metric tonnes and this should be able to raise annual value of US$ 2.4 million to 3.3 million per year. The market news as shown by the last World price index; aseptic 28/30% tomato paste brix is offered between 1,175 to 1,231 US$ per metric tone at factory (exworks) depending on the packaging.(tomato market report 2008.06).

Indicative time schedule for project implementation

Pre investment phase (should be able to take between 2 weeks to 1 month)

- Incorporation period (registration of business, obtaining investors licences, carrying out feasibility studies).

Investment phase (should be able to take up to 5 months)

- Acquisition of land
- Building infrastructure
- Step of equipment

Production phase (should be able to take between 1 to 2 months)

- Recruitment and trail of plants
- Start of actual production

Financial analysis: Approximate payback period, approximate rates of return

Assumption under laying the financial analysis

- A daily production output of 8 tonnes of tomato paste will be produced per day.
- 240 days of production are costed per year.
- An annual increment in the production rate of 10% is projected per year.
- An annual inflation factor has been built in of 10% for all expenses.

Profitability analysis of the tomato paste processing project

Item of Profitability	Year 1	Year 2	Year 3	Year 4	Year 5	Total (US$)
Sales revenue	1,880,000	2,481,600	2,729,760	3,002,736	3,303,010	13,397,106
Less: Processing costs	942,340	1,130,808	1,130,808	1,130,808	1,130,808	5,465,572
Gross profit	937,660	1,350,792	1,598,952	1,871,928	2,172,202	7,931,534
Less: Overheads	726,523	717,287	698,163	688,031	684,403	3,514,407
Net Profit(Loss) before Interest & Tax	211,137	633,505	900,789	1,183,897	1,487,799	4,417,126

Note: Corporation tax of 30%

Feasibility analysis of the tomato paste project (US$)

NPV analysis	Year 1	Year 2	Year 3	Year 4	Year 5
Year end cash flows	2,972,896	23,008,455	47,719,762	69,119,886	104,135,141
Discount factor	20%				
NPV	121,253,966				

Payback period analysis

Payback period	Investment	Net cash flow (US$)	Balance on recovery of investment (US$)
Year 1	2,287,356	2,972,896	(685,540)
Year 2		23,008,455	(23,693,995)
Year 3		47,719,762	
Year 4		69,119,886	
Year 5		104,135,141	

3.1 OTHER CONSIDERATIONS AND ADDITIONAL FORMATION

3.1 Location

Fruit farming

Suitable Government owned land free of squatters, for commercial estate type production, is available at Odina former citrus farm (950 hectares) and Labori former irrigation scheme (800 ha). Mobuku irrigation scheme is also suitable for all year round fruit production. All schemes put together provide a total of over 3000 hectares (Odino, Ongino, Labori, and Mobuku).

Fruit processing

UIA has secured land that it can lease out to investors for setting up processing plants. To date, a number of these pieces of land have been developed into industrial parks in Wakiso and Mukono districts that are within a range of about 15 to 30 Kms from the Kampala City centre, with all the basic infrastructure (power, water, sewerage disposal and road networks) established. The proximity to the centre of the capital city also ensures that the plant is close to the largest market in the country and this lowers distribution and marketing costs. Other major towns such as Jinja that have a reasonable large market have also established similar industrial parks that are available for use by investors.

3.2 Environmental issues

There are likely to be adverse consequences of some of the proposed activities such as irrigation, bush clearing, and application of fertilizers, pesticides, fungicides and disposal of fruit rejects and effluents from processing plants that may be released into the environment. As an adherence to the environmental laws, environmental impact assessment will be crucial at all stages of the project implementation. It is important to formulate mitigation and monitoring measures at early stages of project planning.

All wastewater will be collected into drains. No wastewater will leave the plant without being treated, to remove biological matter. For the economical and compliance to environmental waste management disposal, the solid waste, from the production process will be transferred to a bio digester, give two outputs bio gas and natural manure. The bio gas may be used to subsidize power/energy cost since it can be used in providing energy to run the incubator for ripening fruits. The manure can also be sold off to farmers at a reasonable price.

3.3 Regulatory and licensing issues and procedures

Current legislation in Uganda is largely related to taxation of imports and protection of the environment. Major concerns are on preservation of wetlands, maintenance of biodiversity, and prevention of desertification and control of pollution. Desertification is only of concern in the low rainfall zones in the north of the country and partly outside the proposed project areas.

There are also the provisions of the Land Act 1998 and the Water Statute, 1995. Authority to allocate land under the Land Act is vested in District Land Boards. There is the problem of water Extraction permits in terms of the fee structure. An allocation of water for commercial purposes, without a water permit issued by the Director of the Directorate of Water Development (DWD), is prohibited. Installations capable of extracting or diverting more than 400 cubic meters of water per day are subject to the requirement of a permit by the Director DWD. This implies that developers of water for irrigation exceeding 400 cubic meters a day must apply for water extraction permits for which a fee is paid. Accordingly, irrigation is regulated by a disparate number of legal instruments including: the Water Statute, the Land Act; the National Environment Statute; and the Water sector.

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