

Feasibility Study

Production of Indigenous Fruit Juice Concentrate at Tabora - Tanzania

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October 2004



World Agroforestry Centre and CPWild Research Alliance

Executive summary

This feasibility study was conducted to determine the viability of a fruit juice concentrate processing enterprise located at Tabora, Tanzania. The feasibility of the proposed enterprise was assessed in four core areas namely market and financial feasibility, technical feasibility, resource and environmental feasibility and social and institutional feasibility.

A market opportunity was identified for the domestic production of good quality fruit juice concentrates in Tanzania to be sold to manufacturers in the growing fruit juice nectar-producing sector in Tanzania. The analysis of the financial feasibility of the proposed enterprise revealed that (based on the assumptions that were made) the enterprise is only marginally profitable but would have a positive cash flow and is potentially viable over the longer term. The biggest constraint faced by the enterprise is the costs of transporting finished products from Tabora to the main industrial centres in Tanzania.

As a result of a lack in a comprehensive analysis of the current natural resources that are available in Tanzania this feasibility study has made a number of assumptions regarding the environmental and/or natural resource feasibility of the enterprise. Based on the limited information it was concluded that the proposed enterprise could be environmentally feasible.

Processing technology that is ideally suited to the specific technical requirements of the proposed processing enterprise at Tabora, Tanzania is available. The location at Tabora is suitable in terms of access to raw material and distribution channels. Transport costs associated with the distribution of the final product would, however, have a significant impact on profitability.

Taking the net social benefit of the proposed processing enterprise into consideration it can be concluded that the processing enterprise is anticipated to be socially and institutionally feasible. Surrounding communities would benefit in a number of direct and indirect ways from the establishment of the proposed enterprise.

Based on the framework set out in this feasibility study it can be concluded that the proposed processing enterprise at Tabora is only marginally feasible and could be more profitable if located closer to centres of commerce such as Dar es Salaam. This result of the feasibility analysis is, however, heavily dependant upon the assumptions made during the study and on conditions (political, environmental, economical etc.) remaining relatively stable within the enterprise's operating environment. If either the assumptions or the operating environment were to differ substantially from actual circumstances the actual feasibility of the processing enterprise at Tabora could differ from the current result.

The authors would like to thank the Federal Ministry of Economic Co-operation (BMZ/GTZ), Germany (Project No. 2001.7860.8-001), and the Canadian International Development Agency (CIDA) (Project No. 050/21576) for funding this project.

We also acknowledge the contributions of the ICRAF, CPWild and partner staff who have assisted in collecting and analysing information.

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1 Project summary and terms of reference

The Commercial Products from the Wild Group (CPWild Group) and the World Agroforestry Centre are jointly investigating the feasibility of possible enterprises based on indigenous forests and woodlands products in Tanzania, Zambia, Malawi and Zimbabwe. A critical element of these studies is a series of feasibility studies based on selected potential products for each target country.

Based on a general scoping study it was decided to investigate the feasibility of an indigenous fruit juice concentrate plant in Tanzania. During a pre-feasibility assessment the Tanzanian fruit juice sector was identified as a potential growth sector and a large demand for locally processed fruit juice concentrate exists. Fruit juice concentrate is also a relatively easy product to process, it can be stored without cooling and can be transported at relatively low costs.



Figure 1 – Map of Tanzania (www.cia.gov/publications/factbook)

2 Tanzania country overview

2.1 General

Tanzania is an independent republic in East Africa on the Indian Ocean between Mozambique in the south and Kenya in the north. Tanzania also borders Burundi, the Democratic Republic of the Congo, Malawi, Rwanda, Uganda and Zambia. Dar es Salaam has, until recently, been the capital city but the legislative offices have been transferred to Dodoma, which is planned as the national capital. Dar es Salaam, Arusha, Dodoma and Mwanza are important Tanzanian cities.

In December 1961 and December 1963 Tanganyika and Zanzibar declared independence from the United Kingdom. Tanganyika was united with Zanzibar on the 26th of April 1964 to form the United Republic of Tanganyika and Zanzibar, renamed the United Republic of Tanzania in October of 1964 (www.cia.gov/publications/factbook).

2.2 Economy

Tanzania is one of the poorest countries in the world. Its economy depends heavily on agriculture, which accounts for about half of GDP, provides 85% of exports, and employs 80% of the work force. The Tanzanian economy is a reflection of its relatively stable political situation. The economy has progressed steadily since the implementation of macroeconomic stabilisation and structural reform programme in the mid-nineties (www.cia.gov/publications/factbook).

The agricultural sector in particular has benefited from this programme with the liberalisation of production and marketing structures and product prices. The country's inflation continues to improve as a result of foreign assistance and

fiscal consolidation and resulted in a stronger balance of payments position (<http://www.mbendi.co.za/>).

Progress with privatisation has been mixed and although a number of significant enterprises have been successfully privatized, the country's utilities remain in the hands of the state. There are also disturbing signs of corruption in the judiciary and bureaucracy, but the government is seeking to address these problems in efforts to improve the investment climate (<http://www.mbendi.co.za/>).

Coffee is the country's main export product, while sisal and tea also earn significant amounts of foreign currency. Manufactured goods, cotton, cashew nuts, minerals and tobacco products are exported mainly to India, the UK, Germany, Japan, the Netherlands and Belgium (<http://www.mbendi.co.za/>).

The country imports products such as consumer goods, machinery and transport equipment, crude oil and industrial raw materials from South Africa, Japan, the USA, India and Japan among others (<http://www.mbendi.co.za/>).

3 Methodology

A feasibility study is generally defined as a structured way to efficiently organize the information that is needed for confident decision-making regarding the profitability and technical/financial/social/environmental viability of a specific proposal.

The general approach used in the assessment of project feasibility assesses four main focus areas of enterprise development as proposed by Lecup and Nicholson (2000):

- The market and economic environment
- The scientific and technological environment
- Resource management and the environment

- The social and institutional environment

A feasibility study could follow the structure of the diagram in Figure 2 (Adam & Doyer, 2000). A critical output from the study would be an indication of the viability of an indigenous fruit processing industry. If viable, the results from this study can be used to compile a comprehensive business plan for such an industry.

For this study the following organizations were consulted:

- ICRAF - Tabora (Tabora, Tanzania)
- Regent Food and Drinks (Mwanza, Tanzania)
- Banana Investments (Arusha, Tanzania)
- Faida Market Link Co. Ltd (Arusha, Tanzania)
- Brooke Bond Tanzania Ltd./Unilever (Dar es Salaam, Tanzania)
- M/s Darsh Industries (Arusha, Tanzania)
- Optima of Africa (Dar es Salaam, Tanzania)
- Tanzania Women Leaders in Agriculture & Environment (TAWLAE) (Tabora – Tanzania)
- Small Industries Development Organization (SIDO) (Tabora, Dar es Salaam – Tanzania)
- Department of Food Science and Technology, Sokoine University of Agriculture (Morogoro - Tanzania)
- Presidents Food and Beverages Company (Arusha, Tanzania)
- National Buro of Statistics - Tanzania

The production processes under investigation are based on processes developed by the Department of Food Science and Technology, Sokoine University of Agriculture, Morogoro, Tanzania and the Agricultural Research Council, Nietvoorbij, Stellenbosch, South Africa.

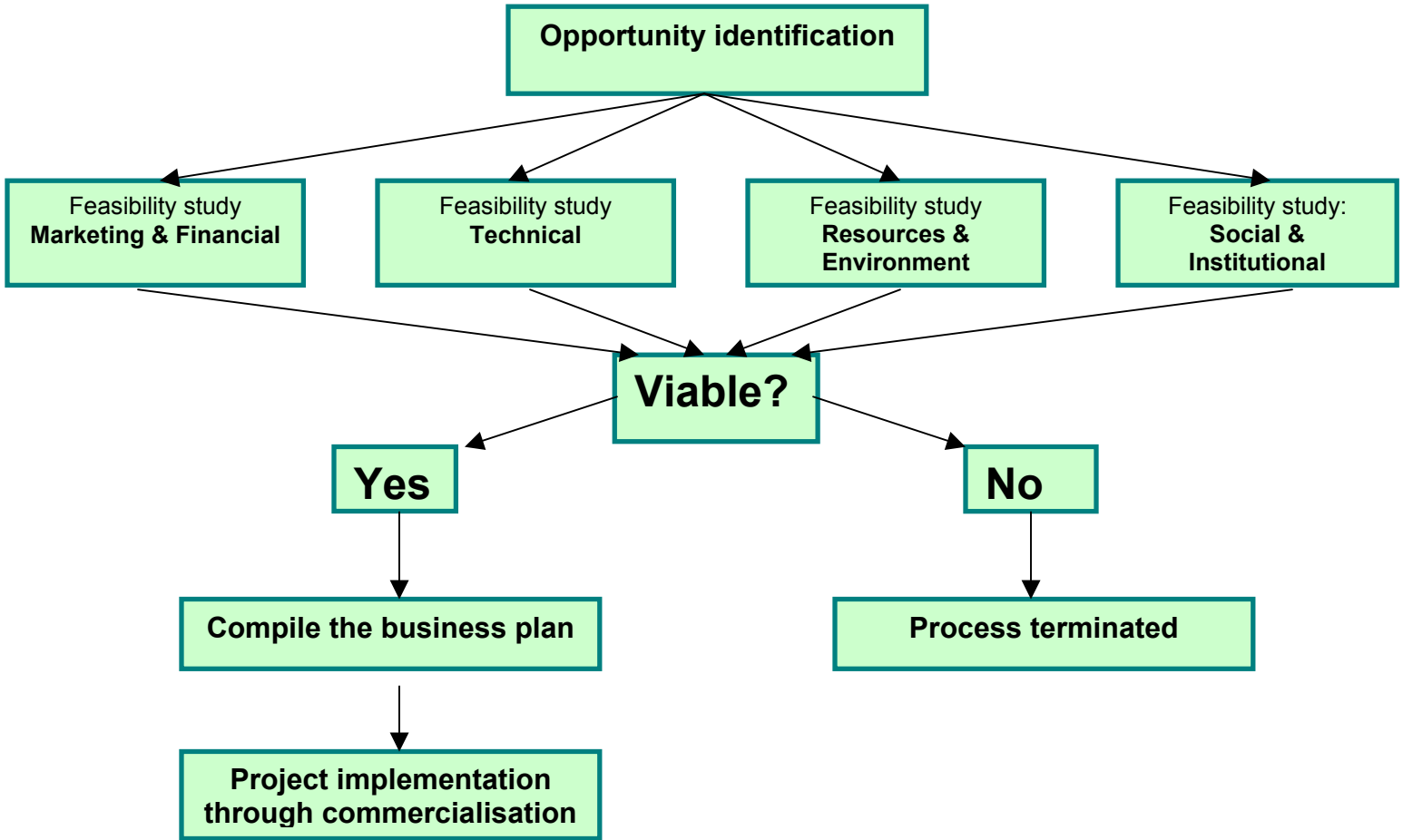


Figure 2 - Flow diagram for the exploration of new opportunities

4 Results and Discussion

4.1 Marketing and financial feasibility

The assessment of the market and the economical environment entails, amongst others, investigation into raw materials, the market potential of products, competition, constraints to business entry and margins and profitability.

Market and economic assessment is important to identify strengths, weaknesses, opportunities and threats in the marketing channels and to gather information about the business environment. Through this exercise, obstacles to the marketing of products can be identified. The goal is to gather information from all role-players involved in the marketing of the product. According to the opportunities identified, studies of the other areas of enterprise development are then undertaken.

4.1.1 Supply chains

4.1.1.1 Fruit juice supply chains

Following research conducted amongst fruit nectar manufacturers in Tanzania their predominant supply chain for fruit juice and fruit juice nectar can be mapped as depicted by Figure 3 below. It is noticeable that currently a very large proportion of the fruit juice and fruit nectar that is available in Tanzania do not have their origins in Tanzania. Tanzania imports significant quantities of fruit juice concentrate and during 2003, 500 tons of concentrate was imported into Tanzania. These concentrates were primarily imported from Ireland (63.89%), Swaziland (27.45%) and South Africa (8.16%). Although some Tanzanian companies produce fruit juice or fruit juice nectar no evidence was found of a company producing fruit juice concentrate.

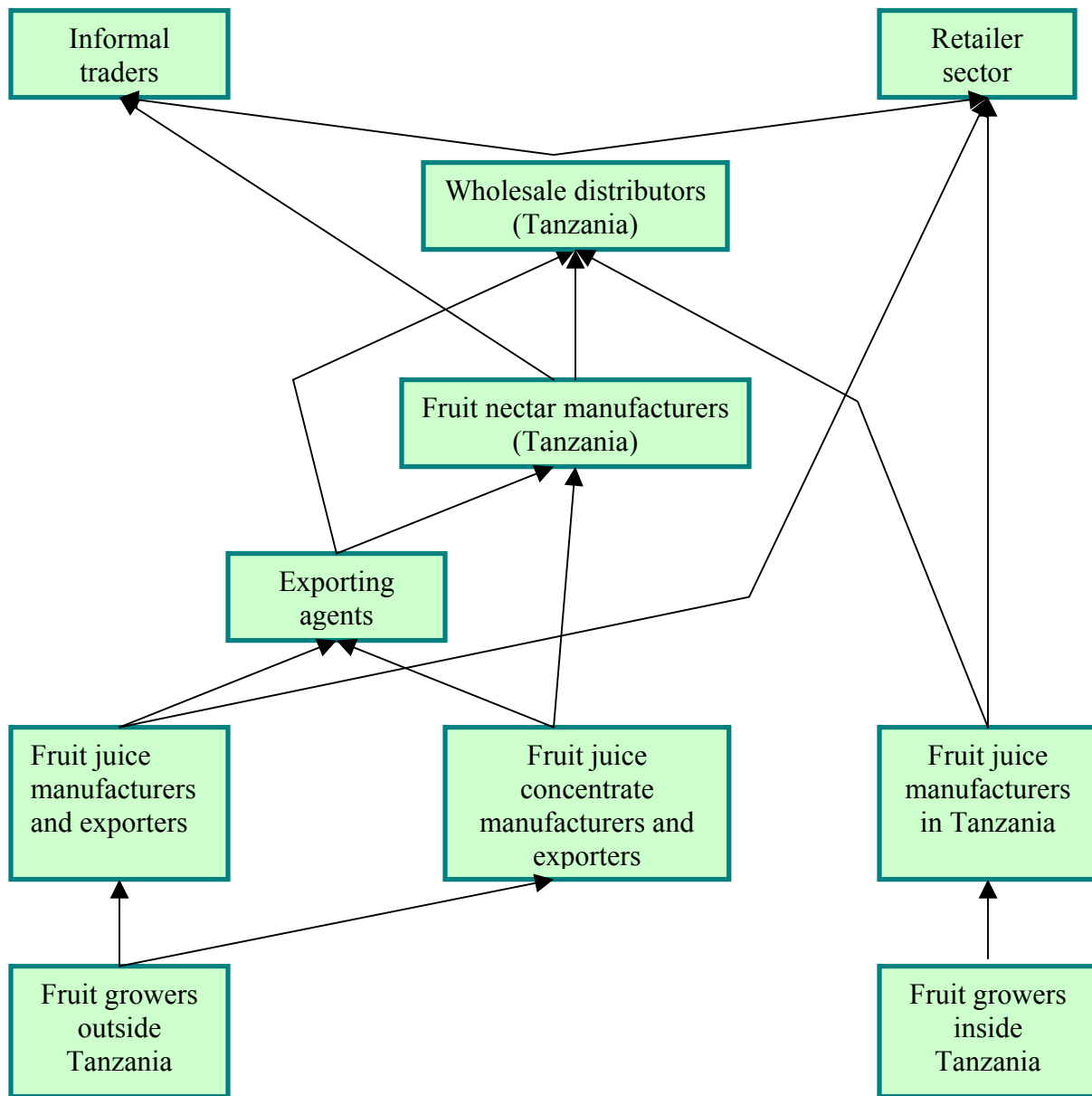


Figure 3 – Fruit juice product supply chains

4.1.1.2 Indigenous fruit juice concentrate

The general supply chain for indigenous fruit juice concentrate can be mapped as depicted by Figure 4 below. A number of indigenous fruit species including *Uapaca kirkiana*, *Flacourtia indica*, *Syzygium cordatum*, *Strychnos cocculoides*, *Vitex doniana* and *Parinari curatellifolia* are found in the vicinity of Tabora.

Mangoes (*Mangifera indica*) and guavas (*Psidium guavaja*), both non-indigenous species but naturalised species, also grow wild throughout the Tabora region.

The indigenous fruit processing enterprise at Tabora will source its fruits from the areas around Tabora where primarily women and children will harvest the fruit. It is envisaged that the Tanzanian Women Leaders in Agriculture and the Environment (TAWLAE) will manage the fruit processing facility in Tabora and will therefore deal with the numerous community groups and enter into agreements with the community groups to supply the processing facility with fruit.

The fruit processing enterprise in Tabora will receive the fruits from the communities either at pre-arranged collection points or at the processing facility. The processing enterprise will then process the different fruits into fruit juice concentrate. The enterprise will be responsible for procuring all the necessary inputs like fruit, preservatives, sugar, packaging materials etc to produce a good quality concentrate.

On completion of processing by the processing facility the concentrate will be distributed to the major fruit juice (nectar) manufacturers in Arusha, Dar es Salaam, Iringa and Mwanza where the concentrate will be processed into fruit juice nectar. The processing enterprise will also have the responsibility of coordinating the distribution of the concentrate as well as creating awareness of the product.

ICRAF – Tabora will have a responsibility to oversee and facilitate the whole process from the procurement of fruit and other inputs through processing to the distribution of the final product and the creation of awareness of the product.

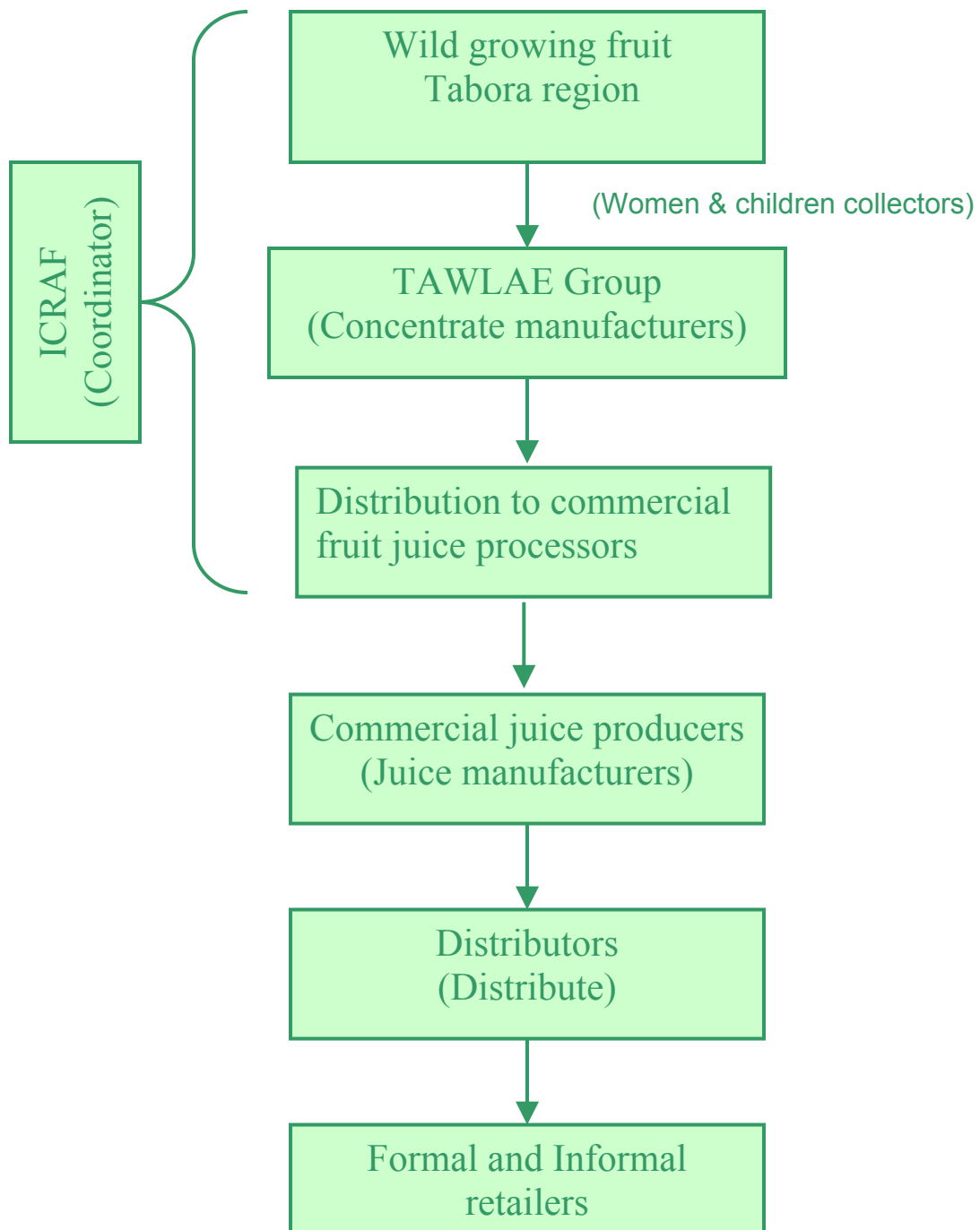


Figure 4 – Indigenous fruit juice concentrate supply chain

4.1.2 Raw material supply

The procurement of raw material inputs must be studied before investing in a processing plant. Raw material input supply is of great importance because the transformation of inputs is one of the basic tasks performed in a processing facility. If inputs are defective, problems will occur in processing and marketing.

Efficient procurement is dependant on five basic characteristics:

- Sufficient quantity of inputs
- Correct quality of inputs
- Time sensitive operations
- Reasonable costs
- Efficient organization

Raw material supply is discussed in more detail under ecological feasibility.

4.1.3 Market analysis

The market analysis entails investigation into the major current players and competition in the market, the market volume and value and forecasts and trends for the Tanzanian processing sector as well as market opportunities in the specific sector.

4.1.3.1 Overview of the fruit juice concentrate market

There are no enterprises in Tanzania (or Southern Africa) that have attempted to commercially produce fruit juice concentrates from indigenous fruit. The fruit juice processing industry in Tanzania is very young with many new entrants, resulting in stiff competition.

The bulk of fruit juices available in Tanzania are fruit nectars made from imported concentrates. A concentrate is a form of fruit juice that has had its “bulk” reduced by removing some water from the juice. Fruit nectar is generally made by adding water to fruit juice concentrate, pasteurising the nectar, bottling the nectar and then distributing the nectar to retail outlets. Such nectars have a restricted shelf-life and are sold from refrigeration in the retail outlets.

Growth in the manufacturing of fruit juice nectars has been responsible for the bulk of growth in the Tanzanian fruit juice sector. Companies that have been or currently are producing some form of fruit juice or fruit nectar include Regent Food and Drinks Company, M/s Darsh Industries, President’s Food and Beverage Company, Dabaga Vegetable and Fruit Canning Company and Tropical Foods Ltd. These companies can be considered the major players in the fruit nectar sector in Tanzania.

“The worldwide processed fruit products market encompasses a very broad and varied range of products and is, therefore, experiencing varying fortunes in the modern consumer climate. While continuing health concerns are prompting stronger consumption of fresh produce, several of the processed fruit sectors, such as jams and canned fruit in syrup, are suffering from their high sugar content. Others, however, including fruit drinks and fruit yoghurts, are benefiting from the health trend, with fortified/functional products being developed in these areas. Changing breakfast habits and increased demand for convenience foods are other factors impacting on this market.”

(<http://www.researchandmarkets.com>)

4.1.3.1.1 Competitors in the Tanzanian fruit juice concentrate market

The bulk of fruit juices available in Tanzania is representative of the general range of commercial nectars that are available in most countries with well-known flavours like orange, guava, coco-pine, peach, tropical plum, passion fruit etc. As pointed out previously most of the fruit juice concentrates available in Tanzania are imported. During 2003 these imports were primarily from Ireland (63.89%), Swaziland (27.45%) and South Africa (8.16%).

The primary competition in the fruit juice concentrate market in Tanzania is from imported fruit juice concentrates, primarily well-known commercial flavours. The production of juices from indigenous fruit is limited through out the region and is generally limited to home industries which produce relatively small quantities of products.

Table 1 – Fruit juice concentrate imports into Tanzania in 2003

Country	Value (USD)	Weight (Kg's)
United Arab Emirates	1 760	5 260
Belgium	4 478	850
Switzerland	8 201	37 624
China	4 524	19 814
Denmark	4 934	787
France	143	148
United Kingdom	3 224	7 365
Greece	49	4
Indonesia	64	377
Ireland	6 289 289	260 007
India	1 196	2 595
Iran	6 588	245
Italy	11 286	1 568
Japan	3	2
Malta	58	666
Malaysia	1 072	2 691
New Zealand	221	30
Oman	275	300
Philippines	38	412
Pakistan	564	1 570
Swaziland	2 699 933	106 770
Turkey	1 262	1 050
United States	1 687	2 274
South Africa	802 857	47 528
TOTAL	9 843 707	499 937

(National Bureau of Statistics – Tanzania)

4.1.3.1.2 Market volume and value

Information regarding the volume and value of the fruit juice concentrate market in Tanzania is very limited. This is primarily as a result of the information not being collected and available information being regarded as propriety by the individual companies. The only indication of the market volume and value that is available is the volume and value of imported fruit juice concentrates. During 2003 Tanzania imported 500 tons of fruit juice concentrate worth an estimated US\$ 9.8 million. Since little evidence was found of a notable fruit juice concentrate manufacturing sector in Tanzania it must be assumed that the

volume and value of the imported fruit juice concentrates is very representative of the market for fruit juice concentrates in Tanzania.

Figure 5 depicts the value and volume of fruit juice concentrate imports into Tanzania. It is evident that both the mass and the value of fruit juice concentrates have been steadily increasing in Tanzania which is an indication that the fruit juice market in Tanzania is growing.

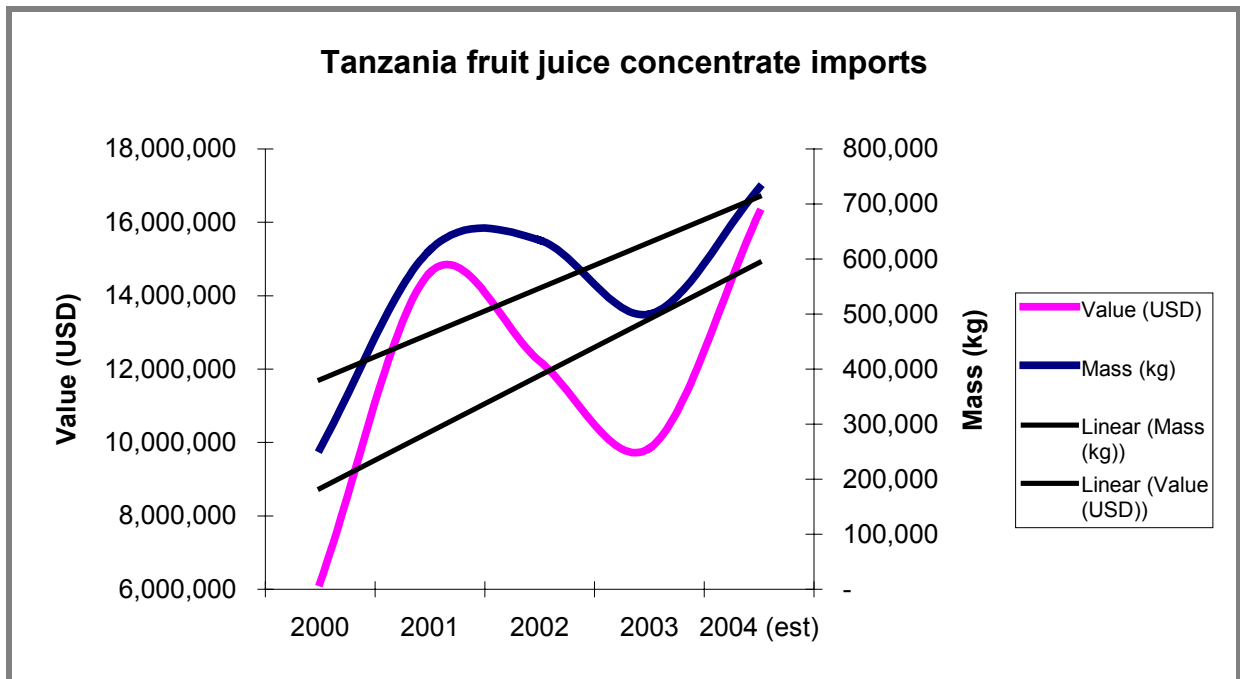


Figure 5 – Tanzania fruit juice concentrate imports (2000 – 2004 (estimated))

4.1.3.1.3 Market opportunities in the indigenous fruit juice concentrate sector

Plenty of juice left in global market

Global consumption of juice and nectars has risen steadily in recent years, fuelled by a healthy image. And producers have no intention of taking their foot off the gas, it seems, with a raft of product innovations planned to keep consumer interest high.

A new report from beverage industry analysts *Canadean* claims that while the 'good-for-you' effect is unlikely to dissipate for some time, juice and nectar producers are already looking for new ways of keeping the sales momentum going, in particular segmenting the market around product innovation, packaging and pack sizes.

With juice being a relatively unsophisticated product – functional drinks apart – producers are obliged to use a broad range of tactics to differentiate themselves from the rest of the pack, including new flavours, new packaging formats and more targeted marketing.

Consumer marketing in particular will become an even more important weapon in the battle for share of throat, according to *Canadean*, with products becoming highly targeted towards specific consumption occasions and locations – such as more single-serve multipack formats for lunchboxes or more products tailored for specific health needs.

As a result of this expected step up in marketing activity, *Canadean* predicts that the market for juice & nectars will advance by around 9 per cent by 2006, with much of this incremental volume coming from rapidly developing regions such as eastern Europe, Middle East/North Africa and Asia.

(<http://www.foodproductiondaily.com/news/news-NG.asp?n=49943-plenty-of-juice>)

4.1.3.2 Economic conditions

Despite Tanzania's past record of political stability, an unattractive investment climate has discouraged foreign investment. Government steps to improve that climate include redrawing tax codes, floating the exchange rate, licensing foreign

banks, and creating an investment promotion centre to cut red tape. (www.geographyiq.com/).

Over and above the macro-environment within which firms in Tanzania have to conduct business the following aspects have been identified as further practical constraints in conducting an indigenous product processing business in Tanzania:

- Consumers lack knowledge/awareness of indigenous products
- Continuous lack of funds for thorough marketing/promotion campaigns
- Communications and transport difficulties with rural producers of raw materials
- Difficulty in procuring production inputs, especially in rural areas.
- Continuous lack of funds for thorough scientific testing of traditional claims.

4.1.4 Consumer analysis

The potential consumers of fruit juice concentrate in Tanzania are businesses that currently use fruit juice concentrates to manufacture fruit nectar. As consumers they are characterised by organizational buying where they need to choose between the most suitable products and services available in a business market.

4.1.4.1 The buying decision

Organizations generally pass through eight stages of decision making in the typical buying process. Consumers of fruit juice concentrates will pass through the following stages in making a decision to buy a fruit juice concentrate:

- Problem recognition
- General need description

- Product specification
- Supplier search
- Proposal solicitation
- Supplier selection
- Order-routine specification
- Performance review

4.1.4.2 Major influences on the buying decision

Based on unstructured interviews with the production managers of firms that were identified as potential consumers of fruit juice concentrates in Tanzania the following major influences on the buying decision were identified:

- Price
- Quality and product attributes (taste, flavour, colour, etc.)
- Consistency and reliability of supply

4.1.4.3 Conclusions from the consumer profile

The conclusions that can be drawn from the consumer profile are:

- The potential consumers of fruit juice concentrates in Tanzania are typically relatively large processing firms that are currently processing or intend to process fruit juice concentrate into fruit nectar.
- A relatively structured procurement process primarily driven by the production managers of these firms characterizes the buying process of these firms.
- The major factors that generally influence the buying decision of the potential consumers include the price of the product, the quality and attributes of the product and the consistency and reliability of supply of the product.

4.1.5 Financial analysis

4.1.5.1 Analysis of indigenous fruit juice concentrate

4.1.5.1.1 Key assumptions

The financial analysis is based on the fruit juice concentrate recipe in table 6. The recipe is formulated for 100 kg of concentrate with a dilution rate of 1:5. It is assumed that 1 kg of raw fruits would yield 0.5 kg of fruit pulp (50% conversion). The recipe was developed and tested for mango concentrate and would only need slight adjustment for other fruits.

Table 6 – Recipe for fruit juice concentrate

Ingredients	Mass required for recipe (kg)
Fruit pulp	49.80
Sugar	47.80
Water	2.40
Sodium benzoate	0.26
Sodium metabisulphate	0.33
Citric acid	0.20

Miscellaneous variable costs were assumed for the production of the fruit juice concentrate and are based on inputs from ICRAF – Tabora and first hand research conducted in Tanzania. These costs include marketing costs, banking fees, distribution, salaries and wages, accounting costs, advertising, consultancy charges, telephone and fax costs, maintenance, licensing, insurance, contingency costs, rent, depreciation etc.

4.1.5.1.2 Summary of financial analysis

Table 7 – Financial analysis estimates

Income statement	Estimate
Gross value of production	USD 137 359.97
Total cost	USD 108 187.09
Net income	USD 29 172.89
Tax	USD 10 210.51
Net profit after tax	USD 18 962.38
Profit (Profit as % of gross value of production)	13.8%
Cash flow analysis	Estimate
Cash flow	Positive throughout the year
Capital budget	Estimate
Net present value	Positive
Breakeven analysis	Estimate
Breakeven price (@ 7 273 cans)	USD 14.64/can
Breakeven quantity (USD 18.89/can)	3 887 cans
Sensitivity analysis	Estimate
Consumables (Fruit, Sugar, Processing)	56.43%
Advertisement	6.35%
Distribution	12.29%
Contingency costs	3.13%
Other variable costs	7.28%
Rent	3.33%
Salaries	6.66%
Depreciation	3.66%
Other fixed costs	0.33%

4.1.5.1.3 Projected income statement

From the projected income statement (Appendix A) it is evident that the fruit processing enterprise at Tabora is marginally financially viable based on the key assumptions made above. According to the projected income statement a 20kg

can of fruit juice concentrate can be sold at US\$18.89, which compares very favourably with similar products.

4.1.5.1.4 Cash flow projections

The cash flow will be influenced by the availability of raw material and the times during the year that income is received. Through effective procurement and marketing strategies it would be possible to ensure a stable cash flow stream throughout the year.

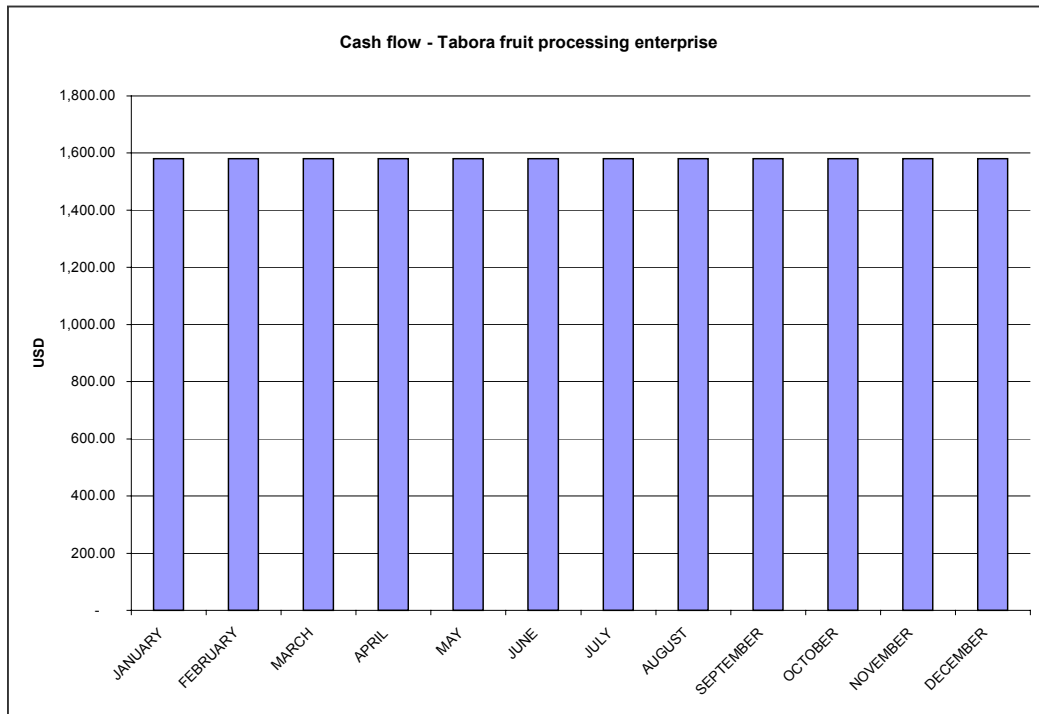


Figure 5 – Cash flow projections

4.1.5.1.5 Break-even analysis

The break-even analysis was conducted by:

- Determining the break-even price whilst keeping the initial level of sales constant.
- Determining the break-even quantity whilst keeping the initial price level constant.

The break-even analysis yielded the following results:

- Based on an annual production of 7 273 cans (20kg) of fruit juice concentrate the break-even price is **± US\$14.64 per 20kg can.**
- Based on a fixed price of ± US\$18.89 per 20kg can the break-even quantity is approximately **3,887 cans (20kg).**

4.1.5.1.6 Net present value

The net present value analysis was conducted by assuming the following:

- An initial investment of ± US\$15 000 is required. It is assumed that this initial investment will be financed via a grant to the same value.
- The return that is expected on the investment is 15%
- The corporate tax rate is 35%
- Producer price inflation is at 15%
- Consumer price inflation is at 10%

From the analysis of the projected net present value five years after the initial investment it is evident that the net present value for the product is positive. According to the net present value (NPV) decision rule that specifies that ventures with a positive NPV should be accepted it can be concluded that the manufacturing of fruit juice concentrate is financially viable (assuming the conditions set out in the financial analysis of the product).

It should, however, be noted that as a result of the cost squeeze phenomenon the enterprise's profit is steadily declining and could, in the period between 6 to 10 years of operation, become negative.

4.1.5.1.7 Sensitivity analysis

The sensitivity analysis was conducted by:

- Determining the percentage that each variable cost item contributes to the total variable cost.
- Determining the percentage that each cost item, including the variable cost, contributes to the total cost of the enterprise.

The cost of sugar is the largest cost item in terms of the variable costs of the fruit juice concentrate at just over 64% of the total variable cost. The cost of fruit, at just less than 16% and the cost of packaging, at just less than 12% of the total variable cost, are the second and third largest cost items of the total variable cost needed to produce fruit juice concentrate (Appendix B).

When considering the total costs, the variable costs constitute approximately 56% of the total cost. Sugar constitutes that largest percentage of the variable costs with 64% of total variable costs (and 35% of total costs). Distribution costs are the second largest contributors to the total cost at approximately 12% with contingency costs in third at 8%.

The viability of the fruit juice concentrate enterprise envisaged for Tabora is therefore the most sensitive for changes in the price of sugar. If the price of sugar were to go up it would adversely affect the financial viability of the enterprise. Conversely a decline in the price of sugar would see the viability of the enterprise increase markedly.

The distribution costs, i.e. the costs of transporting the fruit juice concentrate from Tabora to Dar es Salaam are also disconcerting. The transport costs constitute a very large part of the costs within the enterprise and adversely affect the viability of the product. Since not all of the concentrate can be consumed in close proximity to Tabora the processing enterprise will be compelled to transport the concentrate to regions like Dar es Salaam and will therefore not be in a position to circumvent the high transport costs from Tabora.

If it is considered that the cost of sugar at Tabora is also inflated due to transport cost it can be concluded that by locating the processing facility closer to Dar es Salaam the two largest cost items (sugar and distribution) would be reduced and the enterprise would become more profitable. A possible alternative location could be at Morogoro. It is located on the main road network to Dar es Salaam, making road transport a viable option. It is also located close to the Sokoine University that could assist with product development and quality control. The Dabaga fruit and vegetable processing enterprise is located at Iringa, south of Morogoro. It might be possible to slot into their distribution network as produce from Iringa need to pass through Morogoro on the way to Dar es Salaam.

4.2 Technical feasibility

The assessment of the science and technology environment entails investigation into the suitability of the proposed technology for members of rural target groups, the processing location and processing technology required, the status of the infrastructure and the level and availability of human resources/skills and expertise.

Further aspects of the technical feasibility analysis include:

- Processing, storage and transportation requirements;
- Identification of the gaps between the current situation and the skills to be developed and improved to meet market requirements;

- Identification of the current practices of production, processing and marketing;
- Study of the physical infrastructure and the availability of energy

4.2.1 Processing

4.2.1.1 Selection of processing technology

Upon selecting the processing technology to be used there are various factors that need to be taken into consideration. These factors are discussed at length.

The first factor is the consistency of the processing technology with qualitative requirements of the marketplace. When choosing processing technology it is of critical importance to determine whether the technology will match the quality standards of the selected target market. If the product is being positioned for export it is also important to determine whether the technology meets the consumer requirements in the export market. In the case of fruit juice concentrates in Tanzania this is very relevant since the proposed marketing angle will specifically emphasize a product of good quality to be able to compete effectively with high quality products from elsewhere.

The second factor is constraints that are imposed on technology selection by the technical requirements of the transformative process. Specific processes and technologies required by government health or safety standards constrain the selection of processing technology and this must be kept in mind when initial planning with respect to the specific processing technology takes place.

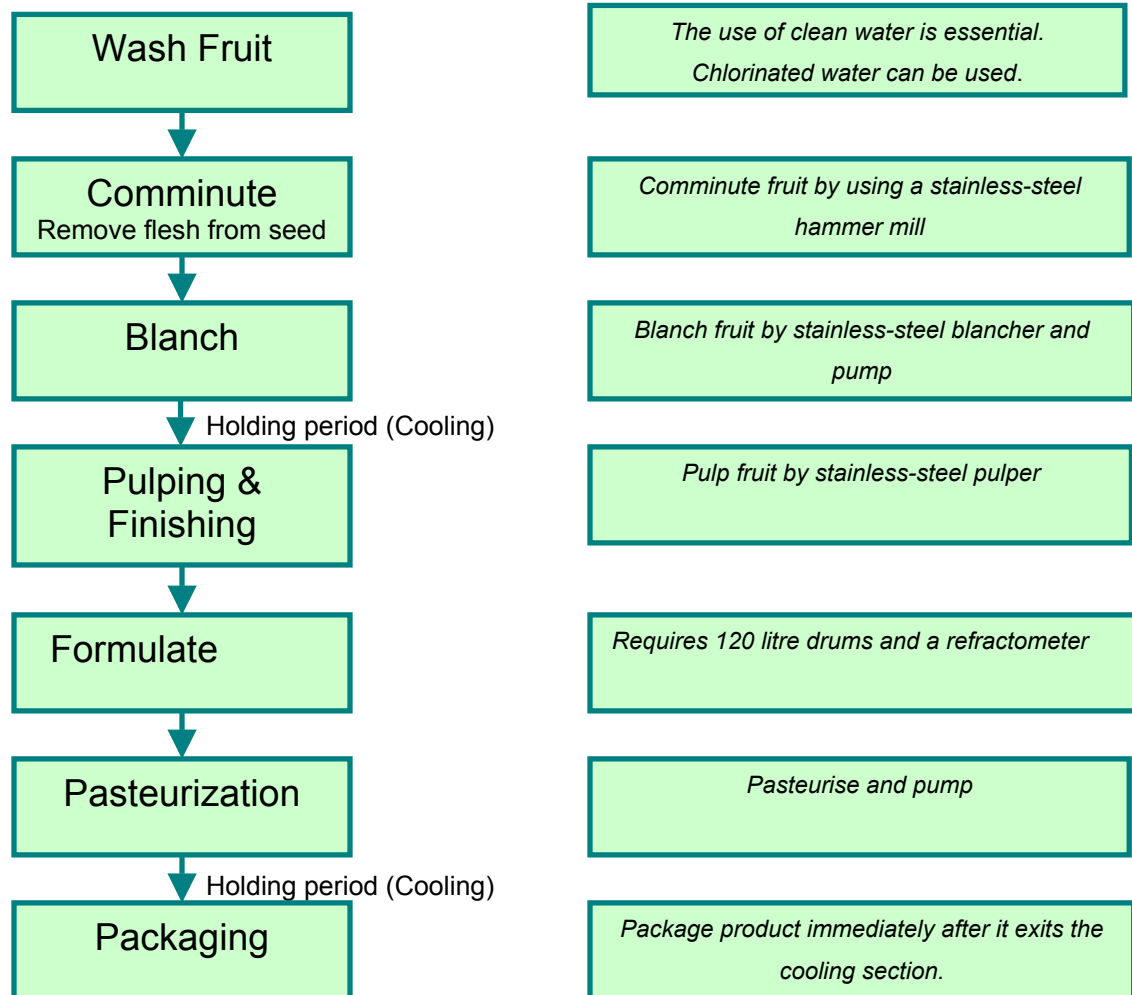
The third factor is the technology's compatibility with the firm's managerial and technical skill capability. Supervisory demands are important decision factors when selecting a specific processing technology and care should be taken so that the supervisory demands of a specific technology are not excessive. The

same argument is applicable for the technical demands of a specific processing technology.

The fourth factor is the nutritional effects of the technology. Processing technology can have a profound effect on the nutritional status of the product being processed. The effect that the processing technology has on the quality and quantity of the product's nutrient status should be determined and, if necessary, the technology should be adjusted to minimize nutrient losses.

4.2.1.2 Processing technology for small scale fruit processors

The Agricultural Research Council Infruitec-Nietvoorbij in Stellenbosch, South Africa has developed the processing technology that is proposed for the specific production of fruit products on a small scale. The production of fruit juice concentrate according to the ARC Infruitec-Nietvoorbij's small-scale technology can be characterized as follow:



The process outlined above is preliminary subject to more experiments to optimise the process. The basic steps in the process are:

Washing of the fruit – This operation should be performed in chlorinated water (100-150 ppm hypochlorite) to ensure that the fruit is clean when moving onto the next step in processing.

Removal of the flesh from the seed – After the fruit has been washed the flesh is then removed from the seed. This part of the process can be performed by hand. If a hammer mill is used to comminute the fruit the peel need not be removed in this part of the process provided that the hammer mill is able to reduce the peel size prior to blanching.

Blanching – Blanching should be performed at at least 90°C. As more experience is gained, especially with the fruit in Tanzania, it might still be possible to eliminate the blanching from a technological point of view. The retention of the blanching process is, however, favoured even though the product is pasteurised later. The reasons for this are:

- The yield during pulping/finishing would be higher after a heat process such as blanching; and
- The use of two heat treatments would significantly eradicate microbes.

The holding period and cooling will be performed as a single process with blanching (i.e. the holding period will consist of a tube between the heating and cooling sections).

Pulping – Pulping/finishing entails pulping and finishing the blanched fruit and is performed in one operation by the finisher.

Formulation – Formulation entails mixing the pulp, sugar and water required with preservatives (sodium benzoate and sodium metabisulphite). The acidity would also require adjustment through the addition of food grade citric acid.

Pasteurisation & Packaging – Pasteurisation, the holding period, cooling and packaging should be performed as a single operation to reduce the risk of re-contamination. The pasteurised product should be packaged immediately after exiting the cooling section.

This processing technology has been specifically designed to suit the requirements and skills base of rural processors and therefore it is ideally suited to the circumstances at Tabora where production will take place on small scale.

4.2.2 Processing facility location

When choosing the location of a processing facility various factors need to be taken into account. These factors include:

- Access to raw materials
- Access to the market
- Labour supply at the processing facility location
- Infrastructure at the processing facility location
- Developmental effects of the location

After giving due consideration to the criteria as set out above it has been decided to locate the fruit juice concentrate processing facility at the SIDO site in Tabora.

This decision has been made based on the following:

- There is infrastructure available in the form of buildings that can accommodate the fruit processing plant.
- Communities in the region have received training in fruit processing and have formed a women's processing group. The women's processing group would be the primary source of labour for the processing facility.
- Consistent supplies of high quality fruit are potentially available from communities in the vicinity.
- Land is available for expansion.
- All utility services like water and electricity are reliable and readily available.
- Access to transport infrastructure (road, railway, airport).

4.2.3 Processing technology required

The processing technology that is required for the manufacturing of fruit juice concentrate from pulp via the Agricultural Research Council's proposed process includes:

- Pulper (stainless steel contact part - 220V) with spare rasper.
- Finisher (stainless steel contact part - 220V) (with spare sieve and set of brushes).
- Stainless steel peristaltic pump (380V) (with 1,5m food-grade hoses).
- Blancher / Pasteurizer (12kW) with control panel with temperature controller and sensor and stainless steel insert rods.
- Set of spanners (for dismantling to clean).
- Pull-through brush cleaning set.
- 50 litre food grade drums.

All of the abovementioned equipment is available in a readymade and compatible format from an equipment manufacturer in South Africa. This equipment manufacturer is Dryers for Africa. The postal address is Dryers for Africa, P.O. Box 3423, White River, 1240. The telephone, fax and e-mail details for Dryers for Africa are +27 (0)13 751 3743 and hbrebner@mweb.co.za.

Over and above the fact that the proposed processing equipment can be used to manufacture fruit juice concentrates it can also be used to manufacture an array of other fruit products like fruit pulp, natural fruit juice, jellies, jams and pickles. The versatility of the equipment is a desirable trait that would allow the users a variety of options in processing rather than limiting them to one option.

4.2.4 Status of the infrastructure

The status of the current infrastructure at SIDO's premises in Tabora is seemingly sufficient to accommodate a processing facility that is proposed by this

feasibility study. The facilities at SIDO's premises in Tabora are connected to both water and electricity supplies. The supply of water is reportedly from a clean and reliable resource. To ensure a final product of high quality the water will however need to be subjected to UV treatment.

4.2.5 Level and availability of human resources and skills

The Agricultural Research Council Infruitec-Nietvoorbij in Stellenbosch, South Africa developed the processing technology that is proposed for the specific production of fruit products on a small scale. The technology is aimed at small-scale processing with low operational and maintenance requirements in terms of human resources and skills.

4.2.6 Inventory management

4.2.6.1 Best storage capacities for raw materials and finished goods

Inventory management is an important part of the processing procedure, as the raw material is highly perishable. It would therefore be necessary to determine how quickly the raw material must be processed into a product to ensure the desired levels of quality.

It should also be determined whether processing would make the storage of the product easier. Generally in the case of fruit the partial processing of the fruit to pulp or the complete processing to nectar and/or concentrate does indeed make the storage of the product easier by reducing perishability.

It is also important to determine the spatial and qualitative requirements for the inventory of raw materials, finished goods, processing supplies and equipment parts. At SIDO's premises in Tabora it should be seen to that there is sufficient,

high quality storage space to accommodate an inventory of raw materials, finished goods, processing supplies and equipment parts.

4.2.6.2 Adequacy of physical facilities

The standard of physical facilities play an important role in inventory management. Quantitative and qualitative losses in the inventories of raw material and finished goods are often a direct result of the standard of the physical facilities. It is therefore important to weigh the economic costs and benefits of adjusting the size and the quality of facilities for inventory handling and storage to reduce losses.

4.2.7 Packaging and other processing inputs

4.2.7.1 Functions performed by packaging

Packaging performs many very important functions as an integral part of a final product. These functions are:

- Packaging protects the quality of the product
- Packaging provides consumers with convenience
- Packaging conveys a certain image
- Packaging can also be informative with regards to the product
- Packaging adds value to a product through differentiation

4.2.7.2 Packaging choice

For fruit juice concentrates produced at Tabora to compete in the specified target market, careful consideration should go into choosing packaging. The following aspects need to be considered when selecting the right packaging:

- Requirements of the consumer and the distribution channels.
- Requirements imposed by the intrinsic nature of the product.

- Packaging characteristics determined by government regulations.
- The possibility of unmet consumer needs that could be satisfied with a different type of packaging.
- The effect of transportation infrastructure conditions on packaging requirements.
- Ecological considerations for the packaging alternatives.

4.2.7.3 Procurement of packaging, ingredients and chemicals

Much of the proposed packaging material, ingredients, chemicals and other inputs needed in the processing of fruit juice concentrate are either unavailable, of substandard quality or very costly in Tanzania. For the cost effective production of a high quality fruit juice concentrate those production inputs that are difficult to procure in Tanzania will have to be imported. These types of production inputs can typically be procured through regional distribution networks.

4.2.8 Programming and control

As with the inventory management the programming and control will be important. Control must start at the collection of the fruit to ensure that only the best quality fruit is collected and used in the pulp-manufacturing process. After the pulp-manufacturing process the production and distribution process must be synchronised to prevent bottlenecks.

Control is thus very important throughout the whole nectar manufacturing process to guarantee a quality end product for the consumer.

4.2.9 Distribution

Since there is currently no production of fruit juice concentrate at Tabora there is also no distribution channel from the Tabora processing facility. When production commences a distribution system will need to be established. The most obvious channel of distribution is delivery of the fruit juice concentrates directly to the fruit nectar manufacturers.



Direct delivery of the concentrates can be achieved by using the railway system between Tabora and the other main centres in Tanzania where the fruit juice nectar manufacturers are located.

The ultimate choice of distribution channel will depend on the profits that can be gained as a result of using a specific channel, the initial costs required to establish a distribution channel and the ease with which an effective and efficient distribution system can be established. As pointed out earlier the distribution costs, i.e. the costs of transporting the fruit juice concentrate from Tabora to Dar es Salaam constitute a very large part of the costs within the enterprise and adversely affect the viability of the product.

4.2.10 By-products

The main by-product of the fruit juice concentrate production process is a fibrous material that can be used as animal feed in a dried form. A process to dry this by-product without the use of expensive drying equipment has to be developed.

In addition to the production of the primary product this by-product could also provide an additional source of income to the processing facility and indirectly to communities involved with the processing facility.

4.3 Resource and environmental feasibility

The assessment of resources and the environment entails investigation into the availability (in time: seasonality; in space: time needed to find and harvest); of the raw materials; the regenerative potential and the impact of harvesting on the survival of the species and the impact of harvesting on the environment.

How to develop products without destroying the resource base is a fundamental concern of the market analysis and development methodology. A product will be considered for development only if its resource base will not suffer as a result of an increase in the harvesting rate or if harvesting can be supplemented or substituted by cultivation. Therefore, it is important to get a clear picture of the status and quantity of natural resources before starting an enterprise. This can also be a tool to monitor environmental impact once an enterprise gets under way.

4.3.1 Raw material supply

The procurement of raw material inputs must be studied before investing in a processing plant. Raw material input supply is of great importance because the transformation of inputs is one of the basic tasks performed in a processing facility. If inputs are defective, problems will occur in processing and marketing.

Efficient procurement is dependant on five basic characteristics:

- Sufficient quantity of inputs
- Correct quality of inputs
- Time sensitive operations
- Reasonable costs
- Efficient organization

4.3.1.1 Raw material quantity

It is estimated that the production of 12 tons of concentrate per month would require approximately 12 tons of fruit. (50% of fruit recovered for pulp, 50 kg of fruit pulp per 100 kg concentrate).

Information on the quantity of fruit that is available for processing in the vicinity of Tabora is not available. If consideration is, however, given to the apparent sparse distribution of the areas where fruit can be found the availability of raw material to produce fruit juice concentrate from could pose a problem to the feasibility of the enterprise.

The supply of raw material is also very dependent on climatic factors and sustainable forestry practices. Drought and poor management would see feasible supplies of raw material diminish drastically. This would result in a feasible enterprise becoming infeasible overnight.

Though concerns can be raised about the availability of raw material from wild populations commercial cultivation and harvesting could supplement the raw material supply from wild populations and benefit the continued existence and distribution of the indigenous trees. It has also been noted that once communities become aware that there is money to be made from the fruits of indigenous trees and that the survival of the trees would ensure future income effort is made to cherish and conserve the trees.

4.3.1.2 Raw material quality

The quality of the raw material that can be sourced from the communities in which the resources reside is highly variable. In the absence of a strictly controlled production process that ensures a constant supply of high quality raw material it is to be expected that the raw material quality would be variable. Factors affecting the quality of the raw material are timing of harvest, harvesting methods, handling of the fruit, transportation of the fruit and storage conditions of the fruit.

Harvesters generally employ crude harvesting techniques for harvesting fruit such as beating trees with a stick and/or breaking branches. This generally leads to unsustainable harvesting and poor quality fruit that might not be ideal for further processing. People are generally uneducated regarding proper harvesting methods and need to be informed that only high quality fruit will be considered for processing.

The processing plant could also consider providing assistance in ensuring raw material of good quality. By setting certain quality standards within which the raw material will be bought and by providing handling, transport and storage support this can be brought about. The improvement in quality and the resultant economic benefits should, however, be weighed against the cost of providing this support.

4.3.1.3 Appropriate timing

Fruit trees only bear fruit for a limited time during a year limiting the availability of raw material to a couple of months per year.

If production of fruit juice concentrate is to be continued virtually throughout the year, to make optimal use of the capital outlay, measures need to be taken to mitigate the effects of seasonality. The primary means to mitigate the effects of seasonality is to process fruit that have different fruiting seasons. By processing a variety of fruit the effects of seasonality on continuous production can be reduced. These fruits are available during the following months per year:

<i>Flacourtia</i> –	January - April
<i>Syzigium</i> -	November - March
Mango -	September - December
<i>Strychnos</i> -	November - December
<i>Vitex</i> -	February - June
<i>Parinari</i> -	June - November

4.3.1.4 Reasonable cost

Supply of and demand for indigenous fruit should be the main, if not the only, determinant of the price. This will ensure that the communities responsible for collecting the indigenous fruit receive a fair price and are not exploited. It will also ensure that fruit is purchased at a reasonable cost so that the processing enterprise stays viable, assuming that all other conditions remain the same.

4.3.1.5 Organization of the procurement system

The organization of the raw material procurement system is a very important aspect that contributes to the sustainability of the fruit processing enterprise. One of the primary functions of the procurement system is to ensure that a sufficient quantity of high quality fruit is procured and/or stored throughout the year for continuous production.

One of the main challenges that the procurement system for indigenous fruit faces is seasonality with many indigenous fruit only available for a few months during a year.

To ensure that a sufficient quantity of fruit is collected to produce the fruit juice concentrate at economically viable levels it will be necessary to convey the information regarding volumes required and prices paid to the communities that have access to the fruit trees. This can be achieved through regular interaction and liaison with the communities where both parties can discuss volumes and anticipated demand.

Provision should be made to receive the fruit pulp at the processing plant. Upon the receipt of the fruit pulp, it should be processed to such a state that the quality remains intact to ultimately ensure a final product of high quality.

4.3.2 Environmental sustainability

Currently there is a lack of a comprehensive analysis of the current natural resources that are available (in terms of species, distribution and quantities) in Tanzania. Furthermore no research appears to have been done to investigate the long-term sustainability of harvesting of fruit nor the impact that harvesting will have on the regenerative potential of the respective species. The lack of information in this arena is of concern and in conducting the feasibility analysis the assumption must be made that the envisaged enterprises will produce the intended products in an environmentally sustainable manner.

4.4 The social and institutional feasibility

The assessment of the social and institutional environment entails investigation into the indirect benefits of the project for the community; the contribution of the project to the income of the community members; the potential for creating employment and the gender impact that the project is bound to have.

Social and institutional criteria are as important as the economic, resource management and technical criteria of a potential enterprise. Potential activities should help, or at least not harm, the most economically vulnerable members of the community.

4.4.1 Socio-economic characteristics of Tanzanian population

Tanzania has a population of approximately 37 million people that are predominantly rural with only 34% of the population living in urban areas. The Tanzanian population is currently growing at 1.95% per annum but this rate is expected to decrease and become negative as a result of the effect of HIV/Aids within the next 15 years. Average life expectancy is 43 years. One in every 4 Tanzanian children dies before the age of 5 years. Tanzania has a broad based population pyramid with 44% of the population 14 years old and younger. The adult HIV prevalence rate in Tanzania is estimated at 9% and an estimated 36% of Tanzanians live under the poverty line.

The agricultural sector is the primary employer providing 80% of the employment opportunities while services and industry provide the remaining 20%.

(<http://www.cia.gov/cia/publications/factbook/>)

4.4.2 Socio-economic characteristics of community groups

4.4.2.1 Tabora district

Tabora is located in west central Tanzania. It is a trade and transportation centre for the region and is connected by rail with Dar es Salaam on the Indian Ocean, Kigoma on Lake Tanganyika, and Mwanza on Lake Victoria. Agriculture plays a vital role in the district's economy and peanuts, cotton, beef, tobacco, and other agricultural commodities are produced and shipped to the main centres of Tanzania. Tabora was founded in 1852 by Arab traders from the Indian Ocean coast and was located at the junction of important caravan routes. It was captured in 1891 by the Germans and became a center of administration.

(<http://reference.allrefer.com/encyclopedia/T/Tabora.html>)

Table 10 – Population and number of households Tabora district

Description	Statistic
Population	1 717 908
Population growth rate	3.6%
Number of households	291 170
Household size	5.9
Population density	23 people/km ²
Urban population	11%

<http://www.xist.org>

4.4.3 Direct and indirect benefits of the processing enterprise for the community

The direct benefits of the processing enterprise for the communities in whose vicinity the enterprise is to be established include the creation of employment opportunities, the creation of a market for currently under-utilized resources and

on the job training of participants in growing, harvesting, processing, packaging and marketing of fruit products.

The indirect benefits of the processing enterprise include a possible decrease in the number of households that are classified as living under the ultra-poverty and poverty line in the vicinity of Tabora as a result of the increased income (both direct and indirect). As a result the level of malnutrition and the severity of the impact HIV/AIDS, which are both very prevalent, can be alleviated – although marginally.

Future cultivation of indigenous trees by rural farmers would increase the benefits derived from the processing enterprise. Through a system of small grower co-operatives farmers can provide the enterprise with a more sustainable and guaranteed supply of raw material.

4.4.3.1 Contribution of the processing to the income of communities

An estimated USD 8 000 – USD 10 000 of fruit will need to be procured from communities in close proximity to the processing plant at Tabora for the processing facility to operate optimally. The implication is that the mentioned amount will be “spent” in the communities that earn on average USD261.97 per person per year (http://www.nationmaster.com/graph-B/eco_gro_nat_inc_cap).

If a 0.5% rate of participation of the whole rural population of Tabora is assumed approximately 7 500 people will collect and deliver fruit to the processing facility. These people would therefore share the USD 8 000 – USD 10 000 that the processing facility would spend on fruit. These increases in income are by no means significant when seen against the average income earned by a Tanzanian. If it is however taken into consideration that the processing enterprise will be established in the very poor and rural areas of Tanzania where it is unlikely that the average income is USD291.97 per person and the fact that a

notable percentage of Tanzanians live with less than USD 1 per day and that 36% of Tanzanians live under the poverty line the anticipated increase in income is bound have a significant positive impact on the poorest of the poor.

(http://www.nationmaster.com/graph-B/eco_gro_nat_inc_cap).

4.4.3.2 Processing's potential for creating employment at community level

The processing enterprise envisaged at Tabora has the potential of creating a number of direct and indirect employment opportunities. The current size of the proposed enterprise would provide direct and permanent employment for 1 permanent manager and 3 – 5 permanent labourers.

It is estimated that the processing enterprise would provide a number of indirect opportunities of employment for people in the communities in close proximity to Tabora if they take part in harvesting and delivering fruit to the processing enterprise.

4.4.3.3 Gender impact of the processing enterprise

Women are bound to benefit the most from the establishment of such a processing enterprise. Although both men and women will be free to participate directly and indirectly in the processing enterprise women in the area are more likely to be the main participants as a result of their current involvement in fruit processing activities.

Currently there are well-established women's processing groups at Tabora managed under the auspices of TAWLAE. Many of these processing groups have received basic training in the processing of fruit.

5 Conclusions

A feasibility study is generally defined as a structured way to efficiently organize the information that is needed for confident decision making regarding the profit potential and technical, financial, social and environmental viability of a specific proposal.

This feasibility study was conducted to determine the viability of a fruit juice processing enterprise that manufactures fruit juice concentrates located at Tabora, Tanzania.

Based on the framework set out in this feasibility study the following conclusions can be made regarding the feasibility of the proposed products.

5.1 Market and financial feasibility

A market opportunity was identified for the domestic production of good quality fruit juice concentrates in Tanzania to be sold to manufacturers in the growing fruit juice nectar-producing sector. The domestically produced fruit juice concentrate would compete effectively with imported fruit juice concentrates of similar quality from countries like Ireland, Swaziland, Kenya and South Africa.

The analysis of the financial feasibility of the proposed enterprise revealed that, based on the assumptions that were made, the enterprise is **only marginally profitable**, is projected to have a positive cash flow and is viable over the longer term.

The positive market and financial feasibility assessment is however dependant on the following:

- Stable inflation and macro economic conditions
- No serious new competitors (from within Tanzania or lost cost imports)
- Continuous and reliable production of a high quality products
- Reliable procurement of production inputs and relatively reliable and stable prices
- Professional management of the business (in all aspects from input procurement to production management to marketing management to financial management)

Profitability would increase if the costs of sugar and distribution can be reduced. One way of doing this would be to locate the processing facility closer to the main industrial centres of Tanzania. A possible alternative location could be Morogoro.

5.2 Resources and environmental feasibility

As a result of a lack in a comprehensive analysis of the current natural resources that are available (in terms of species, distribution and quantities) in Tanzania it is difficult to comprehensively assess and draw conclusions regarding the environmental and/or natural resource feasibility of the enterprise. The implication is that no clear-cut conclusions can be made with regards to the quantity and quality of fruits that are available, what a reasonable cost for the fruit is nor how and when the fruit will be procured. The lack of information also means that no clear conclusions can be made regarding the long term sustainability of harvesting (i.e. long term availability of inputs) nor the impact that harvesting will have on the regenerative potential of the respective species.

This feasibility study has assumed, as a result of a lack in information, that sufficient quantities of high quality fruit will be available to the processing facility at a reasonable cost and that fruits can be harvested sustainably and without adverse impact on the regenerative potential of the trees.

5.3 Technical feasibility

The analysis of the technical feasibility of the proposed processing enterprise revealed that the manufacturing process and the processing technology from the ARC Infruitec-Nietvoorbij, Stellenbosch, South Africa is ideally suited to the specific technical requirements of the proposed processing enterprise at Tabora.

This processing technology has been specifically designed to:

- Produce products that meet the qualitative requirements of the marketplace,
- Adhere to government health and safety standards,
- Be compatible with the managerial and technical skills available at small scale, rural sites such as Tabora,
- And have a minimal effect on the nutritional status of the product being processed.

The existing infrastructure at the SIDO premises in Tabora are also of a relatively high standard and could easily accommodate a processing facility of this nature. A technical constraint would be the large distance between Tabora and the enterprise's markets. Concentrate would have to be transported by rail to customers, adding a large percentage of costs to the operation.

The level and availability of human resources and skills to fulfil the requirements of the processing enterprise at Tabora are currently under-developed to manage (in all aspects from input procurement to production management to marketing management to financial management) the proposed enterprise. This shortcoming can, however, be very easily addressed through appropriate training. The training of women in the basic processing of fruits that has taken place as a result of the efforts of ICRAF – Tabora and will prove to be very valuable once the enterprise has been established.

The technical feasibility of the intended enterprise is primarily dependant on:

- The selection of appropriate processing technology
- Choosing an appropriate location for processing after taking into consideration the infrastructure and human resources that are available, the, accessibility to raw materials and markets
- Management capacity to manage the whole process from input procurement through processing to the final marketing of the products.

5.4 Social and institutional feasibility

The assessment of the social and institutional feasibility of the proposed enterprise reveals that the Tanzanian population is predominantly a poor rural population characterized, by amongst others, poor socio-economic characteristics (life expectancy, infant mortality and population distribution) and rampant malnutrition.

The social and institutional feasibility assessment of a fruit juice processing enterprise at Tabora reveals that the surrounding communities would benefit in a number of ways from the establishment of the proposed enterprise. The direct benefits of the establishment of the propose enterprise include the creation of employment opportunities as well as the creation of a “market” for currently under-utilized resources in fruits, especially indigenous fruits. The indirect benefits of the proposed enterprise include an anticipated decrease in the number of households living under the poverty and ultra poverty line, a decrease in malnutrition, a decrease in the severity of the impact of HIV/Aids and an increase in incomes for communities, especially for women in communities. Taking the net social benefit of the proposed processing enterprise into consideration it can be concluded that the processing enterprise is anticipated to be socially and institutionally feasible.

5.5 Overall feasibility

Based on the framework set out in this feasibility study where feasibility is assessed in four core areas it can be concluded that the proposed processing enterprise at Tabora is marginally feasible. Some shortcomings can also be found in the resource and environmental feasibility as a result of a lack of information. This marginally positive result of the feasibility analysis is, however, heavily dependant upon the assumptions made during the study and on conditions (political, environmental, economical etc.) remaining relatively stable within the enterprise's operating environment. If either the assumptions or the operating environment were to differ substantially from actual circumstances the actual feasibility of the processing enterprise at Tabora could differ from the current result.

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Appendix A

Income statement for Tabora processing enterprise

Items	Unit	Price per unit	Quantity	USD total	USD per kg
		USD	#	USD	USD
- Fruit juice concentrate (20 kg can)	can	18.89	7,273.20	137,359.97	0.94
Gross total value of production				137,359.97	0.94
CONSUMABLES					
- Fruit juice concentrate (20 kg can)	can	8.39	7,273.20	(61,048.88)	(0.42)
				(61,048.88)	(0.42)
MISCELLANEOUS VARIABLE COSTS					
- Advertisement (5% of gross income)	USD/month	572.33	12.00	(6,868.00)	(0.05)
- Distribution	USD/month	1,108.30	12.00	(13,299.57)	(0.09)
- Bank fees	USD/month	25.00	12.00	(300.00)	(0.00)
- Telephone & fax	USD/month	50.00	12.00	(600.00)	(0.00)
- Professional fees	USD/month	50.00	12.00	(600.00)	(0.00)
- Maintenance (5% of capital value)	USD/month	62.50	12.00	(750.00)	(0.01)
- Licensing	USD/month	15.00	12.00	(180.00)	(0.00)
- Insurance	USD/month	80.00	12.00	(960.00)	(0.01)
- Contingency costs (10%)	USD/month	705.05	12.00	(8,460.64)	(0.06)
				(32,018.21)	(0.22)
FIXED COSTS					
- Rent of premises	USD/month	300.00	12.00	(3,600.00)	(0.02)
- Telephone subscription	USD/month	10.00	12.00	(120.00)	(0.00)
- Water subscription	USD/month	10.00	12.00	(120.00)	(0.00)
- Electricity subscription	USD/month	10.00	12.00	(120.00)	(0.00)
- Salaries	USD/month	600.00	12.00	(7,200.00)	(0.05)
- Depreciation on equipment (5yr period)	USD/month	330.00	12.00	(3,960.00)	(0.03)
				(15,120.00)	(0.10)
Total costs				(108,187.09)	(0.74)
Nett total enterprise income				29,172.89	0.20
Corporate tax (35%)				(10,210.51)	(0.07)
Net profit				18,962.38	0.13
Net profit (%)				13.80	13.80

Appendix B

Sensitivity Analysis

Consumables as percentage of Variable costs	%
- Fruit pulp	15.82
- Sugar	64.12
- Water	0.00
- Sodium benzoate	1.22
- Sodium metabisulphate	1.55
- Citric acid	0.95
- Packaging & caps	11.47
- Labelling	1.41
- Electricity (variable)	3.01
- Labour (variable)	0.43
	100.00

Costs	Percentage
CONSUMABLES	
- Fruit juice concentrate (20 litre can)	56.43
MISCELLANEOUS VARIABLE COSTS	
- Advertisement (5% of gross income)	6.35
- Distribution	12.29
- Bank fees	0.28
- Telephone & fax	0.55
- Professional fees	0.55
- Maintenance (5% of capital value)	0.69
- Licensing	0.17
- Insurance	0.89
- Contingency costs (10%)	7.82
FIXED COSTS	
- Rent of premises	3.33
- Telephone subscription	0.11
- Water subscription	0.11
- Electricity subscription	0.11
- Salaries	6.66
- Depreciation on equipment (5yr period)	3.66
Total Costs	100.00