Southern Agricultural Growth Corridor of Tanzania

Appendix X:

Early Win Opportunities

Draft

Mbozi Farm Centre - seed farming with outgrowers

The farm was a state owned crop farm created under NAFCO in 1975. It is situated in the fertile area of Mbozi some 28 kilometres north of the main Mbeya/Zambia trunk road. The total area of the farm is some 4,480 hectares of which 3,000 hectares is arable and of this some 1,840 hectares is cleared. There is no electricity connection, the nearest electrical point being 23 kilometres away. There is no obvious sources of water for irrigation although there is a large swamp on the western boundary that may provide a for a ground water source. The present operations are limited due to lack of resources and also, while the infrastructure in the form of buildings is good, the farm has little of its own farming equipment. Land is being leased to a number of parties at present including smallholders and the brewery on a short term lease basis (mostly annual). A maize seed crop was also being grown. Other than the smallholder production all other crops seen, including the barley, were very poor and appeared to yield less than 1 tonne per hectare. The land utilized by smallholders was leased at Tsh 50,000 per hectare and it is reported they lease some 600 hectares every year (perhaps not an accurate figure from visual inspection.) A trader is using the farm as a purchase centre for buying maize from the smallholder sector and at the time of our visit some 600 tonnes of maize had been purchased largely from farmers in the surrounding area outside the farm boundaries . In reality, the farm is greatly underutilised with little human encroachment other than that on lease on an annual basis. The farm is surrounded by small holder farming communities growing a variety of crops including maize and small plots of vegetables.

Potential related to climate, soils and altitude

Climate and Altitude

Visually the Mbozi farm looks like a well laid out farm with a huge agricultural potential. It has an annual rainfall of some 977 mm and is frost-free. The lowest recorded rainfall is 600mm which was recorded in the season of 1999/2000 while the maximum rainfall was 1623 in any one year. The average temperature is 25°C with a minimum of 11°C in June and a maximum of 29°C prior to the onset of the rains. The occasional drought occurs in February and March in some years. The farm is at an altitude of 1500 metres.

Soils

The soils are well drained deep loams to sandy loams capable of supporting a broad spectrum of crop production. They have a fairly neutral pH at 6 to 6.5 and have good potash levels. However, they are low in phosphate and due to lack of resources only DAP (diammonium phosphate) phosphate and nitrogenous fertilisers have been used recently so further nutrient imbalances and micro nutrients may be short. Therefore a full soil analysis exercise should be carried out before any commercial crop production occurs.

Water resources

It was stated by management that there is good underground water but the tests results we had sight of were limited in both time and ability to pump volume and indicated only enough for limited use, including domestic. There is a large swamp to the west and south west adjacent to the farm which would indicate a presence of water most of the year round under the surface of this area. The volumes available would have to be ascertained before any cognisance of its potential is made.

Crop Potential

The farm being at an altitude of 1,500 metres with a reliable rainfall of around 1,000mm makes it ideal for crop production including cereals, grains and oilseeds.

As there is at present no known reliable water source, irrigation in winter, the dry season, is precluded. As the success of the production of rain fed cereals in summer has been varied, primarily due to lack of suitable varieties of wheat and barley, it is suggested the farm should be initially be dedicated to the production of maize, soyas and seed crops including maize, sorghum, soya, sunflower and sesame and pulses. Such crops and seed can also provide immediate support to the surrounding communities of small holders in the access to inputs, markets, farming know how, storage and scale in general.

Existing Infrastructure

There are excellent facilities in terms of housing, workshops (unequipped) and crop storage low-down's capable of storing 2,500 tonnes of grain. There is good "hard-standing" around the buildings and the roads are in good condition.

Market

Market access is limited in the area notwithstanding the fact that 2 million people live in the nearby Mbeya and the surrounding districts. Access to the market is also restricted through traders who take full benefit of the small volumes and logistical costs involved to move the crops to where they can be processed and sold onto the consumer. Notwithstanding there is a thriving poultry industry in the area with much of the stock feed comes from plants in Arusha. It is suggested that rather than seeing the logistical costs as being a constraint, by producing the finished product for sale locally to such users as poultry producers, it could well become an advantage.

Recommendations

That the farm becomes a commercial production hub growing its own crops including maize, soya and seed along with becoming a service provider to the district offering access to inputs, extension, crop storage and marketing. As there is no ready market for soya in the area the introduction of soya mechanical extrusion plant is essential and along with a maize mill, both human and livestock feeds could be produced adding value both to the farms own crops and the crops of the surrounding smallholders. With the access to inputs, access to and training in better farming methods particularly conservation farming and a local market,

the smallholder will become more commercial in his production as they notice the ability to achieve greater returns for their labor. Small holders can also grow pulses as seed crops to be processed and marketed through a central organisation set up on the farm. Poultry operations could also be started on the farm to further enhance demand for local farm production.

Phase 1

One of the critical issues will be the size of local demand for the products taken beyond milling, such as protein meals and stockfeeds. To this end it is suggested development into expensive equipment is phased in in modular form with expansion taking place only to meet rising market demand. Phase one would commence with the leasing of the land to a commercial entity or consortium with a set of " conditions precedent" within the agreement in regard to servicing the smallholder farmers in both inputs and marketing of food crops. In the first phase the existing cleared land should be brought under full cultivation and additional storage facilities should be built. Electricity should be introduced to the farm, a maize mill purchased and installed and a soya extruder and a stock feed plant placed on the farm. The milling and processing equipment could be owned and run by a separate entity but the core farming unit should be a shareholder in the milling and processing system. Provided interference with management is limited, small holders may also become shareholders in the operation. (The recent NICO local share offering suggests local small holders do have access to funds which would allow them to purchase shares in the operations even though it should be offered at a discount or worth a subsidy.)

Crops and Yields

Demonstration crops should be placed on the farm and surrounding area to demonstrate the use of conservation farming methods and the potential to improve yields with better seeds and improved farming methods. Extension services should be available and may show a return as a percentage of yield improvement and a centralized purchasing system.

a) Commercial crops

These should be limited to maize, soya and seed crops, initially also maize and soya but also improved sunflower varieties. . It is suggested that the cleared 1,800 hectares be used in a 3-year rotation being 2 years grains 1 year oilseeds.

This would mean in phase 1, 1200 hectares of grain including seed maize and 600 hectares of soya and seed legumes would be grown annually.

b) Smallholder crops

These should include maize, soya, sunflower , sesame and pulses. The sesame should be improved white seed varieties for the confectionary and export market while the sunflower should be improved hybrids with a higher yield potential and high oil

content. Traditional food crops, such as cassava, should continue to be grown as an insurance against drought.

c) Target yields and prices

	Low Yield (3t/ha)	Average Yield (4.5t/ha)	High Yield (6t/ha)	Excellent Yield (8t/ha)	Seed	Prices (Commercial quality "B" grade ex farm	Prices (Seed ex farm)
Maize	3.0	4.5	6.0	8.0	4.5	220	600
Soya	1.5	2.0	2.5	3.0	2.5	380	500
Field Beans	1.1	1.3	1.5	2.0	1.3	650	800
Sunflower	1.0	1.5	2.0	2.5	2.0	400*	700

*High oil content hybrid

All yields considered should be treated as commercial and not subsistence.

The smallholder yields should meet be equal too or exceed the low yields in the above table while the commercial yields at least equate to the high yields shown as with the prices.

d) Crop variable costs and returns ~ maize

An indication of the benefit of local storage and processing can be seen from the table below which is based on commercial maize at a price of $200 per tonne which does not offer the farmer a participation in the processing margin. However, if he receives some benefit, as little as 10%, from the additional value of his crop, this immediately offers much-improved margins. It is estimated that the farmer could possibly gain a 20% premium on his present prices if he shared in the benefits of value adding, which would offer him a substantial margin as demonstrated below. Currently the smallholder transport cost is high due to deliver to the central hub where storage and processing will be based and improvement in collection mathods and transport will significantly improve his margins.

Variable Costs per Hectare

	Low Yield (3t/ha)	Average Yield (4.5t/ha)	High Yield (6t/ha)	Excellent Yield (8t/ha)
Seed	44	70	75	75
Fertilizer and Lime	209	345	474	597
Herbicide	0	101	68	93
Insecticide / Fungicides	12	15	48	77
Labour	0	100	50	60
Fuel and Oil	50	71	89	94
Repairs and Maintenance	50	57	71	76
Aerial Spraying	0	0	0	22
Combine	0	0	120	120
Transport @ 20c/t/km	30	5	5	5
Packaging	24	36	48	56
Finance Charge	56	98	125	190

Variable Costs and Returns

	Low Yield (3t/ha)	Average Yield (4.5t/ha)	High Yield (6t/ha)	Excellent Yield (8t/ha)
Price ($200/tonne)				
Yield (t/ha)	3.0	4.5	6.0	8.0
Income ($/ha)	600.00	900.00	1,200.00	1,600.00
Variable Costs ($/ha)	475.00	898.00	1,172.00	1,466.00
Gross Margin ($/ha)	**125.00**	**2.00**	**28.00**	**134.00**
Price ($240/tonne)				
Yield (t/ha)	3.0	4.5	6.0	8.0
Income ($/ha)	720.00	1,080.00	1,440.00	1,920.00
Variable Costs ($/ha)	475.00	898.00	1,172.00	1,466.00
Gross Margin ($/ha)	**245.00**	**182.00**	**268.00**	**454.00**

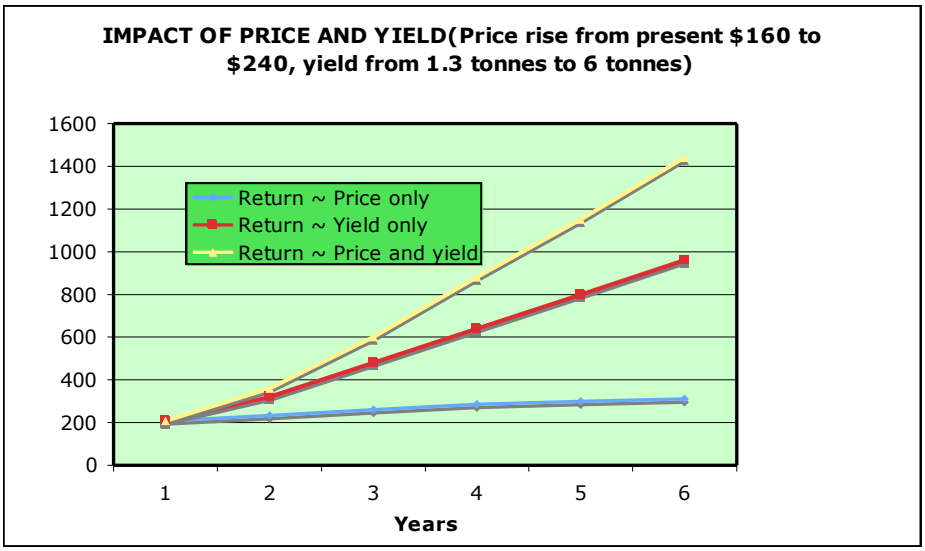
**The margin for the smallholder does not include labour*

Smallholder benefits

A number of benefits can be passed onto the smallholder and these could include the following;

- Increased yields due to access to better varieties
- Increased yields due to access to technical advice and extension including the introduction of conservation farming and rotations
- Reduced costs due to access to inputs at “central” hub
- Better credit facilities by forward marketing
- Access to market
- Better prices from delayed sale due to storage and processing

It can be seen from the graph below that returns per hectare will only significantly improve when yields are improved. A combination of yields and price improvements than become meaningful. Prices are not the most important factor yields are in regard to smallholder returns. In the



Total project capital requirements – Phase 1 ($10.2m depending on scale of operation introduced including financial charges)

The model suggested for phase 1 is:

- Crop production commercial on farm 1,800 hectares (7,200 tonnes maize and 1,500 tonnes soya)
- Seed production 200 hectares (675 tonnes seed maize and 125 tonnes seed soya
- Maize purchases 10,000 tonnes from smallholder

Use of Infrastructure and further requirements including costs ($3.05m)

While there is a fair amount of on farm infrastructure, it will be essential to expand into crop storage, processing and seed production. The existing buildings, with limited renovation will be able to accommodate input storage and seed processing.

Therefore the new infrastructure required to be built would include the following:

- Grain intake and drying (including weigh bridge) ~ $500,000
- Grain storage ~ silos for 10,000 tonnes ($250/t) ~ $1,250,000
- Maize mill ~ $700,000
- Soya mechanical extruders ~ 2 by $40,000 ~ $80,000
- Seed intake and processing ~ $1,000,000
- Laboratory ~ $50,000

- Cold rooms for parent seed storage ~ $100,000
- Upgraded offices ~ $50,000

Farm equipment ($1.51m)

- This would include field equipment ~ tractors and machinery ~ estimate $1,200,000
- Fork lifts ~ 3 x $30,000 ~ $90,000
- Vehicles and motorbikes ~ $120,000
- Sundries ~ $100,000

Working capital crops ($1.7m)

Crop production costs, grain storage and handling along with processing costs.

Overhead annual costs requirement ($.7m)

This will include administration including workshops, overhead fuel and electricity, repair and maintenance overheads and non-field employees such as security personnel, clerical staff and management.

Grain purchase – 10,000 tonnes at $200 ($2m)

Annual financial costs on CAPEX ($.356m)

Electricity

It is essential that electricity is brought to the farm for the enterprise to become a viable option.

Gross sales and margin~ ex stock on farm or at cost into processing mills and plant

Annual Gross Sales

	Tonnes	Price	Total
Commercial Maize	17,200	250	4,300,000
Seed Maize	675	1,000	675,000
Soya	1,500	450	675,000
Soya Seed	125	1,000	125,000
			5,775,000
Annual Costs less Capex Repayments			**4,756,000**
Net Profit			**1,019,000**

Ruvu Cattle Ranch

Land is closely linked to the livestock production in Tanzania where about 26 million hectares is dedicated to grazing (as opposed to only 10.2 million for food crop production.) Tanzania boasts the third largest national herd of cattle in Africa and has long history of raising cattle both as part of a pastoralist culture as well as historically from ranching businesses. Unfortunately the ranching infrastructure has suffered from underinvestment and lack of skilled management and has been allowed to run down. It will require significant investment in order to be raised back up to competitive levels. Nonetheless, Tanzania boasts large areas of land which have a comparative advantage in raising beef. Tanzania produces about 160,000 tons of beef annually most of which is produced by pastoralists and sold cheaply in local markets.

Cattle in Tanzania

Currently most beef is produced by pastoralist and small livestock farmers who often do not perceive the livestock sub-sector as a business sector. They are reluctant to invest and tend to perceive livestock as more of a side business and savings account rather than as a current and potential earnings stream which can be invested in and improved upon.

With respect to the small rancher/pastoralist, the production of livestock value chain products is hampered by low productivity and quality due to reasons such as low weight of livestock, low livestock product yield, poor quality products, high disease prevalence, and shortage of water for livestock.

It is reported that although prices of meat can vary significantly, prices offered in livestock markets fluctuate much less indicating that market forces have little effect on livestock farmers. Livestock farmers are poorly organized and easily manipulated by livestock traders. In this aspect and the industry is not dissimilar from the small holder farmer situation where traders reap an undue share of the profits in the value chain. Lack of information/transparency, the inability of the livestock farmers to access end user markets and the lack of a well organized commercial farming sector which can provide economies of scale, introduce proper ranching methods and support commercially sustainable infrastructure such as abattoirs are the primary impediments.

Unfortunately the marketing of beef and the support required to sustain it has fallen away so the present producers rely on informal markets which are not only indiscriminate in regards to quality but also in regards to the provenance of the animal and how it got to the market place. The market the cattle farmer was serving therefore did not offer a price for quality, presentation or cut. The outcome of this is that producers, in the recent past have supplied the market with poor quality beef, generally in the form of cull draught oxen, old cows or young stock which were unfinished. As this form of marketing become more widespread there was little benefit to continue to support the required infrastructure to

service a discerning market which rapidly turned to imports from as far afield as New Zealand.

Commercial ranching

Accordingly the business prospects for new commercially oriented producers of beef in Tanzania focusing on the domestic market is not promising as margins are low and current demand is met by low cost producers. In order to generate healthy and sustainable margins, commercial entrants will need to establish a market for quality cuts, either domestically but most likely internationally. This will take time, patience and proper capitalization.

There are several commercial farmers who have started to raise cattle in the Iringa area. They have had to import most of the breeding stock and suffer from lack of veterinary support and supply of basic ingredients needed to run a healthy stock. Most have to grow their own feedstock. Some use their own slaughterhouses and packaging and create direct access to premium markets in Iringa and Mbeya where their limited supply of quality cuts is absorbed by supermarkets and the tourist industry. Cost and access to finance and the high cost of transport are frequently mentioned as major impeding factors in expansion.

However an interesting example of how access to markets can stimulate production and supply is the Dodoma abattoir where after a capital injection and installation of management and a business plan, the abattoir now is fully utilized slaughtering goats and sheep for export to the Middle East. Here identification of a niche market offering premium prices quickly resulted in success.

Until similar routes to markets have been created, commercial cattle ranching businesses will remain a niche business. Their focus on the high end premium market and their need to be self reliant for feed will not allow them to be competitive in the national market for low quality/low margin beef.

To compete in the Quality meat market, meat exports from a national herd will require more wide-scale investment in national facilities (certification, cold chain, laboratories)

NARCO ranches – Review of the Ruvu Ranch

The Ruvu ranching system was reviewed by the Field team. The ranch covers some 40,000 hectares and is located between Morogoro and Dar Es Salaam. It lacks fencing and is operated on a basic maintenance only basis utilizing boma's around which cattle graze. The area around the boma's was severely degraded whereas areas further from the boma's would be able to support more grazing.

The Government draws no revenue from its operations and income essentially covers basic operating costs. Cattle is counted at around3,584 the majority of which are youngstock and followers with only 1,500 breeding cows remaining head and is of mixed stock. Some bush and human encroachment was observed.

The ranch does purchase cattle form small livestock farmers for fattening and slaughter. However, the slaughter weights would still be considered low indicating that either feedlots operations are too expensive or the operation cannot support fattening beyond a certain weight (about 250 kgs.)

In addition the following observations were made:

- the ranch clearly suffers from the lack of an organised approach or government focus to raising and processing beef
- The system overall lacks a fully developed cold chain
- It is reported that some of the NARCO herds (although not in Ruvu) are marked by high levels of disease (F&M, Tryps etc)
- there is a low level of HAACP awareness among small livestock farmers
- lack of clustering of skills and resources necessary to achieve competitive advantage in the export market
- access to finance is a problem
- No scientific selection of male and female breeding stock, all done visually
- No records indicating production weights, calving records, slaughter performance, etc
- no rationalization of grazing areas where cattle concentrate around bomas. The lack of properly fenced areas where cattle can roam free, has resulted in land around the bomas being severely degraded whereas grazing land further away from the bomas goes unutilized.
- feed lots are not properly used and proper feed is difficult to find and often costly.
- slaughtering methods are outdated and will not pass international (or even local) standards
- slaughter weight is not economical with cattle being slaughtered at 250 kg thereby resulting in only 125 kg of marketable product
- buildings are outdated and in need of refurbishment
- tanning process is outdated and not profitable under current operations

A business model for redevelopment of the Ruvu ranch is attached and shows a low return on investment at an IRR of 8% over 10 years. However, this model does not take into account the potential growth in the beef markets nor the development of demand for quality cuts in Tanzania or access to export markets. Such developments are likely to significantly boost the commercial ranching model IRR.

Small Livestock Farmer Value Chain Example

Costs (5 years, 300kg animal)	TSH/Head	Costs (3 years, 200kg animal)	TSH/Head
Labour	4,000	Labour	4,000
Drugs/Injections	10,000	Drugs/Injections	10,000
Dipping	1,200	Dipping	1,200
Trekking	4,000	Trekking	4,000
Others	1,000	Others	1,000
Total Costs	101,000	Total Costs (3 Years)	66,600
Revenue Tshs/Cattle		**Revenue Tshs/Cattle**	
Cattle	400,000	Cattle	300,000
Gross Margin	299,000	Gross Margin	233,400
Gross Margin % of Sales	74.8 %	Gross Margin % of Sales	78.0 %

Source: Economic Research Bureau, University of Dar es Salaam

Recommendations for Cattle Cluster

1. Existing NARCO Ranches

Restocking of 2 NARCO that at least 2 ranches(In the corridor perhaps Ruvu and Kalambo in Sumbawanga) are totally privatized under less to professional cattlemen who take over the lease with the purchase of the existing cattle. Sort loans are made available to over a period of 5 years put in the required infrastructure in the form of fencing and water reticulation to restock these ranches to their full.

This will require the procurement of up to 3,000 good breeding heifers on each of the ranches including a seed stud herd on each ranch.

Once the herds at the appropriate stocking rate and quality are established on the ranches a certain number of heifers should be made available to improve the smallholder sector along with young bulls also for this sector.

Each of these ranches should have high standard abattoirs which only slaughter beef and pack beef for direct sale into the wholesale and retail trade. The aim should not be to build an abattoir to slaughter a target that will be hard to attain but rather an abattoir that can slaughter the ranches own cattle with a small amount of remaining capacity to ensure the infrastructure is wholly utilized. It will be essential for these ranches to eventually be able to gain a reputation of producing !st quality beef and attain a reputable brand. A far cry from the present situation.

- Targets for the ranches in herd performance should be as follows:
- Stocking rate 1L/S to 4 hectares
- Cow weight 400 to 450 kilograms
- Bull weight +$650 kilograms
- Calving percentage 80%
- Weaning weight 220 kilograms
- 18 month weight 300 kilograms
- Finished cattle at < 2 years

- Finished slaughter weight 425 to 450 Kilograms
- All cattle slaughtered other than cull cows and cull bulls should be “choice” quality beef
- Target breeding heifers including F1 heifers made available to other players in the industry should be at least 500 per annum after year 5.
- Target good cross-bred bulls to be made available to other players in the industry should be at least 100 per annum.

A further role, but funded by other parties, should be the establishment of cattle management training centers supported with extension staff.

These centres should be able to bring in selected smallholder farmers from time to time and demonstrate cattle management including rudimentary animal health and the importance of their and the value they offer if treated as an income source.

2. Mixed farms in Clusters

It is recommended that those farmers, both emergent and commercial, should be able to access breeding animals through a specific cow loan scheme. Similar schemes have been run in other countries including the Scheme that ran successfully under the auspices of the CSC in Zimbabwe.

The scheme can be run with the cattle remaining in the ownership of the scheme until all monies owed are repaid. In this instance it is suggested the scheme should could possible be run through the ranches.

While on ”lease” these cows will have special brands common to all, and individual tag identification. It will also be expected, if logistically viable, for these producers to deliver there finished cattle to the ranches for slaughter. In the event of the debt being outstanding at the end of the cows productive life these cattle will also be delivered to offset the remaining debt. It is suggested upto 200 heifers could be supplied to a commercial farmer depending on his grazing and facilities while perhaps up to 10 head to the emergent sector. The purpose of this scheme is to broaden in the production base of good quality cattle.

Bananas

Background

Tanzania has a combination of climate, port facilities and other infrastructure near which lends itself will good production and export of international quality bananas. Many neighbouring countries are focussing on regional (South Africa) and exports to the middle for the start up of their banana and mango industries basing the exports on establishing a prominent reputation for quality and consistency in the market. A banana estate with the capacity to export 80,000 Mt/year is the minimum size needed to establish a regular boat service carrying 2,000 tonnes every 10 days. The Middle East's total market size is 300,000 t/year. It is estimated that 80,000 tons can be supplied to the market without the market becoming over-supplied. The EU markets are significantly greater. Because of EU quota and duty regulations, banana exports from Tanzania would have at least a USD 100/tonne advantage over those grown in Central and South America.

Tanzania has a long history of banana production. The agricultural and economic basis for economically sustainable production has not diminished. This project concept note aims to present a proposal to restart the banana export industry by providing the industry with a critical mass and adequate and appropriate financing to allow it to reach economic size and maturity to be able to compete internationally and as such provide the basis for further generic growth.

Market Potential

The estimated regional and international demand and export potential for bananas produced in Tanzania can be estimated as follows:

Country	Market Size (tonnes per annum)	Export Potential (tonnes per annum)
Zambia / Zimbabwe	Little current production	50,000
South Africa	300,000	75,000
Middle East	300,000	80,000
Europe	3,300,000	25,000
Total	4,000,000+	255,000

*Market size estimates per World Bank – Mozambique Horticulture Report - 2006

Opportunity

In short, Tanzania, with its neighbour Mozambique who has already started to address this market, has the potential to participate in the production to export an estimated 255,000 tons of bananas per year and establish export channels to established regional and international markets. To be a meaningful player in this market will require a productive area of approximately 4-5,000 hectares under production based on average commercial/small farmer yields at 50 tons per ha. As small holder yields are significantly

lower, their greater inclusion will increase the need for hectares planted. Below outlines a proposal to start a production program capable of achieving critical mass which is based on utilizing the infrastructure and skills of existing commercial farm operations enhanced by out grower systems.

There is a major banana projects in Mozambique close the Tanzanian border in Nampula Province, where the Matanuska/Chiquita project has started production of bananas on 3,000 hectares of land. They have commenced exports to the Middle Eastern Markets and can serve as an example to start the banana industry in Tanzania.

The area most likely to be suitable for a concentration of commercial and small holder projects would likely be Kilombero where significant production is taking place. Further from Dar port, the Rungwe area would also lend itself for major production but may be better suited for the regional premium market possibly in Zambia.

In the export markets quality and reliability are paramount. Accordingly minimum standards in harvesting, packaging and transport will need to be maintained in order for the product to become acceptable internationally and minimum volumes need to be achieved for shipping and other logistics to be cost effective. Small or medium sized individual farmers will not be able to independently achieve the volumes and establish the market channels required. Accordingly the use of a central organization which coordinates marketing and shipping and which can provide central (cold) storage, colouring grooms and other processing packaging services will be central to a successful banana export operation. Furthermore scheduled harvesting and coordination between farmers will be essential to a smooth functioning local banana industry.

The local farming situation

Bananas have been grown in Tanzania for decades but quality and volumes have decreased and export standards have gone up during the period since independence.

Local small holder farmers are experienced in growing bananas for the local market. Unfortunately their quality and handling standards results in much of their crop being unsuitable for the export market. However with the assistance of technicians and support of nearby commercial farmers and out growers associations, conditions can be created which will greatly improve the ability small holder farmer active participation in the premium export markets.

Returns are attractive

In Mozambique under similar conditions, commercial farmers have proven their ability to produce yields of up to 80 tons per hectare after 2 years of operation. Based on more conservative yields of 60 tons per ha commercial farmers can produce an operating margin of $7,000 per hectare – more than adequate to repay development and capital costs.

Small holder farmers planting 2 hectares of bananas can conservatively expect 20 - 40 tons per hectare and at 18 cents per kg can expect to make as much as $3 – 5,000 per annum. As their yield improves cash flows can increases exponentially.

The establishment of a banana plantation has advantages when compared to other fruits such as mango's and lytchee's especially in regard to the time involved in achieving full production and therefore generating positive annual income flows. Its establishment requires 14 months from planting prior to bearing fruit, compared to 5/7 years for mango's and citrus. Of course this aspect also opens the sector up to more competition. The plantation will require replanting after 8 years of production whereas mango's and citrus groves can produce for decades. The export market potential for bananas is large allowing for greater transport efficiencies once minimum export volumes are achieved and market channels are established.

Project Concept

This Project Concept Note suggests developing as much as 1500 hectares of banana production in the Corridor utilizing existing commercial farmers capable of developing and operating their own banana plantations in association with packaging and processing centres and which can provide technical and logistical support to linked commercial and small holder out grower estates. At 1500 hectares, the project scope is adequate to produce the quantity needed to support cost efficient processing, handling, storage and logistics and as such support the establishment of an export based industry. Once the basic industry platform has been established, organic growth can result in further expansion of the local banana export industry based on market demand.

The following farms have been identified as potential candidates for inclusion in the project:

	Land	Commercial (60 mt/ha)	Emergent (40 mt/ha)	Smallholder (20 mt/ha)	Total
4 commercial farms	500	30,000			
Emergent farmers	500		20,000		
Smallholder farmers	500			10,000	
Total	**1500**				**60,000**

Each commercial farmer will act as an initial central processing and storage center which in turn can feed into a central packaging and cold storage facility and centers from where economical transport to international markets can be arranged. In addition the commercial farm will have access to and provide out growers with technical support and input procurement. Commercial farmers can provide farm equipment (at a charge) for the individual smaller farmers. In addition proximity and linkage to the commercial farm will reduce the possibility of side selling.

Infrastructure

As there are no real commercial producers the farms will require installed electricity and irrigation adequate to supply the power and water required to properly irrigate planned commercial, emergent and small holder production.

Establishment costs

The estimated establishment costs of small holder and commercial banana plantation are approximately $5500 per hectare.

Immediate Markets and Pricing

Based on current market conditions and a price of $0.40 per kg in the South Africa market, farm gate price for product transported to the RSA will be similar or approximately $ 0.25 per kg.

Pricing studies in the Middle East and the EU will have to be undertaken but preliminary results from the Nampula project suggest approximately $0.21/23 per kg is achievable.

Transport

The South African and Middle Eastern market will likely need to be supplied by ship. Alternatives for sale of bananas in the domestic and perhaps regional markets will have to be investigated and may depress returns during the production build up period.

For export to the Middle East, it is expected that the bananas would be sea freighted from Dar to countries below and above the Suez Canal. In addition this route is the preferred route to supply the East of the EU – where Tanzania can maximise its freight comparative advantage over Central and South American production.

Quality issues

Test will have to be conducted to determine the right quality in particular for the Export markets.

Processing, storage and packaging

Proper harvesting, processing, packaging and storage techniques will have to be established particularly for small holders. The attached business plans detail further capital requirements.

Financial Analysis – 200 hectare banana plantation

Capital Purchases and Assets

	Year 1	Year 2	Total
Citrus packshed			
Packhouse	120,000		120,000
Office and workshop	4,500	60,000	64,500
Bulk water -gravity pipeline	300,000		300,000
Infield irrigation	220,000	220,000	440,000
Pipeline-field	25,000	25,000	50,000
Electricity	150,000	5,000	155,000
Roads	2,000		2,000
Coldrooms		48,000	48,000
Plantation establishment			
Land clearing	100,000	100,000	200,000
Land preperation	25,000	25,000	50,000
Lime/fert	120,000	120,000	240,000
Seedlings bananas	140,000	140,000	280,000
Equipment			
Tractor 120 hp	65,000	30,000	95,000
Tractor 75hp	70,000	35,000	105,000
Mower	8,000		8,000
Sprayer	12,500		12,500
Disc harrow	15,000		15,000
Trailers	36,000	32,000	68,000
Ripper/chisel plough	8,000		8,000
Water bowsers	12,000		12,000
Vehicle	30,000		30,000
Motorbikes	4,000		4,000
Office and workshop equipment			
Office equipment	5,000		5,000
Workshop equipment	6,000		6,000
Tools	5,000		5,000
Borehole	8,000		8,000
Contingency	74,800	42,250	117,050
Total	**1,570,800**	**887,250**	**2,458,050**

Working capital requirements

Year 1 Loan	375,000	*capitalized*
Overdraft Year 2 (Cost @ 7%)	(631,874)	- 44,231
Overdraft Year 3	(662,555)	- 46,379
Overdraft Year 4 - 15	(662,555)	- 46,379

Cash Flow Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8 - 15
Bananas (mt)	0	30	55	55	55	55	55	55
Price ($/Mt)	200	200	200	200	200	200	200	200
Crop Sales	0	1,200,000	2,200,000	2,200,000	2,200,000	2,200,000	2,200,000	2,200,000
Variable Costs	198,725	786,798	826,708	899,097	899,097	899,097	899,097	1,043,097
Net Cash Flow	-198,725	413,202	1,373,292	1,300,903	1,300,903	1,300,903	1,300,903	1,156,903
Fixed Costs	268,560	398,160	398,160	398,160	398,160	398,160	398,160	398,160
EBITDA	-467,285	15,042	975,132	902,743	902,743	902,743	902,743	758,743
Capital Expenditures	1,570,800	887,250						
Capitalized working capital	375,000							
Interest on working capital		-44,231	-46,379	-46,379	-46,379	-46,379	-46,379	-46,379
Total Cash Flow	-2,413,085	-916,439.39	-928,752.94	856,364.18	856,364.18	856,364.18	856,364.18	712,364.18
IRR	**19%**							

Citrus

Background

Tanzania produces citrus in a number of areas including Kilombero as well as in selected places throughout the corridor. Recent attempts at attracting the citrus grown in the area at a juicing facility in Morogoro have not produced the intended results with the facility currently being mothballed due to lack of supply. The establishment of an export quality citrus industry aiming for the Middle Eastern and European markets should be considered. By establishing a plantation of adequate size which over time could provide the minimum quantities for the establishment of economic transportation volumes to such markets, can form the basis for growth in the citrus area in which many local growers can participate.

Citrus is a long-term crop. Income from production starts from year 4 onwards and does not really ramp up until year 6. The citrus tree reaches peak production from year 15 through to its 22nd year when it gradually declines to the end of the trees production cycle, which is generally about 32 years.

To achieve adequate volumes capable of servicing export markets it is planned to establish a single 600 hectares unit. Further volumes can be generated when including at least 4 local commercial farmers as out growers each producing 50 - 100 hectares. The program can be further enlarged by adding small farmer out grower programs.

The capital requirement for a 600 hectare plantation is approximately $5.7 million in addition to a working capital requirement of $5.2 million prior to cash flow self sufficiency. (Lack of finance appears to be the primary reason why little activity has occurred in the area in Tanzania.) Once the project is into full production gross margins of around $9,000 per hectare should be achieved, allowing for a potential operating cash flow of $5.7 million p.a. for a 600-hectare plantation once fully mature.

Project area

Export quality citrus requires the proper climate and altitude as well as proximity to water for irrigation in order to produce fruit of consistent quality throughout the year to allow for acceptance in high value export markets such as the Middle East and Europe. Generally elevations between 500 – 700 meters can be considered.

There are expected to be suitable areas in the higher elevations in the Kilombero valley as well as further inland for the establishment of a quality citrus plantation. Areas generally above 600 metres above sea level are considered the most suitable and excellent soils and good water resources need to be available should such a high cost long term investment be considered. Although rivers generally have adequate flow to support a 50 hectare plantation at such elevations, a600 hectare unit would have to have the assurance of adequate water

supply. This would likely mean the construction of or proximity to a dam. Tanzania is known to boast a number of excellent sites for such purposes.

Climate

Oranges are tolerant of a wide range of winter conditions but better suited to Manica farming areas where minimum temperatures are more likely to drop below 13^{o}C periodically, the threshold for colour break in most citrus cultivars. The advent of sophisticated de-greening treatments has enabled producers to supplement the natural colour development process. However areas should be frost free – not generally a problem in Tanzania.

Availability of planting material

A citrus plantation will require the establishment of a professional nursery company. The nursery should be monitored by the South African citrus industry and aim to become fully certified.

Support industries

There are a number of seed and fertilizer businesses established in the corridor but at present their viability is marginal due to a lack of customers in the form of commercial farmers. The establishment of anchor farms is likely to drastically change this situation as new entrants will consider the market attractive and competition will ensue.

Scale in volumes is essential to enable exports to new markets. However to utilize non export grade produce a processing facility to either can or extract juice from produce that does not meet export criteria as well as establish off takers for the excess production and waste derived from local processing will improve project economics. The facility in Morogoro could fulfil such a function. A processing/cold storage and packaging plant will also benefit growers of other fruits in the area of the plantation.

Marketing

It is assumed 60%+ of the crop will be export quality and will be exported firstly into the regional market place but once production reaches scale to economically offer fruit into various international markets, including India and the Middle East, the crop will be exported through the Dar port . The remaining production would require local processing in order to provide for value adding and revenue.

Volume will be key to establishing economical export processes and conditions at Dar port will be crucial to the secure establishment of industry profitability. Cold storage and facilitation of export channels in the port will have to be addressed.

Implementation

A plan would be to identify 600 hectares for a core estate, or possibly 2 core units, which will provide the production economies of scale while simultaneously identifying at least 4 commercial growers capable of growing 50 hectares or more of citrus with land and a willingness to assist the family sector in establishing a co-operative production unit. For family sector participation, 10 hectares of citrus would require at least 20 participants. Planting should be planned over 3 years and seedling production needs to commence well before the start of any development on the identified sites.

Prior to project commencement varieties and production and processing standards need to be confirmed and cooperation with local packhouses and nurseries solidified. In addition to the budget below, export facilitation will require additional outlay of funds.

Financial Summary – 600 hectare core production unit

Capital Purchases and Assets

	Year 1	Year 2	Year 3	Year 4
Infrastructure				
Sheds	121,500			650,000
Office and workshop	60,000			
Bulk water	480,000			
Infield drip	360,000	360,000	360,000	
Pipeline	100,000	25,000		
Electricity	150,000			
Roads	15,000			
Plantation establishment				
Land clearing	200,000	200,000	200,000	
Land preperation	100,000	100,000	100,000	
Lime/fert	90,000	90,000	90,000	
Seedlings	294,000	294,000	294,000	
Planting	26,250			
Equipment				
Tractor 120 hp	65,000		65,000	
Tractor 75hp	70,000	70,000	70,000	
Mower	16,000	16,000	16,000	
Sprayer	12,500		12,500	
Disc harrow	15,000			
Trailers	16,000	16,000	16,000	
Ripper/chisel plough	8,000	8,000		
Water bowsers	12,000	12,000	12,000	
Office and workshop equipment				
Office equipment	10,000			
Workshop equipment	6,000			
Tools	5,000			
Contingency	111,613	59,550	61,775	
Total	**2,343,863**	**1,250,550**	**1,297,275**	**650,000**

Working capital requirements

Year 1 (Cost @ 7%)	650,000	45,500
Year 2	850,000	59,500
Year 3	1,100,000	77,000
Year 4 - 15	1,000,000	70,000

Production

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
Hectares (ha)															
Navels	60	120	180	180	180	180	180	180	180	180	180	180	180	180	180
Valencia	140	280	420	420	420	420	420	420	420	420	420	420	420	420	420
Yield (mt/ha)															
Navels	0	0	0	6	12	18	24	30	36	42	48	50	52	53	53
Valencia	0	0	0	6	12	20	25	35	50	60	65	70	70	75	75
Price ($/mt)															
Navels	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275
Valencia	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Total yields (mt)															
Navels	0	0	0	1,080	2,160	3,240	4,320	5,400	6,480	7,560	8,640	9,000	9,360	9,540	9,540
Valencia	0	0	0	2,520	5,040	8,400	10,500	14,700	21,000	25,200	27,300	29,400	29,400	31,500	31,500
Variable cost per ha															
Navels	872	934	1,032	2,397	2,699	3,001	3,303	3,605	3,907	4,209	4,512	4,612	4,713	4,763	4,763
Valencia	884	921	1,019	2,452	2,810	3,230	3,557	4,039	4,675	5,057	5,483	5,695	5,753	5,936	5,800
Income per ha															
Navels	0	0	0	1,650	3,300	4,950	6,600	8,250	9,900	11,550	13,200	13,750	14,300	14,575	14,575
Valencia	0	0	0	1,200	2,400	4,000	5,000	7,000	10,000	12,000	13,000	14,000	14,000	15,000	15,000
Gross margin per ha															
Navels	-872	-934	-1,032	-747	601	1,949	3,297	4,645	5,993	7,341	8,688	9,138	9,587	9,812	9,812
Valencia	-884	-921	-1,019	-1,252	-410	770	1,443	2,961	5,325	6,943	7,517	8,305	8,247	9,064	9,200

Cash Flow

($'000)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
CROP SALES															
NAVELS	0	0	0	297	594	891	1,188	1,485	1,782	2,079	2,376	2,475	2,574	2,623	2,623
VALENCIA	0	0	0	504	1,008	1,680	2,100	2,940	4,200	5,040	5,460	5,880	5,880	6,300	6,300
VARIABLE COSTS															
NAVELS	52	112	186	431	486	540	595	649	703	758	812	830	848	857	857
VALENCIA	124	258	428	1,030	1,180	1,357	1,494	1,696	1,963	2,124	2,303	2,392	2,416	2,493	2,436
NET CASH FLOW															
NAVELS	-52	-112	-186	-134	108	351	593	836	1,079	1,321	1,564	1,645	1,726	1,766	1,766
VALENCIA	-124	-258	-428	-526	-172	323	606	1,244	2,237	2,916	3,157	3,488	3,464	3,807	3,864
SUB-TOTAL	-176	-370	-614	-660	-64	674	1,199	2,080	3,315	4,238	4,721	5,133	5,189	5,573	5,630
FIXED COSTS	361	361	361	361	361	361	361	361	361	361	361	361	361	361	361
EBITDA	-537	-732	-975	-1,022	-426	313	834	1,718	2,954	3,876	4,360	4,771	4,828	5,212	5,269
Capital Expenditures	2,344	1,251	1,297	650											
Working Capital Costs	46	60	77	70	70	70	70	70	70	70	70	70	70	70	70
Final Cash Flow	-2,927	-2,042	-2,349	-1,742	-496	243	768	1,648	2,884	3,806	4,290	4,701	4,758	5,142	5,199
IRR	**14.5%**														

Commercial Farming Blocks

Southern Highlands – Significant potential but little production

During visits to the Southern Highlands of Tanzania, as part of the SAGCOT initiative, more than 25 agricultural projects were visited. The projects observed gave an indication of the tremendous agricultural potential of the area as well as the significant obstacles faced by the farmers. While there are a significant number of smaller emergent commercial farmers as well as a limited number of commercial farmers who are growing crops successfully in spite of serious constraints, there is little dispute that agricultural efforts in Tanzania over the past 40 years have had little sustainable impact on overall production quantities. Yields have remained static while the population in Tanzania has grown from 10 million in 1960 to 40 million at present. With an estimated population of 85 million by 2050, and the greater background of Africa's population growth, with an expected increase from the present 1 billion to 1.9 billion by 2050, crop yields will have to increase significantly to achieve the quantities required to feed such a population explosion.

A focus on smallholder farming has failed to increase yields and quantities

Although many donor/government programs have produced small initial gains in improved production with small holder schemes, often such gains are lost once donor or Government support is withdrawn. Furthermore, such programs are limited in time and fail to into account that farming is a long-term business which needs to be independently sustainable once a particular program or financial assistance to support agriculture ceases.

Donor/government agricultural support programs primary focus tends to be on poverty alleviation. This relegates the creation of a viable agricultural sector producing large, sustainable and competitively priced crop quantities to secondary status. It also ignores the fact that in Western countries the focus on agricultural development has been to capitalize on existing skills and resources to create a vibrant commercial farming industry aiming to maximize yield and production often at the expense of farm employment. Such focus has formed the basis for the farming industries' strength and longevity, which in turn has supported the creation of an economic structure supporting the subsequent growth of the industrial and service based sectors.

In the end it should be recognised that the focus on poverty alleviation is not the most efficient way to establish a sustainable, competitive and vibrant agricultural sector capable of feeding many people at a reasonable cost. Such focus by nature subordinates the support required to create a commercial farming sector to secondary status, particularly when the commercial farming sector is viewed as competing with the small holder farming sector. Such focus also fails to recognize that most subsistence farmers are not farmers by choice but because of necessity resulting from lack of employment opportunities in other areas or because of social and historical reasons.

In any event, programs aimed at achieving significant yields and production increases by stimulating subsistence farm production are expensive and time consuming of scarce government and donor resources at the expense of other perhaps more economically sustainable programs. Furthermore such focus is unlikely to eliminate the present deficits in food production let alone be able to provide the future production required to feed the growing demand of a rising population both national and across Africa.

Subsistence smallholder and emergent farmer are faced with challenges much greater than those facing the commercial farmer. Those specific to the small farmer will include, most if not all of the below:

- A poor education – farmers who achieve better education levels leave to take up posts in urban areas particularly government
- Lack of agronomic knowledge in crop production (e.g. the value of good seed, the importance of timings, conservation tillage methods, soil fertility, etc.)
- Lack of land title and the ability to raise finance by offering this as security for present production let alone any expansion
- Lack of economies of scale, average land holding barely covers his own needs
- Due to small lot size commercial financial institutions cannot afford to lend due to the high administrative cost per unit of production
- Small size also affects economies of scale prohibiting the ability to mechanise thereby also limiting the area cultivated
- Business knowledge and administrative skills are lacking (many people forget that farming is a business first requiring the understanding of risk)
- Access to infrastructure is difficult to justify in case of small unit sizes (roads, power, storage)
- Inputs are expensive when purchased in small quantities and frequently misapplied due to lack of soil and agronomical knowledge
- Access to markets and knowledge of these markets is difficult to obtain

Most emergent farmer who expand their farming activities actually use financial resources gained from activities other than farming to expand. A recent identification exercise carried out in Zambia to identify this sort of “rising emergent farmer” resulted in the identification of only 30 such farming units. Even then, finance to allow them to expand further could only be obtained under a special scheme which required special guarantees.

Creation of farm blocks

It is therefore suggested to establish a viable commercial agricultural sector that, within a foreseeable period, will provide the economies of scale to attract service industries and infrastructural development and enable the training and knowledge transfer to allow the emergent sector to benefit. Formal opportunities in commercial agriculture will attract employment at all levels where many skills required for commercial production will be learned. The farming blocks should not be limited to large commercial farmers but also have areas designated for use by the emergent commercial farmers, initially those that have some

basic farming experience but latter for those who achieve the required management skills in the large commercial sector to be encouraged to start commercial farming directly.

What the creation of farm blocks will achieve

Zambia is planning to develop further commercial blocks as mirror images of the successful Mkushi, Chisamba and Mazabuka farming blocks, each specialising in crop production growing those crops which do best in the area.

Zambia has also transformed from importing maize and wheat for its population and protein meals for its growing livestock industry as little as 2 years ago, it is now a net exporter of maize, wheat, soya and protein meals. This has been achieved over a 10-year period, which is a short time in agricultural terms. The size of the industry now has brought about the prolific expansion in numbers of service industries, including tractor suppliers, local cultivating and harvesting contractors, local fertiliser production, new players offering loans and the means of accessing finance, increased investment in storage and processing industries, all of whom find themselves competing with each other to offer a better service to the farmer. With the increased production and probably just as importantly, many jobs have been created both in urban and rural areas.

Most importantly this success has not been brought about at the expense of smallholder farmers. Many former smallholder farmers have directly benefitted from the increased employment and economies of scale either expanding their production or finding employment on farms. Poverty has decreased and nutrition related health improved.

Many of the service providers and the benefits they bring are now focusing on the emergent sector and including:

- Access to inputs and competitive pricing
- Credit for inputs
- Technical advice easier to obtain
- Transparent markets
- Storage and warehouse receipts
- Better seeds
- Improved roads and often infrastructure such as power, clinics and schools

In addition to the benefits to the smallholder farmer, the Government also receives many benefits over and above the actual production of crops and livestock. These include:

- Increased job creation
- Increased tax revenue, PAYE and corporate
- Increased food security (stocks now held by means of warehouse receipt and CMA finance)
- Forex earnings (Exports)
- Forex savings (Less imports)
- Less subsidies to local councils for the services they provide including road maintenance

- Local seed production

How this can be achieved

Critical mass is key to growth. Commercial agriculture, once established, creates commercial farming hubs, or farming blocks. Should such an area be identified in advance, such commercial hub creation can occur rapidly. This reduces the cost of establishment of new farming units with a shared cost in the introduction of utilities such as electricity and infrastructure such as roads. It also, by economies of scale, attracts service industries and banking services, contract equipment providers, including that used for land clearing, cultivation and harvesting.

Without title or long term lease there is no finance and little private investment. Accessing land, with title in the form of secure leases, is essential and once again. It is easier to achieve this by designating areas suitable for such projects ensuring that all social responsibilities are adhered to.

The size of a viable block

Obviously, depending on the type of production, once again there are certain economies of scale required for the individual units. As we are considering food security as a major component of the country's economic well-being we are therefore looking at broad acre crop farming of crops such as maize, wheat and soya in the higher more temperate areas such as those found between Iringa and Mbeya, while the lower areas are more suitable for rice, sunflower and sorghum.

In Zambia, the farming blocks are large but it is suggested a farming block should consist of no less than at least 20 farming units of at least 1,000 hectares with at least 60% of this area as arable. Ideally 50 units would probably be ideal with at least 30 smaller units earmarked for the emergent commercial farmer. This indicates an area of 60- 80,000 hectares would be ideal.

What a 30-unit commercial farming area could achieve in rain fed production in the Southern Highlands

Presuming the units are each of 1,000 hectares and the smaller units are 200 hectares this would require 36,000 hectares of which 60% should be arable. This would mean a possible 21,600 hectares under cultivation.

The suggested rotation in the Southern Highlands includes maize, wheat and soya in both the emergent and large commercial farms. The proposed area could support an estimated annual production of 61,200 tonnes of maize, 42,000 tonnes of wheat and 12,300 tonnes of soya.

At current prices such production can earn/save Tanzania $30–35 million in foreign exchange every year. The tables below show production, costs and income.

Crop Production – Large Scale Unit

Crop	Hectares	Yield	Total production	Price/Tonne	Total income
Maize	240	7.5	1,800	$280.00	$504,000.00
Wheat	240	5.0	1,200	$420.00	$504,000.00
Soya	120	3.0	360	$450.00	$162,000.00
Totals	**600**		**3,360**		**$1,170,000.00**
Variable costs					**$720,000.00**
Gross margins					**$450,000.00**

Crop Production – Emergent Unit

Crop	Hectares	Yield	Total production	Price/Tonne	Total income
Maize	40	6.0	240	$280.00	$67,200.00
Wheat	40	5.0	200	$420.00	$84,000.00
Soya	20	2.5	50	$450.00	$22,500.00
Totals	**100**		**490**		**$173,700.00**
Variable costs					**$100,000.00**
Gross margins					**$73,700.00**

Total Production of Farm Block Area, Tonnes and Values

Crop	Hectares	Yield	Total production	Price/Tonne	Total income
Maize	8,400		61,200		$17,136,000.00
Wheat	8,400		42,000		$15,120,000.00
Soya	4,200		12,300		$4,860,000.00
Total variable costs					**$24,600,000.00**

The following tables give an indicative cost of the capital loans/equity required for each type of farming unit. It is presumed that roads and electrical infrastructure will be supplied by the state.

Capital Costs – Large Scale Unit

Buildings			$140,000.00
Land clearing			$480,000.00
Equipment			
Tractors	3	$80,000.00	$240,000.00
Chisel plough	1	$15,000.00	$15,000.00
Harrow	1	$35,000.00	$35,000.00
Planter	1	$45,000.00	$45,000.00
Drill	1	$35,000.00	$35,000.00
Sprayer	1	$25,000.00	$25,000.00
Trailers	4	$9,000.00	$36,000.00
Estimated total			**$1,051,000.00**

Capital Costs – Emergent Unit

Buildings			$60,000.00
Land clearing			$80,000.00
Equipment			
Tractors	1	$80,000.00	$80,000.00
Chisel plough	1	$9,000.00	$9,000.00
Harrow	1	$12,000.00	$12,000.00
Planter	1	$24,000.00	$24,000.00
Drill	1	$12,000.00	$12,000.00
Sprayer	1	$12,000.00	$12,000.00
Trailers	2	$9,000.00	$18,000.00
Estimated total			**$307,000.00**

The total capital requirements for both large scale and the emergent sector would be as follows.

Total Finacial Requirements

Variable costs – Short term annual	$24,600,000
Capital costs – Medium to Long Term 5 to 10 years	$40,740,000
Estimated fixed costs – Short Term Annual	$6,000,000

Further requirements

Not included in the above is large field clearing equipment, heavy land preparation equipment and harvesting equipment. It is suggested this is supplied by a contracting organisation to reduce the financial exposure to the farmers. "Greenfield" farming is a high-risk enterprise during the start up period and all efforts must be made to reduce the risks which should include patient capital, low interest rates and agronomy support.

The farmers should also combine their resources to introduce central storage facilities, processing plants (mills and expressing) and a marketing organisation. These could be

created through 3rd party partnerships or joint ventures with organisations with the required expertise and resources.

Roll out

The above is an example dedicated to cereal and oilseed crops but the same rules and model could be applied to rice, sunflower and sorghum production and also intensive livestock units for dairy, beef and maize.

Farm Block Example

An example of the Southern Corridor's potential is shown in the map below. This area south of Mikumi, with the main town being Ifakara, produces rice, maize, sugar cane and fruit (mainly bananas) by the small holder farmer. There are 2 large commercial estates producing rice and sugar. The shaded area demarcates an area in excess of 500,000 hectares, which appears to have excellent rainfall and good soils. However it is lying fallow as infrastructure is absent and development activities are restricted due to the inability to acquire land as well as other bureaucratic constraints. Roads are poor making market access difficult. Perishable fruits such as bananas are often transported on the back of bicycles or on ill suited trucks resulting in physical damage and bruising on the way to market thereby significantly reducing quality and yield whilst the on farm yields are still impressive due to climatological factors.

Family Sector Commercialisation

Background

The program is based on the utilization of dedicated field staff each focusing on small groups of pre-selected farmers who are willing to assume joint responsibility for input credit and who show interest in and aptitude for adoption of higher yielding/multi crop based farming.

The participation of agro dealers as potential pivots around which such programs can be developed is regarded as a crucial link to the rapid delivery and success of such schemes. In the Mbeya area there are a number of agro dealers who have started to reach out to clusters of small farmers. However they service such farmers from distant central locations and lack the organizational, financial and extension resources required to effectively implement a full program. By supporting a network of "micro" agro dealers consisting of a network of farmers to be recruited from amongst promising farmers already living in target communities, a structured deliver system consisting of input and extensions services provided by an individual based in and trusted by the local community can be structured. Recruiting and training local farmers to become agro dealers servicing their community brings the benefit of utilizing a person known in the local community who can gradually build up an agro dealership in addition to his daily activities so as to defray start up cost and accelerate community trust and acceptance. Providing support to such micro agro dealers will be important in the form of starting demonstration plots, provision of initial credit for inputs and assistance with organizational matters for the local farming community to whom the services are directed.

Introduction

In June 2009 the World Bank published a paper on commercial value chain programs aimed at small farmers – specifically small holder extension programs in the cotton and tobacco industries ("Report No. 48774-ZM Zambia Commercial Value Chains in Zambian Agriculture: Do Smallholders Benefit?"). The paper indicates that "the common perception is that other participants in the value chain, such as middlemen, traders, and processors reap a greater share of the returns and that smallholders are being exploited. Another frequent assumption is that smallholders have to sacrifice the production of food crops to participate in the production of commercial crops."

In short, the conclusion of the study appears to be that not only do smallholder farmer incomes benefit from commercialization when associated with commercial crop extension programs, but the study also noted that it actually improves the conditions and result for food crops in the area.

Since 2006 food crop commercialization programs, similar to the extension systems in the tobacco and cotton industries, have been sponsored by the FAO in Zimbabwe and now reach in excess of 50,000 farmers. They have demonstrated that a properly run extension

program focusing on staple crops can significantly improve the returns to small holder farmers (maize yields improved from 1 – 3 tons per hectare) as well as be financially sustainable in their own right (90% repayment on input credits with the credit losses covered by product mark ups). The keys to success are:

- the use of properly trained and commercially motivated technical officers;
- the use of selectivity to identify capable farmers for inclusion in the programs;
- the timely availability of proper seed and inputs;
- the organization of farmers into growing clubs where performance and repayment is monitored internally, and;
- availability of affordable finance, particularly working capital to supply inputs and purchase crops.

Particularly effective has been instruction in proper timing for planting and conservation farming techniques. Use of fertilizer and seed - although important in optimizing yields and is crucial to double cropping – should be applied after such planting and farming techniques have been adopted.

The success or failure of greenfield projects involving small holder farmers is highly dependent on the availability of appropriate management and financing. Both are in short supply in Mozambique but the project described below has identified experienced locally based agricultural managers around whom a solid small farmer commercialization project can be built.

Project Description

Many Eastern African countries have a history of tobacco and cotton based extension programs. The farmer database gathered and lessons learned in shaping these programs form the basis for a small farmer based staple crop commercialization program. As the tobacco and cotton programs have shifted focus, trained agricultural technicians familiar with the central Mozambique small holder farming area are currently interested in setting up similar program aimed at maize and other rotational crops such as soya, oil seeds and beans. The technicians all have agricultural training and many are former farmers.

Description of Program

The program utilizes a community-based system drawing greatly on the experience and knowledge of local community leaders and Government agencies allowing trained agricultural technicians to select a promising group of farmers upon which to base a small farmer enhancement and commercialization project.

The project is set up for dryland agriculture where a primary crop – generally maize – is grown during the rainy season (Nov – Feb) and a secondary crop can be grown during the dry season provided appropriate training and inputs are available. The program proposes to start with 4,800 farmers and can grow exponentially once proven successful.

The main focus of the system is to establish a database of growers in each district from which a group of promising farmers is selected. Participation in the program requires that farmers demonstrate the ability to adopt new farming techniques and are interested in the commercialization of their farms in order to improve yields.

Approaches to suitable candidates are made through community leaders. Candidates will be ranked according to their farming ability, their standing in the community as well as their financial credibility for which the community leaders are asked to provide references. Once selected, the growers are organized into clubs of between 10 and 20 people. Each club has a chairman elected by members of the group who manage his club. The club system allows for management economies of scale as well as gaining critical mass in marketing of crops and the purchase of inputs.

Repayments of credit for inputs are controlled through clubs. At the point of sale 10% of the value of credit is retained from every member of the club. This money is held until every member of the club has paid back their credit. Failing to do so, the money is retained to pay off the outstanding debt. Bonus incentives are paid back through the same club system.

The project employs a pyramid management structure which for 4,800 farmers includes 10 field technicians, 1 Divisional Manager/Program Manager and administrative support staff. Field Technicians are the most important link to the growers. These staff members are expected to live within the community. Each Field Technician has the responsibility to co-ordinate a minimum of 350 growers (1750 - 2000 hectares). Their responsibilities include, monitoring growers, providing agricultural advice, conducting training programs, coordinating the delivery of inputs, assisting the farmers with land preparation, seeding, applying the inputs, weeding, & preparing crops for market, organizing collection centres for crops, monitoring the selling process in order to guarantee the recovery of the credit, maintaining regular communication with the Divisional Manager.

Field Technicians report directly to Division Managers who are in charge of Districts. Each Division manger has the responsibility of co-ordinating with between 15 & 20 field Technicians (25,000 to 35,000 hectares). The Division Manager's responsibilities include:

- co-ordinating all activities carried out by Field Technicians,
- keeping credit records/farmer/club,
- liaising with Field Technicians and other stakeholders to solve production problems affecting the farmers,
- following the inputs distribution process,
- preparing & submitting on a timely basis project and monthly activity reports,
- following the buying process and ensure credit recoveries,
- ensuring planned production levels are achieved which have been agreed on at the start of the production season, and
- ensuring the set targets & goals are achieved within all sectors in the project area.

All District Division Managers report directly to the central administration management team which has the responsibility of co-ordinating all activities within the area. The Administration management team is headed by the Project Manager. All finances as well as

HR issues are co-ordinated through the central office. Until growth in farmers in excess of 4750 is achieved the Division Manager and Project Manager are likely to be the same person. The central administration team is also responsible for co-ordinating with Government officials as well as procuring inputs & establishing markets for crops.

Marketing

The co-ordination of supplying produce to markets is the responsibility of Division Managers and Field Technicians. The system envisions creating central collection points established within easy reach of the growers and close to the road networks to ensure transport access. Coordination with their Division Manager on sales dates ensuring markets are never congested. Local vehicle owners are contracted to move the produce from collection points to central buying stations in each District. Here a strong link with the storage, milling and marketing project can create significant economic benefits.

A buying calendar is set up in consultation with Field Technicians and the respective clubs to determine sale dates. Field Technicians accompany their farmers to the central buying centres. On arrival at the buying station the grower will produce his contract for identification purposes. Each grower has a unique number allocated in the central database. When the grower is accessed on the data base his credit credentials are accessed. The farmer is paid cash after all credit deductions have been made from the sale of the produce.

Financial Sustainability

The Collection/Credit System has been particularly effective in reducing credit delinquencies extended on input credit boasting a recovery rate of over 90% in the FAO managed projects in Zimbabwe. Tanzania's commercial crop extension programs upon which the proposed system is based have a similar recovery rate. The credit system is heavily dependent on the club system described earlier and is set up as follows:

- All credit defaulters are eliminated from the scheme and are not registered for the following season.
- The debt is paid back by other members of the club through the 10% retention scheme. Farmers in the same club will also lose on a 5% rebate bonus which is only paid to clubs who have completed 100% of their credit.
- In extreme cases farmers will be taken to court and jailed for not paying credit.
- This has been found to be the most effective credit repayment system. Farmers within the club will enforce their own policing systems to insure both the 10% retention money is repaid as well as the 5% rebate.

Implementation

Technicians formerly active with the commercial crop extension programs are available for implementation. With their local knowledge and presence, the project can be started in short order. The availability of experienced staff is the key to being able to start the process and avoid many of the pitfalls encountered by many extension programs sharing similar goals.

It is important to earn the trust of local farmers who will want see positive examples of the project before signing on the program. For this demonstration plots are planned.

Using local solutions will be strongly encouraged. Animal draught power can be implemented more effectively and is less costly then mechanical traction/tractors. This will help farmers increase production without reliance on fossil fuels and as such avoid high operating costs and delays. This in addition conservation farming techniques can significantly assist in reducing start up costs and assuring sustainability.

A controlled expansion is critical to the success of the program. This includes Local knowledge of communities, climates & growing conditions.

The program would aim to select 4-5000 farmers in the first 2 years and can then grow exponentially throughout the region. Each farmer should have access to about 5 hectares so that a multicrop program can be set up with each farmer. One of the potential benefits of the multicorp program is that the success of the first farmers will likely have a lot of spillover effect on other farmers thereby resulting in additional knowledge transfer and potentially increase the size of the program.

When a farmer proves to be particularly promising, this farmer can be selected to farm greater areas of land and as such become part of the emergent and eventual commercial farming community.

Benefits to farmers

The following table calculates the net benefit to the average farmer. It should be noted that planted crops per farmer may vary depending ability, willingness, and soil/climate/water conditions.

Staple Crops – Return to Farmer

	Hectares	Yield (mt/ha)	Cost of inputs ($)	Revenue ($/mt)	Gross Farmer Revenue	Net to Farmer
Maize	1	2	163	180	360	180
Soya	1	1	59	350	350	291
Sugar Beans	1	1	208	700	700	492
Total	**3**		**533**	**1,802**	**1,410**	**963**

In summary the above table indicates that for 4,800 farmers the total revenue will amount to $6,768,000 an increase of $5,904,000 over the current available revenue stream of $864,000.

Certain farmers can be selected to grow premium crops such as sunflowers and chillies. This may add further revenue to the farmer's income as follows:

Premium Crops – Return to Farmer

	Hectares	Yield (mt/ha)	Cost of inputs ($)	Revenue ($/mt)	Gross Farmer Revenue	Net to Farmer
Chilies	0.25	1.25	123	2,000	625	502
Sunflowers	1.00	1.00	103	350	350	247

The administration costs of the program are estimated as follows:

Expense Type	Unit	$ Per Unit	$ Total	
Salaries	Project Manager	6,000	72,000	
	Division Manager	3,000	36,000	
	Administration staff	6,666	79,992	
	Field staff	3,000	36,000	223,992
Energy Rates	Electricity	922	11,064	
	Water	120	1,440	12,504
Transport Costs	Fuel - Diesel	2,000	61,338	
	Fuel - Petrol	2,500	78,917	
	Fuel - Lubricants	565	6,777	147,032
Repairs & Maintenance	R & M - Motor Vehicles	1,994	23,929	
	Tyres	331	3,970	27,899
Accommodation	Rental - Warehousing	2,075	24,894	
	Rental - Offices	1,000	12,000	
	Rental - Accommodation	4,000	48,000	84,894
Security	Internal	2,500	30,000	30,000
Communication Costs	Telephones Costs	461	5,532	
	Cellular Costs	572	6,860	
	Satellite Costs	1,000	12,000	24,392
Stationary	Stationery Costs	113	1,361	
	Computer Stationery Costs	250	3,000	4,361
Insurance	Insurance - Motor Vehicles	667	8,000	8,000
Other Costs				
	Gap-Demonstration	2,500	30,000	
	Gap-Research Extension	2,000	24,000	
	Gap-Training	1,000	12,000	
	Legal Professional	500	6,000	72,000
	Meetings	200	2,400	2,400
Total Over heads			**637,474**	**637,474**

The capital expenditures of the administration and operation part of the program are estimated as follows:

Expense Type	Unit	$ Per Unit	$ Total	
Vehicles	Land Cruisers	48,000	48,000	
	Double Cab	45,000	45,000	
	Motor Cycles	3,500	35,000	128,000
Office Equipment	Computers Desk top	1,000	2,000	
	Printers	500	1,000	
	Desks	750	1,500	
	Chairs	250	1,500	
	Filing Cabinets	1,000	2,000	
	Safes	2,000	2,000	10,000
Grain Handling Equipment	Bag Elevator	8,000	8,000	
	Bagging Machine	15,789	15,789	
	Grain Silos	225,000	225,000	
	Bag sowing Equipment	150	450	
	Oil Presses	4,000	24,000	
Buying Centers	Sheds	8,000	48,000	
	Fencing	3,000	18,000	339,239
Total			**477,239**	**477,239**

Note: Farmer participation is projected to gradually increase from 1,200 in year 1 to 4,800 in year 4.

Income is derived from selling crops at market prices throughout the year.

- No interest charge is assumed.
- Expenses for crops are amounts paid to farmers net of inputs.
- End of year surplus or deficit is retained by the central organization.

The cash flow budget for the first years operation of the project is as follows:

Year	1	2	3	4
Income				
Maize	480,000	960,000	1,440,000	1,920,000
Chillies	300,000	300,000	300,000	300,000
Sunflower	396,000	792,000	1,188,000	1,584,000
Soya Beans	420,000	840,000	1,260,000	1,680,000
Sugar Beans	1,350,000	2,700,000	4,050,000	5,400,000
Total	**2,946,000**	**5,592,000**	**8,238,000**	**10,884,000**
Expenses				
Maize	432,000	864,000	1,296,000	1,728,000
Chillies	142,053	144,955	145,781	146,070
Sunflowers	360,000	720,000	1,080,000	1,440,000
Soya beans	360,000	720,000	1,080,000	1,440,000
Sugar beans	720,000	1,440,000	2,160,000	2,880,000
Total Purchases	**2014053**	**3888955**	**5761781**	**7634070**
Operating Costs	**637,474**	**786,360**	**1,077,240**	**1,385,400**
Total Expenditure	**2,651,527**	**4,675,315**	**6,839,021**	**9,019,470**
Operating Surplus	**294,473**	**916,685**	**1,398,979**	**1,864,530**
Capital Expenditure				
Vehicles	128,000	80,000	80,000	80,000
Office Equipment & Furniture	10,000	12,000	10,000	10,000
Grain Handling Equipment	339,239	339,239	114,239	114,239
Total	**477,239**	**431,239**	**204,239**	**204,239**
Operating Surplus / Deficit	-182,766	485,446	1,194,740	1,660,291
Contingency Reserve	-201,405	-388,896	-576,178	-763,407
Surplus / Deficit	**-384,171**	**96,551**	**618,562**	**896,884**
Cumulative Surplus / Deficit	-384,171	-287,621	330,941	1,227,825

Irish Potatoes

Background

Tanzanian small farmers grow significant amounts of Irish potatoes. Their yields could be improved significantly with the introduction of better seed and growing methods. Unfortunately proper seed for first and second generation potatoes is hard to come by and efforts by farmers to source such seed outside the country have proven difficult. Moreover the lack of proper seed registration and the lengthy periods for import and variety approval are hindering such development by entrepreneurs. A recent attempt to import and grow of first generation seed from Kenya – which seed should be allowed into Tanzania under the regional market rules –was not allowed to plant the seed which had been transported under government supervision into the area.

There are a number of areas which have good conditions for growing seed potatoes. Ihemi is a suitable area where commercial farmers would welcome the opportunity to grow and bulk up first and second generation seed for sale to the smallholder farmers.

Conservatively smallholder yields could increase by 50 – 100% should proper seed and growing methods be used. Irish potatoes are an important food crop grown in the region. Traditionally they are grown under rainfed conditions in the cooler areas. As this is also a frost free period they can be grown at high altitudes where there is insect challenges both in direct damage and as disease vectors. However, the rains bring ideal conditions for bacterial and fungal diseases and make the control of weeds difficult by means of physical hoeing and removal.

Traditionally the crops grown under rain fed conditions also all harvested within the 1st. few months from the cessation of the rains creating annual gluts on the market over that period resulting in very poor prices to the farmer. With the use of irrigation as a production tool along with good seed and the spreading the plantings margins can be greatly improved. Plantings under irrigation can be up to 3 plantings per year, November, March and July, with the use of irrigation.

Chemical control of diseases can is normally reduced on potato crops grown outside the rain season. Yields are also normally significantly higher under this management regime as has been proven in Zambia and Zimbabwe where as much as 50% better yields are achieved in March and July plantings as opposed to the November plantings which rely on rain.

The model below gives an indication of costs and income under the different management regimes. It should be noted that both the yield and income goes up this is due to the following:

Yield due to:

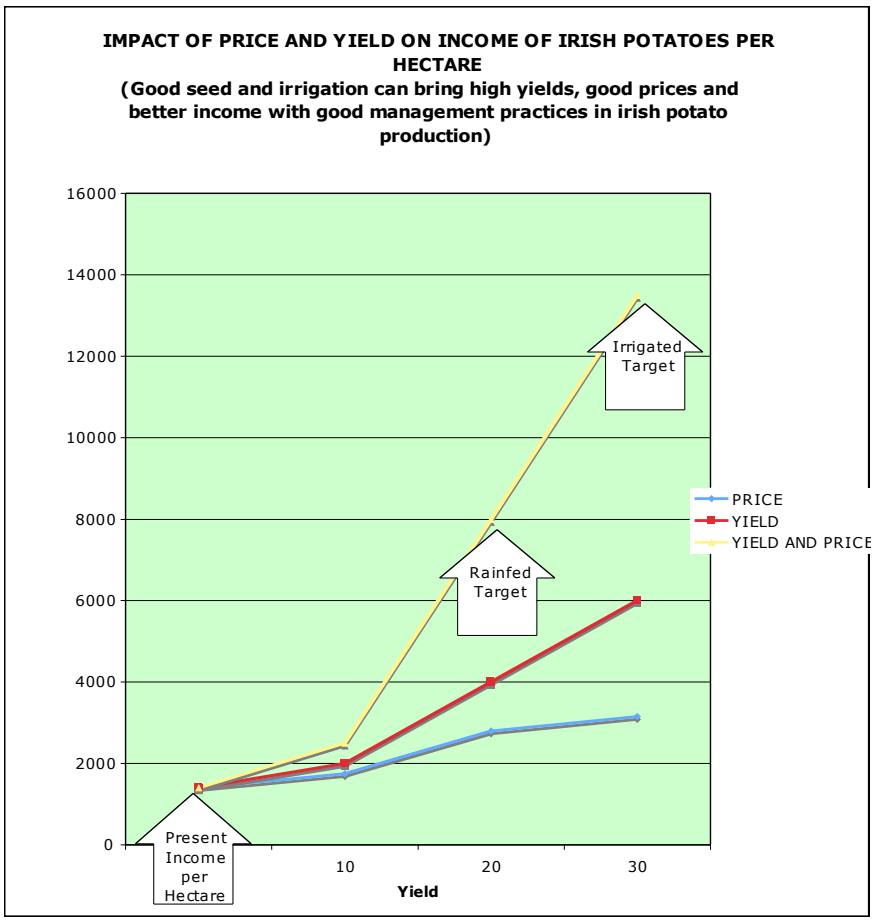
- Improved seed
- Less disease ~ rotation and spraying
- Less pest ~ rotation and control(especially nematod

- Use of irrigation (Yield x 5)
  - Less stress from water
  - Planted during period of low disease and pest challenge
  - Weed control easier and more efficient wth use of chemicals

Price improved due:

- Due to quality by use of seed
- Tubers free of nematode damage
- Tubers large and mature due to use of irrigation as and when required
- Less storage rot due to harvest in dry season
- Crop harvested out of season so prices improve significantly

Of course the other main factor will be to package in 15 kilogram paper pockets for direct wholesale into markets (including direct sales to large retailers; this is best done by means of a marketing association including a number of growers large and small).



Variable costs per hectare

Yield	Low (10mt/ha)	Average (15mt/ha)	High (25mt/ha)	Irrigated (35mt/ha)
Seed	1,200	1,200	1,600	2,400
Fertilizer and Lime	450	861	1,349	1,999
Herbicide	0	28	28	28
Insecticide/Fungicide/Inoc.	238	408	677	745
Labour	478	430	440	460
Fuel and Oil (Oxen x6)	300	340	361	373
Irrigation			216	273
Repairs and Maintenance	38	38	21	27
Transport	120	180	240	400
Packing	20	120	266	400
Transport	6	15	25	35
Finance Charge	195	330	468	576
	3,045	**3,950**	**5,691**	**7,736**

Variable costs and returns

Yield	Low (10mt/ha)	Average (15mt/ha)	High (25mt/ha)	Irrigated (35mt/ha)
Price	230	280	350	350
Income	2,300	4,200	8,750	12,250
Variable Costs	3,045	3,950	5,691	7,736
Gross Margin	(745)	250	3,059	4,514
Return on $ invested	**0.76**	**1.06**	**1.54**	**1.58**

Mangoes Farm

Background

There is great opportunity in Tanzania to establish production of high value export oriented crops such as mangoes, but also lychees and macademia nuts. A plantation can support multiple crops, in particular in macademia, but also other plants, and can provide for great linkages to smallholder farmers as outgrowers. The Rungwe Avocado model is a case in point where export quality crops can successfully involve outgrowers around a commercial nucleus providing market access and commercial scale.

Mangoes will require 4/5 years prior to bearing fruit so proper working capital finance during this period is crucial. Also access to water for irrigation and electricity for affordable power. Irrigation is highly recommended to reduce risk of crop failure.

Note that the fruit fly issue has produced problems for export. However, adequate quantities and crop diversification and increased volumes should be able to support an irradiation facility located in the port which can have multiple uses and as such only minimally increase costs for producers. In addition, a fruit fly monitoring program should be established as measures can be taken to certify fruit fly free zones even in areas where the fruit fly has been found.

Introduction

Tanzania, with its partial sub-tropical climate is considered by many to have excellent conditions to produce many fruit crops including mangoes. Soils, temperature and harvest timing provide the ability to produce high quality fruit during a period which is considered off-season compared to other major producers.

Like the Manica area in Mozambique, Tanzania has the capability to produce mangoes during a part of the season prior to the production season in RSA, and overlaps thereafter. Early season supply to RSA will utilize Tanzania's climatic comparative advantage. This market is estimated at 4,000 Mt/pa. The Middle East is mainly supplied from India and Pakistan with varieties such as Alphonso, Langra and Sindri, during the period from April until August. Brazil and Australia would compete in the counter-season market, during Mozambique's season. They typically supply the less favored Florida mango varieties. The EU is supplied throughout the year with mangoes. The peak supply season is when Brazil and Peru are on the market. Their season coincides with Mozambique and Tanzania.

Market Potential

The South Africa market could absorb 4,000 tonnes of early mangoes. In the initial stages of development, the South African market provides the most promising option.

In the longer term, the Indian, Middle Eastern and Far Eastern markets are the most interesting to East African producers due to proximity compared to South American producers. Once reasonable volumes of mangoes are produced and proper shipping services for Eastern African mangoes have been established, such markets should provide a comparative advantage to local produces. Once in place, Tanzania will have a significant logistical advantage in both costs and timing.

Dar es Salaam and Zanzibar are the only local markets offering sustainable size. However, such markets will only offer a small outlet to compliment South African and international markets and often do not reward quality as they have become used to local varieties.

European markets, due primarily to South American production, are probably not going to play a major part in the future of Eastern Africa's mango market portfolio in the form of fresh sales. However the fresh cut market in Europe via processors such as Geest, and aggregators such as Mack Multiples, may well continue to provide a valuable outlet.

By current estimates, the Middle East could take 30,000 tonnes of Eastern African mangoes currently if Asian varieties were grown.

Tanzania Production Potential

The World Banks estimates that RSA demand can be met by planting 215 hectares of mangoes. Should access to the Middle Eastern market be established, the ensuing 30,000 ton demand can absorb production from as much as 2245 hectares of land. Supplying the Pacific Rim countries can result in additional multiples of arable land dedicated to mango production.

There are three main considerations in the marketing of Mangoes produced in the Tanzania: timing, cultivar and logistics.

Currently, the Dombe region in Mozambique has already started producing export quality mangoes when South African producers came to the areas several years ago. Currently the early Dombe mango crop is processed by Geest in South Africa as a fruit salad ingredient, and exported to Europe.

The greatest long term potential for mango production in Eastern Africa is the counter-seasonal Indian and Chinese market. Successful access may require a change of cultivars to successfully compete in these markets. More research needs to be done on this – the sooner the better.

In order to start the mango industry in Tanzania, it is suggested an area is identified which is suitable for export quality production, and with the assistance of the Catalytic Fund develop a critical mass of initial tree orchards. Such area should earmark at least 150 hectares of trees under irrigated production. Ideally such an area is located in the vicinity of current horticulture producers who may be persuaded to plant some mango trees in addition to

their current crops. Once the trees come into fruit – around year 5 – such out-growers can then participate in the value chain and market access created by the commercial core.

In Mozambique, about 5 years ago, several independent entrepreneurs started mango plantations. They have produced their first crops and proven that marketing mangoes into South Africa is a profitable business. Prospective Tanzanian producers can build on the example set by the Mozambican producers to start up the Tanzanian mango industry and learn from the lessons learned in Mozambique to efficiently commence similar project in Tanzania.

Mango Products

There are four main mango products:

- **Fresh** – Packed into 4kg or 2kg boxes for the South African markets. Direct marketing that bypasses the JHB market should be employed where possible to avoid the 12.5% commission. Marketing companies such as Alliance Fruit charge 4-7% commission.
- **Fresh cut** – Delivered in bulk bins, after having been graded and polished in a pack house. On rare occasions, selected suppliers may for various reasons deliver direct to the freshcut pack house. Freshcut operators in South Africa include: Geest (Bakover), Food Salad Health, Colours (who have a partner company in Ghana that processes the fruit) and Fresh Connect.
- **Juice** – Rejects from the pack house – estimated 15% of delivered fruit.
- **Dry** – A small but growing market.

Pricing

Pricing is affected significantly by cultivar and timing. The following prices represent the prices that have been achieved in the South African markets:

	Harvest Dates	US$/kg
1 – Tommy Atkins	07 Nov – 07 Dec	1.15
2 – Kent	07 Dec – 31 Dec	0.73
3 – Keit	24 Nov – 07 Jan	0.69

Establishing Production

The key to efficient mango production is to locate land which should be well draining and preferably close to a reliable water source. As mango trees and yields are susceptible to droughts, irrigation should be installed. Cost efficient irrigation will require proximity to electricity. The trees are best watered by means of drip irrigation.

Expected yields are 25 to 30 tonnes per hectare under full production. Consideration should be given to expansion of the area with other fruit trees such as lychee or citrus.

Should other producers commence production in the vicinity, the cost for the introduction of electricity as well as the completion of a central pack shed and cold rooms could be shared and as such reduce the per unit cost of infrastructure significantly.

Key to establishment of an efficient industry will the development of marketing and transport links to markets outside of the region, specifically the Middle East. Streamlining of export shipment and procedures will be an important element.

An outline of the project and its estimated financial requirements to full development is shown on the following pages. It must be understood that these are in some cases broad estimates by the authors and the project need a full financial analysis.

Project Location

The Kilombero area has much land available suitable for mango production. Soils are generally good running from sandy loams into “Hutton” type red, and water is readily available. It is proposed to establish up to 200 hectares of additional mango trees. By creating a plantation of this size to start with, economies of scale could be achieved to support infrastructure and adequate product generated to provide a consistent supply to the Middle Eastern and Pacific Rim markets.

Such an initiative would need to require research prior to its establishment. Specifically it will require an in depth market study focusing on establishing links with the Middle Eastern, Pacific Rim and possibly the European markets and the identification of the appropriate varieties. The study would need to focus on establishing type, quality, market acceptance criteria, pricing and volumes, and import barriers addressed. Relationships with importers into these markets will require development. A full business plan will need to be established.

Financial Profile for 200 Hectare Mango Plantation

Capital Purchases and Assets

	Year 1	Year 2	Year 3	Total
Hectares planted	100	100		200
Infrastructure				
Sheds	108,000		72,000	180,000
Office And Workshop	30,000		90,000	120,000
Bulk Water	160,000			160,000
Infield Drip	180,000	180,000		360,000
Pipeline	50,000	25,000		75,000
Electricity	150,000	5,000		155,000
Roads	5,000			5,000
Housing	75,000	25,000		100,000
Packshed			31,500	31,500
Plantation Establishment				
Land Clearing	100,000	100,000		200,000
Land Preparation	50,000	50,000		100,000
Lime/Fertilizer	45,000	45,000		90,000
Seedlings	105,000	147,000		252,000
Planting	26,250	26,250		52,500
Equipment				
Tractor 120 Hp	65,000			65,000
Tractor 75hp	35,000	70,000		105,000
Mower	8,000			8,000
Sprayer	12,500			12,500
Disc Harrow	15,000			15,000
Trailers	8,000	6,000		24,000
Ripper/Chisel Plough	8,000			8,000
Water Bowsers	6,000	12,000		18,000
	35,000			35,000
	7,000			7,000
Office And Workshop Equipment				
Office Equipment	5,000			5,000
Workshop Equipment	6,000			6,000
Tools	2,000			2,000
Contingency	64,838	35,063	8,100	108,000
Total	**1,361,588**	**736,313**	**201,600**	**$2,299,500**

Cash Flow – Mango

	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Years 10-15
Income	0	0	570,000	760,000	1,235,000	1,710,000	1,995,000	2,660,000	3,610,000	3,800,000
Yield (ton per ha)	0	0	3	4	7	9	11	14	19	20
Price per ton ($950)										
Variable Costs										
MANGO	84,592	180,413	511,715	630,234	868,155	1,105,644	1,241,907	1,562,334	1,975,584	2,058,234
Net Cash Flow										
MANGO	-84,592	-180,413	58,285	129,766	366,845	604,356	753,093	1,097,666	1,634,416	1,741,766
SUB-TOTAL	**-84,592**	**-180,413**	**58,285**	**129,766**	**366,845**	**604,356**	**753,093**	**1,097,666**	**1,634,416**	**1,741,766**
Fixed Costs	201,920	201,920	201,920	201,920	201,920	201,920	201,920	201,920	201,920	201,920
EBITDA	-286,512	-382,333	-143,635	-72,154	164,925	402,436	551,173	895,746	1,432,496	1,539,846
Capital Expenditures	-1,361,588	-736,313	-201,600							
Total Cash Flow	-1,648,100	-1,118,646	-345,235	-72,154	164,925	402,436	551,173	895,746	1,432,496	1,539,846
IRR - 15 year unleveraged; no exit multiple			16%							

Mtanga farm

Seed Potatoes

Some small farmers in Tanzania grow Irish potatoes, both in the Southern and Northern Highlands. The high plateau in the Iringa and Mbeya areas are ideal for potato production. The profitability associated with this crop is already above many staple crops such as maize and rice. However, potatoes are prone to disease and the land on which potatoes are grown should be rotated periodically in order to minimize the changes of disease. Current yields by small farmers average about 5 tons per hectare. Such yields are based on old variety seed stock for which modern alternatives exist. Utilization of proper seed varieties can increase yields to as much as 30 tons per hectare with the required management and inputs. Moreover a professionally managed seed operation can also serve as a training center for extension officers in order to transfer proper potato farming techniques to small farmers.

Mtanga farm, a recently reopened commercial farm near Iringa, has the managerial expertise and land available to commence a seed potato operation. Their proposal is to grow up to 200 hectares of seed potatoes with the use of mini tubers produced by means of tissue culture. Such seed can form the basis of a proper bulking stock for planting 2,000 hectares of Irish potatoes. If this is then reused for a further generation as seed it can plant 20,000 hectares. The seed should be retained for only 3 generations by the farmer following this and should then be replaced with a new purchase by the farmer. Given that the average small farmer farms less than 1 hectare and those that grow potatoes only grow a portion of their available area, the 200 hectares seed project can benefit as many as 60,000 farmers and positively affect 240,000 dependents. As other than the cost of seed, the cost of inputs will remain the same, any increase in yields will benefit the farmer directly perhaps only requiring the hiring of additional labor in order to deal with the increased volumes. Of course, if he has access to finance there is no reason in prohibiting him from achieving commercial yields with the correct high inputs.

Mtanga is prepared to participate in setting up a seed potato growing and distribution operation for sale of seed to small farmers. However its capital is limited and it will require financial assistance with planting and establishing sales channels to small farmers. In order to incorporate the benefits of the seed small farmers in turn will require technical assistance.

There are many benefits to producing quality potatoes. They are rich in calories and nutritional items, can provide high yields on small areas of land, can be stored and easily transported and are widely accepted as a food stock in Tanzania. Should the industry grow significantly, they can be exported to regional markets.

Obstacles

There is very little research on potato seed varieties in Tanzania and it is likely that tissue cultures will have to be imported from other countries. Seed tissue is available from Zimbabwe and Kenya but needs to be tested locally for effectiveness and application. Government needs to work with the

farmer to ensure proper testing, particularly allowing for on farm testing which is currently difficult. The review process of new seed varieties is slow and cumbersome and needs to be accelerated in order for the private sector to remain interested, be able to afford to complete the tests and commence production.

Infrastructure in the farm area needs to be addressed. Electricity is some 25 km away and the road needs to be upgraded particularly should crop volumes increase.

Should a 200 hectare seed potato project become operational, storage will have to be addressed.

Access to spare parts and equipment is a real problem. This in effect means that farmers need to double up on their equipment needs as a breakdown in a vital piece of machinery can result in planting/harvesting delays, which will seriously impact crop yields.

Picture Mtanga Farm

Costs

The costs below are estimation from the generic prices we have available from the authors experience and will be refined following accurate quotations from suppliers and engineers if project is instigated.

	Number	Price ($)	Total ($)
Machinery			
Tractors (80 hp)	4	45,000	180,000
Ploughs (3 furrows)	2	8,000	16,000
Harrow (3 metre)	2	10,000	20,000
Ridge fertilizer unit	2	12,000	24,000
Traliers (5 tonner)	6	10,000	60,000
Sprayer (5 metre)	12	15,000	30,000
Knapsack sprayers (hand)	12	230	2,760
Forklift (1 tonne)	1	25,000	25,000
Potato lifters (chain)	2	30,000	60,000
Buildings			
Sheds (900m^2)	2	160	288,000
Manager's House (300m^2)	1	200	60,000
Irrigation			
Pivots (30 ha)	2	50,000	100,000
Power source and pumps (generator)	2	45,000	90,000
Pipes (1500 mm)	2,000	35	70,000
Total			**1,025,760**

Potato Cost Breakdown

	Cost ($) 1 ha	Bulk 1 ($) Crop 1 ~ 4 ha	Bulk 2 ($) Crop 2 ~ 24 ha	Bulk 3 ($) Crop 3 ~ 1444 ha
Seedlings	20,000.00	80,000.00	Retained	Retained
Lime	50.00	200.00	1,200.00	7,200.00
Fumigation	120.00	480.00	2,880.00	17,280.00
Fertilizer	1,390.40	5,561.60	33,369.00	200,217.60
Nitrogen	209.40	837.60	5,025.60	30,153.60
Insecticide	36.60	146.40	878.40	5,270.40
Fungicide	342.00	1,368.00	8,208.00	49,248.00
Diesel	762.00	3,048.00	18,288.00	109,728.00
R&M (Machinery)	676.80	2,707.20	16,243.00	97,459.20
Electricity	180.00	720.00	4,320.00	25,920.00
R&M (Irrigation)	25.00	100.00	600.00	3,600.00
Labour (Total Infield)	990.00	3,960.00	23,760.00	142,560.00
Transport (Crop)	1,440.00	5,760.00	34,560.00	207,360.00
Insurance (Crop)	68.40	273.60	1,641.60	9,849.60
Storage & Handling	30.00	120.00	720.00	4,320.00
Packing Materials (Bags)	150.00	600.00	3,600.00	21,600.00
Total	**26,470.60**	**105,882.40**	**155,294.40**	**931,766.40**
Variable Costs to 1st Sale				
Sales in Tonnes	0	0	0	Gross Income
Value (~$500/mt)				1,800,000.00
Value (~$600/mt)				2,340,000.00

Smallholder Farmer Potato Economics

Costs	Quantity	Unit	Per unit	Per Acre		Per Hectare	
			TSH	TSH	USD	TSH	USD
Seed	8	bag	50,000	400,000	308	988,000	760
Fertilizer (DAP)	2	bag	50,000	100,000	77	247,000	190
Fertilizer (CAN)	2	bag	33,000	66,000	51	163,020	125
Chemicals (Ridomil)	1	pkt	30,000	30,000	23	74,100	57
bags	80	bag	700	56,000	43	138,320	106
ACTIVITIES							
land clearing	1	app	10,000	10,000	8	24,700	19
cultivation	1	app	25,000	25,000	19	61,750	48
planting	1	app	10,000	10,000	8	24,700	19
weeding	2	app	20,000	40,000	31	98,800	76
Fert. application	1	app	15,000	15,000	12	37,050	29
spraying	2	app	10,000	20,000	15	49,400	38
harvesting	80	bag	2,000	160,000	123	395,200	304
transport field to home	80	bag	1,000	80,000	62	197,600	152
Total cost				1,012,000	778	2,499,640	1,923
YIELD AND REVENUE							
Yield per acre	80	bag	108	8,640		21,341	
price at farm gate	80	bag	30,000	2,400,000	1846	5,928,000	4,560
Total Sales				2,400,000	1846	5,928,000	4,560
Gross Margin				1,388,000	1068	3,428,360	2,637

Post Production – Processing, Storage and Handling Facilities
Maize, Wheat and Soya

Background

The aim for the introduction of local processing, storage and handling within a district or region is to enhance, shorten and improve the transparency in the vertical integration/value chain between the producer and consumer. In doing the producer should receive a better price/greater share of the end price while the consumer will receive a higher quality product produced locally and available at a competitive price. The reduction of both logistical and trading costs along with a lowering of the loss of volume that often occurs in multiple transactions will benefit both producer and consumer.

The Corridor is marked by inadequate storage and handling facilities for all the volumes of locally produced commodities, but especially so for maize, wheat and soya. Proper facilities within reach of producers will help to ensure that high quality untainted raw material is readily available to processing plants throughout the year.

For processing the same conditions hold. Although rice has some rudimentary infrastructure dedicated to post production facilities, even here an improvement in quality and transparency in management can substantially increase producers' profit margins. For maize, wheat, soya and barley, there is little post production infrastructure.

Below are three examples of the financial characteristics of a maize, wheat and soya processing facility. Such processing facilities would ideally be constructed within existing production areas so as to immediately enhance the local value chain and have a ready market for product which should be cheaper than product based on either imports or processing facilities which are located far from the producer and consumer markets. In reality changing the existing system will take time and effort regardless of the fact that economics favour local processing in the long run. In the case of wheat and soya, production quantities will need to be increased to support a local processing facility. However local demand indicates such volumes can be used to substitute existing imports. Moreover in the case of maize and soya, there appears to be significant latent demand from poultry and cattle operations for protein meals in addition to human demand for maize meal and soy oil, to support a full range of post production facilities including a mill operation. However access to proper working capital, marketing and storage are required to ensure a high probability of success.

Maize traditional milling and marketing:

In the traditional maize production system, 8 transactions take place between small scale producers and the consumer. As producers generally do not have access to those steps beyond the village trader, a lot of the value of the end product remains with the participants in the post production chain.

Traditional Maize Value Chain – Producer to Consumer

Maize producer ⇒ local transporter ⇒ village trader (consolidates production for margin) ⇒ District trader(transports and consolidates at district level for margin ⇒ grain delivered and or purchased by industrial mill (logistical cost) ⇒ Maize milled (milling margin) ⇒ Meal distrusted to wholesaler (distribution cost and margin) ⇒ Meal collected or distributed to retailer (wholesaler margin) ⇒ Meal sold to consumer (retail margin).

Integrated production and marketing:

In the integrated chain, the aim is to shorten the length of the value chain, optimally to 4 steps. Provided competition and information are shared, the producers are likely to receive a larger share of the value chain profits and provided they information is shared are likely to be in a better bargaining position when compared to historical traditional value chain.

Modern Value Chain – 4 steps between Producer and Consumer

Maize producer ⇒ Collection by agents of local mill (agency fee/margin) ⇒ Storage by local milling company under CMA (storage charges) ⇒ Milling (milling margin) ⇒ Collection by local wholesalers and retailers.

Therefore in theory, especially if supported by local market demand, processing, storing and handling food crops locally can result in better prices to the farmer for his product and the consumer can obtain it cheaper. Unfortunately, more often than not, due to inadequate funding and management this has not been the case with the introduction of most local processing facilities. Many times cheap local processing relying on poorly maintained equipment coupled with inadequate and poor storage facilities leads to large post harvest losses, poor processing recoveries and a poor quality product on offer to the consumer. Moreover often the poor quality product tends to be just as expensive as the higher quality product provided by large industrial processors.

Criteria for the establishment of local post-production facilities

- Will processing facilities add value to the primary producer?
- Do local production volumes warrant value adding?, or
- Will production be stimulated by offering local processing which can offer better prices for commodities grown locally and as such stimulate production?
- Is the final product aimed for the local market, national market or regional market? What are the transport issues which require addressing?
- How sophisticated is the market? i.e. does it warrant mechanical or solvent extrusion, does it require super refined maize meal?
- Will the introduction of processing offer opportunities to create new business based on the local processing and it's by products
    - i.e. soya meal for stock feeds ⇒ dairy, chicken and pork.
- When compared to current alternatives, are processing costs reduced to allow better prices to producer as well as a better value for money for the consumer?

- Can processing be supported by local storage facilities or does new capacity have to be added. Can the annual crop requirements be stored locally so as to enable continuous processing throughout the year?

Based on our observations, it would appear that there is a large opportunity to process the following commodities in the corridor:

Maize – production already adequate and there is one initiative already taking place. There are opportunities for further projects within the Corridor especially in the west including Mbozi.

Wheat – production probably not adequate at present for a mill but the existence of the mill should stimulate production, especially in the Ihemi area

Soya – production adequate for mechanical extrusion but at present too marginal for the consideration of solvent extraction unless other commodities such as sun flower, cotton seed or sesame included. Soya extrusion coupled with a stock feed processing plant will allow for crop diversification, better rotations, and can support the emergence of a white meat industry (pork and poultry), egg and dairy production.

Rice – is already being processed in the corridor and the local market demand is being fairly adequately met although there are still opportunities to improve the general quality of the product produced. However, inability of farmers to aggregate production into larger quantities generally forces them to use small local mills. Inefficient equipment used in processing maize, sunflower and rice locally is generally rudimentary and simple neither efficient in the production of high quality product nor in the raw material recovery. There are number of large rice mills, however their utilization is limited to the larger producers as small quantities generally offered by individual farmers are not sufficient to commence a production run in a large mill.

Maize milling

Maize milling offers the simplest and cheapest 1st step into local production. Much of the local market is being serviced by means of producing straight run meal by means of a “hammer mill” without any regard to the quality of the raw material or the damaged grain or foreign matter that can be present in any given sample.

The attraction to milling maize locally is that it is the local staple food, is produced in large volumes locally and incurs high “double” logistical costs if milled outside the production area.

Of the 3 commodities mentioned above maize, which is also less vulnerable to storage spoil, is probably the easiest and least capital intensive to commence processing hence the recent establishment of the farmer owned maize mill in Ihemi.

Will hammer mills are suitable for milling livestock feeds it is suggested roller mills are more suitable and produce a better product for human consumption.

A generic milling model is shown below using the present maize meal prices to indicate the possible margins and savings if milled locally.

Maize – Collection and Distribution Radius 300km

	Kg	Extraction	Kg	$/Kg	Central Milling (Dar)
Recovery	970				
B/Fast	520	52%		0.48	249.60
Roller	300	30%		0.41	122.70
Bran	150	15%		0.045	6.75
Milling Losses	30	3%			
Total Wholesale Value per tonne					**379.05**
Milling cost					30.00
Packaging					10.00
Transport to mill	300	1.00	1	0.12	36.00
Transport from mill	300	0.97	1	0.12	34.92
Finance charge					18.00
Total Cost					**128.92**
Margin for Distribution					**250.13**
Local maize price					200.00
Margin for share distribution					**50.13**

Maize – Collection and Distribution Radius 75km

	Kg	Extraction	Kg	$/Kg	Local Milling (Dar)
Recovery	970				
B/Fast	520	52%		0.48	249.60
Roller	300	30%		0.41	122.70
Bran	150	15%		0.045	6.75
Milling Losses	30	3%			
Total Wholesale Value per tonne					**379.05**
Milling cost					30.00
Packaging					10.00
Transport to mill	75	1.00	1	0.12	9.00
Transport from mill	75	0.97	1	0.12	8.73
Finance charge					18.00
Total Cost					**75.73**
Margin for Distribution					**303.32**
Local maize price					200.00
Margin for share distribution					**103.32**

The main savings in processing maize locally is in cutting out the middlemen (traders) who greatly discount the farm gate price of maize. They offer an immediate cash payment and an assured market to desperate farmers at the time of harvest. Those farmers produce quantities which individually are too small to take to larger market centres and their ability to wait for better offers is impaired by lack of information and faith in the market as well as the lack the credit facilities too bridge such time period. Proximity to a mill, storage and credit will allow them to offer their product at a better time, obtain a better margin and thus benefit from a reduction in logistical costs in both delivery and distribution.

Wheat milling

The wheat milling scenario offers a different model to the maize model in that the majority of present wheat flour production in Tanzania is obtained from milling imported wheat.

Therefore the immediate advantage will be either the difference of the local producer price to import parity as a raw material into the mill, including the logistical costs from port to mill and the costs of distribution.

The model below gives the indicative price of imported wheat:

Cost	Estimate	Source	$/mt
Price	$283.00	FOB Gulf	$283.00
Insurance	0.30%	FOB	$0.85
Freight	$65.00		$65.00
CIF			**$348.85**
Finance	6.00%	60 Days	$3.47
Trader's margin	2.50%	Estimate	$8.72
Import tariff	35.00%		$126.37
Discharge	$24.00	Estimate	$24.00
Clearing and docs	$10.00	Estimate	$10.00
Other	$15.00	Estimate	$15.00
Total FOB Truck			**$536.41**

The present producer price is some $439.0 which from what we can ascertain is in line with the TB offer for barley to the producer.

Therefore the milling advantage in producing locally produced wheat would be as follows:

Imported Wheat

	Kg	Extraction	$/Kg	Local Milling (Dar)
Recovery	970			
Flour	780	78%	0.85	665.34
Bran	150	15%	0.05	7.50
Milling Losses	7	1%		
Total retail sales value				**672.84**
Imported wheat price				536.00
Milling cost				35.00
Packaging				25.00
Transport from mill	300	1	0.12	36.00
Finance charge	3 months			24.12
Margin for Distribution				**16.72**

Local Wheat

	Kg	Extraction	$/Kg	Local Milling (Dar)
Recovery	970			
Flour	780	78%	0.85	665.34
Bran	150	15%	0.05	7.50
Milling Losses	7	1%		
Total retail sales value				**672.84**
Local wheat price				395.00
Milling cost				35.00
Packaging				25.00
Transport delivery	75	1	0.12	9.00
Transport distribution	75	1	0.12	9.00
Storage charge				45.00
Finance charge	10 months			56.88
Margin for Distribution				**97.96**

Soya processing

Solvent extraction is the most efficient method of removing the oil from soya. In the case of the Tanzanian market, with its limited consumption of soya at present, the immediate demand for soya should be for consumption by livestock. Therefore mechanical pressing of soya should be considered as the 1st option prior to introduction of an oil extrusion facility. Unlike other oilseeds, much of the value of the processed product remains as the protein meal while the oil is of secondary importance.

The soya bean with around 40% protein makes an excellent source of protein for both human and animal foodstuffs. By reducing the fibre (through de-hulling) and reducing the fat (through expelling) protein will make up a larger percentage of the remaining meal. This can go as high as 48% thereby increasing the value of the remaining soya bean meal since protein levels are an important component in stock-feed manufacture as farmers purchase feed in relation to the value of digestible protein or energy.

With some 18% fat in the soy bean, around 10-14% oil can be expelled mechanically. All 18% can be extracted chemically through a hexane process which should be eventually become the process of choice when production volumes are adequate to support the capital investment required.

Producing and processing soya in a productive farming area shows many advantages over importing meal. Including:

- Double cropping with winter cereals under irrigation
- Improved crop rotations
- Improved soil fertility through nitrogen fixation
- A source of vegetable oil and protein meal
- Can lead to local production of high protein feeds for human consumption
- In conjunction with energy crops such as maize as the protein component of stock feeds, especially for the white meat industry replacing the more expensive protein fish meals.

The table below gives an indicative price on imported soya beans.

Cost	Estimate	Source	$/mt
Price	$477.00	FOB Gulf	$477.00
Insurance	0.30%	FOB	$1.43
Freight	$65.00		$65.00
CIF			**$478.43**
Finance	6.00%	60 Days	$4.77
Trader's margin	2.50%	Estimate	$11.96
Import tariff			*Unknown*
Discharge	$24.00	Estimate	$24.00
Clearing and docs	$10.00	Estimate	$10.00
Other	$15.00	Estimate	$15.00
Total FOB Truck			**$544.16**

The generic table below shows the advantages of growing and processing soya locally.

Imported Soya

	Kg	Extraction	$/Kg	Local Milling (Dar)
Recovery	990			
Cake	870	87%	0.60	522.00
Veg. Oil	120	12%	0.90	108.00
Extrusion Losses	10	1%		
Total wholesale				**630.00**
Imported soya price				544.00
Processing cost				45.00
Packaging meal				7.20
Packaging oil				12.00
Transport distribution of meal	300	87%	0.12	31.32
Finance charge				24.48
Margin for Distribution				**(34.00)**

Local Soya

	Kg	Extraction	$/Kg	Local Milling (Dar)
Recovery	990			
Cake	870	87%	0.60	522.00
Veg. Oil	120	12%	0.90	108.00
Extrusion Losses	10	1%		
Total wholesale				**630.00**
Local soya price				400.00
Processing cost				45.00
Packaging meal				7.20
Packaging oil				12.00
Transport delivery	75	1	0.12	9.00
Transport distribution	75	1	0.12	9.00
Finance charge				57.60
Margin for Distribution				**90.20**

The processing of raw vegetable oils into a product fit for human consumption

Extruded oil content of the oilseeds, mainly sunflower, is sold in its raw form. To enhance the value of this product, be it from any oilseed, the following will be required:

- **Neutralising:** The oil is washed with a caustic soda mix through which the free fatty acids binds with the caustic soda and forms soap that is removed from the oil.
- **De-gumming:** The oil is washed with water that binds with the gums in the oil and is then allowed to settle or is centrifuged.
- **Deodorising:** The oil is heated to around 200° C (260 is flashpoint) under vacuum and dry steam is introduced in the pressure vessel. The volatiles evaporating at this temperature is carried off under vacuum with the steam, rendering the oil tasteless and without smell. At the same time, any water remaining in the oil is evaporated so a "dry" oil results.

Rungwe Avocado farms and outgrower scheme

Background

Robert Clowes, a young Zimbabwean businessman whose family farmed in the Mbeya area in the sixties, has returned to the area and established an avocado nursery and plantation. Here he has proven that the growing conditions, soil and climate, are ideal for the production of high quality avocados under rain fed conditions. He has grown the crops with the use of compost and rock phosphate at a much lower cost than many of his competitors who use irrigation and expensive chemical fertilisers. His work drew the interest of two local businessmen involved in the promotion and development of existing tea out grower schemes. They recognized the benefit that export grade avocados could have in the enhancement of their outgrowers' income and they decided to join forces and to create the Rungwe Avocado Company which promotes the production of avocados within the smallholder sector as outgrowers along with a central smallholder plantation. To this end they recently obtained funds to establish a pack house for the support of the outgrower schemes.

An additional opportunity is represented by starting additional commercial avocado outgrowers schemes elsewhere in the Corridor. The area of Kilombero is likely to offer such opportunities. By spreading the production geographically, the risk of weather-related interruptions is reduced thereby allowing for greater certainty in the delivery schedules as well as greater volumes overall.

An additional avenue worth exploring is the planting of additional crops such as mangoes, litchis and macadamia nuts. The commercial nucleus can easily be expanded to support such crops as well as outgrower linkages similar to the current avocado scheme.

Marketing and shipping

The plan is to market through established agents into the European markets, with trial shipments sold in the UK last year to ascertain the acceptability and demand for the product. For the purposes of this trial airfreight was used, but this is an uneconomical method of transport and it is likely that road and sea freight will be used. Not only does the off seasonal time of production offer opportunity in Europe but also in the regional markets, especially South Africa. Transport to South Africa may also provide transport cost savings which are currently $1/kg for transport to Europe. The budgets for the project to achieve a 30% IRR were based on a selling price of $7.50 per carton ($1.875 per kilogram). Due to the window that may be exploited, expectations are that the price per carton will rather be around $9.00 per carton, the equivalent of $2.25 per kilo.

In July a trial shipment was send via refrigerated container through the port of Mombasa, Kenya, which was chosen due to perceived cost and time advantages when compared to the port of Dar es Salaam. The shipment was well received in the UK and the next harvest should result in the company's first profitable shipment. In addition, the South African market has shown an interest in purchasing the avocado crop at prices which compare favorably to those in the UK.

Business model

The model is based on the production and export of high quality fruit by both commercial plantations (large and small) and out grower production. The avocados will be certified and marketed.

The plan is to establish a number of avocado plantations and out grower schemes, the first of which is in the Rungwe area. Presently there is 59 hectare established plantation, plantings having been completed in 2009, and the early planted trees are already producing fruit, which is significantly ahead of when trees in other areas have produced fruit. Perhaps most importantly comparatively little soil enhancement and other costs have been incurred which makes the growing process very cost competitive.

The aim is to have planted the following by the end of 2011:

- 60ha of its own plantation
- 140ha of smallholder plantation
- 400ha of smallholding out grower avocados

Longer term and ongoing aims are also:

- To establish a state of the art pack house (funding already sourced from AECF)
- To export 4.2 million kilograms of avocados by year 10
- To graft Hass seedlings onto existing smallholder trees
- To train and to establish extension services

The estimated total cost of the start up is an estimated $4.2 million but future roll-outs will probably have a reduced cost due to a number of advantages gleaned from the original start up.

The present business model gives an indicative IRR over ten years of 30%, a very attractive investment for those willing to take a long view in agriculture. The gross sales by year 2015 should reach $6.8 million per annum.

Costs and production

The cost of establishing a hectare of avocados including land clearing by hand is estimated at $612, which in the case of the smallholder accrues mostly to his own labour account. The cost of each seedling is 60 cents to the smallholder grower. His other major costs will include the making of compost, phosphate and plantation maintenance such as weed control most of which are planned to follow organic processes. On average each out grower will have 60 trees planted which is the equivalent of 0.15 of a hectare. The table below gives an indication of the gross income and not including the farmer's own labor costs.

Smallholder Income from Avocado Sales

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ha planted (cumulative)	36	126	261	396	396	396	396	396	396	396

Average yield for area planted (mt/ha)	-	-	0.1	0.4	1.3	2.9	4.7	6.1	7.1	7.5
Total Tons produced (mt)	-	-	27	175	533	1,136	1,845	2,396	2,801	2,970
Price paid to smallholder ($/kg)	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18
Gross Income per grower with 60 trees ($)	-	-	2.48	10.85	33.64	73.11	121.08	160.40	191.27	206.84
Gross Income per grower with 120 trees ($)	-	-	4.97	21.71	67.27	146.21	242.16	320.81	382.53	413.69
Gross Income per grower with 240 trees ($)	-	-	9.93	43.41	134.55	292.43	484.33	641.62	765.06	827.37
Gross Income per grower per Hectare ($)	-	-	16.56	72.36	224.25	487.38	807.21	1069.36	1275.10	1378.95
Smallholder Total Income ($)	-	-	4,322	28,653	88,801	193,002	319,657	423,467	504,940	546,065

There will be chemical costs and the cost rock phosphate at planting. The table below gives an indicative summary of production income to the smallholder farmer.

To ensure the correct chemical application, including pest and disease control, the commercial organization's extension staff will carry out the spraying while also to ensure quality control during harvest this will be carried out by RAC teams as will the transport to the pack house to ensure proper handling and damage due to bruising.

Summary of Production Income to the Smallholder Farmer

	2009	2010	2011	2012	2013	2014	2015
Export Production (kg)	8,880	42,000	149,160	550,100	1,475,310	2,323,750	3,269,000
Packing Labor ($)	**43**	**203**	**723**	**2,665**	**7,147**	**11,256**	**15,835**
Utilities ($)							
Power	799	3,856	13,967	52,539	143,723	230,905	331,328
Water	18	86	310	1,168	3,194	5,131	7,363
Total ($)	**817**	**3,941**	**14,277**	**53,707**	**146,917**	**236,036**	**338,691**
Materials ($)							
Packing materials	1,518	7,326	26,537	99,825	273,074	438,719	629,524
Detergents & Chemicals	44	214	776	2,919	7,985	12,828	18,407
Other materials	44	214	776	2,919	7,985	12,828	18,407
Total ($)	**1,607**	**7,754**	**28,089**	**105,662**	**289,043**	**464,375**	**666,338**
R&M ($)							
R&M Materials	-	-	64,300	66,012	67,511	69,036	70,828
R&M Labour	-	-	6,430	6,601	6,751	6,904	7,083
Total ($)	**-**	**-**	**70,730**	**72,614**	**74,262**	**75,939**	**77,911**
Total Packing costs ($)	**2,467**	**11,899**	**113,818**	**234,648**	**517,368**	**787,607**	**1,098,775**
Packing costs per kilo ($)	**$0.28**	**$0.28**	**$0.76**	**$0.43**	**$0.35**	**$0.34**	**$0.34**

Benefits and Roll Out

A further two areas have been identified for avocado production which will extend the harvesting period. This includes the Mbozi area where fruit can be produced in November and December and the Njombe area which will be slightly later than the Rungwe area.

The additional production areas will give Rungwe diversification of production so as to mitigate any potential damage from crop failure of damage in one area during a particular year. This will provide greater assurance that the client can be reliably supplied and will as such allow for greater client loyalty and a more reliable income stream.

The table below gives the roll out capital cost for mirror projects each with a core production base of 80 hectares where the pack house will be situated along with the ancillary support and extension services for the out growers.

Roll Out Capital Cost for Mirror Projects

ROLL OUT CAPEX/PROJECT	YEAR 1	YEAR 2	YEAR 3
Plant & Machinery	$20,000	$420,058	
Land & Buildings	$78,058	$628,000	
Total Vehicles	$64,000	$149,000	$103,000
Office, Furniture & Fixtures	$7,900	$5,900	$5,900
Planting	$11,612	$91,800	$-
TOTAL FOR YEAR	$181,569	$1,294,758	$108,900
TOTAL FOR PROJECT	**$1,585,227**		

Each project will offer 280 people direct employment by the project while a further 2,640 smallholder commercial farmers will be involved in out grower production. The project offers an ideal roll-out model as the central core estate is limited in area (80 hectares or less) while the outgrowers can use their existing land holdings which is expansive and land clearing, an expensive undertaking if done by the commercial sector, can be done by hand.

Challenges

i. Port Clearing

In order to ship the avocados to the UK and South Africa efficiently a refrigerated container ("reefer") should be utilized and shipped within a fixed timeframe to prevent spoilage of the fruit. Should the reefer be subject to delays at port, the shipment stands to not only an increase in transport cost, but also run the risk of spoilage or of not meeting the requirements of the end users. By clearing the reefer when packed at the pack house, such delays can be avoided. Moreover clearing at the pack house will reduce port delays and as such help port efficiency and throughput.

ii. Transport

Transport from the farm to the main road is currently via unpaved roads. Particularly in the rainy season, these roads are challenging and can cause the avocadoes to be bruised by shipment or be subject to delays. Extra costs in the form of packaging and time will need to be budgeted.

iii. Electrification

The pack houses will require cooling in order to store the avocados at the right temperature. Without electrification such cooling will be expensive.

iv. Agronomy

As the growing operation matures, diseases will likely emerge which will have to be analyzed and combated with pesticides, etc. Moreover a high value crop such as avocados will require bespoke fertilisers and soil enhancement for which advice and products are not available in Tanzania currently. Allowing the operation access to such advice from agricultural centers outside Tanzania, prior to such advice being available within Tanzania, will be crucial to maintaining the export quality and quantity of the product.

v. Packaging

Currently few packaging alternatives exist in Tanzania. Over time the operation will be able to benefit greatly as well as support a local packaging industry should such industry be developed locally and thereby avoid having to import packaging materials. Such local packaging will also be able to help with a value adding/branding strategy later on when the product is established.