MANGO VALUE CHAIN ANALYSIS IN TANZANIA

FINAL REPORT

JANUARY 2011

"Embe bora *limelala mchangani*
Nani atalichukua?"

STUDY INITIATED BY AMAGRO AND COMMISSIONED BY

Cluster Competitiveness Program

AND CONDUCTED BY

Match Maker Associates Ltd

ABBREVIATIONS

ADF	African Development Foundation
ARI	Agricultural Training and Research Institute
ASA	Agricultural Seed Agency
BET	Board of External Trade (now TanTrade)
BOT	Bank of Tanzania
CFC	Common Fund for Commodities
CIF	Cost Insurance and Freight
COMESA	Common Market for Eastern and Southern Africa
COSTECH	Commission for Science and Technology
CSF	Critical Success Factor
DADP	District Agricultural Development Programme
DALDO	District Agricultural and Livestock Development Officer
DRC	Democratic Republic of Congo
DSM	Dar es Salaam
EPZ	Export Processing Zone
EU	European Union
FAOSTAT	Food and Agricultural Organization – Statistic Service
FINTRAC	Woman owned and US-based Agri-Business Consultancy Company
HODECT	Horticultural Development Council of Tanzania
LGA	Local Government Authorities (often District Councils)
MAFC	Ministry of Agricultural, Food Security and Cooperatives
MITM	Ministry of Industry, Trade and Marketing
MMA	Match Maker Associates Ltd.
Mt/MT	Metric tons
NGO	Non Governmental Organization
PPP	Public-Private-Partnership
PSD	Private Sector Development
R&D	Research and Development
SACCOS	Savings and Credit Cooperative Society
SGM	Simplified Gross Margin
SGP	Simplified Gross Profit
SUA	Sokoine University of Agriculture
TAHA	Tanzanian Horticulture Association
TAPP	Tanzanian Agriculture Productivity Programme
TBS	Tanzania Bureau of Standards
TCCP	Tanzania Cluster Competitiveness Programme
TFDA	Tanzanian Food and Drugs Authority
TIB	Tanzanian Investment Bank
TOSCI	Tanzania Official Seed Certification Institute
TZS	Tanzanian Shillings
UAE	United Arab Emirates
USAID	US Agency for International Development
TANEXA	Tanzania Exporters Association

TABLE OF CONTENT

LIST OF FIGURES:

LIST OF TABLES:

ACKNOWLEDGEMENT AND DISCLAIMER

A team led by Peniel Uliwa (MMA) together with Frederic Kilcher (Affiliate Consultant) and Marc Keller (MMA) has written this report. However the invaluable support of Tertula Swai (TCCP) and Hamadi Mkopi (AMAGRO) during the fieldwork made our work so much more effective whereas the AMAGRO office has been backstopping us throughout the assignment. In the course of undertaking this assignment, the team has received enormous support and cooperation from different people and organisations, all of which are sincerely acknowledged. Without their contributions, this task would have been much more onerous if not impossible, at least in such a short time.

Special thanks go to the numerous AMAGRO members (The Chairman Mr Burton Nsape, members of the board and executives and other members), who made – out of their business schedules – time to provide the consultants with valuable insights. The information and views of the various DALDO's and their horticultural specialists (Bagamoyo, Tanga Municipal, Korogwe, Mkuranga, Kisarawe and Morogoro Districts) contributed greatly to the success of this study.

Our gratitude also goes to Alon Hovev (Director) and Eran Hovev (CEO) of Tendaji Agro, as well as Dr Salum Diwani (Director) of By-Trade, Ian Samakande (Managing Director) of Agro-Rain, Fatma Riyami (Managing Director) of Natureripe Kilimanjaro Ltd., Anil Kumar (Managing Director) of Mbagala AZAM factory and Julien Camaleonte (Sales and Marketing Manager) of YARA, Ms Jacqueline (CEO) TAHA for their openness and knowledgeable views. We acknowledge and value the insights from Mr. Mtopela, Mwinyi and Hussein (wholesalers), Mtemi Lawrence (Executive Director of TANEXA), Fanie Du Plesis (Trading Manager at Freshmark/Shoprite) and Raymond Wigenge (Director of Food Safety for TFDA).

Last but not least the enthusiasm and commitment shown by Lameck Borega (Investors facilitation officer for EPZ), Faustine Masaga (Chief Standard Officer for TBS), Geoffrey Kirenga (Director Crop Development at MAFC) and Theodosy Msogoya (SUA) – was highly appreciated for their valuable contributions. The contribution of the AMAGRO members and other invited stakeholders who participated in the validation workshop of November 29th 2010, is highly appreciated.

There are many more persons who were consulted during the assignment but it is impossible to add all their names here. We sincerely thank all of them for their inputs.

Finally, it must be stressed that the opinions expressed in this report are purely those of the authors based on observations and findings during the study. It therefore goes without saying that the authors, and not AMAGRO takes full responsibility for any errors or omissions that may be found in the report.

EXECUTIVE SUMMARY

Global picture

Worldwide Mango are grown in over 60 countries and half of the produced and traded tropical fruits are mango. The mango fruit grows well under (warm) tropical climate, with long dry season (over three months) followed by sufficient rains. Tanzania is the 17th largest producer in the world with over 300,000 ton per year, whilst India, with annual production of over 13 million tons, is by far the largest producer in the world. The Tanzanian production is, however, largely dominated (around 95 %) by the traditional varieties but this study focuses essentially on the exotic or improved varieties[1] that are globally traded. Countries in the Northern hemisphere are producing but also consuming most of their mango. The production time in the northern hemisphere is roughly between April and September and in the Southern hemisphere between November and March. The lack of supply in the northern part of the world during these months and their high demand provides a very interesting export opportunity for Tanzania and other countries located below the equator. Although the EU is an attractive export market, the Middle-East and Turkey provide an even more attractive opportunity for Tanzania, due to their relative vicinity, their less stringent requirements (compared to the EU) and their growing economies.

Regional market perspective

To tap from this export opportunity, Tanzania needs to be competitive within the region (South and Eastern Africa), mainly with South Africa, Kenya, but also Mozambique and Madagascar. South Africa and to a lesser extent Kenya are very much ahead of Tanzania due to their higher productivity, marketing, logistics distribution networks and their comprehensive public-private partnership approach. Kenya is exporting annually approximately 2,500 to 3,000 tons (2009) to Tanzania, its second biggest export market and this is mainly when Tanzania is not able to produce. For Tanzania, besides the export market, the increasing amount of local urban medium and high-income consumers, provide another interesting market outlet for improved and processed mango products.

Mango subsector in Tanzania

In Tanzania we can differentiate two varieties of mango, improved and traditional. The first group comes from non-commercially planted mango trees. These traditional mangos are bought by small traders from different sources in the country and sold in urban centres. Over 95 % of the mango traded in Tanzania is coming from this traditional channel. The improved varieties have been introduced from different countries in the last 40 years. The “improved” varieties are being produced by medium to large-scale farmers mainly located in Tanga, Morogoro and Pwani Regions. Some of these farmers have tried to export mangos but have currently stopped due to problems of fruit flies and inability to supply sufficient volumes. The

[1] In this document, when we mention improved varieties, we always refer to the varieties that resulted from the selection and improvement programmes realized in India, USA and other countries. This generic name covers many varieties whose total number is not precisely known (maybe ~30 on the main land and ~ 200 in Zanzibar).

mango sub-sector is mainly driven by the large export demand, increasing demand from processors (mainly Bakhresa in the meantime) and increasing demand from local medium-high income urban consumers.

Currently the Tanzanian mango potential for improved varieties is not well utilized, even though the climate, the soil, the seasonality opportunities etc. are favourable. On production level, farm management and business acumen are often weak as there is a lack of agricultural knowledge and dissemination of it, insufficient market focus, marketing is dominated by spot transactions, record are hardly kept and a long strategy for the sub sector is yet to be defined. This result, among other issues, in major post-harvest losses, low yields, inability to control fruit fly and overall the inability to sustain a profitable mango farm.

Other critical weaknesses of the subsector are, among others, lack of regulation and certification of seedling, low uses of necessary farm-inputs (i.e. pesticides and irrigation), inappropriate financial services and hardly any reliable data collection, processing and dissemination. There are, however, numerous project interventions by NGOs and the government but these have not yet managed to sustainably improve the situation by developing effective and efficient supply chains in order to take full advantage of growing market opportunities. Tanzanian's neighbour Kenya, offers an attractive opportunity to learn from and benchmark with, especially as Kenya has set up a strong national strategy that consists of a strong partnership of the public and private sector.

In this context, a large part of the mango farmers who don't invest in the crop in an adequate manner fail to take advantage of the potential of the crop. These farmers only manage to get an average of 50 mangos per tree (7,020 mangos per Ha after deduction of losses) after substantial investment during several years (up to 7) and their gross revenue per hectare was ascertained at barely TZS 1.17 million, corresponding to a Simplified Gross Margin of 17% and after deduction of their direct costs (970,000 TZS/Ha). This is not even as much as a result of a reasonable maize farm. With this scenario, which should be addressed by all means, the farmers would have to wait up to twelve years before the cash flow becomes positive.

There are few farmers who have tried harder and invested more (about TZS 3 million per hectare) including irrigation. These farmers have managed to sell up to 46,800 mangos per hectare for over TZS 8.4 million (7^{th} year) that have resulted into a Simplified Gross Profit of TZS 5.4 millions (equivalent to a SGM of 64.3%) and positive cash-flow are possible after the 8^{th} year. But for those who have made such investments and for a number of reasons (poor management, external climatic conditions) such that the yields have are not significantly above the level of the "average farmers", the investments have resulted in high negative margins (gross profit of menus TZS 1.6 million equivalent to a SGM of minus 115.8%).

The traders and processors seem to enjoy better margins although the small volumes handled by traders is a limiting factor.

Though it was outside the scope of this assignment to conduct an in-depth feasibility / business plan of investment in a mango venture, it became evident that investment decisions needs to be taken with caution and optimal management of mango farming is crucial for success. The uncertainty in achieving high yields highlights the

importance of fast-tracking the improvement of the skills and – for those who have not yet invested sufficiently – to equip their farms with the basic infrastructural equipment (irrigation, dipping and pack-house, etc.) and apply the recommended best management practices.

Value Chain Development

Based on these sub-sector findings, three supply chains based on the growing market segments have been identified for further development. These are coupled with a number of business models that have been crafted for value chain upgrading. Whilst the main target in the medium to long term of supply/value chain improvements will be the export market, there are deliberate efforts to craft efficient supply chains that are geared at the local up-market and at supplying the processors with quality mangos.

The first selected chain is the 'high quality fresh mango for the export market'. The current seed supply is clearly a problem and therefore seedlings would have to be supplied by selected/trusted private seed suppliers and eventually own seeds can be multiplied. In this chain, four initial clusters (Kabuku, Bagamoyo, Mkuranga and Kibaha) are recommended to be organised around pioneering, progressive and more productive growing areas. These clusters should make the harvest and post-harvest handling, farm-management, logistics and marketing much more efficient and effective. The Kabuku cluster is proposed to be led by Kabuku-Mayunga farm, and in Mkuranga, the Natureripe Kilimanjaro Ltd can play a leading role. Mr Shenyagwa in Mlandizi could be spearheading the Kibaha cluster. In Bagamoyo a combination of farmers could lead the cluster. The various clusters are required to have a dipping facility, pack houses and refrigerated transport up to the airports / harbour. The management of the clusters is envisaged to be outsourced to highly qualified experts. The chain is clearly geared at the highly attractive export market in Middle East but also Turkey, as both markets have shown high interest. AMAGRO and various public-private partners (FINTRAC, Tendaji-agro, TAHA, TCCP, etc.) will be catalyzing the chain in crucial aspects like organizing the cluster structure, feasibility for setting-up post-harvest facilities along the chain, establish regular and quality seed supply but also in strengthening farm-management and increasing market-linkages.

The second chain is driven by increasing local demand of medium-high income consumers, who demand high quality, disease free and spotless mango. To successfully penetrate this market, farmers should be organised in collection points, which deliver consistently the quality mangos via a contracted network of specialised fresh fruit wholesalers and retailers in main urban centres and DSM in particular. The contracted fresh mango fruit intermediaries would have to follow the required quality standards, procedures and contribute to the promotion of mango, possibly with a common brand. The retailers should be able to maintain the temperature of the mango in their shops in order to preserve the quality, appearance and shelf-live of the mangos. All these chain actors have to comply with the needed requirements and therefore only a selected group of retailers initially will be part of the chain. The economic benefits for the chain actors will be that this market segment will absorb increasing volumes, provide higher end-market prices and lower overall losses. AMAGRO, together with partners like SUA, HODECT, TCCP, TAHA etc., will focus

their support efforts on data collection and dissemination, training of chain actors on implementation of chain requirements, set-up market linkages, etc.

The final chain is the 'processors led chain', currently mostly driven by the Bakhresa Group of Companies with other companies coming up in Morogoro & Kibaha. Although a large part of the requested mango for the processor will continue to come from the traditional varieties and channels, there is an opportunity for improved mangos too. The growers targeting the local upmarket and export market will not manage to only produce first grade (high quality) mango and therefore they will need to find an attractive market outlet for their second- and third grade (lower quality) mango. Setting-up strong market linkages and transport modalities will reduce losses and costs. The clusters, presented in the previous chains, will be used to set-up business linkages with processors and an efficient transport modality. The clustering of growers might give stronger stand to bargain for slightly higher prices. AMAGRO, various development partners and the processors will be training for specific grading system, identifying and training selected processors but also in facilitating market linkages.

In addition to the specific value chain recommendations, and in order to attain growth and competitive of the mango sub sector in Tanzania, the following main crosscutting generic interventions are proposed: the promotion of Good Agronomic Practices (GAP) through improved extension services and demonstration farms, the promoting of a system for certification of seedlings, promotion of R & D and dissemination of results on crop management - Pest & Diseases (fruit fly etc), implement feasibility studies for infrastructure required through PPP, lobby for conducive Trade Policy, intensify the market promotion (trade fairs, mango festivals and extension of the local retail network, etc.), finalise and keep updating data on sub sector (production, varieties, markets) and develop and implement a sustainability strategy that prioritizes only the key areas on which AMAGRO can do better than other existing entities. The AMAGRO strategy could include actions such as lobbying on behalf of their members, brokerage of on-demand (paid) extension services to specific members' needs, advisory on investment requirements (technical and financial) and broker between their members' needs for capital and financial institutions.

It is thus expected that by adopting the findings and recommendations in this study would provide AMAGRO with a strong direction in their ongoing strive to further professionalize their organisation and a base to engage with other key stakeholders in a bid to improve the subsector at large. And even more important, the identified value chains provide a clear market oriented focus and the value chain driven strategies will make the mango actors more competitive, effective and profitable.

1 INTRODUCTION

Match Maker Associates (MMA), a private sector development (PSD) consultancy and training company based in Tanzania was assigned by AMAGRO with the support of the Tanzania Cluster Competitiveness Program (TCCP), to undertake an analysis of the mango sub-sector in the regions of Tanzania with major focus on the improved / exotic varieties. This study is intended to give AMAGRO the understanding of the Mango Value Chain and to identify the possibilities of developing the industry along the entire value chain and in order to make Tanzania grow and become competitive in the mango industry.

Tanzania has been growing essentially traditional varieties of mango for domestic market but currently improved varieties are increasing in importance and a unique market window exists regionally and internationally. The study is based on in-depth review of relevant literature and field interviews (see ANNEXE I: ITINERARY FOR Mango SUB SECTOR ANALYSIS) with a wide variety of actors in Dar es Salaam, Arusha, Tanga, Pwani and Morogoro, all carried out with maximum participation of AMAGRO members.

The value chain is a new concept to many AMAGRO members. Therefore a workshop was conducted on 21/10/2010 to introduce the value chain concepts and methodologies to AMAGRO members and one member of AMAGRO and one of TCCP were associated to the MMA consultancy team during fieldwork. After preliminary analysis of data and draft report, a validation workshop was held on 29/10/2010 with the objective of validating and sharing the outcomes of the value chain analysis and recommendations for the way forward.

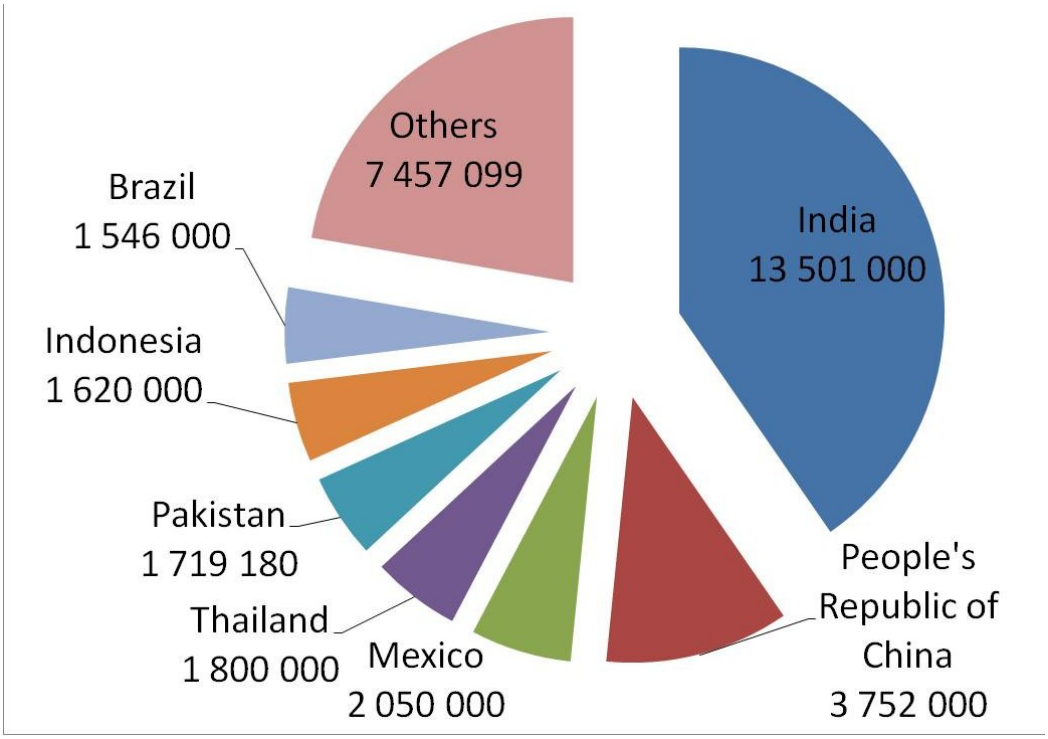
The report starts with the market analysis, which gives an insight of mango market in the world, regional and local market. The following chapter, the Sub sector analysis and development, covers the sub sector actors and dynamics, the economic viability of the sub sector and the major constraints and opportunities for growth and competitiveness. It ends with some insights about interventions that, if implemented will contribute to the development of the sub-sector. The fourth chapter provides a comprehensive value chain analysis for three different chains identified according to their potential of development. The report ends with the proposed way forward and some conclusions. Lastly, the annexes contains various supporting documents, the itinerary and a contact list.

2 MARKET ANASYSIS

2.1 WORLD MARKET

Fifty percent of the tropical fruits produced and traded worldwide are mangos that are grown in over 60 countries. The mango fruit grows well under (warm) tropical climates, with long & dry season (over three months) followed by sufficient rains. Although the total world mango production is over 25 million tons most of it is locally consumed[2]. Mango prices are declining in the world market with growing export volume, though prices fluctuate mainly depending on variety, size, origin and season. The largest producers can be seen in Figure 1 below.

Figure 1: Largest producers in the World (Metric Tons)



Source: Food And Agricultural Organization of United Nations: Economic And Social Department: The Statistical Division (2007).

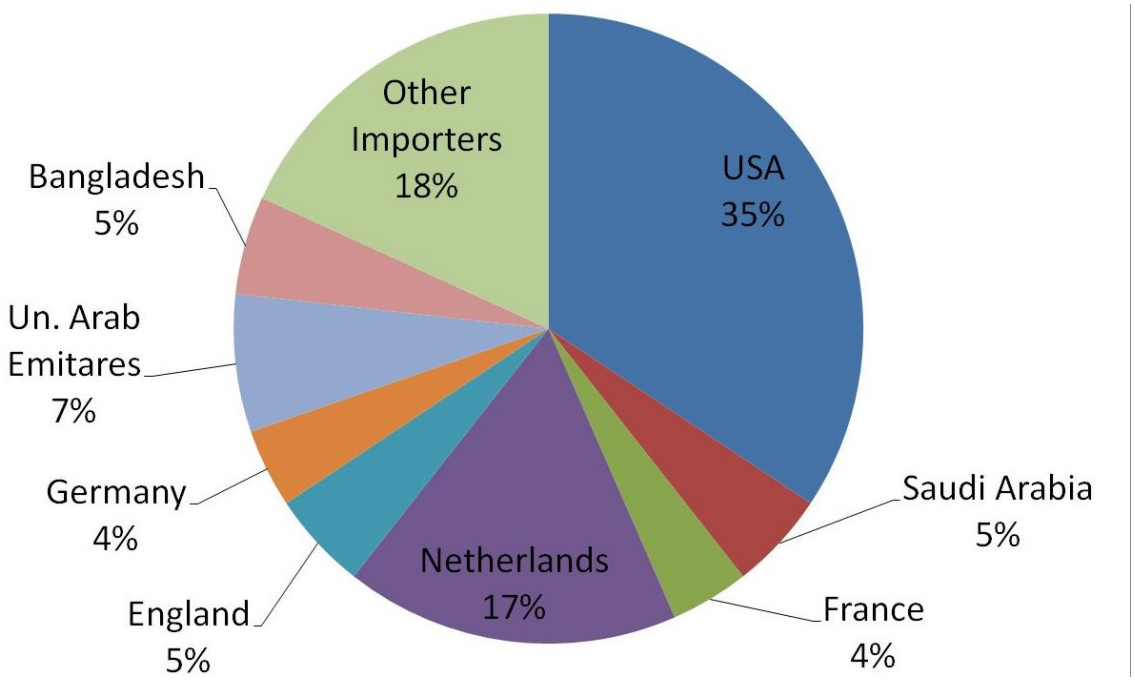
Figure 1 reveals that seven countries are producing over three quarters of the entire world mango production, with India being the leading producer (over 47%). Interestingly most mango producing countries still have the potential to further increase their production in response to increasing demand and taking into account the seasonality advantage of production cycles by countries in the northern and southern hemispheres.

The markets for local consumption as for export are growing. The demand for mango throughout the world has been increasing, especially in the United States of America

[2] TechnoServe: Business opportunities and challenges in the Beira corridor (2008) – data from 2002 to 2008.

and in Europe mostly as consumers in the developed world are becoming more and more aware of the tropical fruit and its many different uses. In Figure 2 we see the largest importers of mango.

Figure 2: Largest importers (relative importance - %)



Source: USDA, Foreign Agricultural Service 2006

The USA is the single largest importer: in 2005 it imported 289,088 Mt and in 2006 it imported mango worth $ 233.1 Million[3]. But due to USA's relative large distance and strong competitions from South-American producers, the European and Middle-Eastern markets are more feasible and attractive for Tanzania. Note that the Netherlands in Europe and UAE and Saudi Arabia in the Middle East are redistributing the mango in their respective regions. There is no longer an international market for green skinned mango (Dodo, White Sofa, Keitt, etc.). Consumption of mango in the EU is among the lowest consumption levels in the world, but the EU market is growing quickly. Between 2003 and 2007, consumption increased by 7% in value annually. As consumers get more familiar with mango, preferences are shifting from nicely coloured but fibrous varieties, towards less fibrous varieties[4]. The growing demand in Europe can be explained by its exotic reputation, it healthiness (Vitamin A and C), energy (Carbohydrates) and helps maintain healthy blood sugar levels (Cholesterol - free). In the Middle-East (especially in the United Arab Emirates) the religious control on alcohol increases the demand for fruit-juices (mango often being the most popular juice).

Yellow varieties (e.g. Kesari/Muyuni, Apple, Edward, Florigon, Haden) are acceptable in Far East whereas Red varieties (e.g. Tommy Atkins, Zill, Early Gold) are preferred in Europe. Middle East accepts both. The export requirements in the Middle East are

[3] USDA, Foreign Agricultural Service 2006
[4] CBI, Market survey, the EU market for Mango, 2009

generally lower than in Europe although strong taste (quality), size etc. are determining factors. The market for ready-to-eat mango (pre-cut and packaged) is small but growing in EU. Access to the EU market is however, dictated by stringent standards and certification requirements (EUREP-GAP, HACCP and other Ethical Trading Initiatives (ETI), which makes it difficult to export mango from Tanzania to EU.

The seasonality is a crucial factor in the Mango trade. Table 1 (below) shows that major Mango growing countries from Northern Hemisphere are only producing during a part of the year, thus providing export opportunities for others countries during the rest of the year (Tanzania, South Africa, Peru and Indonesia).

Table 1: Mango harvest seasons in main mango producing countries

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Pakistan												
Philippines												
Mexico												
Malaysia												
Jamaica												
India												
Venezuela												
Guatemala												
Kenya												
Egypt												
Indonesia												
Brazil												
Australia												
Madagascar												
South-Africa												
Tanzania												

Source: Pakistan horticulture Development & export board, Mango marketing strategy (Lahore 2005).

In recent years Kenya managed to take full advantage of being situated on the equator, thus been on both the Northern and Southern Hemisphere. Table 1 shows that Kenya has one long mango season (the high season from October to March – coloured in light brown) and a small season from April to June (coloured in dark brown). We will see later that this enables Kenya to export mango to Tanzania and the wider region. Tanzania is the second export market for Kenya[5].

[5] Steve New, Kenya Horticultural Development Program 2004-2010 Market Opportunities for Mango Growers (USAID 2010).

2.2 REGIONAL MARKET

None of the (seven) large producing countries are in Africa (see Figure 1), however the continents' share and production is going up. Moreover African countries are gradually managing to penetrate export markets, for example West-African countries (i.e. Mali, Burkina and Senegal) are progressively exporting to the EU (see Table 2) varieties such as Amélie, Kent, Keith and Palmer.

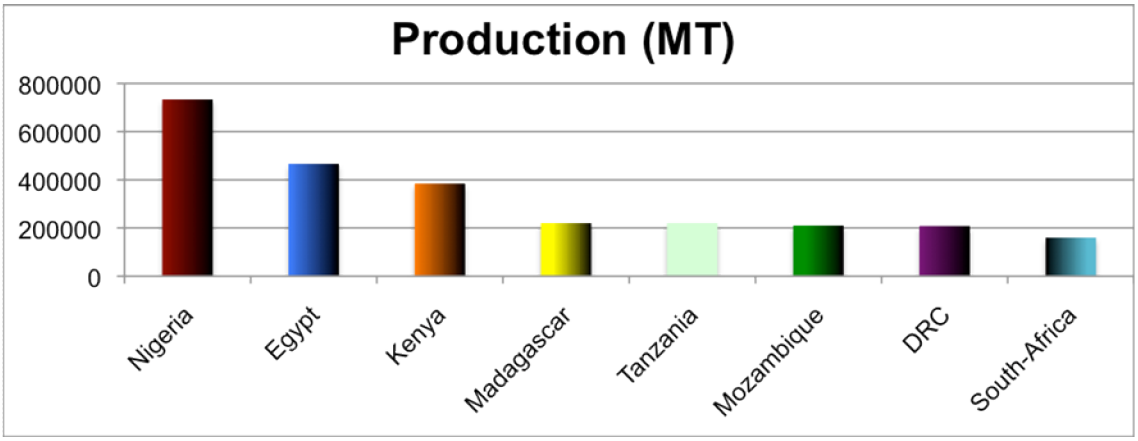
Table 2: Imports into the EU 2004 - 2009 (Mt)

Suppliers	Years						Growth 04-08	
	2004	2005	2006	2007	2008	2009*	Annual	Total
Brazil	69,319	82,293	84,858	82,993	96,870	69,590	9%	40%
Peru	19,817	26,394	41,027	36,854	50,756	25,062	27%	156%
Pakistan	10,938	12,306	10,120	13,224	12,941	12,913	4%	18%
Israel	8,059	12,548	11,181	14,808	12,261	12,606	11%	52%
Cote d'Ivoire	11,426	9,856	14,428	14,706	11,249	11,659	0%	-2%
USA	7,612	6,894	5,971	7,404	7,516	5,536	0%	-1%
Senegal	2,810	3,011	6,194	4,702	6,034	6,219	21%	115%
Costa Rica	3,983	6,271	7,545	4,664	5,360	5,685	8%	35%
Mali	2,096	2,560	3,477	4,317	4,902	3,480	24%	134%
Dominican Rep.	1,228	1,591	1,618	2,767	4,307	4,179	37%	251%
India	915	1,720	2,472	2,425	2,577	2,470	30%	182%
Burkina	928	1,164	2,152	3,191	2,406	1,957	27%	159%
Others	23,516	20,035	19,786	19,003	13,209	12,893	-13%	-44%
Total	**162,646**	**186,643**	**210,829**	**211,057**	**230,388**	**174,248**	**9%**	**42%**

Source: Eurostat 2009

Africa as a whole was producing 2.92 million tons of mango out of which 2.38 million tons were used to satisfy domestic demand. 229,797 tons are exported to Arabia, 98,114 tons to non-mango-producing Asian countries and 220,410 tons to Europe. The common market for Eastern and Southern Africa (COMESA) is very limited, only worth $1.5 Million in 2005. Figure 3 shows us the largest producers in Africa. Tanzanian can take advantage of being located in the Southern Hemisphere but it has to compete with South-Africa, Mozambique, Madagascar, DRC and Kenya who are also located south of the equator. Kenya in particular has developed a very strong and ambitious public-private partnership to further increase their role as mango exporter. Tanzania is the second market outlet for Kenya (over 3,000 MT) in 2009 after United Arab Emirates (3,500 MT).

Figure 3: Largest African producers in 2007



Source: Food And Agricultural Organization of United Nations: Economic And Social Department: The Statistical Division (2007).

Mango growing countries in Southern and Eastern Africa are targeting the EU market but increasingly the Middle East and to a lesser extent also Southern and Eastern Asia are offering attractive export opportunities. Moreover the relative vicinity of East-African countries to Middle East makes it logistically less costly and gives a competitive advantage. Moreover the rules and regulations in this part of the world are less rigid than in the European Union. Mango growers in Latin America and West-Africa, have a comparative advantage over Tanzania for export to EU due to their relative vicinity and the fact that they dispose of more developed infrastructure for exporting.

2.3 TANZANIA

Two main types of mango can be differentiated in Tanzania: the local ("traditional") varieties and the recently introduced "improved" ones. In the list of the 20 top producers in the world (FAOSTAT, 2000) Tanzania was ranked 17th and produced about 0.87% of the production in that year which is most likely mango of traditional varieties.

Table 3 below show the different mango varieties commonly in the market in Tanzania:

Table 3: Common traditional and improved mango varieties produced in Tanzania and relative prices

Variety	Farm-gate price (TZS/piece)	
	High season	Low season
"Traditional" varieties		
Dodo, Bolibo, Ngowe, Viringe, Muyuni, Bonyoa	15 to 66 TZS/Unit	50 to 150 TZS/Unit
"Improved" varieties		
Apple, Tommy Atkins, Kent, Keith, Alfonso, Pavin, Zill (Red Indian), White Sofa, Van Dyke, Haden	100 to 300 TZS/Unit	300 to 500 TZS/Unit

Source: Data from the study

The production is expected to grow rapidly in the coming decennia, especially because in the last decennia several hundred large commercial mango farms were

established or are being established in many parts of the country (e.g. Mayunga & Turiani Farms in Tanga region, up to 300 new farms totalling about 15,000 ha in Mkuranga in Pwani Region. Several new farms are being established in Tabora, Morogoro, Dodoma, Kilimanjaro regions). These farms are mostly producing the improved varieties that are demanded by the local up-market and the export market. The few progressive Tanzanian exporters have difficulties conforming to the standards of the export markets (mostly Middle East), namely consistent quality (spotless appearance, without any diseases etc.), consistent supply (minimum several Metric tons per week), timely deliveries and supply of specific Mango varieties.

The end markets change according to the type of mango. The local market is still dominated by the local (traditional) varieties although the improved varieties are increasingly consumed and in a lesser extent exported. Overall, Tanzania is producing about 317,000 Mt but only recently the country is acknowledging the full potential of it. Therefore the production is expected to grow rapidly in the coming decennia as a result of the establishment of farms of different sizes in different areas with "improved" varieties. During the study we have visited farms of up to 300 acres. The improved varieties are more appreciated by the local up-market and are the only ones suitable for exports.

In 2008, Tanzania exported only 200 tons to Kenya and less than one ton to Kuwait. That same year Tanzanian imported 2,000 tons from Kenya, 1.5 tons from United Arab Emirates and less than a ton from India. In 2009 only 5 tons were exported to South Africa whereas 2,500 to 3,000 tons were imported from Kenya, 336 tons from India and 130 kg from United Arab Emirates. The relative large imports from Kenya can be explained by the different production calendars: Kenyan producers can produce during a longer period of the year and can export to Tanzania when Tanzania faces a gap of mango supply.

Although imports fluctuate, generally there is an increasing trend for imports. The imports are mostly in the off-season, when there is hardly any local supply. Besides occasional droughts, there is no indication that the local production (in the high season) has gone down, on the "contrary" actually. We have no indication that the traditional mango growing significantly changes (up or down), however the mango growers for improved varieties have increased strongly over time. Thus local market demand is increasing but so is the production, especially during the high season (Dec- March) there is larger supply than the demand. From 1994/95 to 2003/04 mango production in Tanzania has increased from 165,514 Metric tonnes to 255,000[6]. Unfortunately there is lack of more accurate and recent production data. However, most of the surveyed AMAGRO producers, which is a good illustration of all AMAGRO members, started their mango production activities less than 5 years ago. Thus they were only recently able to supply the market. Also non-AMAGRO members are supplying increasing amounts of improved mangos (i.e. from Tabora and Shinyanga – see Figure 7) to the Dar es Salaam market. For example in the months September-October, Tanzania normally relies on imported mangos from

[6] Prof. Dazydelian L. Banda, Mango Value Chain Development presentation (Round Table Africa 2008)

Kenya but in October 2009, Tabora and Shinyanga managed to supply the Dar es Salaam market with over 1500 Metric Tons (mostly with Dodo, Boribo and Ngowe).

Local prices are therefore expected to decrease if no new markets will absorb the new inflow of locally produced mango (i.e. increase in exports for improved mango and processing for traditional and improved varieties). Markets for exports and processing show great potential but a strong public-private partnership and market / value chain led approach is needed, to benefit from these opportunities. Presently, the Bakhresa group of companies has increased its processing capacity to 165 MT per day of juices and concentrates but also large multinational companies / organizations like Tendaji-agro are increasing their efforts to get involved in the export of mango. There are serious pipeline plans to revive the ailing UNNAT Fruit Processing Company based in Morogoro which has huge capacity for fruit processing.

Taking into account the growing local population and increasing urbanisation, the local (medium-high income) market will remain a highly attractive market. The medium-high income market is dominated by Dar es Salaam, although demand for high quality mango continues to grow in Arusha and Mwanza as well. Official records on the population in Dar es Salaam, estimated by the city council, are set at 3 million though unofficial estimates suggest the actual total to be 4-5 million people. This indicates a substantial and attractive market in Dar es Salaam. Also there are more and more single and smaller households in Dar es Salaam and these tend to high quality, branded products and well-packaged[7]. The increasing request from the up-market for spotless, branded, disease free, large size and strong taste mango is a strong indicator for it.

3 MANGO SUB SECTOR ANALYSIS AND DEVELOPMENT

This chapter highlights the survey findings on mango subsector dynamics in Tanzania, more specifically in Pwani, Morogoro and Tanga regions. The mango sub-sector is defined as “the set of mango products for different market segments”. The analysis and description of this sub-sector are based on:

(i) the mapping of the flows of mangos (between actors and on geographical basis),

(ii) the description of the different actors involved and their functions,

(iii) the dynamics – meaning the positive and negative conditions and processes that influence the current and future situations,

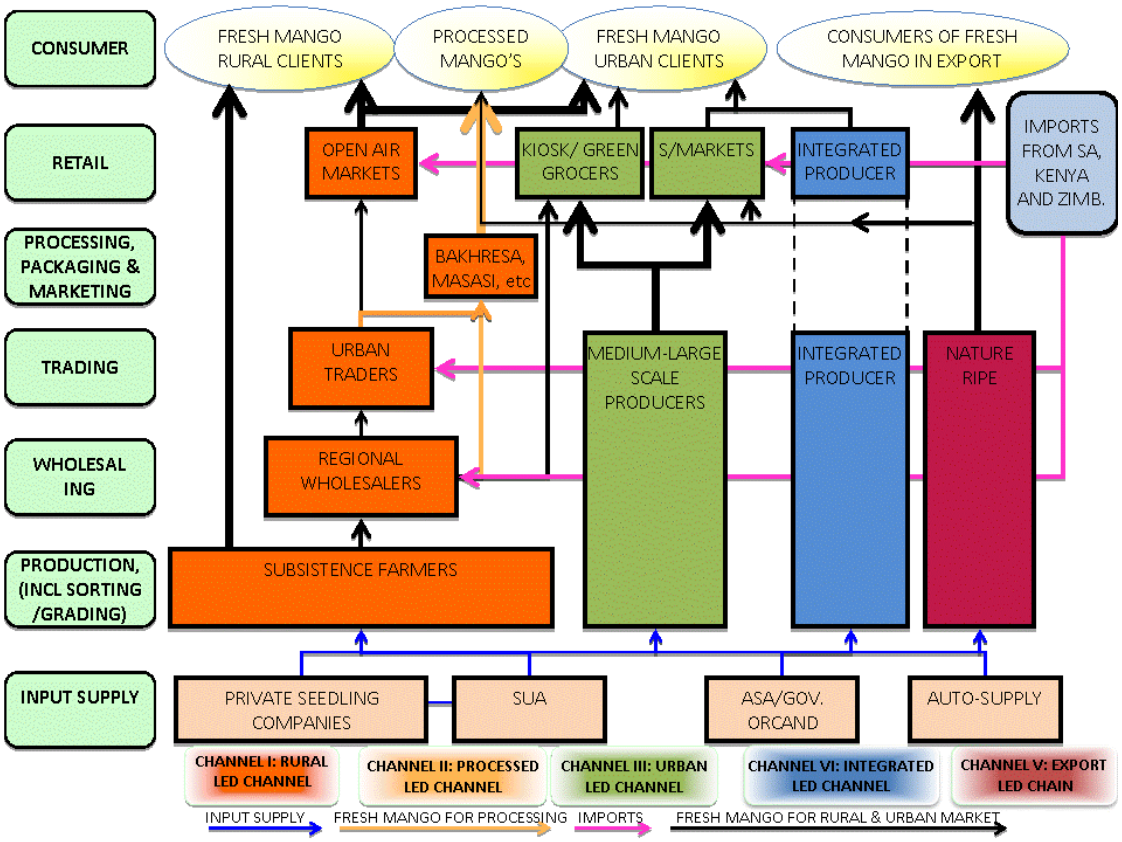
(iv) the analysis of the economic viability of the sub-sector and

(v) the constraints and opportunities to be dealt with or utilized for the development of the sector.

[7] This information was provided by the city council of Dar es Salaam (2010)

3.1 MANGO SUB-SECTOR: INTRODUCTION AND MAP

Figure 4: Mango Sub-Sector Map



Source: Data from the field study

The sub sector map (Figure 4) shows how mango products currently flows via several alternative supply chain paths from farm to various end market consumers in Tanzania. Five primary channels or supply chain paths operate within the country.

- The first of these is what we can refer to as a low-income led market channel of "traditional" varieties of mangos. In this channel, producers get their seeds from various sources and practically don't use fertilizers and pesticides. Most of mangos move through regional traders and urban wholesalers, onto the retail outlets (open air markets and street vendors) to low income consumers.
- The second alternative channel focuses on the growing demand of processor (presently Bakhresa – AZAM Fruit Juices in Dar es Salaam) although UNNAT Fruit Processors in Morogoro is expected to become soon a substantial buyer of mango for processing of fruit juices once it reopens its factory. The processor(s) mainly rely on supply from the traditional varieties of mango directly supplied by producers or traders, who are able to sell mango at factory-determined[8] prices, which are lower than in the fresh market. To remain competitive Bakhresa has to purchase its mango for lower prices,

[8] Prices offered by processors are lower than fresh market. A study in Kenya indicated that Processors cannot pay more than Ksh10-12/kg (TZS 160-200) to compete with imports or export to world markets. Currently AZAM buys traditional varieties of mango for 140 to 200 TZS/kg.

however it can provide producers with a secured market with large volumes. Moreover the combination of different kinds of mango more or less fleshy, sweet, with flavour, with fibres, etc. allows improving the quality of the juice.

- Urban consumers drive the third channel. These consumers are becoming more familiar and appreciate the properties of improved varieties. During this study it came up that Apple and Keith are among the top varieties in high demand, which are mainly produced by commercial large-scale farmers. However the traditional varieties still dominates the urban market.
- The fourth channel is very similar to the third, only that it integrates all activities under control of a single company through to the retail level that enables this company to control quality and build up a reputation (brand) for their products. The driving forces behind this channel are own-initiated large-scale farms primarily selling improved varieties to the urban consumers.
- Lastly we have the export led channel, which is presently championed by Natureripe Kilimanjaro Ltd, although there are a few other actors who also sporadically manage to export (low volumes). The export drive has not been taken up actively in last years due to pest and disease threats.

In the mango sub-sector, various distinct actors can be distinguished across the five channels described above that perform different functions. These actors are described in the Table 4 below.

3.2 PRIMARY ACTORS

Table 4 below provides a description of the activities and functions assumed by the different primary actors involved in the mango sub-sector.

Table 4: Primary actors, activities and description

Actors	Activities / Functions	Description
Input suppliers	Provide agro-inputs, advises and training, experiments, analysis	Input suppliers like By-Trade, Yara, Agro-Rain and Balton are important partners for the mango growers because they provide a set of pesticides, fungicides, fertilizers, etc. necessary to guarantee the success of production of new varieties of mango. This requires them to identify the most appropriate agro-input products for this crop, to manage the registration process and to take part to the testing of the agro-inputs with the farmers. Whenever required, these companies advise or train the farmers. Yara even carries out soil and leaves analysis. The agro-dealers are thus part of a broad research group that supports farmers in their attempts for setting up highly performing mango farms.
Nursery Developers	Produce seedlings, test different varieties, trace the best rootstock and grafts	Nurseries produce seedlings that are either grafted or not. They collect seeds, prepare the rootstock, do grafting (or not and make sure that the seedlings reach a proper stage of development. They identify the best rootstock and the orchards from where scions can be collected. Besides private companies / farmers, public organisations like SUA, Government Orchards in Mpiji – Bagamoyo and ASA are important suppliers of seedlings. Mr. Shebuge in Tanga, Natureripe and Mr. Shabani Ndalo (Bolibo Nursery) in DSM are prominent long time suppliers of seedlings.
Producer	Produce mango, harvest, grade, treat, package, bulk, (retail).	There are three main categories of mango growers: subsistence farmers growing traditional varieties, other SHFs growing traditional varieties and improved varieties and lastly the medium to large scale mango growers (over 50 acres) who are predominantly growing improved mango varieties. The last group is largest group in commercial mango growing. However most producers have only started relatively recently (less than 10 years ago) to grow improved mango varieties for commercial purposes.
Trader	Harvest, bulk, transport, retail	Most traders of mango buy from farms and sell to wholesalers in urban areas e.g. in DSM they sell to wholesalers in Buguruni, Temeke, Kariakoo and Ilala markets (70 to 80%) who in turn sell to retailers or directly to consumers (10%). Few town retailers who try to get supply directly from rural areas (10 t 20%). Usually, traders rent from SHFs a tree for a season according to the expected production of that tree and harvest according to the ripening and market needs. Many traders still work with traditional varieties, especially Dodo because they are less prone to rotting and more known to the consumers.
Wholesalers	Bulk, Transport, grade,	Wholesalers are based in the main fruit markets in Dar es Salaam (Buguruni, Temeke, etc.) and other urban centres in Tanzania. They gather large quantities of mango from the different supply areas. They either put orders with traders who bring the mango to the wholesalers' trade point or they organize themselves a trip to the production areas where they

		get mangos from producers or local traders. The wholesalers sell mangos to retailers, consumers, hotels and restaurants and to processors if no other fresh market outlet is available.
Retailers	Grade, Retail,	They are located in the local markets or at the street corners in kiosks. In the rural areas, they source mango from producers or middlemen who bring mango to their retailing point. They deal with a limited number of suppliers (3 – 6). In the urban areas, they source mango mostly from wholesalers. The retailers usually buy lots of 50 to 300 mangos according to their demand – and renew it when they have sold most of it (after 4 to 7 days). There are no special cooling facilities / pack houses in those markets. Local retailers can re-sell their mango in bulk to town retailers who sometimes source the mango directly from the rural areas.
Processors	Grade, maturate, process, distribute,	Bakhresa – AZAM Fruit Processing Co. is the largest processor of mango in Tanzania and it processes mostly traditional mango varieties to make mango concentrate for juice. The juice is sold in Tanzania and concentrates are to be exported within the East African Community. Plans are on-going to revive the UNNAT processing plant of fruit juices. Masasi Food Industry is about to start processing tests and could start supplying pasteurized juices if the tests are successful. Dabaga (Iringa), Simba, Red Gold (Arusha) are some of the companies that are processing mango into pickles for local market. Mango can be processed in many other forms (dried, flours out of cocoa, extraction of some molecules, etc. Tanzania has only so far developed a few of them, hence there is potential for deepening the processing function in Tanzania.
Importers / exporters	Bulk, link,	There are few exporters (4-6 according to Tanexa) selling within the region (Eastern-Southern Africa) or to the Middle East. Although there are relative small and larger sized exporters, overall exported volumes are low. During this study it was determined that there are about 15 regular traders involved in the importation of mango from Kenya to Tanzania.

Source: Data from the study

3.3 SECONDARY ACTORS

In the mango sub-sector, there are various categories of supplementary service suppliers and different types of institutional support that define the business environment in the districts surveyed. A summarized description of these service providers is presented in this section. More detailed information can be found in ANNEXE II: Secondary Actors.

The most important of these are governmental institutions, including: Agricultural Seed Agency (ASA), ARI-Mikocheni (Agricultural Training and Research Institute), Export Processing Zone (EPZ), Local Government District Council (LGA), Ministry of Agriculture, Food Security and Cooperatives (MAFC), Ministry of Land, Housing and Human Settlement's Development, Tanzania Airport Authority, Sokoine University of Agriculture (SUA), Tanzanian Bureau of Standards (TBS), Tanzanian Food and Drugs Authority (TFDA), Tanzanian Investment Bank (TIB), Horticultural Development Council of Tanzania (HODECT). These government agencies offer a wide range of support to mango chains, including seed multiplication, research

activities, private sector support, lobby and advocacy, legislatorial functions, policy development and districts / local level training and extension services.

The second category of supportive institutions includes NGOs, Private Sector Horticultural associations and Donor supported programs that offer farm-to-market chain facilitators and integrators. The following NGOs, associations and programs play a crucial role in developing chain capabilities and chain management competencies in the surveyed areas: ADF, TAHA, CFC, TCCP, USAID-TAPP (Fintrac and Technoserve). Some of these organizations primarily focus their efforts on input and production level activities i.e. building the capacity of producers directly, increasing sustainable supply of inputs, they also help to set up SACCOs and increasingly supporting marketing activities. TAHA focuses on lobbying and advocacy for favourable policies and enabling environment for its horticultural members.

The support which secondary actors provide is stronger in some districts than in others. The Local Governments in the coastal belt are increasingly seeing mango as a priority crop within Horticulture, although most emphasis remains to be on food crops, like maize, beans, rice etc. Overall these support organisations are not yet able to create a strong/conducive business environment for increased investments and for creating competitive enterprises.

3.4 SUB-SECTOR DYNAMICS

3.4.1 MANGO: A POTENTIAL NOT WELL UTILIZED IN TANZANIA

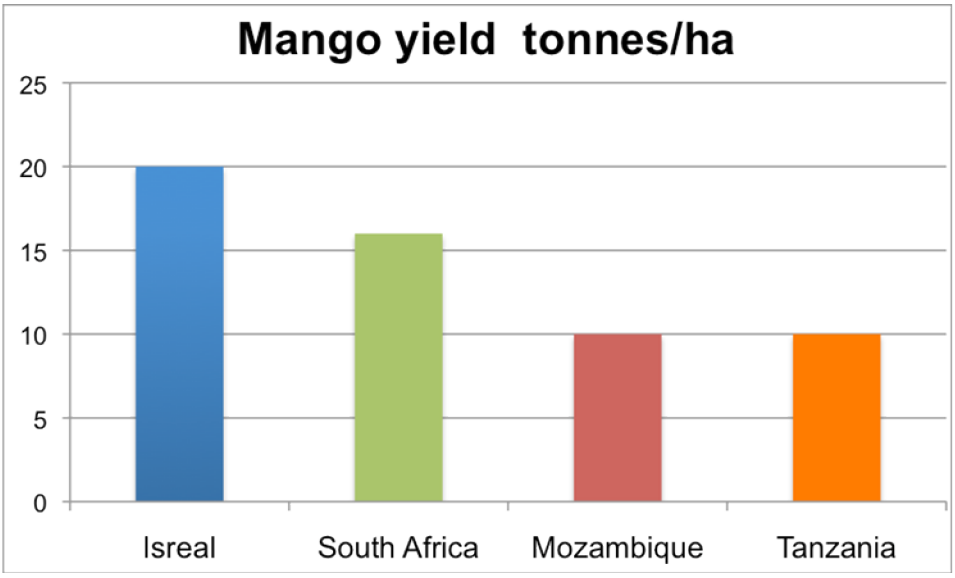
Above-mentioned support organizations are crucial to increase the inflow of new technologies and good agronomic practices, which is currently limited. This situation strongly limits the productivity of Tanzanian mango.

In the USA mango growers can obtain 250 kg per tree per year (after 10 years) corresponding to 38.7 tons/Ha. In Tanzania, it is difficult to speak about average yield as many different situations can be met. According to the data presented in Figure 5 the average Tanzanian yield reaches 10 Tons/Ha but based on our surveys the average production per tree farmers who planted improved varieties of mangos is closer to 25 kg (50 units per tree[9] x 0.5 kg per mango) and 3.9 tons/Ha. This average may sound very low but it illustrates a situation where many farmers still don't manage to get a regular production on all the trees of their orchard. Other producers have mentioned higher average yields on some trees, plots or farms but it is not yet the pre-dominant situation.

The highest identified productivity of (individual) Tanzanian mango producers is 30 tons per hectare and productivity in Israel can go up to 60 tons per hectare. But the averages of Tanzania, Israel (a highly developed mango growing country), South Africa and Mozambique can be seen in Figure 5 (next page). Not only the productivity is higher in Israel and South Africa but equally important is that the management of the farm is much more efficient.

[9] According to Mr. John de Wolff (01/12/2010).

Figure 5: Productivity of mango-producing countries



Source: Israel and Mozambique Market News Service, UNCTAD/GATT, Geneva and APEDA, New Delhi (2006), South-Africa from TechnoServe, business opportunities and challenges in the Beira corridor (2008) and Tanzania from own surveys finding (2010)

3.4.2 RECENTLY, NEW VARIETIES ARE GETTING MORE ATTENTION

Mango trees grow easily in Tanzania given the favourable agro-climatic conditions particularly in the coastal regions, and mango have for long been collected and sold on the domestic market. Since the mid-seventies, farmers have been setting up substantial mango farms with “improved” varieties. In the last decennia the focus on exportable varieties has increased with more farmers and investors planting Apple, Zill (Asian varieties) or Kent, Keith, Tommy Atkins (varieties from the USA). However the main local supply is still from the traditional growing varieties, although improved varieties (especially the Apple variety) are increasingly recognized and appreciated due to their colour and good taste. Besides, traditional varieties have little export potential.

3.4.3 COMMERCIAL MANGO FARMS: IS THERE A FAVOURABLE LONG-TERM INVESTMENT CLIMATE?

Commercial mango growing needs - amongst other things - long-term investments and the corresponding access to capital, a well thought-out market strategy and access to technical know-how. Therefore most SHF are not (yet) able to set-up commercial mango farms and set up of mango farms is mostly conducted by few large-scale producers with substantial private capital or good access to external capital. The first three to five years of mango growing are purely investments (costs), from the fifth / sixth year onwards mango trees are producing. The large advantage is that mango trees can be harvested for 50 to 100 years, in which investments can be earned back and a profitable business established. However many factors will influence the profitability of the mango farm, think of farm-management, harvest and post-harvest handling, uses of irrigation, ability to identify and satisfy end-markets, attracting and keeping required labourers but also the availability and choice of mango varieties. As we saw earlier, even the large-scale producers haven’t yet managed to integrate enough know-how to guarantee regular high returns and this is partly due to the lousy investment climate.

Increasing number of (foreign) private companies are providing important products and services to Tanzanian mango growers. Balton and Agro-Rain are offering irrigation material and related advises. Input supplier (Yara, By-Trade) sell inputs (fertilizers and pesticides) and associated training services. The company Tendaji-agro (from Israel) offers farm management personnel and knowledge, and can support the set up and the management of post-harvest facilities. They also can help producers to access finance and can support producers to access the (export) markets.

Although the mentioned organizations bring-in knowhow, experiences etc., which can be build-upon, the state of supportive services in general still needs improvement. For example government institutions (SUA and ASA) and private seedlings producers are not able to consistently provide producers with variety specific seedlings. Not only are specifically requested varieties of seedlings often not available but also the quality is not controlled or regulated either. Besides TIB, no other private financial institution has invested or shown concrete interest in investing into mango farming. Mango trees start producing after three or more years and mango growers thus need longer-term loans. As a consequence, financial organizations fear to invest in this crop considering a higher level of risk[10]. However NMB and CRDB have been setting up a track record in agricultural investments, as they have invested in prospective individual producers. They are also interested to invest with attractive individual producers, even in a relatively new sub-sector as mango.

These organizations are also crucial to further develop the Mango sub-sector, i.e. as many growers still need to improve their agro-economic skills and get adequate equipments. The limited uses of irrigation makes producers rely on rainfall; which make harvest more unpredictable, increases losses and lowers productivity. Only the more progressive producers are currently looking into setting up irrigation and packaging facilities by doing water surveys and writing business plans. Some have already started applying (drip) irrigation or using post-harvesting facilities (e.g. cool stores).

3.4.4 MANGO GROWERS: REAL INVESTORS OR WEEKEND FARMERS?

Most AMAGRO members (mango growers) are successful business/governmental workers from Dar es Salaam and are so-called 'weekend farmers'. This implies that during the week the owners leave the day-to-day management to farm managers who are often not qualified and/or sufficiently motivated. The owners might visit/manage their farm during the weekends.

Besides this aspect most of their 'farm business management practices' are generally poor:

- The full requirement of the farm investment to make it viable is often ignored,
- Record keeping is often neglected,
- Business acumen is limited (mango growing is mostly seen as hobby instead of running a business, although gradually this attitude is changing),
- Cooperation with other producers is limited

[10] Later on in the report (paragraph 3.5) we will see that Mango growing can be highly profitable business and thus a very interesting market, for financial institutions, to invest in.

- Long term (market) strategies are too rare amongst the producers.

Equally important some producers cannot access loans; which prohibits them to undertake necessary farm investments. Many surveyed producers as well as organizations outside mango are expecting to request investment financing from TIB's agricultural window under Kilimo Kwanza thrust, however is should be noted that TIB may not have enough resources to fund all of them.

Fortunately current producers can realize economies of scale as farms of 50 acres and more are very common. All the "new" mango growers bought their land and – provided they have official Land Titles – they can use their land as collaterals for access to loans.

Job Kimaro – importance of good management

Many Amagro members are working/living in Dar es Salaam during the week and manage their farms during the weekends. This resulted in weak management, which significantly reduced their efficiency, effectiveness and eventually the profitability.

This is not the case of Job Kimaro and his family who are constantly managing and monitoring their farm and their labourers. While many mango growers are struggling with fruit-flies Job Kimaro managed to control them. By paying labourers according to their performance (daily supervised/monitored by him and his family) he gets from them a much more effective service than labourers from weekend-producers. Even though irrigation is no (yet) in place, the productivity per tree is high compared to other Tanzanian mango growers. One tree (Apple variety) is already producing 600 fruits per year and when its irrigation system is in place this will progressively rise.

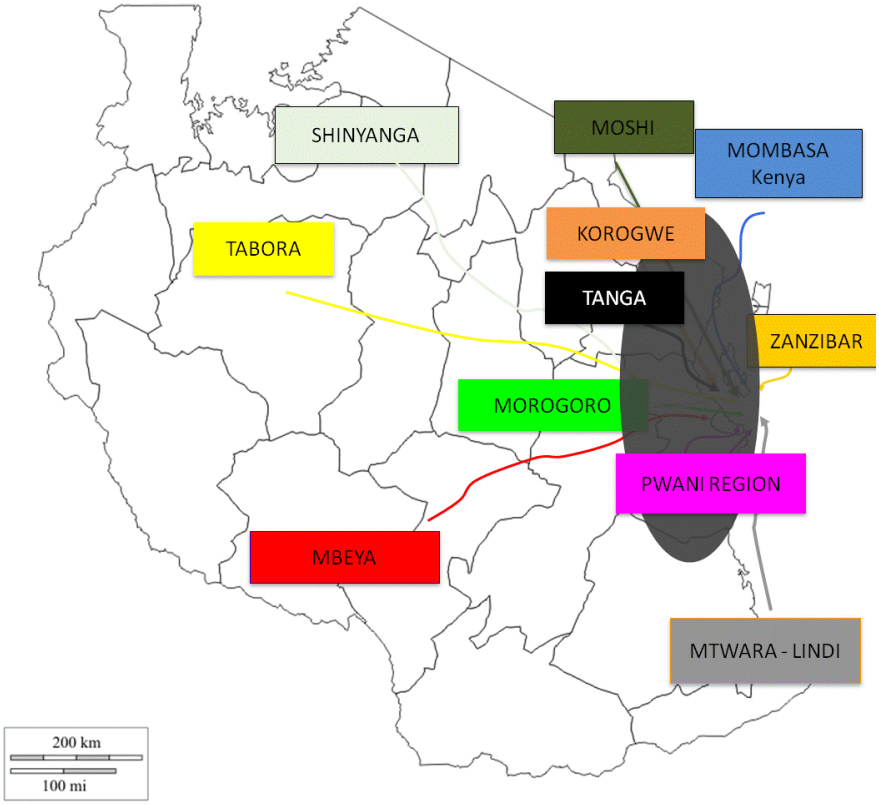
Source: Data from the study

3.4.5 DIVERSE ORIGINS FOR A REGULAR SUPPLY

The leading Mango producing regions (traditional and improved) are Tanga, Mtwara - Lindi, Morogoro and Pwani, but an increasing number of mangos are coming from Korogwe, Tabora, and Shinyanga (see Figure 6 next page).

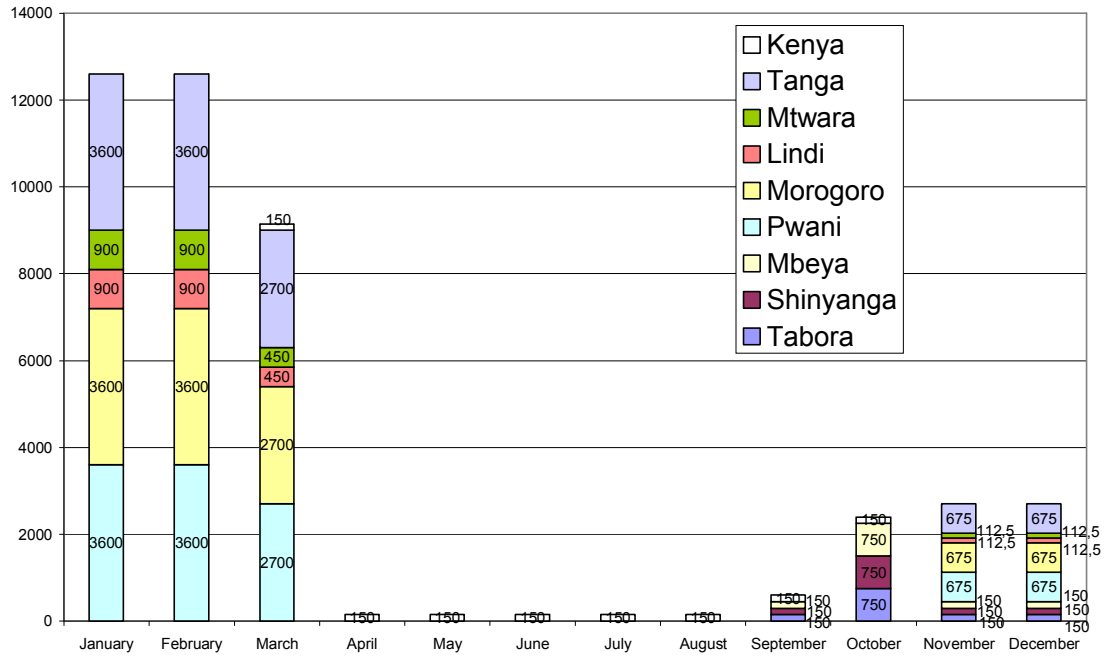
Prices and volumes are normally fluctuating strongly throughout the year, namely low prices and high volumes in the peak months (December - January) and high prices / lower volumes in the remaining months. However recently mango from Tabora and the Lake zone started entering the market as early as September, hence significantly reduced the dependence on mango from Kenya. The volumes from these areas are still relatively low compared to the mango growing areas in the coastal area (Tanga, Pwani and Mtwara-Lindi) and Morogoro (see Figure 7 on the next page). The highest concentration of improved mangos is in Pwani and Tanga region (roughly the gray circled part in Figure 6). Hence there is a huge challenge but also a development opportunity for the sub sector to coordinate and enhance efficiency of different supply chains.

Figure 6: Geographical Flows of Mango in Tanzania



Source: Data from the study

Figure 7: Mango supply (tons) to Dar es Salaam per period and origin



Source: Data from the study

3.4.6 GENDER ISSUES

Traditionally men own the mango trees and women are responsible for the sale of the fruits. Although these patterns can still be met – especially for the "traditional" varieties and in smallholder's farms – the situation is changing. Some women are managing entire mango farms and sometimes the whole family plays a role in mango growing. Whoever the owner / manager is, the main factor of risk is still the insufficient involvement of the other part in the acquisition of the know-how to run the farm and guarantee its continuity in case of disengagement of one of the members of the couple. However men still dominate in mango production and marketing. Larger (regional) traders are often men but small traders/retailers on local markets are from both genders.

3.4.7 MARKETING: DOMINATED BY SPOT TRANSACTIONS

Most urban traders are organized into (informal) fruit and/or mango specific associations. Between trading partners in most chains spot transactions still dominate; most participants in the chains simply prefer not to have prior agreements but rather deliver the produce to the market and hope for the best price.

Large-scale mango growers don't collaborate with traders through contracts whereas many small producers owning traditional varieties[11] rent out their trees for whole season to a single trader based on informal contracts that define the amount to be paid to the owner of the tree according to the expected harvest (small mangos are counted / estimated). Prices are low (10 to 40 TZS/unit) compared to the case in which farmers harvest themselves the mangos (50 to 75 TZS/Unit).

Contract enforcement is an essential precondition for supply chain development. It is strengthened by mutual trust and by the successful demonstration of business benefits resulting from long-term business interactions. Several traders and wholesalers have succeeded in demonstrating the benefits, which can result from mutually supportive activities built around long-term trusting relationships. A trader can buy from larger producers on credit (at farm gate) and pay back after they sold their produce. For a trader to buy from the same larger producer on credit, he/she has to make sure the previous payment has been paid.

Kabuku Mayunga farm is in the process of establishing a strategic relation with the end buyer, to professionalize its farm-management and agro-knowledge, roll out sophisticated irrigation system (if water surveys turn out positively) and all this is done with the support of the Israeli company Tendaji –agro.

Although there is limited structured trade in the sub-sector, there are interests expressed among players to engage in market linkages between chain actors.

3.4.8 WHEN CITIES LIKE MANGOS BUT NOT MANGO FARMS

The expanding urbanization strongly increases the pressure on agricultural land. Land ownership is therefore becoming a major issue for agricultural producers located close to expanding urban centres. In Tanzania, land is owned by the government and can only be leased by individuals and organizations. This implies that the central and local governments can propose new land uses, provided these uses are suggested / accepted by the local communities through a participatory process and under the condition that adequate compensations are given to the

[11] It is a quite common practice for many small mango producers in Morogoro, Tanga and Pwani regions (met during the interviews) and probably beyond that area.

person / organization that is requested to hand back his/its land. At this stage, the concept of “Urban Green Belt” is barely… a concept that doesn’t last long when put in balance with financial interests. Compensation procedures exist but are often neglected under the pressure of these same omnipotent financial interests. Amount offered are normally much below the actual value of a plot and – in this case – of the trees that have been planted on it.

As a consequence several mango growers have lost (or are about to lose) their mango plantation(s) which makes them and many others (in the “threatened” areas) hesitate to invest more in the mango business e.g. with additional plantations or packaging/cooling facilities.

In a nutshell, the current mango sub sector dynamics and prospects for different market segments are summarised in Table 5.

Table 5: Market for mango: Current situation, Dynamics and Prospects

Type	Market	Current situation	Dynamics	Prospects
Fresh trad. (Dodo, , etc.)	Low income consumers Small retailers	It is currently the main market. Traditional mango are cheaper (per unit), have a longer shelf-life and are preferred by many consumers and retailers	The situation may remain so for some time.	As population increases this market segment will continue being there.
Processed Products Traditional from varieties (juices, jams, concentrates, pickles)	Small processing Units and large industrial processors	Many restaurants process small daily quantities of mango daily (10 to 50 kg)	Many customers look for natural juices due to increasing health concerns	The small processing units might take a small percentage of the total (up to 10%)
		UNNAT, AZAM, MASASI Food Industries have an installed processing capacity of around 200 tons of fruits daily and are able to produce export-quality juices and concentrates.	AZAM is developing strongly processing activities in Mbagala and is actively branding and promoting its juices on the Tanzanian market.	AZAM is planning to supply the juice factories located in the EAC area (8 units) with concentrates from Tanzania. Other extensions with capacity of 150 tons daily can be installed according to the needs of the market.
Improved varieties (Apple, Kent, Tommy Atkins, etc.)	Local market	"Improved" varieties of mango are hardly available in the distribution networks used for traditional mango. Low-income customers almost don't know the new varieties.	The "improved" mangos are slowly penetrating the distribution network of traditional varieties.	With proper promotion, the improved varieties could fetch part of the market of the traditional mango (e.g. 2nd or 3rd grade mango unfit for supermarkets or export)
	Up-market Supermarkets, selected shops	High-income consumers are increasingly aware that improved varieties are available in most supermarkets. They accept to pay up to 1,000 TZS/unit. But the volumes are limited (10,000 mango per week	Producers of improved varieties are actively promoting their products in the supermarkets.	With proper promotion and coordination between the producers and the supermarkets (to guarantee the quality of the products) the sales may double or triple.
	Export UK, EU, M-East	Very small quantities of improved mango are exported mainly due to qualities issues (fruit flies) and to the lack of consistency of the production.	Many producers are surveying export markets and prepare the plantations to these markets.	The demand identified in Europe or Middle East is huge (UK, 40 tons/week), Netherlands (40 tons/week), Dubai, Turkey[12]

[12] According to Mr. Wahid Wahid (Importer of mangos) Dubai could absorb all the mangos from Tanzania. Moreover, the Turkish Embassy and Turkish Airlines are ready to help setting up an export trial of 400 kg (with expansion possibilities) as an alternative to Dubai/Middle-East.

Source: Data from the study

3.5 ANALYSIS OF THE ECONOMIC VIABILITY OF THE SUB-SECTOR

3.5.1 PROFIT ANALYSIS

3.5.1.1 MANGO GROWERS

For the elaboration of farm level profitability analysis, we collected data from twelve (different farm sizes & experiences) mango growers located in Tanga and Pwani regions. Two teams have been using a common template to collect data about the financial performance of implementation and management of the farms and the corresponding economic outputs of these farms. These teams met very different situations in terms of average yields, direct costs and financial returns.

Most farmers still don't manage their mango farms optimally and get low average yield and low returns. Fewer farmers have been investing more intensively and spending more money and time on their farms but the corresponding outputs is not always compensating these efforts. Indeed, some of them managed to get an average of 200 mangos per tree on the 7th year while others hardly manage to get an average of 50 mangos per tree.

Therefore we present below three scenario that illustrate the variability of these situations: (i) the most frequent one, (ii) the potential of the crop and (iii) based on same level of costs on a potential scenario but resulting still in lower yields due to poor management/lack of knowledge etc. In order to help comparing the different scenario we intentionally applied a common on farm selling price of 200 TZS even though in the reality, farm-gate prices can vary from 150 to 500 TZS.

(i) Average / common situation

This situation is characterized by an average yield per tree of 50 mangos corresponding to ~ 7,800 mangos per Ha and approximately 3.9 tons per hectare (plantation of 7 years and above). This production is the result of a limited level of care and investment on the farm: no irrigation, little fertilization and use of pesticides, limited maintenance, harvest and post harvest care. Therefore, losses of 25% are common and this limits even further the farmers' incomes. To compensate this low yield, farmers normally try to sell mangos through channels offering higher prices (300 to 400 TZS/Unit) but as we already explained, we considered here that they sell mangos for 200 TZS/Unit on average.

Table 6: Farmers' profitability analysis – Average situation

Average yield / tree	Prod. per Ha	Losses	Sales	Price	Sales	Direct Costs	SGP	SGM
50 mangos	7,734	1,933	5,850	200	1,170,000	970,400	199,600	17%

Source: Data from the study

In this case, the plantation generates a gross revenue on a Ha of 1,170,200 TZS. Due to the limited care given to their plantation, the direct costs are limited to 970,400 TZS/Ha and the remaining gross profit is 199,600 TZS/Ha, equivalent to a SGM of 17%. This gross profit is not a success for farmers who have been investing on long-term activities and considering the potential of the crop. But also if all indirect costs are applied the situation turns to the negatives. In comparison, smallholder farmers producing maize in reasonable conditions of success can obtain higher levels of gross profit (MMA, 2010).

If these farmers don't harvest at all or if their level of losses increases after having taken care of their plot as describer above, their losses can reach the equivalent to the direct costs (970,400 TZS/Ha).

These farmers' situation is also bad because their SGP (not yet a positive cash flow or a pure profit) doesn't cover the expenses of the next season and would oblige them to advance again financial resources to take care of their plantation and increase the chances to harvest. As a consequence, these farmers are evolving on the razor's edge: a new drought can make them abandon the plot and maybe the crop. This scenario, which seems to dominate presently, is undesirable for the sub sectors' further investment and growth.

(ii) "Potential Output"

During our survey, we also met some farmers who have managed average yields per tree of 200 mangos equivalent to 31,200 mangos per Ha and approximately 15,6 ton/Ha. These yields are a result of higher investments and care to the farms designed to allow maximum possible success. Annual expenses (including depreciation of some investments) for irrigation, fertilization, crop protection, harvest and post-harvest cares, depreciation of the major investments, etc. represent in average over TZS 3 millions. In compensation, they also succeed to limit losses (10%).

Table 7: Farmers' profitability analysis – Potential Output

Average yield / tree	Prod. per Ha	Losses	Sales	Price	Sales	Direct Costs	SGP	SGM
200 mangos	46,800	4,680	42,120	200	8,424,000	3,004,565	5,419,435	64,3%

Source: Data from the study

These farmers can generate sales of over TZS 8.4 millions on the 7th year out which remains a simplified gross profit of TZS 5.4 million after deduction of the direct costs (TZS 3 million). This represents a simplified gross profit of 64.3%. Note that the yields and the selling prices regularly pass the averages mentioned here. With this level of simplified gross profit the farmer can easily finance the direct costs of the following season. We will see in the chapter 3.5.1.3 how these incomes can contribute to the stabilization of the cash flow. This scenario is a possible outcome in Tanzania if mango farming is taken as business but still far below good practices benchmarks as shown in Figure 5 (Israel, South Africa).

(iii) Unsuccessful attempt towards the potential

It is apparent, that some farmers are really enthusiastic with their mango plantations in order to get high returns. Unfortunately, none of the mango growers met could state that – up to now – all parameters are under control and that they can guarantee that they will reach and sustain the potential yields. Many farmers seem to have faced drawbacks due to various factors such as starting from insufficient knowledge base, working in isolation, changing environmental conditions etc that is out of their control. Whenever this happened it resulted into high levels of negative returns. In the following simulation, we try to show the results of gross margins that can be reached if the average yield per tree in this scenario of high investments remain within 50-mango/-tree.

Table 8: Farmers' profitability analysis – Unsuccessful attempt towards the potential

Average yield / tree	Prod. per Ha	Losses	Sales	Price	Sales	Direct Costs	SGP	SGM
50 mangos	7,734	773	6961	200	1,392,200	3,004,565	(1,612,365)	(115.8%)

Source: Data from the study

The result is a simplified gross loss of TZS 1.6 millions (SGM of – 115.8%), arising from sales limited to TZS 1.39 millions and expenses of TZS 3 million.

The frequency of such situations is not easy to predict but – according to some AMAGRO members – it is still high and puts them in a situation whereby loans are dangerous solutions to invest in the plantations or in the annual cash requirements. Only the farmers with multiple activities can reasonably afford to face these situations.

This third case shows that farmers are investing money to implement a kind of research-based activities using financial resources that should be applied for profitable investments. It indicates that the business environment is poor and that serious improvements are required to allow more farmers realize the potential of the crop with limited risks of failure.

3.5.1.2 FACTORS OF SUCCESS / "FAILURE"

So what are the factors that influence the result of the farmers' investments? Is there a recipe used by the most successful farmers that could be extended to all the mango farms and guarantee the same output or at least help avoiding huge losses?

During our survey, we didn't find such a recipe and even the most skilled and experienced farmers admitted that they still misunderstand many parameters of the crop. There are indeed factors that help being more successful and others that lead to lower profits. But none of these factors can guarantee alone the positive/less positive output. An investment such as irrigation is for sure helping to guarantee better outputs but its positive effects can be compromised by a whole set of other factors such as ineffective/insufficient crop protection, lack of harvest and post-harvest care resulting in high losses, etc. Thus, the following factors must be considered as inter-dependent conditions for a better output and increased profitability.

Table 9: Factors of success/failure of mango plantations

Factors of success	Factors of "failure"
Quality of the seedling (rootstock and scions)	Sick, weak or un-adapted rootstock
Land preparation Especially the preparation of holes, the stock-fertilization, soil testing etc.	Planting without preparing a sufficient volume of soft and fertile soil (adapted to soil test results) for the seedlings
Fertilization Initial required for the development of the plant, to cause flowering, and to ensure that the fruits are healthy, etc.)	Insufficient stock, maintenance and flower-induction fertilization, lack of boron,

Factors of success	Factors of "failure"
Crop protection: Weeding to avoid the competition for the mango trees, fungicides and insecticides to maintain the health of the trees, flowers and fruits.	Absence or applications without proper schedule
Irrigation To guarantee the development of the seedlings and trees as well as to guarantee the development of the fruits.	Lack of irrigation, application of water at inappropriate stages
Pruning: To guarantee the good balance between the vegetative and productive development of the plant, and as a method to induce flowering.	Insufficient pruning that lets the tree use its energy to produce branches instead of fruits.
Harvest and post-harvest Pick the fruit when they are mature and not yet ripe = visit every tree after three days. Caution during the transport and handling (including packages for each stage of the transportation). Heat or other treatment to protect the fruits against fruit flies or fungus Storage in proper places (between harvest and sale)	Picking ripe fruits (false ripening) Bulk transport, improper packaging material Allowing high losses through storage of un-treated fruits in un-proper places (open to insects, wind, etc.)
Sales Early determination and development of the marketing strategy (buyer, place of delivery, prices, quantities, etc.)	Generating high losses by choosing to lose a mango rather than to sell it at a lower price.
Management and planning Appropriate farm management system in place	Lack of planning of the different steps of the crop. Having insufficient financial reserves to allow a fast and efficient action against whatever factor that could affect the crop.

Source: Data from the study

3.5.1.3 MANGO: THE NEW TANZANIAN GROWTH INVESTMENT OPPORTUNITY?

At this stage, the reader has understood that some millions in the pocket or access to a loan alone are not guarantees to get positive returns from mango farming.

In order to evaluate better the level of risk / potential of the crop, several questions still need to be answered:

1. How much should an investor be ready to mobilize as an initial investment if she/he wants to plant one hectare of mango?
2. How long time will she/he have to wait until the investment results into positive cash flows?
3. How much will it bring back?

In order to answer to these questions a fully-fledged business planning is necessary which is outside of the scope of this value chain analysis. However, in order to provide an indicative picture based on data gathered during the survey, we have

considered two possible cases: A low performing farm and a farm whose performance get close to the potential described earlier. We didn't develop a case corresponding to regular high losses as we considered that no investor who should plan to get frequent losses or that if an investor faces several severe drawbacks in a short period of time, the decision should be to quit the sector rather than to continue investing in vain.

For simplicity sake we have furthermore made some assumptions:

- We didn't include the amount corresponding to corporate taxes (30% when profits start to be realised), and some non-cash items such as depreciation.
- We considered that in both cases the farmers managed to work with their own capital and didn't need to take loans. Therefore, we didn't integrate repayment of loans & interests.
- We hence didn't consider the opportunity cost of the capital and
- We didn't integrate costs that we could not easily quantify (e.g. overall management costs)

The simulation portrays the following picture in Table 10.

Table 10: Investment requirements and results for "normal" and "potential" cases

Parameter	**Case one "Average performing farm"**	**Case two "Well performing farm"**
		Cost of the initial investment (Y 1 to Y 3)
Cost of land (per Ha)	TZS 3,625,000	TZS 3,625,000
Irrigation system (per Ha)	Not installed	Some form of Drip Irrigation system
	TZS 0	TZS 5,000,000
Cost of seedlings, plantation and fertilization	TZS 429,960	TZS 419,400
Maintenance of the plantation before beginning of the production	Minimum care	Good care:
	Year 1: TZS 205,120 Year 2: TZS 315,520 Year 3: TZS 320,520 Year 4: TZS 320,520	Year 1: TZS 205,120 Year 2: TZS 1,357,360 Year 3: TZS 1,362,360 Year 4: TZS 2,574,900
Annual maintenance after beginning of production	Minimum care	Good care:
	TZS 640,000 (Y5), TZS 695,000 (Y6), TZS 970,000 (7 to 9), 1,015,000 (Y10), TZS 1,065,000 (Y11 onwards)	From TZS 3,004,565 (Y5 to Y7) to TZS 3,059,565 (Y8&9), 3,104,565 (Y10 onwards)
Harvest and post-harvest	With no special care for the choice of the fruits. No special post-harvest treatment and excessive time between harvest and sales that leads to high losses	Careful choice of the fruits Hot water treatment and utilization of a local for storage of the fruits before sales. Short time between harvest and sales.
Sales	On the farm Average selling price of 200 TZS/fruit. Losses of 25% in average	Sale to wholesaler with proper planning and distribution: 200 TZS/fruit and limited losses (10%)

Parameter	Case one "Average performing farm"	Case two "Well performing farm"
Funds	No loan	No loan
Fruits per tree with 155 trees per Ha (production menus losses)	Year 5 to 9: 50 mangos per tree Year 10 onwards: 100 mangos per tree	Year 5&6: 200 mangos per tree Year 7 to 9: 300 mangos per tree Year 10 onwards: 400 fruits/tree
Positive Cash flows Point	Year TWELVE with a closing balance of TZS 263 360	Year EIGHT with a closing balance of TZS 1,458,917.
Annual employment	Farm: 5 to 10 persons Marketing: 5 to 10 persons	Farm: 10 to 20 persons Marketing: 10 to 20 persons
Other effects	Spin-off effect (capacity to invest ever second year in a new Hectare of mango trees)	Spin-off effect (capacity to invest every year in a new Hectare of mango trees and more) after the 8th year.

Source: Calculations and assumptions of the team based on information collected during the survey. For more details see in ANNEXE III: Assumptions for calculation of gross margin - Table 27 and Table 28.

The point here was not to produce a perfect guideline for investors, but rather an indicative picture based on the principle of taking mango farming as business (and not as hobby) that AMAGRO members could improve, develop, etc. It is strongly advised that any new investment analysis should be backed by proper business plan. The profit analysis (chapter 3.5.1.1) gives a proxy of annual profitability / losses that the investors should be aware of.

3.5.1.4 TRADERS, WHOLESALERS AND RETAILERS

Table 11: Profit analysis for traders, wholesalers and retailers for both traditional and improved varieties

Name / Function	Buying Price (TZS)		Direct Costs (TZS)		SGP (TZS)		Sales (TZS)		SGM (%)
	Per Unit	*Per Kg*	Per Unit	*Per Kg*	Per Unit	*Per Kg*	Per Unit	*Per Kg*	
Traders									
Improved varieties	200	*400*	43	*86*	57	*114*	300	*600*	**19%**
Traditional Varieties	25	*125*	19	*95*	25	*125*	69	*345*	**36%**
Wholesalers									
Improved varieties	300	*600*	78	*156*	94	*198*	472	*944*	**20%**
Traditional Varieties	67	*335*	29	*145*	104	*520*	200	*1,000*	**52%**
Retailers									
Improved varieties	470	*940*	25	*50*	105	*210*	600	*1,200*	**18%**

Traditional Varieties	200	*1,000*	21	*105*	179	*895*	400	*2,000*	**45%**

Source: Data from the study

3.5.2 PRICE STRUCTURE AND COST DRIVERS

The following tables present, for five important supply channels, the price structure (meaning: the way how each actor and for each actor, each cost, contributes to the elaboration of the final price) and the cost drivers (meaning: the kinds of costs that contribute more to the increasing of the final price, actor after actor.

In the supply channel for fresh improved mango to the local mid and up-markets (supermarkets) – see Table 12 – the cost driver along the channel is the cumulated gross profits (80%) that go in priority to farmers (81% of the total gross profit). The cost of labour (9%), other costs (5%), transport (3%) and inputs (2%) constitute 20% of the total costs.

Table 12: Price structure & cost drivers – channel of improved mango to mid & up-markets (supermarkets)

Actor	Price Structure and Cost Drivers		
	Description	**Value (TZS/Kg)**	**%**
Consumer (final price)		1,100	
Supermarket	Selling price	1,100	100%
	Gross Profit	166	15,1%
	Other costs	50	4,5%
	Transport	0	0.0%
	Labour	50	4,5%
	Inputs	0	0.0%
	Buying price	834	75.8%
Mango grower	Selling price	834	
	Gross profit	717	85,9%
	Other costs	10	1,2%
	Transport	31	3,7%
	Labour	49	5,9%
	Inputs	27	3.3%

Source: Data from the study

In the supply channel for fresh improved mangos to the local mid and up-markets (through local retailers) – see

Table 13 – the main cost driver along the chain is – again – the cumulated gross profits (80%) that go in priority to the retailers (50%) and producers (39%) of the total gross profits). Transport (8%), labour (6%), other costs and inputs (3% each) represent the rest of the total costs.

Table 13: Price structure and cost drivers – channel of improved mango to mid & up markets (local retailers)

Actor	Price Structure and Cost Drivers		
	Description	**Value (TZS/Kg)**	**%**
Consumer (final price)		1,102	
Retailer	Selling price	1,102	
	Gross Profit	439	39.9%
	Other costs	16	1.5%
	Transport	15	1,4%
	Labour	10	0.9%
	Inputs	0	0.0%
	Buying price	622	56.5%
Wholesaler	Selling price	622	
	Gross Profit	99	15.9%
	Other costs	5	0.8%
	Transport	72	11.6%
	Labour	4	0.6%
	Inputs	0	71.2%
	Buying price	442	75.0%
Mango grower	Selling price	442	
	Gross profit	348	78.8%
	Other costs	16	3.6%
	Transport	0	0.0%
	Labour	49	11.1%
	Inputs	27	6.6%

Source: Data from the study

In the case of the supply channel of traditional mango to the "traditional" retail market (Table 14), the main cost driver is again the gross profit (71%) that is mainly captured by producers (73%). Transport and labour represent 12% of the total cost each and inputs represent 6%.

Table 14: Price structure and cost drivers for traditional supply channel of traditional mango (retailers)

Actor	Price Structure and Cost Drivers		
	Description	**Value (TZS/Kg)**	**%**
Consumer (final price)		778	
Retailer	Selling price	778	
	Gross Profit	75	10%
	Other costs	35	4%

Actor	Price Structure and Cost Drivers		
	Description	Value (TZS/Kg)	%
	Transport	30	4%
	Labour	0	0.0%
	Inputs	0	0.0%
	Buying price	638	82%
Wholesaler	Selling price	638	
	Gross Profit	40	6%
	Other costs	20	3%
	Transport	15	2%
	Labour	25	4%
	Inputs	0	0.0%
	Buying price	538	84%
Local trader	Selling price	538	
	Gross Profit	35	7%
	Other costs	40	8%
	Transport	45	8%
	Labour	18	3%
	Inputs	0	0.0%
	Buying price	400	74%
Mango grower	Selling price	400	100%
	Gross profit	400	100%

Source: Data from the study

For the supply channel we didn't manage to get access to the processing costs, hence we could extend our analysis only to the farmers and traders. At this stage, gross profit was still the main cost driver (44%), fetched in priority by farmers (77%). Other costs (22%), transport (20%) and labour (14%) are the remaining costs (see Table 15).

Table 15: Price structure and cost drivers for supply channel to industrial processing

Actor	Price Structure and Cost Drivers		
	Description	Value (TZS/Kg)	%
Processor	Buying price	147	
Local trader	Selling price	147	100%
	Gross Profit	15	6,7%
	Other costs	32	0.0%
	Transport	30	8%
	Labour	20	3%
	Inputs	0	0%
	Buying price	50	74%

Actor	Price Structure and Cost Drivers		
	Description	Value (TZS/Kg)	%
Mango grower	Selling price	50	
	Gross profit	50	100%
	Labour (harvest)	0	0%

Source: Data from the study

For the supply channel to the export market for fresh improved mango, we didn't manage to get enough information on the direct costs as no exports are currently taking place.

3.5.3 MARKET MARGINS

In most cases moving mango from farmers to final consumer involves several transactions in Tanzania. The final price is the result of the successive increasing of price by the different actors. The "Market Margin" allows understanding the part of the final price that remains with the producer. It is an indicator of the efficiency of the channels.

Table 16: Market margins for different mango sales channel

Parameters	Supermarket	Improved variety on local market	Traditional varieties on local market	Traditional varieties for processing (1)
Farmers' farm gate price (A)	834	442	400	50
Final price (B)	1,100	1,100	778	147
Difference (A – B)	266	658	378	97
Market Margin	32%	149%	95%	194%

Source: Data from the study

The highest margins indicate higher degrees on chain inefficiency. Farmers selling improved varieties directly to supermarkets present the most efficient supply chain arrangement (market margin = 32%). The farmers who sell traditional varieties for processing present the less efficient supply chain arrangement (market margin = 194%).

Market margins allow comparison with other chains and crops. For instance, the market margins for maize in Tanzania reach 234% in average. The average market margins of the mango channels is of 117.5% and this indicates that most of the mango marketing channels are globally more efficient (from the producers' point of view) than the maize marketing channels.

3.5.4 THROUGH-PUT TIMES

Table 17: Through-put times for different mango sales channels

Actor/Function	Export	Supermarket	Improved variety on local market	Traditional varieties on local market	Traditional varieties for processing
Producer	1 to 3 days	1 to 3 days	1 to 3 days	2 to 5 days	2 to 5 days
Trader			1 to 2 days	1 to 2 days	1 to 2 days
Wholesaler			2 to 5 days	2 to 5 days	
Retailer / Supermarket		2 to 5 days	2 to 5 days	2 to 5 days	
Exporter	1 to 3 days				
Air-freight and importer	2 to 3 days				
Sea transportation and importer	7 to 21 days				
Total put-through times	9 to 30 days	3 to 8 days	6 to 15 days	7 to 17 days	3 to 7 days

Source: Data from the study

The Table 17 above illustrates the throughput times for the different channels. Is it important to note that these times change from one channel to the other but also for a same channel according to the attention that the actors pay to ensure timely delivery of the fruits and therefore, to how they contribute in increasing the shelf-life or in easing the export process. It also allows identifying the technological requirements for the different supply channels. For instance, if mangos were to be exported by boat the transportation time can vary from ~ 10 days (to Dubai) up to 21 days (to Europe). In this case, cold chain facilities are compulsory and any gain of time in Tanzania is of strategic importance as at least 5 days can be gained compared to the current “worse” situation. In the case of sales of improved varieties on the local market, the throughput time can vary from 6 to 15 days. Knowing the increased sensitivity of improved varieties, it is important that all actors work with maximum time efficiency so that mangos reach the shelves at the age of 6 and not 15 days. Consumers may accept to have to ripen mangos at home but they will certainly not enjoy having half of the bought mangos getting spoiled. Examples of multi-model transport cases exist that are successful even for export to EU markets from a land-locked country like Mali.

3.6 CONSTRAINTS AND OPPORTUNITIES

This section summarises the major constraints that hold back mango sub sectors growth and competitiveness in Tanzania and also identifies opportunities that could be used to redress the situation.

Table 18: Constraint and opportunities of the Mango Sub-Sector

Constraints	Opportunities
Input supply	
- Some producers of seedling are producing without taking the market demands into account, which makes their long-term business case fragile. Some farmers buy generic "improved" mangos without paying attention to the kind of market that this entitles them to target. - Lack of regulation and certification of seedling production triggers production of fake seedlings, which effects the production and sector at large. - Upcoming seedling suppliers have inadequate technical knowledge and skills for nursery management, resulting in inadequate supply and causing stagnancy in sector's growth / production expansion of desired varieties. - There are not enough scions to cope with the demand for seedling different varieties. - Low volumes required by the mango grower don't present an attractive business case for agro-dealers to import some of the inputs (at all or at reasonable cost). - Some Government orchards that were source of reliable seedlings have been abandoned.	- Increasing demand gives private seedling producers an incentive to increase their production and make it a commercial viable business. - Several institutions, ASA (TOSCI), AMAGRO and various NGOs have started initiatives to increase regulations and certification systems - The government subsidies-inputs program, within Kilimo Kwanza, gives a window to bring this program to the Mango Sub-sector too - Under ASDP, some districts have prioritized horticulture and mango in particular and are allocating funds and expertise to the sub-sector - The Ministry recently supported several soil testing laboratories to guarantee the availability of soil analysis for producers.
Production management	
- The mango growers don't apprehend the full investment required to guarantee full economic return. Many mango farms that have been installed are incomplete (no proper irrigation, no specific funds for cash-flow needs, etc.). The lack of previous understanding of the return on investment is discouraging for those who expected quick returns with limited additional expenses. - Production management is essentially based on self made experience but is initially low and for most of the farmers it is still insufficient to allow them to benefit from the potential of the crop. The owners of the farms are not enough present next to the managers and hence, the farm management is often poor. - There is limited availability and reliability of high technical skilled labourers. This limits the endurance of sustainability knowledge at the producers. - Lack of communication between research institutes, extension workers and districts.	- Availability of commercially attractive and relative resistant mango varieties like Apple, Red Indian and others and late-maturing varieties like Keith. - TAHA has a comprehensive initiative to revive a practical training centre to improve the approach and capacity of horticulture at large and Mango specifically. - Countries like Ghana, Kenya, India, etc. offer attractive benchmarks and examples for GAP. For example Kenya has set up a practical training centre, which is based on a strong public-private partnership, to improving extension workers. Mali has set best examples of how PPP initiative can revive and turn a sub-sector vibrant. - COSTECH possesses a budget of over 30 billions of TZS to realize fast-track researches on, for instance, technology transfers

Constraints	Opportunities
- Fruit-fly in particular and other pest diseases threaten production of market acceptable quality. - Most producers lack long-term planning and entrepreneurial acumen to make their farm commercially viable. - Extension of urban centres endangers many urban mango plantations which makes them hesitant to invest in their mango business. - Rain patterns are not regular and the production is undermined by insufficient supply of water at strategic stages (after flowering, etc.)	- Many actors of the sub-sector are keen to support AMAGRO for the identification and mobilization of an Expert in mango production who could fast track the improvement of the growers' skills. - There are large areas available for plantation of mango in blocks that could reach higher productivity.
Market Access	
- Producers are not able to access high value markets due to inability to have QQC threshold. - New varieties are less appreciated by small retailers because they are too prone to attacks of insects and rotting. - When production is high, the marketing channels for fresh mango fail to absorb all the production: losses are high and/or prices decrease very much. - Tanzania doesn't have a proper pack-house that is compulsory to guarantee quality for export to Europe.	- Increasing economic growth in developing countries (China and India) and lower local production in certain months, offers exporting opportunities for Tanzanian mango grower. - TAPP, TAHA, TANEXA and CBI can support for the identification of opportunities for exports - Requirements for export to Middle East are less stringent than for the European Market and allow Tanzanian mango growers to learn about the process of exporting with limited risks of failure. - Export facility could be set up through collaboration between mango growers.
Infrastructure / Technology	
- Weak infrastructures, specifically pack-houses, but also poor road systems. This makes producers less efficient; mangos are damages and causes relative high losses for traders. - Irrigation system is hardly developed and promoted, which makes many production less profitable and more dependent on rains. Irrigation companies have not yet developed a case study for mango in the Tanzania context. - Poor quality of plastic planting material makes drafting seedlings difficult and affects the quality of seeds and thus productivity of producers. - Lack of appropriate packaging material (bottles and taps) limit the processing of mangos into pickles, jams, etc.	- FINTRAC, TechnoServe can mobilize funds from USA to support the Horticulture Sector for example with feasibility studies (processing and pack house[13]). - The cost of irrigation infrastructures and running costs are known and can be integrated in plantation projects[14]. - Tanesco has funds for village electrification. New green energies can be used for irrigation and processing (solar, biogas, etc.).
Finance & Risks	

[13] For export to Middle East, the requirements for a pack-house are basic: it must include an acclimatised room and a sorting and cleaning facility. See in **Error! Reference source not found.** for a basic design for treatment and packing infrastructures.
[14] Cost per Acre for drip irrigation: Installation TZS 3.7 millions per Acre, expansion 920,000 TZS.

Constraints	Opportunities
- Inadequate financial products that don't encourages further investments, risk taking etc. and thus limits growth of the sub-sector.	- Increasing financial institutions are tailoring their products and services to specific agricultural sub sector. - Long-term investment financing avenues for technology acquisition e.g. with TIB are forthcoming.
Enabling Environment	
- There are no facilities in Tanzania able to provide soils, leaves, pests, and insects' analysis at reasonable cost and in short time. Producers depend on facilities located in other countries. - There is hardly any data collection and computerization, which makes it difficult to attract (foreign) investors and to enable the potential to tap from market opportunities.	- EPZ is promoting clusters for fresh and processed fruits and vegetables: Mkuranga and Morogoro are contemplated by this initiative. - FINTRAC is able to support the implementation of feasibility studies for pack or processing units. - DALDO Offices (Mkuranga, Kisarawe, Tanga Municipal and Morogoro) consider mango as a high potential crop and ready to cooperate with AMAGRO
Policy	
- Little enforcement / absence of long term Land-use plans in Tanzania limits investments - Insufficient enforcement of regulations and policies limit the profitability of the market. - Registration of new agro-inputs is expensive and takes over three years. Fast track registration is almost impossible to obtain.	- The Ministry of Agriculture / Direction of Crop Development identified mango as one of the high potential crops to be promoted. - AMAGRO has the possibility to become part of the programming for development of several horticultural crops (including mango) that HODECT is about to initiate.
Organization and management	
- Most farmers are scattered with small volumes, and not yet well organised for bulking, quality control and cost- effective use of infrastructure like collection centres and pack houses.	- Clusters of farmers in strategic areas are emerging in Tanga and Coast region

Source: Data from the study

3.7 GENERIC INTERVENTIONS

At this level of analysis various strategic cross cutting issues in the mango subsector would require leverage intervention.

Table 19: Generic interventions for the development of the Sub-Sector

Strategic issues	Proposed leverage interventions	Potential actors / Collaborators
Diversification and Expansion	• Organisation of farmers into clusters • Support demonstration farms and extend training programmes, • Promote a system for certified seedlings and plants • Improve extension services / adoption of GAP / investment plans / management advises e.g. by getting foreign mango experts. • Promote technology (irrigation, crop management, harvest and post-harvest) and increased outreach • Collect information about the quantities and qualities available in the different localizations so that market arrangements can be easier established + collection of information about needs of inputs to ease the grouped supply and the decreasing of prices. • Promote and facilitate pooling / clustering to constitute sufficient volumes adapted to the (export) market requirements. • Identify the financial products that are more adequate to support investments in Mango production and negotiate with financial institutions and government to turn these products available.	• AMAGRO, LGAs, MAFC, YARA, AZAM, By-Trade, EPZ, TOSCI.
Research & Development	• Promote Technical Impact Points for R & D and dissemination of results on crop management, Pest & Diseases (fruit fly etc), soil testing, irrigation, yields, etc. • Fast-track the dissemination of best practices in mango technical knowledge and expertise • Carry out a technical study to identify precisely the different varieties, their agro ecological suitability in Tanzania and the markets that are demanding these varieties. • Device a working definition for Tanzania to clarify the names / identification of the different varieties. • Shelf life of different exportable varieties • Facilitate export trials of irradiated mango?? • Promote the uses of soil testing and application of appropriate inputs.	• R & D Institutions (ARI, HORTI etc), MAFC, AMAGRO
Post harvest Infrastructure	• Cold Storage Facilities – Pack houses at Clusters – washing, waxing & grading • Support to value addition initiatives by SMEs • Inland refrigerated transport and overseas shipment/air freighting (Logistics) • Investigate the food Irradiation facility • Quality Insurance laboratories • Hot water dips and water vapour treatment facilities	• Large scale Farmers, Private Sector Investors, AMAGRO, MITM, TBS, TFDA, Airport Authority, TAHA and

Strategic issues	Proposed leverage interventions	Potential actors / Collaborators
		EPZ
Regulatory & Policy	• Trade Policy / EPZ Projects • Grades & Quality assurance standards • Pre shipment / air freight inspections • Long term land use & planning	• MITM, TAHA, TCCP, AMAGRO, EPZ
Market Expansion	• New market development (may be through bilateral trade arrangements) • Intensify the identification of possible markets (export) and the share of this information with the mango growers. • Market Promotion (trade fairs, mango festivals etc), Branding and Publicity • Provide quality control services	• TAHA, MITM, AMAGRO,
Sub sector data /Market Information dissemination	• Update data on sub sector production, varieties, etc • Continuous mapping of market potential & dynamics • Documentation and dissemination of export & import market requirements • Promotion of investment opportunities	• MAFC, MITM, TAHA, AMAGRO, TIC
AMAGRO Organizational strengthening	• Lobbying on behalf of their members, for inputs • Offer / broker on-demand (paid) extension services to specific members needs. Collaborate with public extension services wherever these can play a role. • Broker between their members need for capital and financial institutions • Manage the increasing expectation of its current and potential members and make the organization much more focused and effective. • Develop and implement a sustainability strategy • Increase the membership basis by including the new mango growers. • Adopt a legal status that allows AMAGRO to implement (economic) activities corresponding to the members' needs	• AMAGRO, Development partners e.g. TCCP, ADF.

Source: Data from the study

4 VALUE-CHAIN DEVELOPMENT

4.1 IDENTIFICATION OF SUPPLY CHANNELS FOR VCD

4.1.1 JUSTIFICATION

The value chains to which we will give more attention have been identified and crafted according to the following criteria:

- Growth potential (can the market to which the value chain is aiming absorb more products?)
- Leverage for impact (are there feasible solutions to make the supply channel evolve into a dynamic value chain?)
- Economically viable chain (will the upgrading of the supply chain into a value chain bring positive economic impact for the actors of the chain?)
- Private sector drive (are there sufficient and dynamic private actors to lead the identified chain?)

4.1.2 INTRODUCTION OF THE SUPPLY CHANNELS

Considering the criteria presented above, the supply channels that are considered eligible include the following:

- **Fresh mango for export market**

The demand on the export market is huge and is projected to grow. An importer in Dubai mentioned during the study that he could buy all the current exports (2010) from Tanzania. Several market opportunities in the Turkey, UK and Netherlands have been identified demanding several containers weekly.

- **Mango for the local mid and up-markets**

The local mid and up-markets offer very interesting returns for the producers and have an important growth potential. This is the market segment which is becoming health conscious and with increasing effective demand.

- **Mango for processing**

The emerging industrial and small processing units can absorb very large quantities of mango. The few processing companies in the sector can currently absorb about 4,500 tons per month and have expansion plans. There are obviously other processing possibilities such as drying, production of jams, pickles, Anjari, etc. but compared to the processing of (semi) industrial juices, these options should be considered either as niches or as mid-term options. When mango growers will have properly up-graded their production (improvement of yields and returns), they will be in a position of realizing proper feasibility surveys for any kind of processing and invest in small to medium size processing units. In the meanwhile, priority should be to work on the immediately available market outlets: export, local mid and up-markets and actual demand for processing.

Even though every chain targets its own niche market and has a clear focus and strategies how to reach that, it is also important to note that these three chains are inter-connected. However, this can also be seen as a complementary proposition. For instance, a farmer targeting export market might fail to produce 100% mangos fit for export market. In this case, he might consider other markets like local mid and up-markets or processing market. It is always possible to “down-scale” the market outlet

in case of necessity / opportunity but it is almost impossible to sell on the more stringent market if this has not been the target since the beginning. For all three chains to reach its potential the farm-productivity needs to increase and further professionalized, as many producers are currently under performing. However various pioneering and more advance producers can lead the way and play a central roll in bringing the chains forward.

At this point, the reader could ask why – with the criteria presented in the justification chapter – our survey didn't propose a strategy to develop the value chain of traditional varieties of mango for industrial processing. As a matter of fact most industrial processing activities seem to require the blending of traditional and improved varieties of mango. Thus, development of improved varieties could be supported / affected by those of traditional varieties.

However, as AMAGRO members don't grow traditional varieties of mangos we left this potential value chain aside. Still, we recommend that AMAGRO keeps an eye on it and consider the possibility of developing a concerted strategy with the "traditional" mango growers to make sure that their own strategies are not undermined.

4.2 VALUE CHAIN FOR EXPORT MARKET

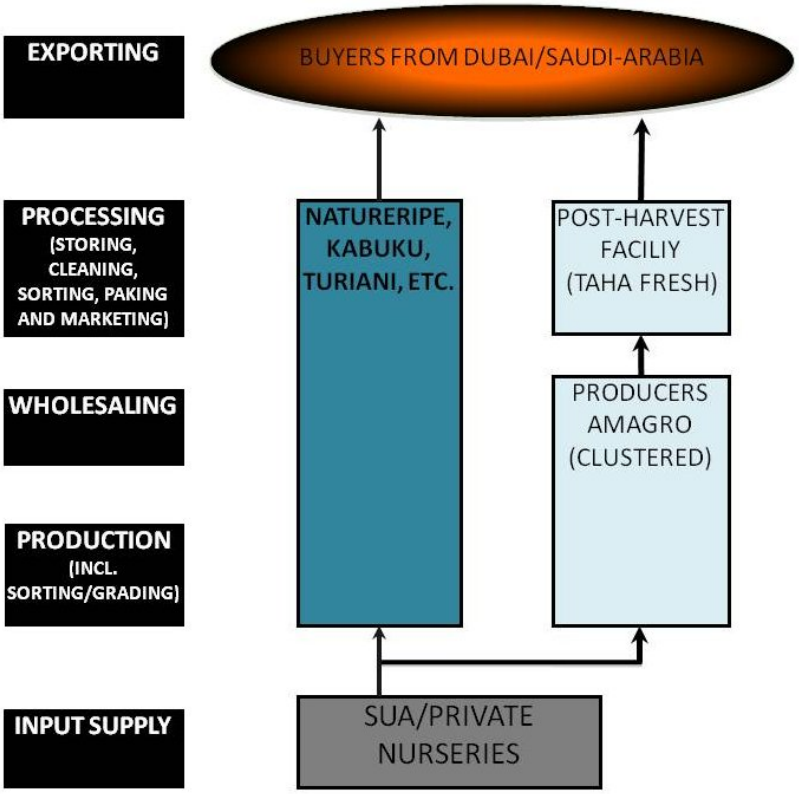
4.2.1 DESCRIPTION OF THE SUPPLY CHAIN

This is an export led channel. The chain is clearly driven by high demand from the Middle East, European Union (EU) and Turkey and their preparedness to pay higher prices for high quality mango. Moreover Tanzania is located below the equator (Southern hemisphere) and has the advantage of producing in the off-season compared to the main producing countries (located in the Northern Hemisphere). Furthermore, the main producing countries are also consuming countries and majority are located in the Northern Hemisphere, the off-season therefore provides the chain with a window though short that has great market potential. Still Tanzania needs to compete with other countries in the Southern hemisphere, like Kenya, South Africa and Mozambique. However the foreign demand is so much higher than supply that this is more of a longer-term concern. Therefore it is not surprising that Tanzania mango farmers are currently preparing themselves to tap into this market.

Tanzania has been exporting small quantities of mango but with challenges, such as fruit flies and not been able to supply sufficient volumes, halted the exports. Even Natureripe Kilimanjaro Ltd who is amongst the few pioneering farmers with experience in export business had to suspend this activity because of the mentioned problems. Moreover, many growers are not sufficiently aware of the export requirements (see ANNEXE IV: Outline of infrastructure required for export) and its implications for their mango business. To sum up Tanzanian opportunities are clear-cut but most producers have still a long way to match the markets demands.

Proposed value chain map and description of proposed economically viable mango flows is shown in Figure 8.

Figure 8: Export driven chain



Source: Data from the study

SUA and various private nurseries provide the seedlings. Natureripe Kilimanjaro business model is to control the whole process from production up to exporting, which makes it easier to control quality and manage logistics. Kabuku Mayunga Farm in Handeni district is in the progress to set-up a structure similar to the one implemented by Nature Ripe. The proposed chain upgrading to be developed is shown on the right side of the figure. It will be further elaborated in the following paragraphs.

4.2.2 PROFITABILITY ANALYSIS

Figure 9: Profitability producers

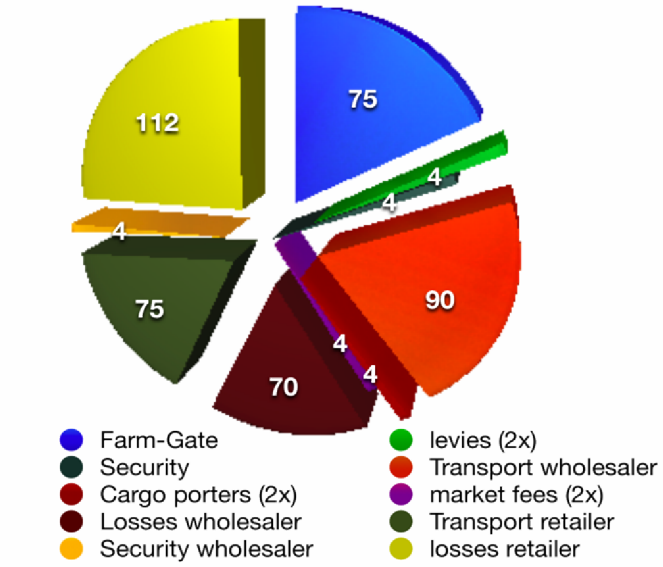
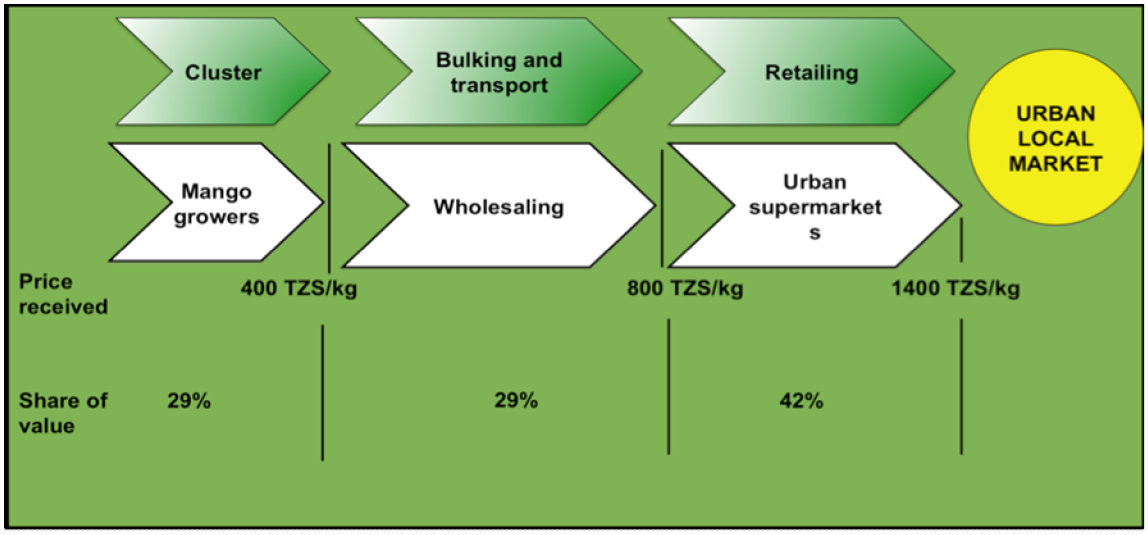


Figure 9 shows the profitability of the chain actors targeting the export market. However most haven't been able (yet) to export, therefore we indicate the costs from production up the current end-market, being DSM. For these chain actors (both producers and wholesalers) the main cost drivers are – besides the farm gate - the transport costs and the (post) harvest losses. For an exporter like Nature Ripe, the costs drivers are very similar although labour costs are higher (also see Figure 12) but especially the transport costs (air-freight) are very high. This transport costs from DSM airport to Dubai airport can go up to 1.5 to 2 dollar per piece, although it depends on the volumes transported. The Middle-Eastern market, however, request air delivers even though it results in higher buying prices.

Figure 10: Current situation to the local market



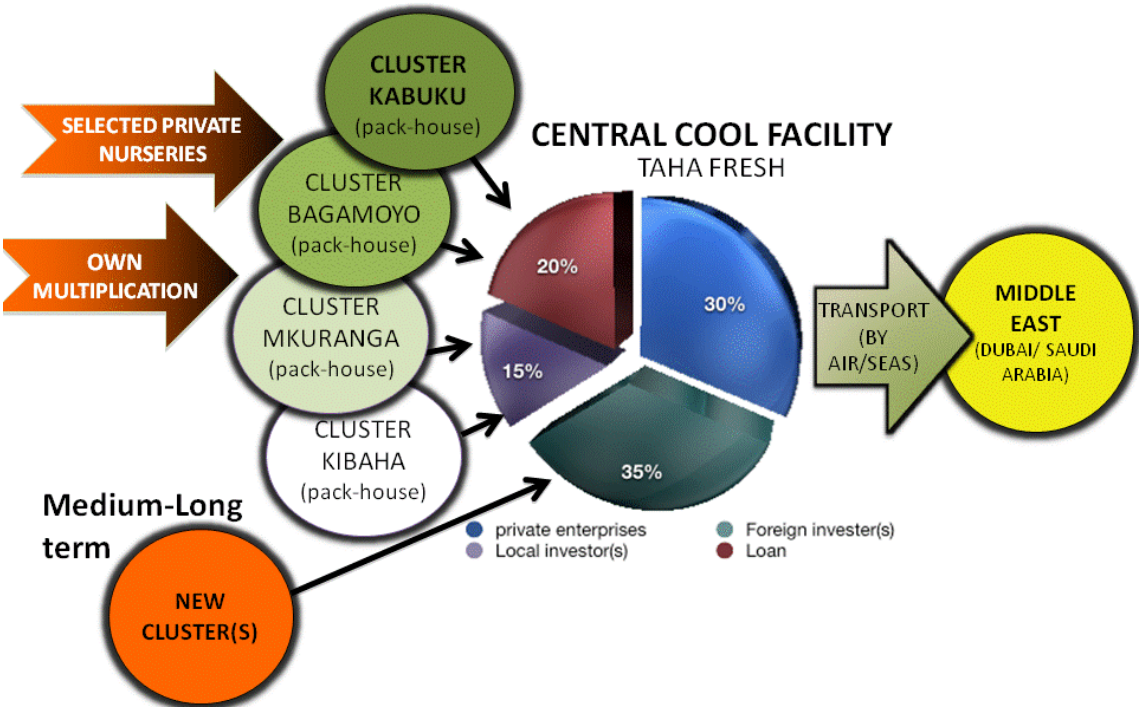
Source: Data from the study

As mentioned most producers who aiming the export markets, have stopped and are supplying the local (up) markets. The price received and the value shared is shown in Figure 10, this is especially interesting as we are going to compare it with the export market (Figure 11 and Figure 12). Note here that many producers don't manage to sell to the up-market, which can results in lower prices along the chain.

4.2.3 BUSINESS MODEL

To enable Tanzanian mango farmers to tap into the export market, a different and comprehensive approach is needed (see business model, Figure 11). In this proposed way forward farmers will get their seeds from selected high quality private nurseries but eventually every cluster will multiply its own seeds (under supervision of TOSCI).

Figure 11: Business model - export chain



Source: Data from the study

In the first phase three clusters are envisioned based on current sub sector dynamics to target the export market, these zones are chosen due to their vicinity to DSM, their progressiveness (potential use of irrigation, management etc.) and therefore their relative readiness to export. Every cluster is envisioned to start with a few (roughly 2 to 6) large scale and progressive farmers, who will do their post-harvest handling in a designated pack house facility (for sorting, grading, packaging etc. all in cold storage stores) within the clustered area. This pack houses are envisioned to set-up around the driving producers in the cluster, in Korogwe around Kabuku and in Mkuranga around Nature Ripe. These pack houses don't have to be highly modernised but a spacious storage facility with temperature regulated rooms and space for other post harvest facilities will be sufficient (see ANNEXE IV: Outline of infrastructure required for export). Existing pack-houses can be rented from large companies like Bakhresa and don't need to be built from scratch. The management of the cluster pack house and logistics should be outsourced to a highly qualified mango-handling expert, who

should be paid accordingly. However the individual farmers will manage their farms in line with the policy of the cluster. In the medium-long term (roughly after 3 years) other farmers can gradually join the cluster and the value chain.

However, initially four clusters driven by selected progressive farmers will lead the way in the chain. Kabuku Farm will drive the Korogwe cluster, as they are pioneering in its approach to professionalize their activities. Most importantly it has decided to get foreign expertise and co-investment on board. Therefore it now works closely with an Israeli company Tendaji that is currently conducting water surveys, writing a business plan, professionalizing the farm-management practices (irrigation, pack house on farm, introducing new agro-economic methods and supporting Kabuku Farm in marketing their crop). This technical support package includes a visit to export markets and mango growing areas in the Middle-East (Israel). This way of professionalizing is the first of its kind in Tanzanian Mango sub-sector and is anticipated to set a viable business model that could be emulated by other farmers. Next to Kabuku Mayunga Farm is the Turiani Farm, which has over 190 acres of apple mango and in the process of expansion with other late, maturing varieties. The combined production alone, when further professionalized, can make this into a leading cluster. Also a cluster around the experienced company Natureripe Kilimanjaro (Mkuranga district) and the progressive company Kibaha Mango Empire (Kibaha district) can play this role. The fourth cluster in Bagamoyo has the potential to set-up a similarly strong cluster. Jointly they will be able to supply the requested quality and quantity and give the export chain a strong boast. In order to make it work clusters need to be set-up around clear parameters, be guide by a detailed planning and have clear terms of cooperation within the cluster (profit sharing, traceability issues etc.) and in time formulize these aspects.

To decrease the relative high losses (see costs driver Figure 9) a more effective way of transporting is needed, the uses of improved packaging and cold chain trucks will be crucial. In this cold storage facility the mango will be bulked, get a last quality check and be sent to the DSM harbour. The whole chain will be facilitated with cold chain facilities. This is a must to control the quality, keep a reasonable shelf-live and good appearance. Fortunately the private sector (TAHA) and donors (USAID/FINTRAC) will be driving forces in setting-up post-harvest (cooling) facilities. In the beginning of 2011 TAHA will conduct a feasibility study to determine the size, location, requirements, etc. of these central cooling facilities. Without central cooling facility in Dar es Salaam but with their cold chain facilities on cluster level, farmers can already start exporting smaller quantities and may be by air freight in the short term (0-3 years). After three years of experience the clusters ought to be ready to export larger quantities and by then the central cooling facility is expected to be operation. A central cooling facility in DSM would make the whole approach more efficient and effective.

Importers from Dubai and Abu Dhabi are in such a high need of mango, that importers are eager to work together with Tanzanian mango farmers and organisations, just to boost its exports. TCCP is also a program that is supporting horticultural clusters to make them more competitive. This is an opportunity for mango farmers to tap into. The involvements of foreign expertise – be it from importers or companies based in Tanzania (Tendaji) – is crucial for the chain's success as it will enable the actors to eliminate the elements keeping them from

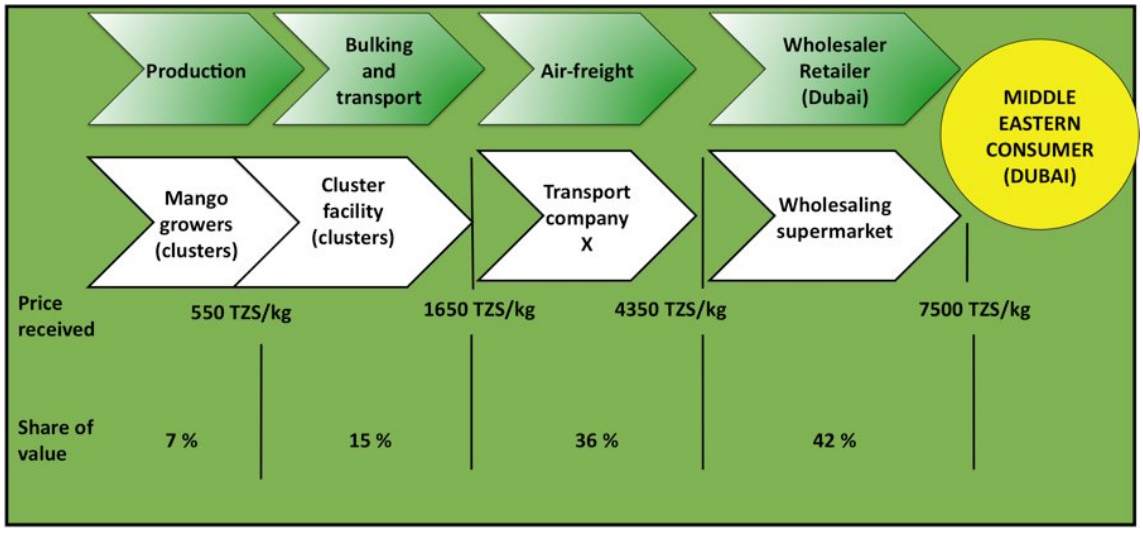
exporting, think of inconsistent availability of inputs, weak farm-management and inability to control pest and diseases, poor infrastructure (i.e. irrigation and cold chain facilities), lack of marketing knowledge etc. As mentioned above, foreign experts can be hired as managers for the proposed clusters but they can also play a role in supplying the Tanzanian farmers with sufficient and reliable inputs, capital etc.

To realise this approach, mango farmers need to access finance. Besides the mentioned donor initiatives/support, TIB is an important provider of capital and it is able to offer attractive terms and interest. However TIB doesn't have the mandate or the resources presently to finance all mentioned needs. Fortunately EPZ and BOT can offer credit guarantees; which makes it much easier to get loans from regular banks. Furthermore Tendaji-agro is not only offering a wide range of agro-consultancy services but also plays a role as broker. The company is working with large financial institutions, which are mostly interested in equity and agricultural investments. To get loans from these financial institutions, farmers minimally have to have professional management, irrigations and cold chain facilities in place.

4.2.4 ADDED VALUE WHEN EXPORTING

4.2.4.1 FIRST PHASE: 1 TO 3 YEARS

Figure 12: Envisioned export to Middle East (Dubai) – first phase



Source: Data from the study

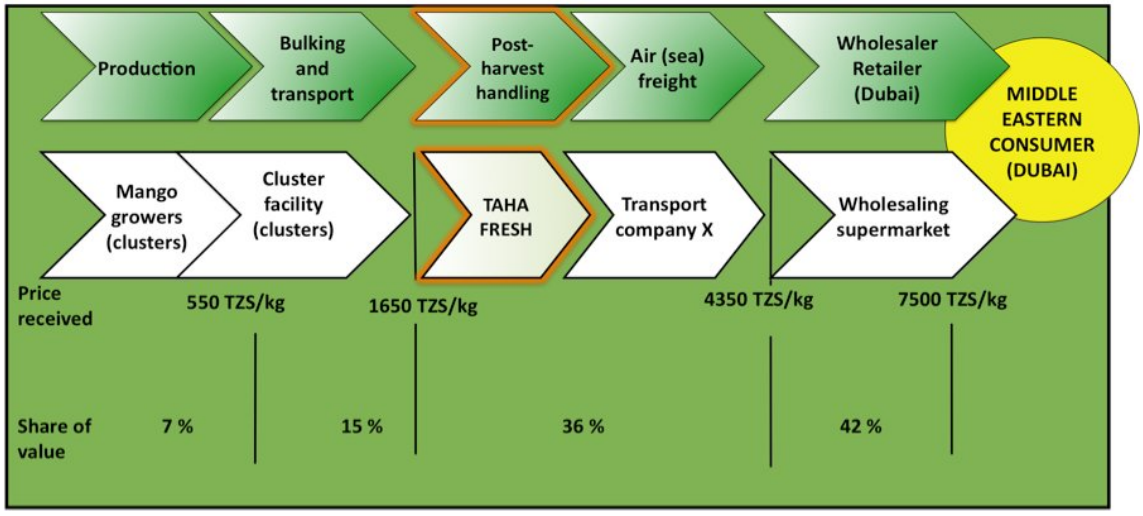
Although the final consumer price (7500 TZS) seems high, the price differences between 1650 TZS/kg and 4350 TZS/kg will be fully covered by transport costs from Tanzania to Dubai and the costs within Dubai (4350 to 7500 TZS) will go to transport, packaging etc. The assumption is that one kg is the equivalent of two pieces of (improved) mangos. The potential advantage of exporting, compared to selling locally to up-market, is not only the higher selling price but also the large volumes the export market is requesting and able to absorb. Moreover with increasing local supply in the high season, when the export is envisioned and the demand in the Middle East is highest, other market (i.e. export) become increasingly attractive. Of course this is not an easy trajectory and it involves higher costs and risks, for example a rejection of a container can jeopardize the whole venture. The proposed chain has an innovation to include a cluster facility (pack house) that would bulk from different

farmers and organise appropriate logistics to link up with TAHA Fresh. This cluster facility will essentially be farmer owned but professionally managed and whatever added value (in this case TZS 1100 per kg) will add into farmers' share of the cake. TAHA Fresh is expected to be professional freighters who would be able to bulk from different clusters and manage the export logistics.

The product will be bulked in the various and respective clusters and than directly transported to the airport and flown to Dubai. The advantages of airfreight, instead of sea-freight, are the short transit time (only two days), a complete cold chain is not needed and it's suitable for lower volumes[15]. All these aspects are highly relevant for Tanzania, because there are no cooling facilities in place, only lower volumes can be exported and perishability remains a large issue. When the chain is able to expand, cooling facilities will be build up and the produce is large enough than transport by sea because a viable option.

4.2.4.2 SECOND PHASE: 4 TO 6 YEARS

Figure 13: Envisioned export to Middle East (Dubai) – second phase



Source: Data from the study

In the second phase, roughly after three years, it is likely that TAHA, TAHA Fresh and FINTRAC (funded by USAID) have operationalized their commercially run central cooling facilities in Dar es Salaam and possibly other (strategic) locations. This makes it easier and less expensive to establish a complete cool chain, starting from the mango production on cluster level, cooled transport to the central cluster in Dar es Salaam and lastly to the final destination in the Middle East. If the export chain also managed to significantly increase their volumes, this will reduce our main cost drivers, transport and post-harvest losses. A part of the shown transport costs in Figure 12 (2700 TZS) can be reduced due to more efficient use of transport. In the long term, roughly after four to six years, shifting to sea-freight could further lower the costs and make the chain more efficient. Next year weekly shipment to Dubai will

[15] Yeyande Sangho, Patrick Labaste and Christophe Ravry, Growing Mali's Mango Exports: linking farmers to markets through innovations in the Value Chain (The World Bank 2010).

start which allows mangos, when volumes are sufficient, to supply the Middle-East much cheaper. This will also give Tanzania a crucial competitive advantage over competing countries. But this has to be carefully discussed with the buyers, who currently prefer airfreight and also large volumes are needed to make sea-freight viable. The advantage of exporting by sea comes from the economies of scale associated with bulk shipping and the resulting lower freight cost per weight unit.

4.2.5 COMPETITIVENESS

The competitiveness of the export chain centres on the following questions:

NEW ENTRANTS: How difficult is it for new entrants to enter a new market?

Economies of scale and investments in cold chain facilities, irrigation and logistics management are needed to make exports commercially viable. This implies that production, transport, processing and other supply chain activities need to be fully streamlined. Significant entry barriers for new entrants are: (i) the set up a system of efficient production and of (ii) an efficient transport system, (iii) the full utilization of post-harvesting (cold chain) facilities and (iv) delivery of a quantity, quality & consistent product. In chapter 3.5.1.3 it was described that initial investment costs can go up to 14.5 million TZS. Hence for SHF with limited access to capital and large-farmers with lack of business acumen and weak farm-management, it will be very difficult to deliver an export ready fresh mango all the way to the DSM harbour.

SUBSTITUTES: How easily can the product be substituted?

Foreign competitors and local large-scale farmers that compete with Tanzania (Kenya, South Africa etc) can relatively easily substitute the products (improved varieties of fresh mangos) of the chain that Tanzania would target. Besides mango fruit can be substituted by other fresh fruits if Tanzania proposition is not going to be sound enough (as shown by entry barriers in the above section).

BARGAINING POWER OF SUPPLIERS: How strong is the position of buyers and sellers?

The bargaining power is on the side of the mango producers, due to the current high demand of Mango importers. However buyers (importers) are clear about their minimal requirements and these are nonnegotiable (see Table 20 – order qualifying).

INTERNAL RIVALRY: How strong is the competition and rivalry among existing firms, who are the major competitors, their strengths and weaknesses and how are they positioned?

The market analysis showed that Kenya and various Eastern-Southern countries are Tanzanians most important competitors. Kenya has the advantage of having microclimates in both the Southern and Northern Hemisphere, which allows it to deliver all year-around. After some difficult years, South-Africa is increasing its production and exports. Overall the country is ahead of most African Mango farmers, i.e. due to its sophisticated infrastructure (irrigation, cold chain facilities etc.), strong business environment, which is geared to the export market. However their competition will (initially) be mild due to the large demand and the ability of importers to absorb large volumes (annually Dubai imports around 60,000 Metric tons)[16]. When demand and supply will be more in balance Tanzanian will mainly compete mostly on price, as the competitors are producing very similar mango varieties. If the chain will

[16] Source: USDA, Foreign Agricultural Service (2006)

adapt new varieties, for example the Shelly variety from Israel, that could give the chain a competitive advantage on quality, shelf-live and appearance.

4.2.6 CRITICAL SUCCESS FACTORS

In this part we will describe the main success factors, seen from the end market as depicted during this study. The third column indicates the necessary measures to satisfy the market requirements.

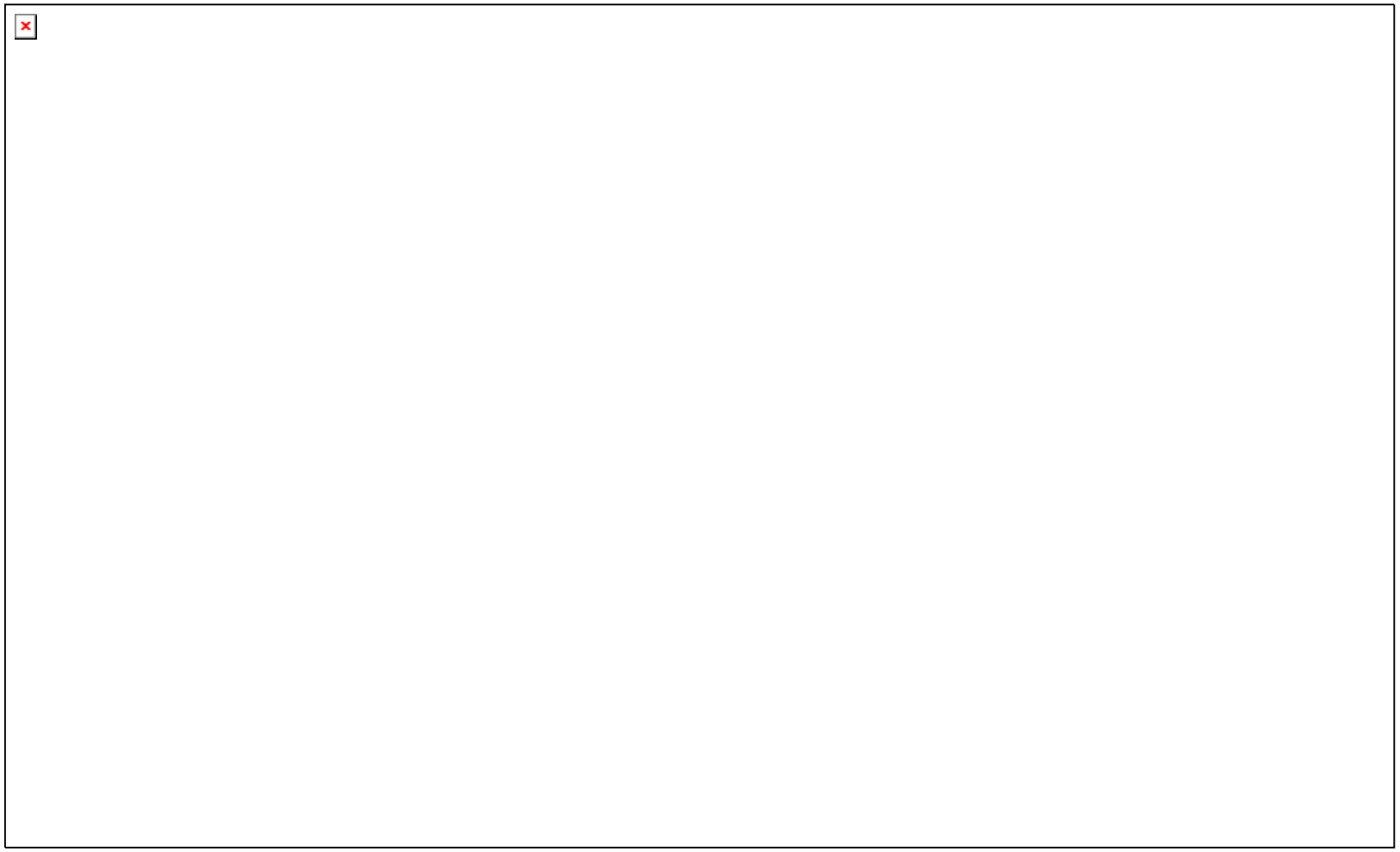
Table 20: Critical success factors - Export Value Chain

Proposed chain	Critical Success Factors	Implications
Fresh improved varieties mango for export market (Dubai/Abu Dhabi)	**Order qualifying:** • Premium quality (no pest & diseases) • Regular, reliable and sufficient supply. • Consistent quality	• Multimodal transport modelling (road, air or sea) is key to competitiveness • Communications between actors and traceability of produce (producers) are crucial to control quality. • Sufficient volumes, minimal 4 tons per week. • Irrigation is a must to secure consistency in supply. • Expanded distribution network and need cool facilities throughout the chain. • Constant and critical farm management.
	Order Winning: • Attractive packaging and spotless mango • Longer shelf-life • Competitive price	

Source: Data from the study

4.2.7 UPGRADING STRATEGIES FOR EXPORT VALUE CHAIN

Figure 14: Upgrading strategies for Export Value Chain



4.2.8 ACTORS INTERVENTIONS

Here we have divided the interventions in to two phases, short and medium/long term. The short term (0-3 years) will build the capacity of the main actors and set the structures and facilities in place to target the Middle Eastern market. Although not shown in the Figure 15, in these years of preparation, farmers will remain selling their produce to the local market and increasingly sell their produce to the export market. On the medium-long term scaling-up to really utilize the progressive approach, facilities and structures.

Figure 15: Upgrading issue and actors interventions - phase 1: 2011-2013

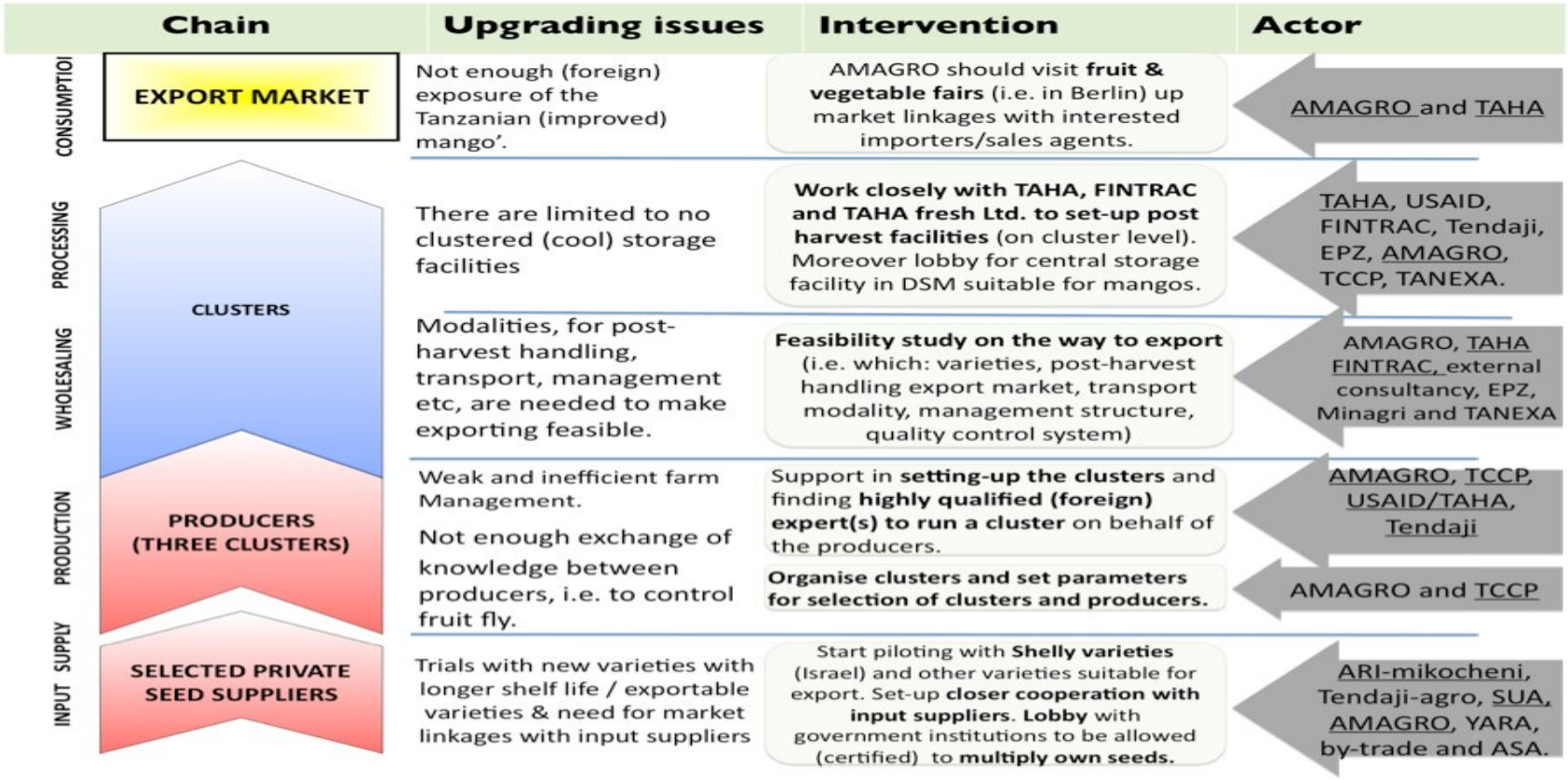
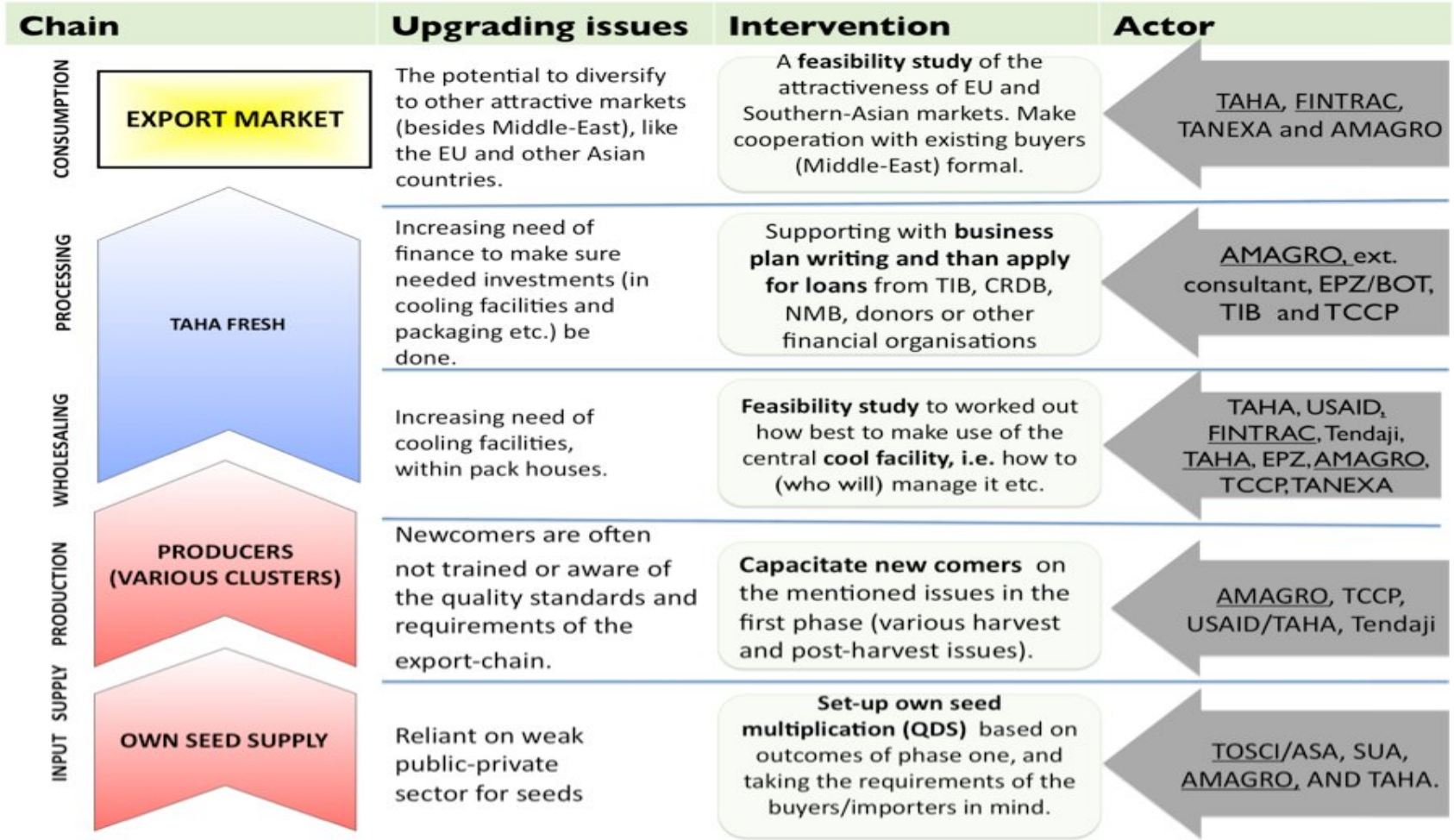


Figure 16: Upgrading issue and actors interventions – phase 2 (2014 and beyond)



Source: Data from the study

4.3 VALUE CHAIN FOR LOCAL MID AND UP-MARKETS

4.3.1 DESCRIPTION OF THE SUPPLY CHAIN

The objective of this value chain is to enhance the local consumption of improved varieties of mango. Indeed, this consumption is currently still limited as these mangos are sold mainly through supermarkets and "private" urban marketing channels and their availability is still limited in many urban areas. For instance, the main wholesalers at Buguruni market in Dar es Salaam estimated that annually about 430 to 500 tons (36 tons weekly) are going through the usual distribution network from an estimated total production of improved mango of 15 – 20,000 tons in 2009 -2010[17].

Mango growers should consider using – and taking advantage of – a distribution network that is able to deal annually with about 43,100 tons[18] of traditional mango and 2 to 2,500 of imported mango.

There is thus a need and an opportunity to increase the amount of improved mangos consumed on the local mid and up markets especially for first and second grade mangos (as a buffer of the export market).

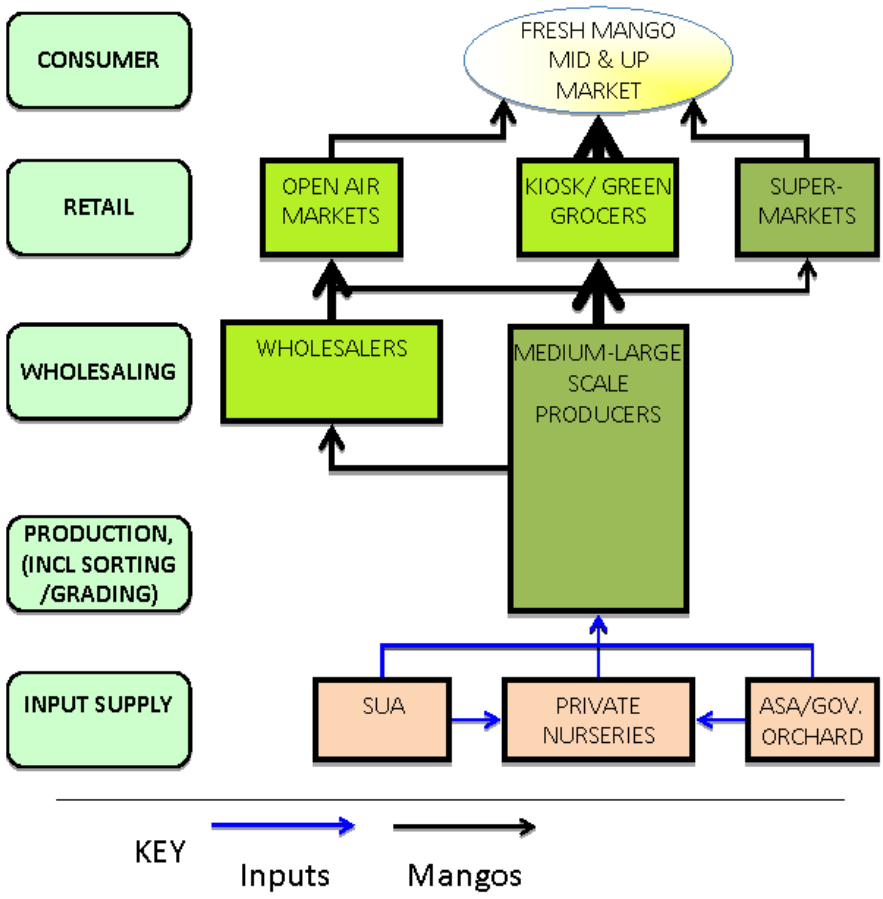
Two main complementary channels could co-exist.

- In the first channel, producers supply mango directly to supermarkets and specialized kiosks / groceries. This channel could be reserved for farms that are able to guarantee regular supply to these clients and to comply with their legal requirements[19].
- In the second channel, large-scale mango growers sell mango to retailers on open markets and kiosks through wholesalers based on the main fruit markets in Dar es Salaam. These wholesalers need to be carefully selected and their collaboration with the mango growers needs to be well supervised. For instance, it is important that the mango growers define with the wholesalers the conditions of handling and promotion of the mango.

The Figure 17 below represents the value chain for fresh mango for the mid and up markets. Consumers' preference for traditional varieties seems to be based on consumption habits but also on differences in price. In fact, improved mangos are more expensive per unit and by Kg than traditional mangos. Moreover, improved mangos are more prone to get spoiled and customers and retailers fear them. Nevertheless key wholesalers from Kariakoo, Ilala and Temeke Stereo market indicated an increasing demand for improved varieties. Their superior taste and sweetness, larger size and fewer fibbers can explain this.

[17] Communication from Mr. Hamadi Mkopi / AMAGRO, on 15th of November 2010
[18] Data from our survey
[19] Some supermarkets only accept to deal with farms which are registered as companies. Other specific requirements exist.

Figure 17: Value Chain for Mid & Up Fresh Markets



Source: Data from the study

But the quality of these mangos (diseases incidences, size and appearance) strongly varies; which damages its reputation and thus limits a faster growth of demand. The proposed channel should therefore make branding, a top priority. In combination with an adequate promotion for consumers and retailers and a proper handling (harvest, post-harvest, packaging and transport, etc.) improved mango will become more attractive for up-market consumers to purchase them. This approach of well-managed brands will make the chain more competitive and distinct it from the current situation characterized by a highly fluctuating quality of (improved) mangos.

4.3.2 PRICE STRUCTURE, COST DRIVERS AND ADDED VALUE

The analysis of the economic impact is based on the calculation and discussion of the price structure, cost drivers and added value. The two first notions have been introduced in chapter “3.5.1: Profit Analysis”. The “added value” mentioned here is the part of the “total value consumed” corresponding to the sum of the interests and rents, wages, depreciation, direct taxes and profits. It is thus different from the Gross Profit that doesn’t include wages paid, reserves for depreciation and reimbursement of loans, payment of rents and direct taxes. The added value shows how a chain contributes to the increasing of the wealth of the chain and thus, of the country. In comparison, the other components of the “total value consumed” can be considered

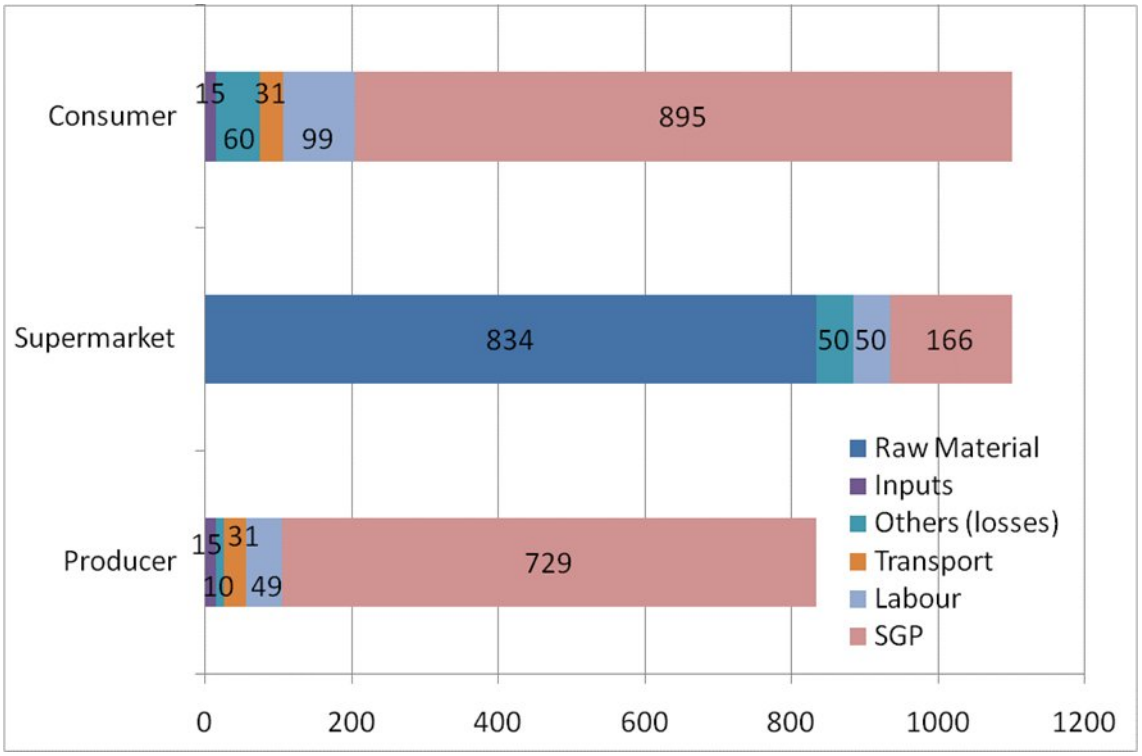
as final consumption / destruction of resources (intermediate costs[20] or other inputs[21]).

For the analysis of the price structure, cost drivers and added value, we distinguish the supply of end consumers through supermarkets and the supply through wholesalers and usual retailers.

Other precision, we used for this analysis the data originated from the producers who managed to get closer from the "potential output" of the crop (cf. chapter 3.5.1.1) and not the data from the "average farmers" as the latter's results have no value as benchmark.

Figure 18 shows how the price is built up along the chain with supermarkets outlets. From 834 TZS/Kg that the producers get, 729 TZS (87%) corresponds to SGP (simplified gross profit). The cost of inputs (15 TZS/Kg), others (10 TZS/Kg), transport (31 TZS/Kg) and labour (49 TZS/Kg) represents in total only 13%.

Figure 18: Price Structure for the retailing through supermarkets



Source: Data from the study

For the supermarkets, the cost of supply corresponds to 76% of the total expenses, and the SGP corresponds to 15% (166 TZS/kg). The remaining (losses and labour) represent 9%.

The association of the costs incurred by supermarkets and producers leads to a final price for the consumer of 1,100 TZS/Kg. In this price, the cumulated gross profits

[20] Including operational services such as rental of machines and transport, direct inputs such as seeds, pesticides, fertilizers, energy and water, finished products utilized such as packages or seedlings

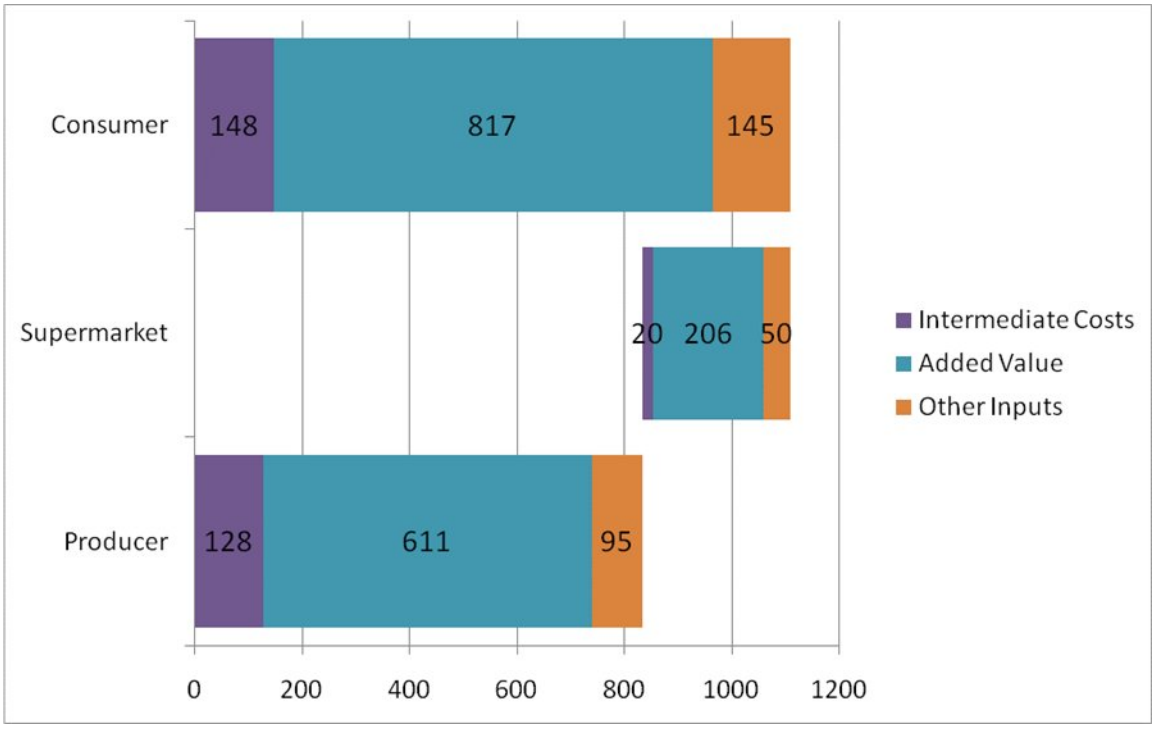
[21] Mainly losses in our case

correspond to 895 TZS/Kg (81.3%), the labour corresponds to 99 TZS/Kg (9%) and the other costs (losses) correspond to 60 TZS/Kg (5%). The remaining costs (inputs and transport) represent 4%.

This means that increasing of competitiveness compared to concurrent products is possible through reductions of the gross profits. Significant impact for farmers could still be huge if they increase scale of production (the margin of progression in terms of yields is still huge). The current importance of the gross profits in the final price also shows that the actors have the capacity to invest to improve the competitiveness of their action.

Figure 19 represents the way how added value is built up along the chain. It shows that for a selling price of 837 TZS/Kg, the farmers produce an added value of 611 TZS (73%). The supermarkets contribute for an increasing of price of 276 TZS of which 75% (206 TZS) is value added. The total value added reaches 817 TZS/Kg corresponding to 74% while the intermediate costs reach 148 TZS/Kg and the other inputs (145 TZS/Kg) represent 13% each / 26% in total.

Figure 19: Added value for retailing through Supermarkets



Source: Data from the study

If the ten main supermarkets in Dar es Salaam sell weekly an estimated 10,000 mangos corresponding to 120,000 mangos (60,000 kg) over 3 months the corresponding market and added value reach TZS 66 and 49 millions respectively.

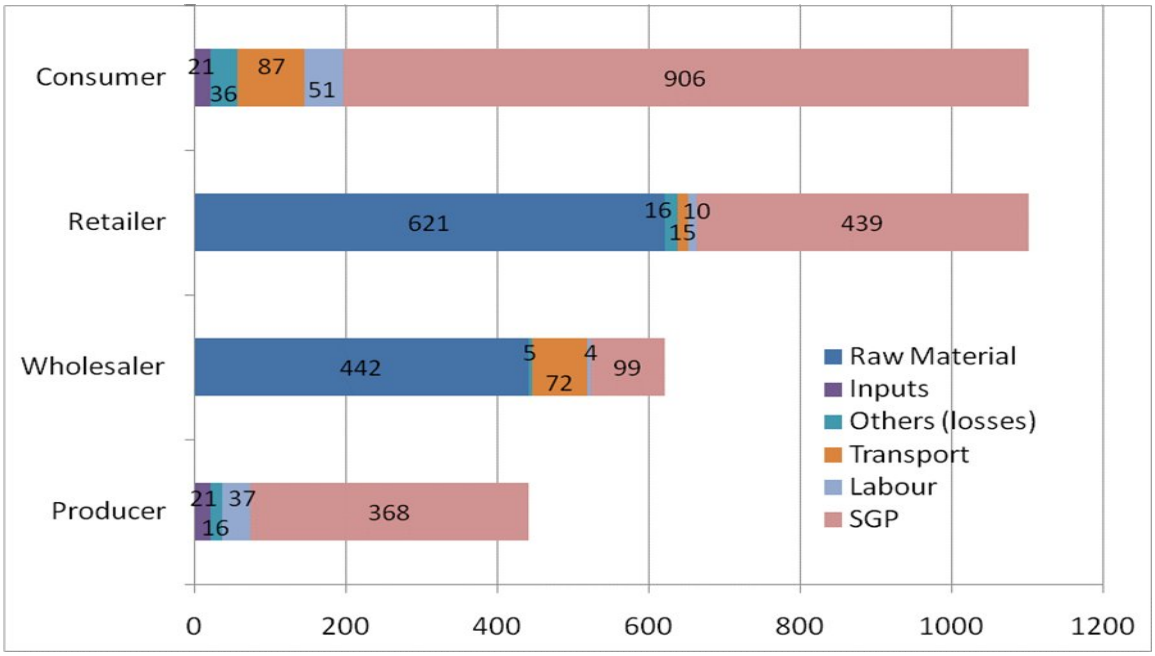
Figure 20 shows how the price is built up along the chain with outlets through small retailers. Producers get in this case 442 TZS/Kg of which 368 TZS (83%) are gross profits, 37 TZS (8%) is labour, 16 TZS (4%) correspond to other costs (e.g. losses) and 21 TZS correspond to inputs (5%). Wholesalers sell the mangos for 621 TZS/Kg of which 442 TZS (71%) correspond to the buying price of mangos. The do a gross profit of 99 TZS/Kg (16%) and pay transport (72 TZS/Kg ~ 12%). The also spend

money on labour (4 TZS/Kg) and other costs (5 TZS/Kg) for ~ 1% of the total selling price.

Retailers sell mangos for 1,100 TZS/Kg but from this total 621 TZS correspond to the buying price. Their gross profit reaches 439 TZS/Kg (40%) and their different costs reach 41 TZS/Kg (4%).

Of the final price paid by the consumers, 82% correspond to the cumulated profits of the different actors (906 TZS/Kg), 8% correspond to labour (87 TZS/Kg), 5% correspond to labour (51 TZS/Kg), 3% correspond to other inputs (mostly losses ~ 36 TZS/Kg) and 2% correspond to inputs (21 TZS/Kg). Similarly than for the previous case analysed, the final price can be reduced (if it is a requirement for the improvement of competitiveness) through reductions of gross profits, labour or transport. But these reductions have to result of a negotiation between the actors involved and must – as much as possible – be compensated by increased volumes so that the total gross profits can be maintained or improved.

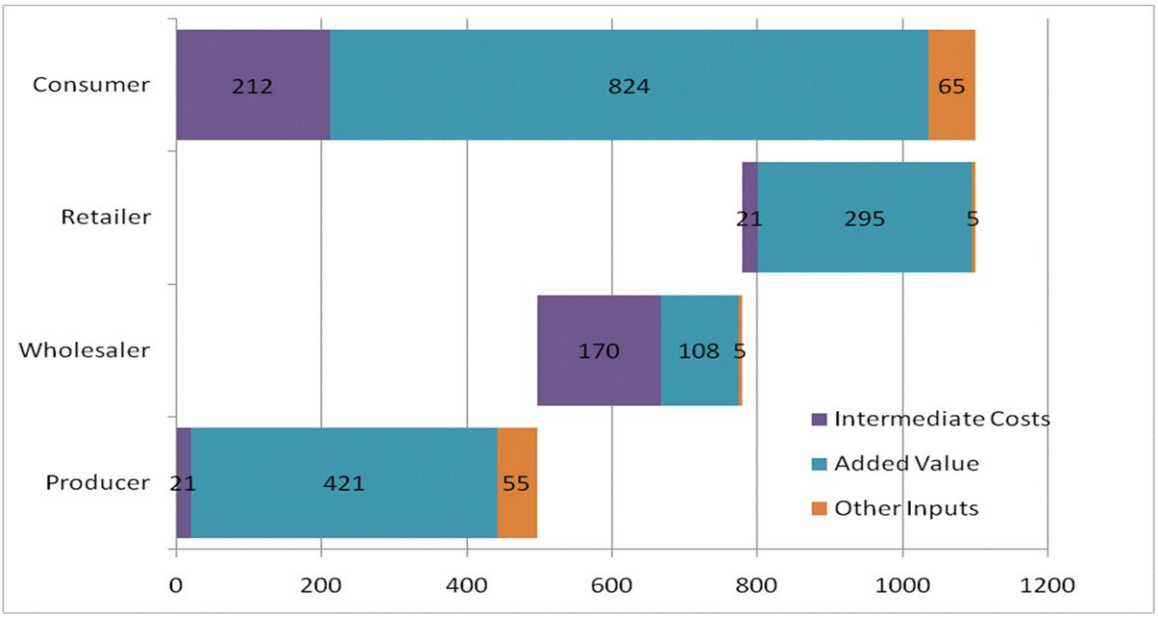
Figure 20: Price Structure and Cost Driver - Sales through small retailers



Source: Data from the study

Figure 21 (following page) shows that the major cost driver in this chain is – again – the gross profit (82%) that is almost equally shared between the retailers (48% of the total) and the farmers (41% of the total). Transport (8%) and labour (5%) contribute for 13% to the final price. The reduction of the farmers' share in the total gross profit is originated from the lowest selling price that they fetch, which is logical as more actors are involved.

Figure 21: Added value in the case of sales through retailers (mid-up markets)



Source: Data from the study

In this case the total added value produced along the chain is similar to the previous case (824 TZS/Kg) of 1,100 TZS/Kg. Though, there are more actors who contribute for the construction of this added value and logically, each of them contributes for a smaller share: farmers contribute for 421 TZS/Kg, wholesalers contribute for 108 TZS/Kg and retailers contribute for 295 TZS/Kg.

It has not been possible to get accurate data about the extension of the distribution network of improved mangos to the mid and up consumers. In order to be able to evaluate the contribution of this part of the chain in terms of added value, we have assumed based on market informers that there are about 300 possible retailing points and that each sells 300 mangos per week. A total of 90,000 mangos could thus be sold corresponding to 1,080,000 mangos for a 3 months season (corresponding to 540,000 kg) a market of TZS 594 millions and a total added value of TZS 444.9 millions.

4.3.3 COMPETITIVENESS – PORTER ANALYSIS

New entrants: How difficult is it for new entrants to enter a new market?

Even though barriers exist as significant investments are required for the start up of each new hectare (almost 10 millions TZS), it appears that the rate of entry is high. New entrants benefit from the experience from the existing mango growers as the latter clearly operate as “promoters” of the mango crop. Hence, the new entrants might perform better than the pioneers. Some of the “new entrants” might come from neighbouring countries and may be able to supply during periods seasonal deficiencies but also the rest of the time if they produce at competitive price. Local industry should be aware of this and develop strategies to substitute imports

Substitutes: How easily can the product be substituted?

Improved varieties of mango have specific taste, use, seasons and they are thus little affected by substitutes. Trends of consumption benefit altogether from promotion activities and development of awareness concerning health requirements. However,

improved mangos are still unknown to many consumers and face quality problems that could give room to other fruits.

Therefore, much attention much be given to the quality of mango and to the promotion of the fruit together with the extension of the distribution network.

Bargaining power of suppliers: How strong is the position of sellers?

Producers of improved mango are still in a situation characterized by limited supply, possibility of selling directly to consumers, possibility of shifting from one channel to another (low quality to processing and high quality to export). Furthermore, they are organized and can define / apply concerted sales policies.

However, the sales on the local market will only increase it the quality is improved and regularly good. This requires an adequate collaboration between producers, wholesalers and retailers.

Bargaining power of buyers: How strong is the position of the buyers?

There are a limited number of large supermarkets able to pay high prices and these supermarkets require limited quantities. To reach more customers, producers need to deal with a small number of powerful wholesalers based on the central urban markets. For this effect, it is important that the producers avoid negotiating as individuals but show their capacity of boycotting the wholesalers if they don't collaborate.

Internal Rivalry: How strong is the competition and rivalry among existing firms? Who are the major competitors? What are their strengths and weaknesses and how are they positioned?

Currently, limited production and quickly expanding market allow avoiding competition for sale. However, identification of new markets, efforts for the top satisfaction of the consumers' and other actors' interests and continuous adaptation of the producers to the (new) requirements of the (new) markets are vital to preserve the current cooperative attitude and the high returns for producers. Cooperation of mango growers through AMAGRO has been important to limit internal rivalry and it should thus be strengthened and developed.

4.3.4 CRITICAL SUCCESS FACTORS

Table 21: Critical success factors - Value Chain for fresh mango to mid and up local markets

Proposed chain	Critical Success Factors	Implications
Fresh improved mango for the local mid and up markets	**Order qualifying:** • Premium quality and defect free. • Regular, reliable and sufficient supply and quality. **Order Winning**: • Price attractive for consumers and retailers. • Identification of guaranteed quality control mechanism • Improved and wide availability in more consumption centres.	• A sophisticated harvest, post-harvest (including bulking and cooling facility), grading and distribution system from farms to retail network is needed to consistently supply high quality mango • Collaboration between producers, wholesalers and retailers as well as branding (improved packaging and promotion) is crucial to fasten the market penetration. • Irrigation is compulsory to guarantee quality and consistent supply. • Coordination of producers is required to avoid jamming the market.

Source: Data from the study

4.3.5 BUSINESS MODEL FOR LOCAL MID AND UP-MARKETS

This business model (Figure 22) integrates:

- The producers of improved varieties of mango either from AMAGRO members (represented in green) or not (represented in red).
- Selected wholesalers (blue)
- The end mid and up-markets that include supermarkets as well as selected retailing outlets (yellow)

In a context where the distribution channels of improved mango are not yet well established there is still an opportunity for the producers to contribute in the design of a distribution network that is in their favour.

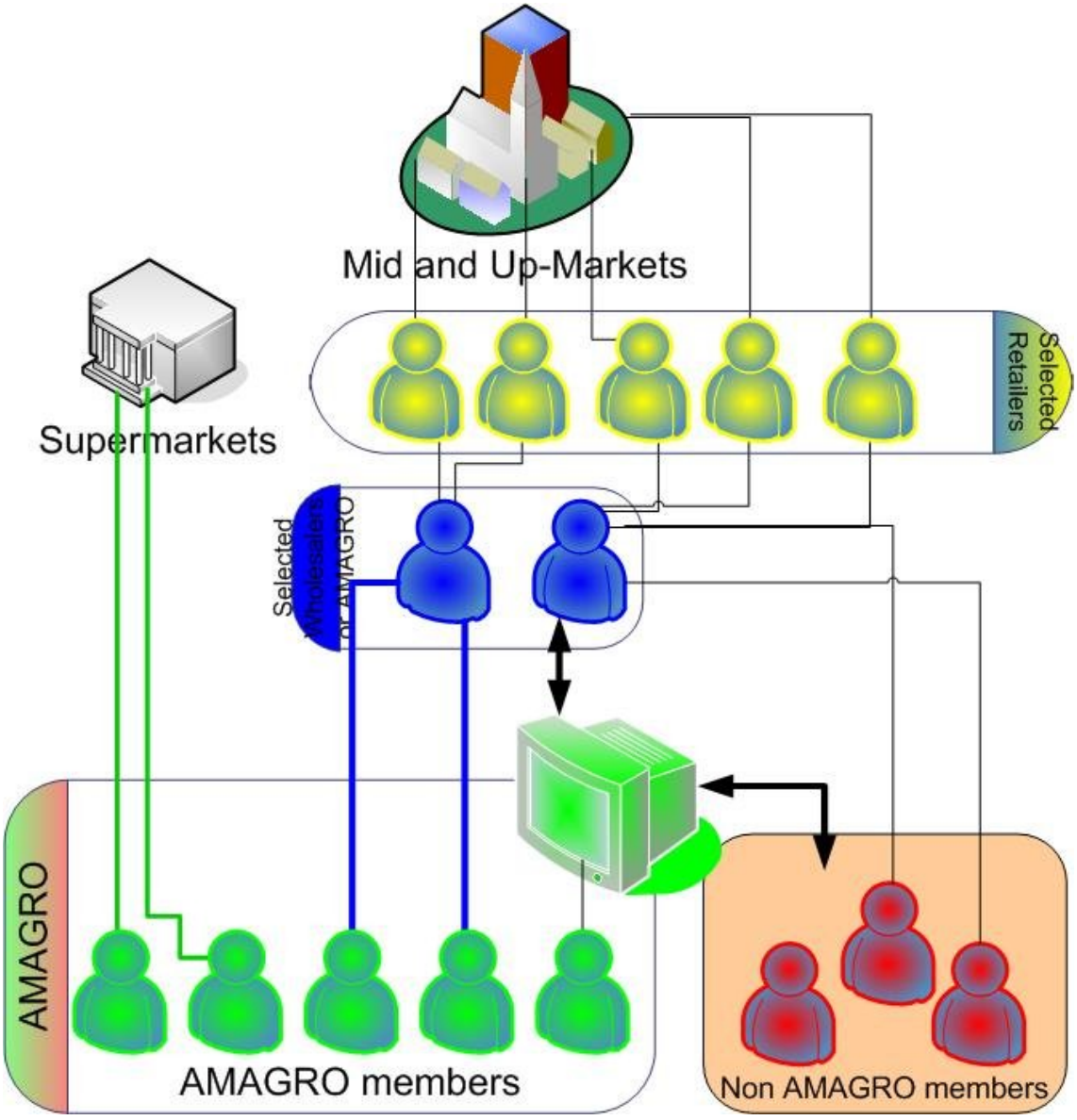
The potential of improvement of this model is based on the strengthening of the business links between mango growers and the further actors of the chain (wholesalers and retails) through a cautious selection of the latter. AMAGRO is also thinking about the possibility of taking over this function although the feasibility and institutional options of this positioning is still to be ascertained.

Once cooperative wholesalers and retailers will have been identified, mango growers will need to negotiate with them about the conditions of the cooperation (share of responsibilities, costs and profits). In the case the wholesaling function would be integrated by AMAGRO's economic wing, this negotiation still needs to be done and internalized.

AMAGRO can bring a major support to the producers through:

- Centralization of information about:
  - the production (number, location of farmers and importance of the production of improved mango) of AMAGRO members and other mango growers too
  - the actors of the chain and especially those with whom it is safe and profitable to establish commercial links (some of them could even be selected and earmarked considering their reliability),
  - the market requirements (critical success factors) of the mid and up-markets
- Supervision of the conditions of implementation of the agreements
- Organization of promotional programs with the selected wholesalers and/or retailers. Training and advising the AMAGRO members on production (improve of the quantity, quality, timing, etc.) and marketing (existing markets and their requirements) in collaboration with relevant R&D an Horticultural training institutions,
- Mobilization of private sector investors in collaboration with relevant public sector institutions (PPP) for the implementation of feasibility studies for common facilities (pack houses, refrigerated transport fleets, production of clays / boxes for transportation of mango, etc.),
- Support development mechanisms for (self) enforcement of the commercial agreements that members establish with supermarkets, wholesalers and retailers,
- Provision of similar services to the non-members (against payment),

Figure 22: Business model for local mid and up-markets



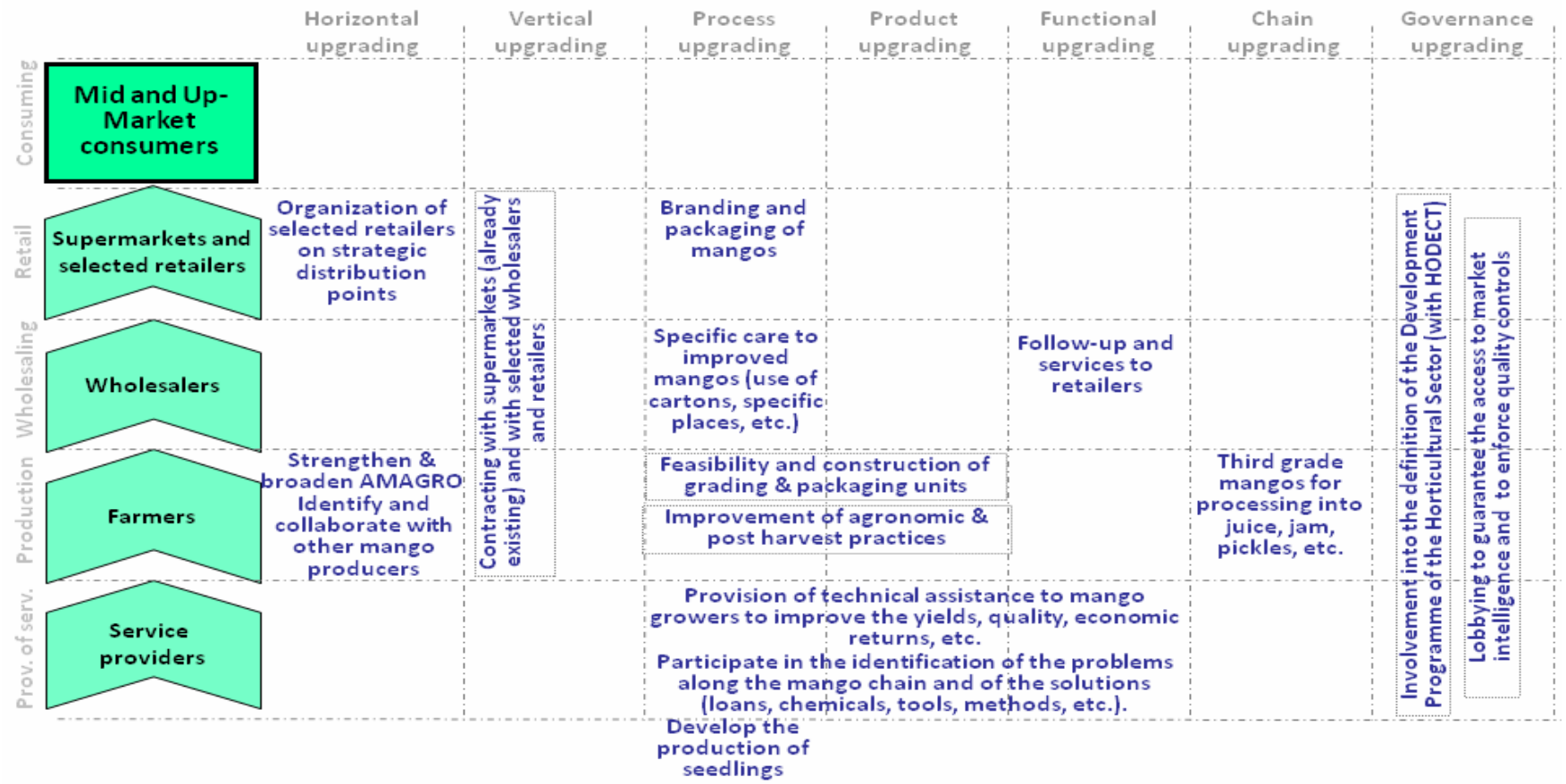
Source: Data from the study

There is also a need to build/contract a central fresh produce market in Dar es Salaam for example where horticultural produce from the regions would be sold at good prices. This central market would be a centre and an attraction for a certain class of customers (individuals and companies) who are quite aware and conscious on environmental, health and safety issues.

4.3.6 UPGRADING STRATEGIES FOR THE LOCAL MID&UP-MARKETS

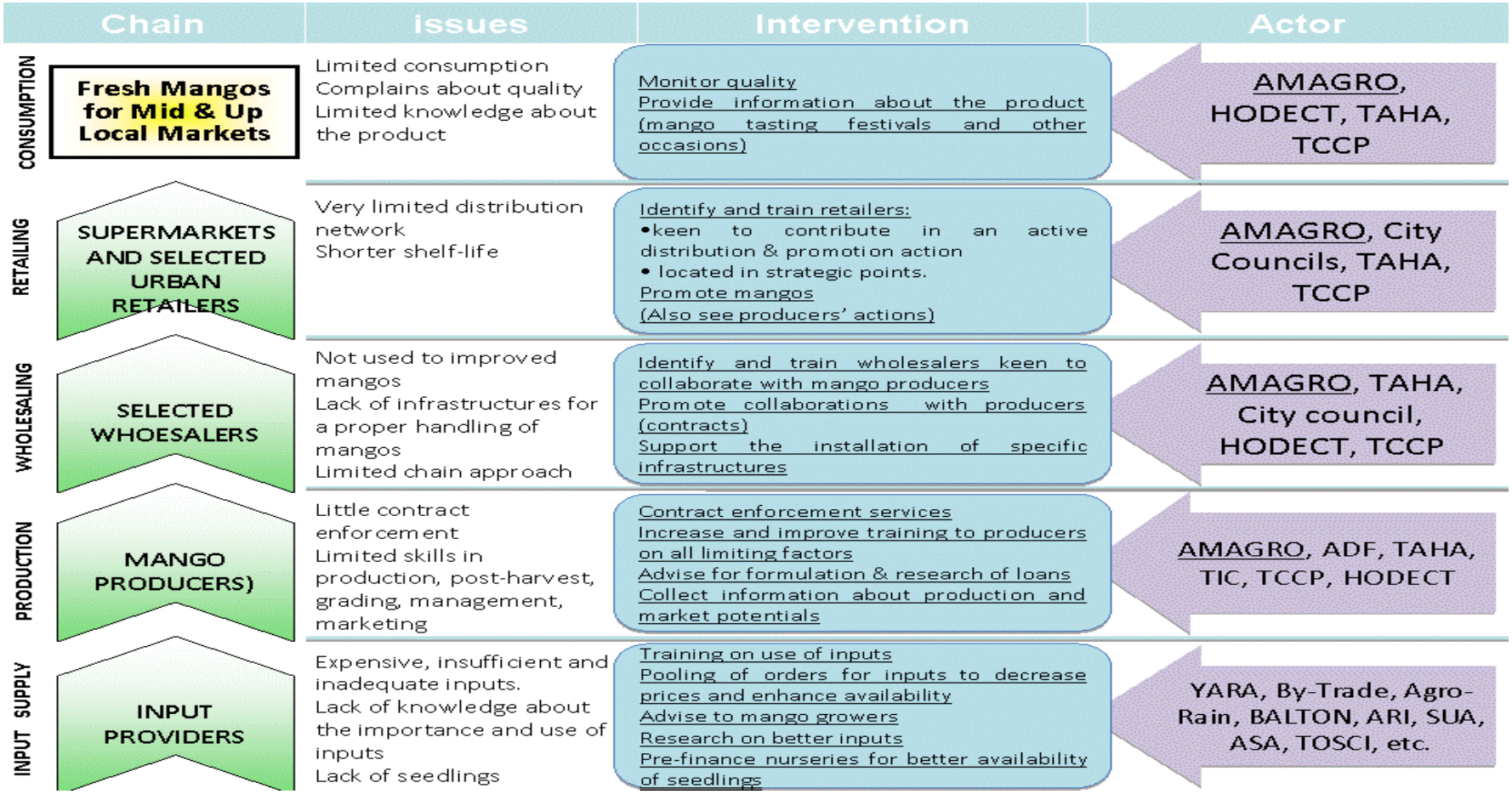
In the case of the local mid and up-markets, all activities can be initiated immediately and should – if continued for 3 to 5 years lead to the stabilization of the market.

Figure 23: Upgrading strategies for the local chain of fresh mango to mid & Up-Markets



4.3.7 ACTORS' INTERVENTIONS

Figure 24: Actors' interventions for local Mid & Up fresh markets



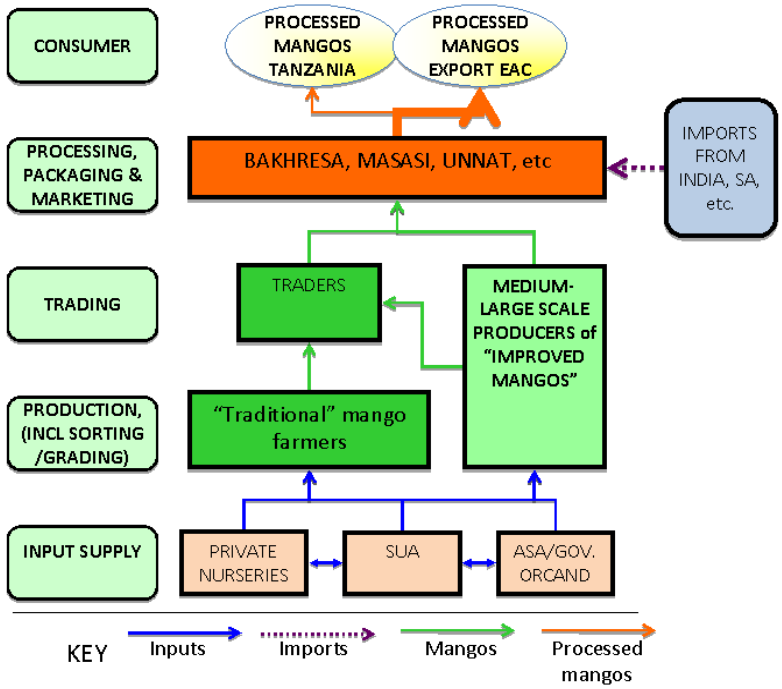
4.4 VALUE CHAIN FOR PROCESSED MANGO

4.4.1 DESCRIPTION OF THE SUPPLY CHAIN

The development of this value chain emerges at the crossing of an opportunity and a need. The opportunity is the construction of several fruit processing plants that are aimed at supplying the local and export market with juices and concentrates. AZAM has an installed processing capacity of 165 tons daily and is currently the biggest processor. This company is able to sell very large quantities of fruit concentrates to the eight juice factories based in EAC. UNNAT in Morogoro is currently lying idle because of supply and internal problems. MASASI Fruit Industry in Kibaha is also struggling to get supply. The full operation and contribution of these actors are crucial for the Tanzanian agricultural sector and the mango sub-sector in particular because now, many mangos get spoiled because of insufficient market outlets. Tanzanians enjoy drinking juices, eating pickles; Anjaris, etc. but have to spend money on imported products. Even those who would like to "Consume Tanzanian products" (to generate employment in Tanzania) cannot, as the local supply cannot suffice.

Processing units could thus operate on a blend of improved third quality improved variety mango and traditional mango. For producers of improved mango, this additional market outlet could – if combined with the two other ones – lead to a "zero losses" strategy equivalent to a "full productivity" result.

Figure 25: Value Chain of mango for Processing



Source: Data from the study

Figure 25 illustrates the value chain for processed mango. It shows that producers of traditional varieties could continue selling to traders (as the price of their mango allows the intervention of traders) while producers of improved mango could sell directly to the processing units (to decrease the costs) or through local traders. Imports (of concentrates for juices and pickles) will exist as long as the price of local

supply will be too high compared to imported substitute products. Farmers' challenge is to manage to supply the processing units at economical price.

4.4.2 ECONOMIC IMPACT

4.4.2.1 PRICE STRUCTURE, COST DRIVERS AND ADDED VALUE

For many farmers of improved mango, selling the fruits at 150 TZS/Kg is not an option. But managing to convert their losses into additional incomes should seem acceptable for most of them. Only few of the mango growers met evaluate their losses to less than 20% and some said that they can lose as much as 60% of the production if they don't manage to sell in time. Moreover, many mango farms are at a stage at which their production is still supposed to increase (5 – 10 years) and many other have just been installed (south Mkuranga, 15,000 Ha) and will produce in 4 – 10 years). In a context in which much still needs to be done to secure the market outlets (export, local fresh) processing could constitute an interesting alternative solution. For purpose of modelling, it is envisaged a model farm that would sell all the mangos that could otherwise get lost (10%) to an industrial processor. These mangos are sold farm-gate for 120 TZS/Kg so that traders can get a margin for their own costs and profit. The harvest of these mangos generates a slight increasing of labour (+6%).

Table 22: Added Value and Cost Break down – Sales of low quality and recycling of losses

Category	Sub-categories		With losses	Without losses	Difference
Value Added	Value Added	Interests and rent	239 808	239 808	
		Wages	1 034 173	1 094 125	+ 6%
		Depreciation	197 087	197 087	
		Direct Taxes	0	0	
		Profit	10 247 424	16 019 607	+ 36%
	Sub-total Added Value / ha		11 718 493	17 550 627	+ 33%
Intermediate products	Operational services	Rental machines	0	0	
		Transport	0	0	
	Inputs	Seeds	0	0	
		Pesticides	463 899	463 899	
		Fertilizers	84 652	84 652	
		Energy	7 194	7 194	
		Water	22 662	22 662	
	Finished products	Packages	0	0	
		Seedlings	0	0	
	Sub-total Intermediate products / ha		578 408	578 408	
Other inputs	Losses (10%)		1 534 772	0	- 100%
	Sub-total Other input / ha		1 534 772	0	- 100%

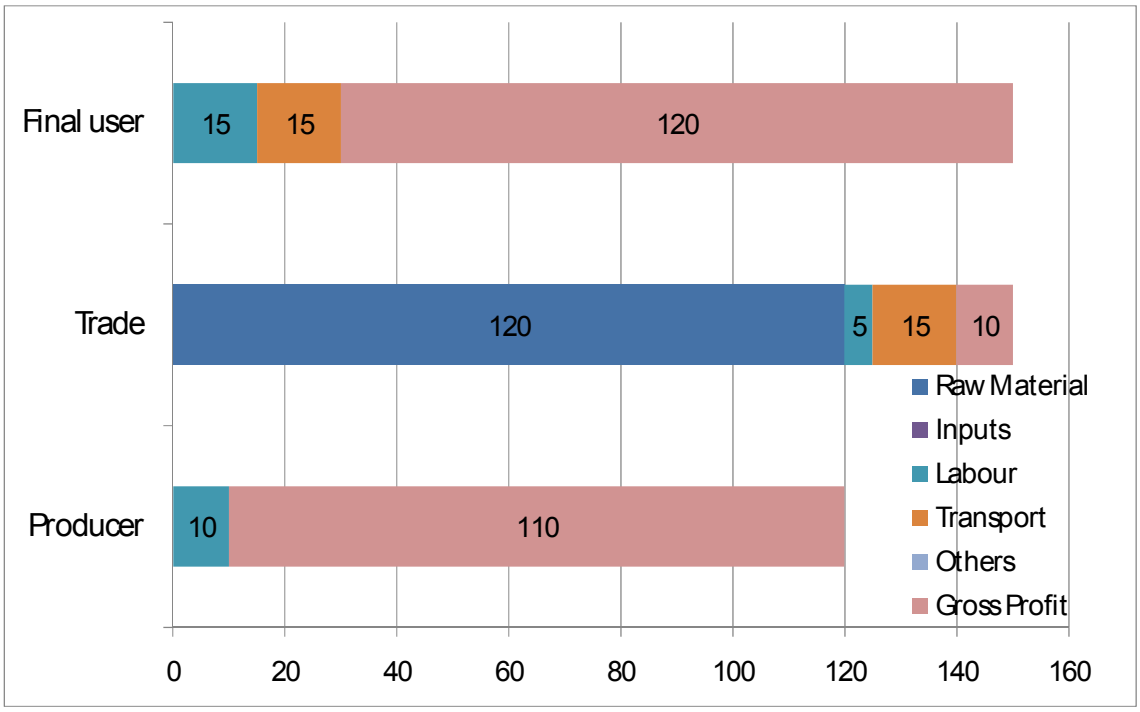
Total Value Consumed	**13 831 673**	**18 129 035**	**+ 24%**

The Table 22 shows that a farmer can improve the added value of his activity of 24% if he organizes his activity in order to be able to orient the 3rd grade fruits and to reconvert losses into sales. For this, he would only have to increase some labour for harvesting (+6%) and orient the grading in such a way that the small and shapeless mango are specially reserved for processing purpose. These mangos are then sold farm-gate at 120 TZS/Kg that still leave 20 to 30 TZS of margin per Kg for the trade to get transport the fruits and get some profit on the operation.

If AMAGRO's estimation of the production of improved mango (15 to 20,000 tons annually) is right and if this assumption can be generalized (15% and 10% respectively for 3rd grade and recovering from losses) there could be 3,750 to 5,000 tons of improved mango available for processing.

Figure 26 shows how the price is built up along the chain of improved mangos for industrial processing. It shows that the gross profits represent 80% of the end price, which is due to the fact that farmers can consider as a pure profit the valorisation of mango that would otherwise get lost. Increasing of competitiveness compared to imported raw material for the production of juice is potentially difficult as there are no costs to compress and because mango growers are sensitive to the differential of price between the different market outlets (ratio of 1 to 10 compared to the sales on local fresh market).

Figure 26: Price Structure for the industrial processing

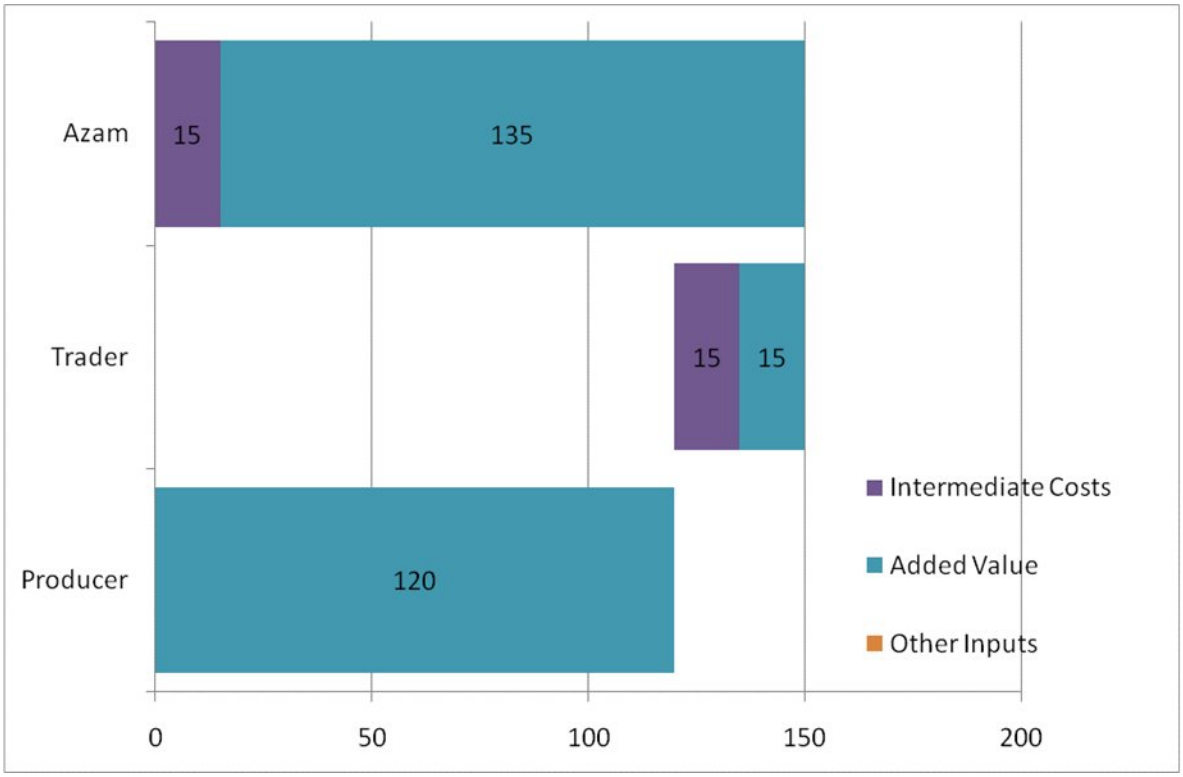


Source: Data from the study

Figure 27 shows that this chain produces for each kg of mango an added value of 135 TZS (without considering the added value of the processing activity). Based on our previous assumption of 3,750 to 5,000 tons of mango accessible for this outlet, a

total added value of TZS 506 to 675 millions can be produced out of a total market of TZS 562.5 to TZS 750 millions.

Figure 27: Added value for sale for industrial processing



Source: Data from the study

4.4.2.2 COMPETITIVENESS – PORTER ANALYSIS

New entrants: How difficult is it for new entrants to enter a new market?

The highest the rate of entry in the sector will be, the more products will be available for processing (beginners' mistakes, jamming of the market). Thus, from the industrial processors' point of view the rate of entry could be qualified as insufficient. AMAGRO should pay attention to the dynamics of the traditional mango as processing depends on both types of mango. A quantitative balance between improved and traditional varieties of mango should be defined with the processors and promoted by AMAGRO.

Substitutes: How easily can the product be substituted?

Concentrates from India and other major mango producing countries are easily available and importable especially if Tanzania doesn't propose sufficient amounts of internal supply. The potential impact of processing of local mangos in terms of added value at national level is big; therefore, mango growers and AMAGRO should define strategies to supply local industrial processors at competitive price to guarantee the sustainability of the processing.

Bargaining power of suppliers: How strong is the position of sellers?

The bargaining power of suppliers is depending of their capacity to penetrate the mid-up local market or the export market or to produce sufficient volumes/quality that will help the processors to reach sufficient levels of economies of scale to be more flexible on prices.

Bargaining power of buyers: How strong is the position of the buyers?

Buyers' bargaining power is – on one hand – high as they can get supply of concentrates through imports but on the other hand, they are also keen to get supply locally to be able to make plain use of their processing equipments and be able to show that they contribute for the National added value rather than for the increasing of the commercial deficit.

Internal Rivalry: How strong is the competition and rivalry among existing firms? Who are the major competitors? What are their strengths and weaknesses? How are they positioned?

The internal competition might increase as three operators are operating (AZAM) or about to operate (UNNAT). On the other hand, some of the operators (e.g. MASASI) plan to target a specific niche in order to avoid competition.

4.4.3 CRITICAL SUCCESS FACTORS

Table 23: Porter Competitiveness Assessment for Processed Mango

Proposed chain	Critical Success Factors	Implications
Improved mango for industrial processing	**Order qualifying:** • Minimum quality. • Regular, reliable and sufficient supply and quality. **Order Winning:** • Price attractive for processors (compared to prices of substitutes available on the international market).	• Harvest, post-harvest, grading and distribution from farms to processor are key to quality • Collaboration between producers, traders and processors is crucial to keep quality and costs under control. • As for main-stream production, irrigation is compulsory to guarantee consistent supply. • Coordination of producers is required especially for bulking and economies of scale (transport).

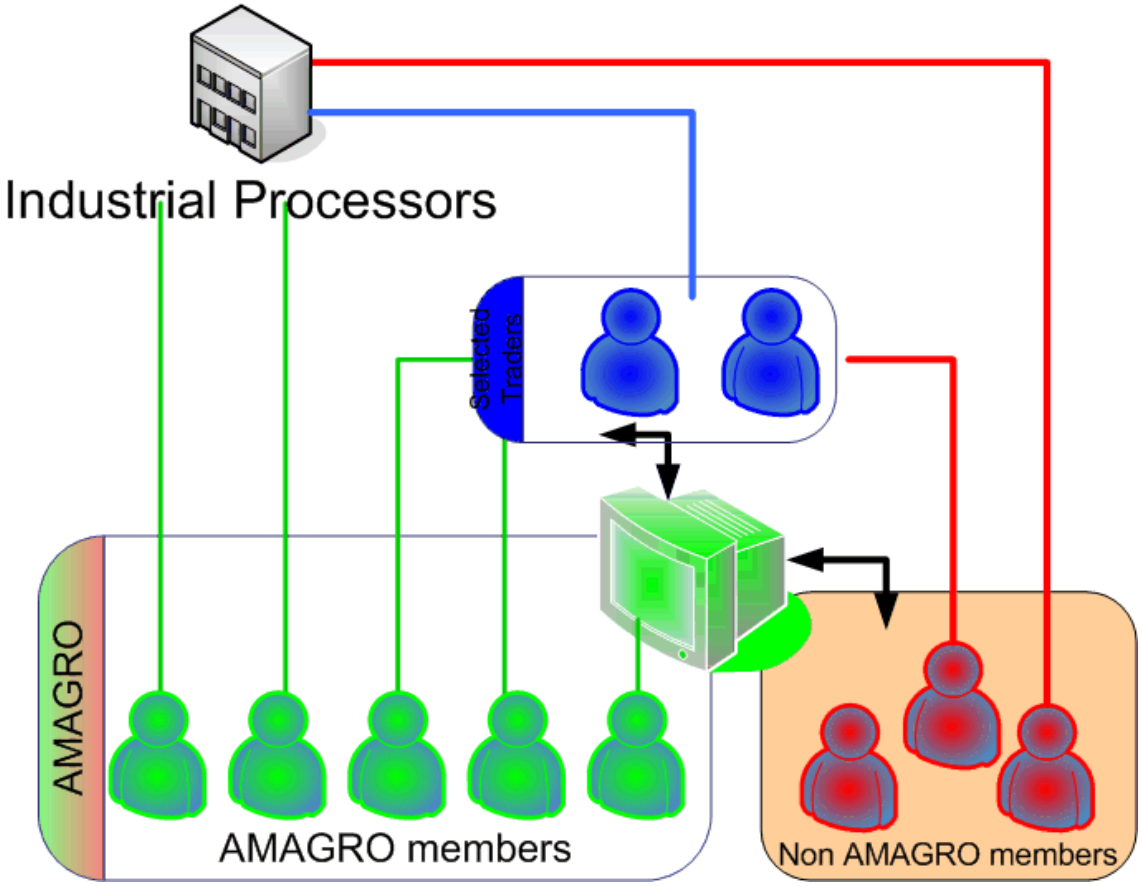
4.4.4 BUSINESS MODEL

Figure 28 represents the business model proposed for the development of the value chain for improved mangos for industrial processing. The objective of this business model is to create the conditions for a fully efficient supply of improved mango to the industrial processors. It includes mango growers (either members of AMAGRO or not), selected traders and industrial processors (AZAM, UNNAT, MASASI, etc.).

Farmers need to enter into agreements with the processors (and the traders if they are involved) to guarantee the prices and to collaborate in systems aimed at keeping the costs under control. I.e. processors might be able to get into agreements with transporters and /or traders to limit the transportation costs and guarantee the quality.

Again, AMAGRO could contribute in the system by collecting and sharing information about the availability and needs of processed products as a way to improve the transparency of the market. AMAGRO can also support its members for the negotiations with the processors and supervise the implementation of the contract.

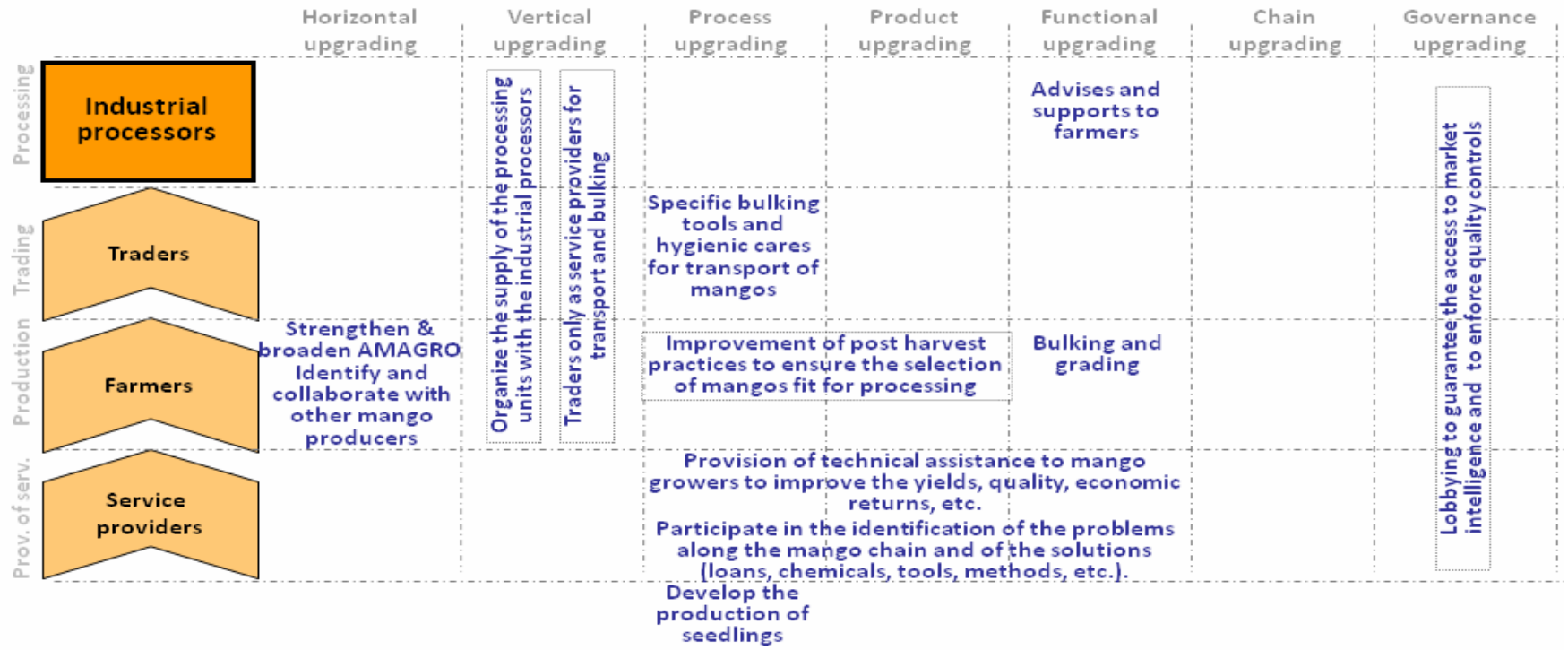
Figure 28: Business Model for Industrial Processing of mango



Source: Data from the study

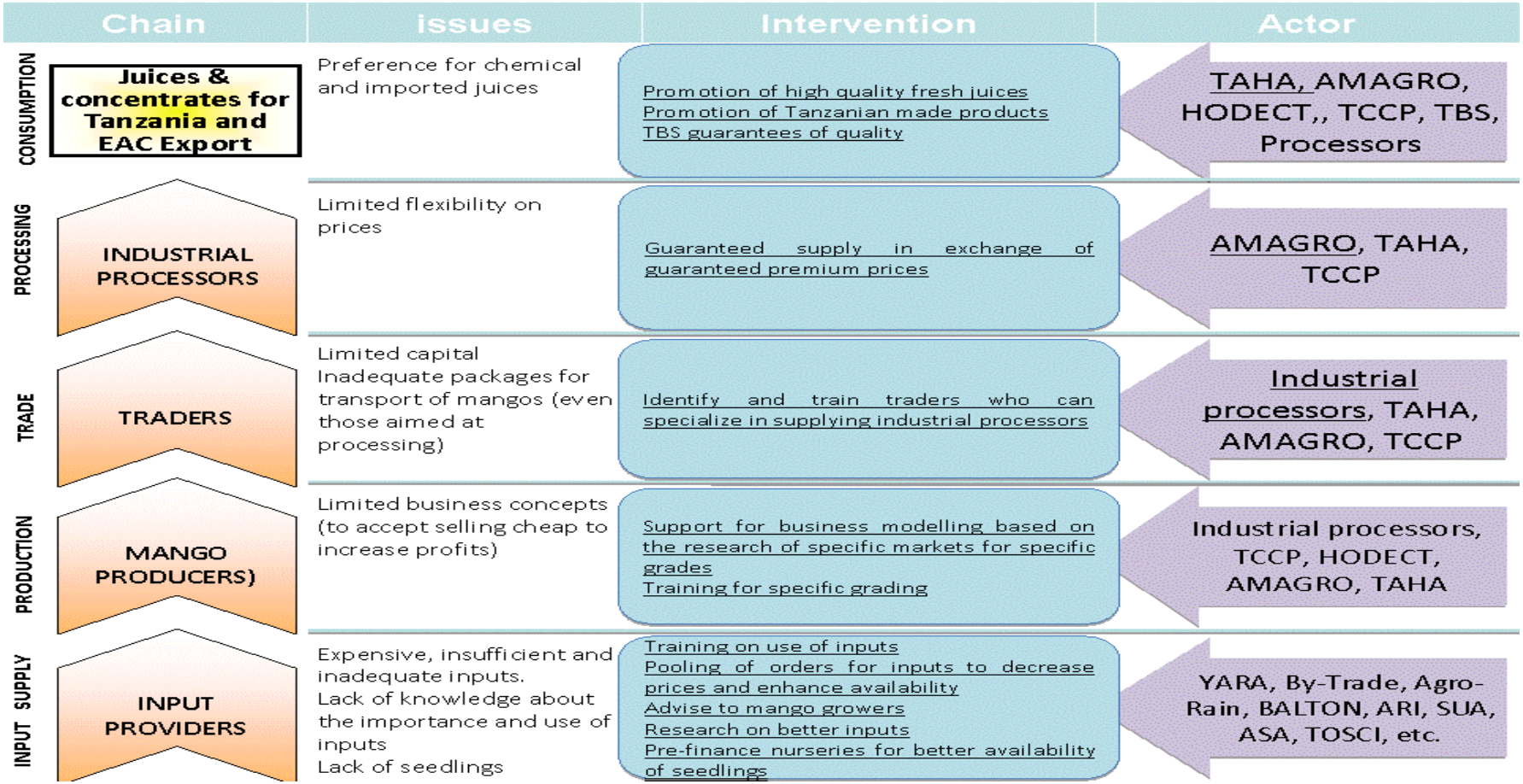
4.4.5 UPGRADING STRATEGIES (SHORT-TERM)

Figure 29: Upgrading Strategies for Mango Industrial Processing



4.4.6 ACTORS' INTERVENTIONS

Figure 30: Actors interventions for Processed Mango



5 CONCLUSIONS AND RECOMMENDATIONS

Table 24: Strategic issues, Conclusions, Recommendation and potential actors

Strategic Issues	Conclusion	Recommendations	Potential Actors
Generic - Cross cutting issue			
Diversification & expansion	- Mango growers and traders are in a professionalization process but many factors hinder their evolution. - They are usually not located in close perimeters; which limits possibilities of economies of scale and of exchange of experience. Mango growers have insufficient access to extension services and often lack proper farm management skills. They rarely use production techniques and equipments that allow high productivity. E.g. production is almost exclusively rain-fed. - Irregular / unknown quality of seedlings can endanger the success of investments and the access to the export market. Moreover, insufficient seedlings are available (for specific varieties). - Many farmers are unaware about the context in which they get engaged (market, land, investment, etc.). - All these factors contribute to the limitation of the yields, increasing of losses and – in return – limited individual and second-line investments.	- Organisation of farmers into clusters for economies of scale - Promote the adoption of GAP through improved extension services, demonstration farms, - Promote a system for certification of seedlings and improve the availability of improved planting material - Facilitate the acquisition of expertise and promote the corresponding technology for quality and productivity - Promote awareness about the dynamics and challenges of the sub-sector - Wherever possible, collaborate with the institutions to tap in the potential growth of mango (LGAs, projects, Private Tanzanian or foreign companies, etc.).	- AMAGRO, LGAs, MAFC, ASA, TOSCI, SUA - Commercial firms experienced in the set up of fruit plantations - Partner countries with expertise

Strategic Issues	Conclusion	Recommendations	Potential Actors
Research & Development	- Mango growers face many problems for which no clear remedy is available. E.g. they plant varieties without knowing if their shelf life is adapted for the export market and they can not tailor their fertilization as they lack access to soil analysis services. - Their post-harvest techniques are of limited efficiency especially for accessing the EU export market	- Promote R & D and dissemination of results on crop management, Pest & Diseases (fruit fly etc). Ease the access to soil analysis hence the use of appropriate fertilizers. - Analyse the shelf life of different exportable varieties ad do trials of irradiation of mango as a post-harvest treatment for export	- R & D Institutions (ARI, HORTI etc), MAFC, AMAGRO
Infrastructure	- Post harvest is often poor as mango growers either don't use post harvest facilities or invest in small local-conceived facilities with limited guarantee of result. There is no central or regional post harvest facility and no modern facility for fruit treatment (irradiation, water dips, vapour treatment, etc.). - Mango are mostly transported in conditions that ruin the previous post-harvest efforts and the potential shelf-life - Many processed mango-based products are imported. Little (but growing) quantities of mango are processed and benefit of local added value. - Farmers willing to export fail to get the quality insurance documents as there is no entitled laboratory for this purpose.	- Implement feasibility studies for infrastructures through PPP for the development of the mango sub-sector (irrigation, post-harvest, treatment, cold storage, pack-houses, improved urban wholesaling points, quality Insurance laboratories, processing units) - Promote improved transport means for mangos (clays/boxes, inland refrigerated transport) and develop overseas shipment/air freighting availability - Promote hot water dips and water vapour treatment facilities at farm level. - Design, gather and mobilize adequate financial resources to allow the acquisition of the facilities corresponding to the different needs (over-drafts, normal loans, slow-capital loans, etc.).	- Large scale Farmers, Private Sector Investors, AMAGRO, MITM, TBS, TFDA, Airport Authority, TAHA and EPZ
Regulatory & Policy	- Trade policies need to be improved to ease exports of mango. TBS is still in the process of finalizing the quality standards for fresh mango. Mango exporters fail to obtain timely pre-shipment / air freight inspections. Some markets are still out of reach due to the absence of adequate certification processes. - Mango is about to become one of the spearheading crops for the development of the horticultural sector in Tanzania.	- Lobby for conducive Trade Policy / EPZ Projects - Fasten the adoption and diffusion of grades & quality standards - Initiate pre shipment / air freight inspections - Facilitate the adoption of norms (WTO/HACCP/GLOBALGAP/SPS, etc.) when required to allow entry on specific markets	- MITM, TAHA, TCCP, AMAGRO, HODECT, Private Sector Actors,

Strategic Issues	Conclusion	Recommendations	Potential Actors
Market expansion	- The commercialisation of Tanzanian mango is still in its infancy. Most producers lack of marketing knowledge. Most relations between actors are ad-hoc. Hence, there is a risk that production increases faster than the corresponding markets. - Local consumption of fresh improved mango is limited as many consumers are not yet familiar with the product. Mango growers are equally (un)known.	- Promote new market development (bilateral trade arrangements, long-term and win-win relations between the chain actors, etc.) - Promote branding and market promotion (trade fairs, festivals, extension of the local retail network in priority through retailers able to present and store mangos in good conditions). - Lobby on City Council to manage the improvement of the wholesaling infrastructures in the Dar es Salaam markets.	- TAHA, MITM, AMAGRO, HODECT, City Council, Wholesalers and retailers
Data management	- AMAGRO has initiated a database including most of the members and some non-members. But little is known about the producers of traditional mangos (location, qualities, quantities, seasonality, constraints, potentials, etc.). The same weakness exists on the market side. - As a consequence, little info is available for potential investors in the mango sub-sector (production, processing, post harvest management, etc.)	- Finalise and keep updating data on sub sector (production, varieties, etc.) - Realize a mapping of the potential, dynamics, requirements, etc. of the different markets - Promote investment opportunities in the mango sub-sector	- MAFC, MITM, TAHA, AMAGRO, TIC
AMAGRO (Organizational Strengthening)	- As long as the mango producers are isolated, they often fail to solve problems that they meet (land grabbing by extending cities, access to advice and training, needs of supports from governmental / donors institutions, etc.). - Many mango growers fail to maintain their farms because they don't have a clear idea about the investment requirements and about the way to access capital. - AMAGRO's strategy is still tuned according to the context in which the association has been created. With new challenges, this strategy needs to be upgraded to enshrine the new challenges of sub sector growth.	- Develop and implement a sustainability strategy that prioritizes only the key areas on which AMAGRO can be better than other existing entities. For this, AMAGRO will have to manage the increasing expectation of its members and make the organization much more focused and effective. - This strategy could include actions such as lobbying on behalf of their members, brokerage of on-demand (paid) extension services to specific members' needs, advisory on investment requirements (technical and financial) and broker between their members' needs for capital and financial institutions.	- AMAGRO, ADF, TCCP.

Strategic Issues	Conclusion	Recommendations	Potential Actors
Strategic Issues	**Conclusion**	**Recommendations**	**Potential Actors**
Specific Value Chain Upgrading			
VCD for export market	- A huge potential for export exists in Middle East, India and EU. Mango growers will though have to tackle a series of constraints in order to realize this market potential. The current export of TZS 36 millions (with a test-export of 4 tons /week) is negligible to be able to stay on the producers map. But the potential is 20 times bigger (TZS 739 millions) as importers in EU showed interest to buy 80 tons per week (provided this quantity and quality is available).	- On the short term, export could be limited to Middle East. Supply of export could be guaranteed by clustering a group of progressive farmers around a pack-house, cold chain, extension services and foreign expertise aimed at improving farm management, control of pests and diseases, etc. Close collaboration with foreign partners / investors would ease / fasten this process. - On the medium-long term, the chain will be improved through the transformation of the transport into an integrated "cold chain".	- TIB, Agricultural Bank, TIC, Private Import / export Companies, AMAGRO,
VCD for Fresh for local mid & up market	- Local consumption of fresh improved mango is still quite limited as historically, the mango growers have tried to avoid marketing mango through the traditional "wholesale – retail" channel that has the most potential (but also the main challenges). Under certain conditions, the local mid and up-markets can constitute an interesting potential market (market of about TZS 690 millions)	- The supply of the mid and up-markets could be guaranteed by the set-up of a market arrangement including mango growers and selected wholesalers and retailers (including supermarkets). The market arrangement would be aimed at creating a win-win situation that will fasten the flow of mangos to the consumers as well as the promotion of mangos and the strengthening of the different actors.	- AMAGRO, TCCP, TPSF, TCCIA, Associations of traders and wholesalers.
VCD for processed mango products	- Consumption of "fresh" and "natural" juices is fast growing in Tanzania and in the neighbouring countries and as a consequence, some major companies have invested in processing units (AZAM, UNNAT, MASASI). The challenge for mango growers is to take advantage of this potential market through a volume approach rather than through a "unit-price" approach. The potential market could reach TZS 506 – 675 millions (currently available mangos for processing). It is in fact much bigger than that as AZAM aims to provide juice concentrates to all 8 juice factories in EAC.	- The supply of the industrial processing units could be guaranteed through an organization at farm-level that would guarantee that any mango un-fit for export and mid/up markets (but fit for processing) is collected and sent to the factories through arrangements (contracts) either directly with the factories or involving traders for bulking and transportation purposes. - AMAGRO will again have a coordination and facilitating role. - Explore other value addition opportunities e.g. dried mango for niche market as sub sector stabilisers.	- Processors, AMAGRO.

6 ANNEXES

6.1 ANNEXE I: ITINERARY FOR MANGO SUB SECTOR ANALYSIS

16 – 20/10/10 Collecting and reading secondary data Peniel Uliwa, Marc Keller, Frédéric Kilcher

21/10/10 Value Chain Appraisal Workshop Peniel Uliwa, Marc Keller, Frédéric Kilcher, AMAGRO, TCCP

22/10/10 Inception meeting MMA – AMAGRO Peniel Uliwa, Frédéric Kilcher, Hamadi Mkopi, Tertula Swai

Table 25: Itinerary or the study and contacts

	Team 1: Frédéric Kilcher and Hamadi Mkopi			Team 2: Peniel Uliwa, Marc Keller and Tertula Swai		
Date	**Task**	**Contact**	**Location**	**Task**	**Contact**	**Location**
25/10/10	Debriefing appreciation Workshop		DSM	Planning meeting with MUVI Coordinator in Tanga		Tanga
	Planning meeting MMA – AMAGRO		DSM			
				Abdulla Samid, Mango grower, Tanga		Tanga
26/10/10	Mr. Ibrahim Kahn, producer and processor	0772898923	Kariakoo – DSM	DALDO Korogwe	0715294264	Korogwe
	NATURERIPE – Mrs. Fatma Riyami and team	0784284800	DSM	Mr. Omari Shebughe, seedling and mango producer	0784430694	
	Mr. Amiri Kaimu (Kiwope Farm)	0784506206	Mkuranga			
27/10/10	Mr. Mboya DALDO – Mkuranga	0785019173	Mkuranga	Mr Joseph Bomani – Farm Manager – Kabuku Mayunga Farm	0752111000 (Daniel Noni)	Kabuku
	Retailer on Mkuranga market		Mkuranga			
	Trader on Mkuranga Market		Mkuranga			
	Dr S. Diwani – By-Trade	0783424905	DSM	Dr. Rashid – Turiani Farm	0754280442	Kabuku
	Mr. Ian Samakande / Agro-Rain	0767669911	DSM			

	Team 1: Frédéric Kilcher and Hamadi Mkopi			Team 2: Peniel Uliwa, Marc Keller and Tertula Swai		
Date	**Task**	**Contact**	**Location**	**Task**	**Contact**	**Location**
	Mr. Charles Lupembe / Mango producer					
28/10/10	Mrs. Tesha / Mango producer	0754311860	Kisarawe	Mr Clemen Shebiru – DALDO Tanga Municipality, Salum Makalo Crop Officer and Cathrine Mbago- Horticulturalist	0784473648 (DALDO)	Tanga
	Mr. Mbegu / Mango Producer		Kisarawe			
	Mr. Minja DALDO – Kisarawe		Kisarawe			
	Mr. John De Wolff / Mango Producer	0784700092	Kibaha	Mr Kisheri – regional Trade Officer, Tanga		Tanga
	Mr. Shenyagwa / Mango producer –Kibaha Mango Empire	0754278438	Kibaha			
29/10/10	Mr. Nkala DALDO – Morogoro Rural	0787098578	Morogoro Rural	Ms Fidelika Myovela DALDO Bagamoyo & Ms Mwajuma Amanzi horticulturalist	0754371053 (Horticulturist)	Bagamoyo
	Dr. Msogoya / Sokoine	0783172544	Morogoro	Rajabu Msenda - Farmer Group (under CFC Project)		Bagamoyo
	SUA Nursery and Orchard		Morogoro	Mrs Mwanyika & Mr Mwamanga Farms		Bunju
	Mr. Zaccharia / Masasi Food Industry	0784577558	Picha ya Ndege	Prof. Mayo	0773524235	Bagamoyo
30/10/10	Mr. Mwinyi & Hussein / Mango Wholesalers	0715697540 0715857318	Buguruni Market / DSM	Mr Job Kimaro/ Mango Farmer		Bunju
	Daluti / Mango wholesaler		Buguruni Market / DSM	Mr Rajabu Mtopela –Trader Ilala	0753682133	Ilala / DSM
	Mr. Shabani Ndalo / Mango Nursery –Bolibo Nursery	0787961612	Ubungo / DSM			
	Mr. Damian Mtwango / Retailer	0716914045	Kariakoo / DSM			

	Team 1: Frédéric Kilcher and Hamadi Mkopi			Team 2: Peniel Uliwa, Marc Keller and Tertula Swai		
Date	**Task**	**Contact**	**Location**	**Task**	**Contact**	**Location**
	Mr. Hamad Mkopi / Mango grower	0715312036	Sinza / DSM			
	Shoprite Supermarket / Milimani City		Mwenge / DSM			
	SHOPPERS Supermarket	022 2602418	Masaki / DSM			
	Team meeting		Sinza / DSM			
01/11/10	Mr. Geoffrey Kirenga / Ministry of Agriculture	0754480069	TAZARA / DSM	Shoprite Main Office – purchase manager	022-2183731	DSM
	Mr. Daluti / Ministry of Agriculture – Irrigation	0784328319	TAZARA / DSM	NIC Irrigation		DSM
	Ministry of Land – Mr. Klerruu Principal Valuer	0754302069	Kivukoni / DSM	TANEXA - director	022 2248948	DSM
	Mrs. Tatu Jongo / Mango grower	0754350673	DSM	TIB – Noni Daniel Peter	0754783360	DSM
	CENTURY Insurance – Mr. Malema	0754833488	DSM	*Dr. Turiani*		DSM
	Mr. Tesha / Airport Authority	0754784314	DSM	Temeke Stereo Market – wholesalers Ally and Amadi	0786450833 & 0789070921	DSM
01/11/10	Mr. Julien Camaleonte / Yara	0767768488	Pugu Rd / DSM	Export Processing Zone Tanzania – Mr. Lameck Borega – investor Facilitation Officer	0713555450 022 2451831/2	DSM
	Mr. Anil Kumar, AZAM	0754515264 0653322680	Vingunguti / DSM	TFDA – Mr. Raymond Wigenge (Director)	022 2450512, 022 2450751	DSM
	Mr. Bundala / DSM City Council	0787264536	DSM	Tendaji-agro – Ervan Hoviv	0713796216	DSM
	Mr & Mrs. Rugambwa / Mango growers	0756443719	DSM	Imalaseko Supermarket		DSM centre
03/11/10	Mr. Masaga / TBS	07543394996	Ubungo / DSM			

	Team 1: Frédéric Kilcher and Hamadi Mkopi			Team 2: Peniel Uliwa, Marc Keller and Tertula Swai		
Date	**Task**	**Contact**	**Location**	**Task**	**Contact**	**Location**
05/11/10	Mr. Burton Nsape / Chairman AMAGRO	0754763440	Mikocheni / DSM	Chairman AMAGRO – Mr. Burton Nsape	0754763440	DSM
				TAHA – Director Ms. Jacqueline Mkindi	ed.taha@habari.co.tz 0754306878 0272544568	Arusha

6.2 ANNEXE II: SECONDARY ACTORS

Table 26: Secondary actors, Activities / Functions, Coverage and Observations

Actors	Activities/Functions	Coverage	Observations (Strengths / weaknesses)
ADF Project	ADF is supporting AMAGRO with trainings, developing a business plan and production manual, expanding membership and establishing an on-farm mango demonstration site.	Tanzania	The first phase is about to end and many needs still exist in terms of trainings to the AMAGRO members, support for the access to market, etc.
ARI-Mikocheni	Research and development, in the case of mango on fruit-flies and other damaging insects	Tanzania	Again, an opportunity exists for AMAGRO to identify research questions and mobilize resources through lobbying at COSTECH
ASA/TOSCI	ASA is certifier of seeds, moreover promote seed production and since recently also plays a part in regulating the Mango sub-sector.	Tanzania	023-2600109 Dr. Semin (0713-220763 Philemon)
CFC	Offered seedlings, giving out on farm trainings, working closely with ARI-Mikocheni in Bagamoyo and its overall goal is to promote forestry by promoting mango growing.	Coastal area's	Learned from their experiences and will now focus their efforts in one area (Rufiji) through block farming
COSTECH	The Council of Science and Technology of Tanzania is in charge of the selection of and support to researches. In the case of mangos, it is a strategic institution for the mobilization of resources for the analysis of production limiting factors.	Tanzania	When COSTECH accepts a research project, it is able to mobilize funds to support the project. If AMAGRO manages to identify clear research topics and to mobilize SUA (teachers and students) COSTECH can step in and provide financial support.
Dar City Council	The City Council of Dar es Salaam is entitled to define the rules for trade of fruits in the city. If the local fruit distribution network has to be broadened / improved, the City Council needs to be involved	Dar es Salaam	The Dar es Salaam City Council has limited authority on the other "MANISPA" (Ilala, etc.) and any negotiation for the improvement / broadening of the fruit distribution system needs to be repeated with each MANISPA.
EPZ	EPZ planned to provide superior infrastructure and facilities for faster setup. This is aimed for exporting companies but from 2011 onwards also companies aiming at the local market can benefit from similar advantages.	Tanzania, although EPZ area is located in Bagamoyo District close to Dar-es-Salaam (279 Acres)	Companies within EPZ don't need to pay taxes, duties on materials, port charges and goods will be considered as 'transit' which allow the goods to move faster through the harbour. Lastly EPZ and BOT can give guarantee to a company, which makes it much easier to access finance.
HODECT	HODECT is the Horticultural Development Council of	Tanzania	HODECT is a potentially important institution to guarantee the

Actors	Activities/Functions	Coverage	Observations (Strengths / weaknesses)
	Tanzania that has been working with the actors of this sector for the development of a strategy and is now about to involve them in the definition of a work programme. It is operating as a steering committee of stakeholders responsible for the development of systems and mechanisms for partnership.		integration of the actors' priorities in the Government action plans. It is an important PPP platform. AMAGRO should prepare sound information about the importance of mango farming that could be used by / with HODECT to produce leverage and make decision makers to invest effectively / efficiently in the sub-sector.
Ministry of Agriculture, Food Security and Cooperatives	The Ministry of Agriculture is the entity that defines the agricultural development priorities. Fortunately, mango has been chosen as one of the most promising horticultural products and is now entitled to receive support through the central and local personnel from the Ministry. Furthermore, the Ministry is a stakeholder in HODECT and can contribute to make so that mango development actions are contemplated in the HODECT action plan.	Tanzania	AMAGRO needs to be able to prepare sound support information about the economic and social impact of mango farms. This is a condition for AMAGRO to be able to get support from and provide support to the Ministry for the identification and implementation of clear development policies. An opportunity exists for collaboration with the Ministry and the question is if and how AMAGRO will be able to use this opportunity?
Ministry of Land	This Ministry is in charge of the supervision / implementation of the land developments. In the case of mango growers, it is the entity to contact in case of any dispute happening during the – on-going – urbanization process.	Tanzania	Mango growers need to be aware of the procedures used to define the land uses in urban perimeters: usually participatory and based on collective decisions. They must be able to show the economic and environmental impact of mango farms. They must be aware of the financial interests involved and need to be able to mobilize legal procedures if their rights are not respected.
SUA	Important actor in delivery of mango seedlings and conducting R & D on horticultural crops.	Tanzania	The production of seedlings needs to be better connected to the requirements of the mango market. The Department of Crop Science and Production can implement researches on problems identified by AMAGRO.
TAHA	The organization was established in 2004 and it advocates for the horticultural industry by lobbying. It disseminates information, provides technical support and encourages international marketing of the industry (promotion).	Tanzania	Though it's a relative new organization, it plays an important role (together with East-African partner organization) in fighting the fruit-fly problem for mango.

Actors	Activities/Functions	Coverage	Observations (Strengths / weaknesses)
TANEXA	Membership association that promotes market linkages, lobbies and supports exporters in finding finance.	Tanzania -	Recently TANEXA has increasing its focus on the Mango sub-sector.
Tanzania Airports Authority	The Tanzanian Airport Authority (TAA) is in charge of the supervision and improvement of the Tanzanian airports. TAA is currently analysing the feasibility of an extension of the Cold Room facilities of the Dar es Salaam Airport	Tanzania	Again, AMAGRO's capacity to do sound and clear lobbying (in this case, on TAA with well-sustained data showing the possible economic returns of a well designed cooling facility) is strategic for the improvement of the working environment of the mango growers.
TBS	Bureau in charge of the definition and application of the standards for fresh and processed mango	Tanzania	Standards for mango are being up-dated according to the standards applying in EAC.
TCCP	Tanzanian Cluster Competitiveness Programme (under Tanzanian Private Sector Foundation) uses the cluster methodology to strengthen selected geographic industry clusters and contribute to Tanzania's Economic Development.	Tanzania	The cluster methodology is potentially extremely powerful to develop an industry especially if it is associated to a VCD approach. As both can contribute to the development of the competitiveness of the industry.
TFDA	Their main focus is to protect the human health.	Tanzania	Fees for small processing plant is 30,000 and for large 250,000 TZS.
TIB	The government owned investment bank (TIB) is a leading institution in agro-investments and in Mango production in particular.	Tanzania	Many producers have requested for a loan with TIB but elections (2010) and not enough funds (from Kilimo Kwanza) to satisfy all the loan requests.

Match Maker Associates Ltd

6.3 ANNEXE III: ASSUMPTIONS FOR CALCULATION OF GROSS MARGIN

Table 27: Example of investment requirements and cash flows ("average-low performing" plantation per Ha)

Description	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y10 to 20	
													Annual	Period
Opening Balance	0	-4 260 080	-4 575 600	-4 896 120	-5 216 640	-4 686 640	-4 211 640	-4 011 640	-3 811 640	-3 611 640	-2 286 640	-1 011 640		
Cash Flow														
Production (after losses)	0	0	0	0	5 850	5 850	5 850	5 850	5 850	11 700	11 700	11 700	11 700	**128 700**
Price/Unit	0	0	0	0	200	200	200	200	200	200	200	200	200	**200**
Sales	0	0	0	0	1 170 000	1 170 000	1 170 000	1 170 000	1 170 000	2 340 000	2 340 000	2 340 000	2 340 000	**25 740 000**
Total Cash Flows	**0**	**0**	**0**	**0**	**1 170 000**	**1 170 000**	**1 170 000**	**1 170 000**	**1 170 000**	**2 340 000**	**2 340 000**	**2 340 000**	**2 340 000**	**25 740 000**
Available Cash Inflows	**0**	**-4 260 080**	**-4 575 600**	**-4 896 120**	**-4 046 640**	**-3 516 640**	**-3 041 640**	**-2 841 640**	**-2 641 640**	**-1 271 640**	**53 360**	**1 328 360**		**11 528 360**
Cash Outflows														
Installation costs (y0)														
Land	3 625 000													
Irrigation (Agro-Rain)	0													
Seedlings	256 000													
Plantation	163 400													
Fertilization	10 560													
Sub-total Installation	**4 054 960**													
Maintenance costs before production (y0 to y3)														
Water	100 000	100 000	100 000	100 000										
Fertilization		70 400	70 400	70 400										
Fungi-Insecticide		35 000	35 000	35 000										
Pruning	10 000	15 000	20 000	20 000										
Weeding	90 000	90 000	90 000	90 000										
Replacements	5 120	5 120	5 120	5 120										
Sub-total maintenance befo	**205 120**	**315 520**	**320 520**	**320 520**										
Running costs														
Water					200 000	200 000	250 000	250 000	250 000	250 000	300 000	300 000	300 000	**3 300 000**
Fertilization					100 000	100 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000	**1 650 000**
Pesticides					100 000	100 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000	**1 650 000**
Pruning					30 000	30 000	40 000	40 000	40 000	40 000	40 000	40 000	40 000	**440 000**
Weeding					20 000	20 000	60 000	60 000	60 000	60 000	60 000	60 000	60 000	**660 000**
Harvest					90 000	135 000	180 000	180 000	180 000	225 000	225 000	225 000	225 000	**2 475 000**
Post-Harvest					20 000	30 000	40 000	40 000	40 000	40 000	40 000	40 000	40 000	**440 000**
Sales					80 000	80 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	**1 100 000**
Sub-total Running Costs				**0**	**640 000**	**695 000**	**970 000**	**970 000**	**970 000**	**1 015 000**	**1 065 000**	**1 065 000**	**1 065 000**	**11 715 000**
Total Cash Outflow	**4 260 080**	**315 520**	**320 520**	**320 520**	**640 000**	**695 000**	**970 000**	**970 000**	**970 000**	**1 015 000**	**1 065 000**	**1 065 000**	**1 065 000**	**11 715 000**
Closing Balance	**-4 260 080**	**-4 575 600**	**-4 896 120**	**-5 216 640**	**-4 686 640**	**-4 211 640**	**-4 011 640**	**-3 811 640**	**-3 611 640**	**-2 286 640**	**-1 011 640**	**263 360**		**10 463 360**

Table 28: Example of investment requirements and cash flows ("well performing" plantation per Ha)

Description	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y10 to 20	
									Annual	Period
Opening Balance	0	-9 253 220	-10 610 582	-11 972 944	-14 547 822	-11 936 387	-9 324 952	-3 905 518		
Cash Flow										
Production	0	0	0		28 080	28 080	42 120	42 120	56 160	**617 760**
Price/Unit	0	0	0		200	200	200	200	200	**200**
Sales	0	0	0		5 616 000	5 616 000	8 424 000	8 424 000	11 232 000	**123 552 000**
Total Cash Flows	**0**	**0**	**0**	**0**	**5 616 000**	**5 616 000**	**8 424 000**	**8 424 000**	**11 232 000**	123 552 000
Available Cash Inflows	**0**	**-9 253 220**	**-10 610 582**	**-11 972 944**	**-8 931 822**	**-6 320 387**	**-900 952**	**4 518 482**		**99 329 698**
Cash Outflows										
Installation costs (y0)										
Land	3 625 500									
Irrigation	5 000 000									
Seedlings	256 000									
Plantation	163 400									
Fertilization	3 200									
Sub-total Installation	**9 048 100**									
Maintenance costs before production (y0 to y3)										
Water	100 000	100 000	100 000	1 312 515						
Fertilization		947 242	947 242	947 242						
Fungi-Insecticide		200 000	200 000	200 000						
Pruning	10 000	15 000	20 000	20 000						
Weeding	90 000	90 000	90 000	90 000						
Replacements	5 120	5 120	5 120	5 120						
Sub-total maintenance befo	**205 120**	**1 357 362**	**1 362 362**	**2 574 877**	**0**					
Running costs										
Water					1 312 515	1 312 515	1 312 515	1 312 515	1 312 515	**14 437 665**
Fertilization					947 242	947 242	947 242	947 242	947 242	**10 419 664**
Pesticides					250 000	250 000	250 000	250 000	250 000	**2 750 000**
Pruning					239 808	239 808	239 808	239 808	239 808	**2 637 890**
Weeding					90 000	90 000	90 000	90 000	90 000	**990 000**
Harvest					135 000	135 000	135 000	180 000	225 000	**2 475 000**
Post-Harvest					30 000	30 000	30 000	40 000	40 000	**440 000**
Sales										**0**
Sub-total Running Costs				**0**	**3 004 565**	**3 004 565**	**3 004 565**	**3 059 565**	**3 104 565**	**34 150 219**
Total Cash Outflow	**9 253 220**	**1 357 362**	**1 362 362**	**2 574 877**	**3 004 565**	**3 004 565**	**3 004 565**	**3 059 565**	**3 104 565**	**34 150 219**
Closing Balance	**-9 253 220**	**-10 610 582**	**-11 972 944**	**-14 547 822**	**-11 936 387**	**-9 324 952**	**-3 905 518**	**1 458 917**		**96 225 133**

6.4 ANNEXE IV: OUTLINE OF INFRASTRUCTURE REQUIRED FOR EXPORT

Quality standards required for export to Middle East can be satisfied with the following basic elements:

A dipping unit

Fruits must be harvested between 6 and 10 AM and be immediately cleaned and treated in a dipping unit (hot water or other possible procedure).

The dipping unit must be conceived so that it is easy to load the fruits on a truck that offers good transportation conditions (controlled temperature, no bruising of fruits, etc.).

A pack-house.

The pack-house can be located on the farm if the production of the farm is sufficient to guarantee its full utilization and the constitution of lots for export (X tons equivalent to the size of a container).

The pack-house can be a simple infrastructure that allows satisfying the following conditions:

- Cleanness (a frame of plastic sheets can be installed in a simple storage room),
- Controlled temperature (enough AC equipments considering the volume of the room),
- Located / organized in such a way that the loading of mango boxes on a container is easy

Air conditioned containers

The temperature of the mangos must be under control for all the time that they will spend “on transit”. They cannot go below or beyond a certain level. The best solution is the availability of air conditioned containers.

Presence of reliable shipping lines to the targeted market

6.5 ANNEXE V: QUALITY CRITERIA FOR EXPORT MANGO

I] QUALITY REQUIREMENTS FOR EXPORT

A) Minimum requirements

In all classes, subject to the special provisions for each class and the tolerances allowed, the mango must be:

- Intact;
- Firm;
- Fresh in appearance;
- Sound: produce affected by rotting or deterioration such as to make it unfit for consumption is excluded;
- Clean, practically free from any visible foreign matter;
- Free from pests;
- Practically free from damage caused by pests;
- Free from black stains or trails which extend under the skin;
- Free from marked bruising;
- Free from damage caused by low temperature;
- Free from abnormal external moisture; and
- Free from any foreign smell and/or taste.

B) Classification

Mangos are classified in three classes defined below:

i) Extra Class

Mango in this class must be of superior quality. Shape and colouring must be characteristics of the variety.

They must be free of defects, with the exception of very slight superficial defects provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

ii) Class 1

Mango in this class must be of good quality. They must bear characteristics of the variety. However, the following slight defects may be allowed provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- Slight defect in shape;
- Slight defect of the skin due to rubbing, sap or sunburn, suberized stains due to resins exudation (elongated trials included) and healed bruises not exceeding 3, 4, and 5 cm2 for size groups A, B & C, respectively.

iii) Class II

This class includes mango which do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified above. The following defects may be allowed provided the mangos retain their essential characteristics as regards the quality, the keeping quality and presentation:

- Defects in shape not affecting the varietals character
- Defects of skin due to rubbing, sap or sun burn, suberized stains due to resins exudation (elongated trails included) and healed bruises not exceeding 5, 6 and 7 cm2 for size groups A, B, C respectively.

In Classes 1 and II it is also allowed:

- Scattered rusty lenticels;
- A yellowing of green varieties due to exposure to direct sun light, not exceeding 25% of the surface of the fruit, excluding necrotic stains.

II] PROVISION CONCERNING SIZING

Size is determined by the weight of fruit. The minimum weight of mango must not be less then 200 g except the Anwer Ratol variety for which the minimum weight must not be less than 180 g. Mango are sized according to the following size groups: Size Weight in gm Maximum permissible difference between fruit within the package in gm

- A 150– 200 50
- B 201– 350 75
- C 351– 500 100
- D Above 500 125

The mango fruit must have following minimum quality parameters at ripening. TSS 15% Total sugars 12% Acidity 0.4% (Maximum)

III] PROVISION CONCERNING TOLERANCES

Tolerance in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicated.

A) Quality Tolerances

i) Extra Class

5 per cent by number or weight of mango not satisfying the requirements of the class but meeting those of class 1 or, exceptionally coming within the tolerance of that class.

ii) Class 1

10 per cent by number or weight of mango not satisfying the requirements of the class but meeting those of Class II or, exceptionally coming within the tolerance of that class.

iii) Class II

10 per cent by number or weight of mango not satisfying the requirements, with the exception of fruit affected by rotting, marked bruising or any other deterioration rendering it unfit for consumption.

B) Size Tolerances

For all classes: 10 per cent by number or weight of mango conforming to half of the permissible difference of the related size group above or below the range specified on the package with a minimum of 180 g for those packed in the smallest size range and a maximum of 925 g for those in the largest size range.

IV] PROVISION CONCERNING PRESENTATION

A) Uniformity

The contents of each package must be uniform and contain only mango of the same origin, variety, quality and size.

B) Packaging

Mango must be packed in such a way as to protect the produce properly. The materials used inside the package must be new, clean of a quality such as not to cause any external or internal damage to the produce. The use of materials and particularly paper or stamps bearing trade specifications is allowed provided the

printing or labelling has been done with non-toxic ink or glue. Each carton must have holes on two sides for proper ventilation. Individual fruit wrapping with tissue paper or foam padding is encouraged. Packages must be free from all foreign matter.

C) Post Harvest Treatment

Mangos are subjected to post harvest treatments for export purposes to control or prevent spread of pests and diseases and improve ripening process. Such treatments must be in line with the laws of the importing country and information provided to them as required.

V] PROVISION CONCERNING MARKING OR LABELING

Each package must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside.

a) Identification

Packer } Name and address or
And/or } officially issued or
Dispatcher } accepted code / trade mark

b) Nature of the Produce

"Mango" if the contents are not visible from the outside
Name of the variety

c) Origin of the produce

Country of origin and optionally, district where grown or national, regional
Or local place/farm name.

d) Commercial Specifications

Class
Size expressed as minimum and maximum weight
Size code (optional)
Number of fruit
Weight of fruits

e) Official control mark

Official mark of the national official quality certifying agency
Additional information if desired by importer

VI] PHYTO-SANITARY CERTIFICATION

The phyto-sanitary certificate is pre-requisite. It is issued by the National Plant Quarantine Department to the effect that the fruit is fit for human consumption. It will neither pose any health risk to consumers nor will transmit any pest or diseases to the importing country.

6.6 ANNEXE VI: TERMS OF REFERENCE OF THE SURVEY

Objective / Overview:

The Tanzania Cluster Competitiveness Program (CCP) is a three-year World Bank project/DFID/ (UK) funded private sector competitiveness program, administered by the Tanzania Private Sector Foundation (TPSF). The program was designed to assist the Tanzania private sector to achieve sustainable growth through stronger cooperation while building capacity in private and the public sector institutions to operate strategically in pursuit of common objectives. CCP is supporting associations in the horticulture industry to address issues such as:

- Increased productivity: expanding production and increasing productivity
- Access to markets: accessing and targeting high growth, profitable markets
- Skilled workforce development: increasing skills and improving service / quality
- Government regulations: making it easier and less costly to do business in horticulture
- Standards and certifications: adopting the best standards and certifications
- Support services to the horticulture industry: strengthening the supporting organizations

The Association of Mango Growers (AMAGRO) is planning the second annual Mango Testing Festival to be held in December 2010. Alongside the tasting festival, AMAGRO will organize a technical conference at which the industry will discuss key constraints to development. In preparation for the conference, AMAGRO intends to conduct a value chain analysis of the industry. Understanding the Mango Value Chain in Tanzania is fundamental to developing the industry from farming to packing, processing, distribution and sales. Mango growers in Tanzania have a growing domestic market and a unique market window regionally and internationally. A value chain analysis will assist AMAGRO members, and the Mango industry to prioritize the opportunities in market and development activities required to meet the opportunities.

The value chain is a new concept to many AMAGRO members. The planned analysis also presents an opportunity to raise awareness among the farmers and buyers about the value chain as a way to prioritize development activities. The assignment will include training sessions and workshops to introduce AMAGRO members to value chain concepts and methodologies.

Objectives:

There are two main objectives of this assignment:

1. Conduct a value chain analysis of the Mango industry in Tanzania
2. Conduct training workshops and disseminate information on the value chain methodology

Detailed Activity Description and Tasks:

Specifically, the Tanzanian contractor will be asked to conduct the following tasks:

1. Assist AMAGRO to compile, review and synthesize recent, relevant local, regional and international reports on the Mango value chain
2. Through one-on-one interviews and small focus groups with business, public sector and civil society leaders work with AMAGRO to:
3. Conduct a map of the mango value chain in Tanzania, gathering contacts and details for all the businesses operating across the value chain
4. Identify the strengths, weaknesses, opportunities and threats faced at each stage of the mango value chain
5. Collect key business data for the value chain including unit pricing for varieties and products, volume of sales, costs of business operations along the chain
6. Map current markets for mango products and estimate size and value of each market
7. Identify the binding constraints to the growth of the sector, specifically in industry productivity, access to export markets (regional and international), quality control and upgrading, workforce development, access to supporting services and the general business environment. Identify priority policy reforms for the Mango industry that can be included in the Horticulture Policy Agenda that CCP is assisting the industry to develop.

Deliverables

The consultant will deliver to AMAGRO and the CCP team the following:

1. Value Chain Analysis of the Mango Industry in Tanzania:

- Estimated price, cost, volume figures for each major product throughout the value chain
- The structure and make-up of the mango value chain including number and sizes of businesses, types of activities (farming, distribution, packaging, and value add), and current markets served
- List of the key issues in the business environment in each value chain highlighting the industry specific regulations, standards and certifications, workforce, access to business development services, infrastructure, and access to financing

2. Detailed notes from each meeting/interview and background analysis undertaken for the assessment

3. Facilitation of two one-day workshops with AMAGRO members.

- The first workshop will be held at the beginning of the assignment to train AMAGRO members on the value approach and methodology. This first workshop will also be used to introduce AMAGRO members to the analysis and ensure that the approach is aligned with their needs and expectations.
- The second workshop will be held mid-way through the analysis. The purpose of the second workshop will be to share the initial results of the analysis and ensure that AMAGRO members are able to review the analysis and ask questions prior to completion.

4. The final results of the analysis will be presented jointly by the consultant and AMAGRO at the Mango Conference planned during the tasting festival

Reporting Relationships

The team will be reporting to AMAGRO and the CCP Horticulture Cluster team.

Timeline and Level of Effort:

This assignment is scheduled to start September 15 and be completed by December 1, 2010. The work will be carried out by the consultant with a total of 40 days of Level of Effort. All work will be conducted in Tanzania.

Corporate Qualifications Required

The Tanzanian contractor is expected to be an established firm or organization with relevant qualifications in analyzing and facilitating private sector development.

Specifically, the organization will have demonstrated experience:

- Analyzing industry clusters, value chain and sub-sector competitiveness with focus in cluster development, value chain productivity, strategy development and implementation.
- Advising private businesses on strategic and operational issues such as improving productivity, access to markets, strategic partnerships, and government relations.
- Providing technical assistance to private sector development projects across Tanzania.

The organization will also have established contacts with business leaders and knowledge of business communities across all regions of Tanzania highly desired.

Profile and Experience of Value Chain team:

- Education: Advanced professional degree in Business or Economics (MBA, Master or PhD in Business or Economics).
- Prior Work Experience: 10+ years of experience in Tanzania analyzing industry cluster and value chain competitiveness with focus in cluster development, value chain productivity, strategy development and implementation. Experience working in the private sector or advising businesses is critical. Past experience working on donor-funded projects in private sector development is desirable.
- Skills and Abilities Desired: The candidate should have a proven record analyzing business and value chain competitiveness. The candidate should have proven skill in conducting interviews, compiling and analyzing industry data, and developing insights into the key drivers of industry competitiveness. Proficiency in working in Microsoft Excel, PowerPoint and Word. Fluency in Kiswahili and English.