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Innovation and inclusive Industrialisation in agro-processing: Tanzania citrus value chain

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Executive Summary

Background

Citrus in Tanzania is mostly grown by smallholder farmers with an average of less than 10 hectares, resident in the regions of Tanga (majority), Morogoro and Pwani in Tanzania Mainland, as well as in Zanzibar. The information used to prepare this paper depended on some primary information as well as secondary data, which was not easily obtained given that there are few studies undertaken in the sector in recent years. Primary information was obtained from interviews conducted by farmers in Tanga Region, public officials in Tanga and Morogoro, and academicians/researchers in Morogoro.

Status of the Sector and Role of SMEs

The citrus sub-sector was once among the most advanced industries in the horticulture sector, with solid R&D and extension services to smallholder farmers who were assured of reliable supply of seedlings for their farms, and markets for their produce by supplying some established fruit processing plants in Tanga, Morogoro and Dar-es-salaam. The factories collapsed after some years of operation due to a combination of factors including unstable fruit supplies. After realizing the absence of citrus processing factories following the closure of those in Tanga Region some decades earlier, there was an attempt to establish an ultra-modern fruit in Morogoro in the early 2000s. The investment failed due to lack of adequate supplies.

The slow withdrawal of R&D, extension and closure of factories gradually led to the current situation, whereby farmers are on their own and rely on an unstructured marketing arrangement operated by middlemen and traders who buy the crop at the price they dictate and take the fruits to urban centres as well as export some of them to neighbouring countries, mostly Kenya. Interestingly, just like the citrus fruits' farmers are weakly unified, and so are citrus traders and citrus processors who lack formal platforms although traders are known to have some influence through their informal cartels. It was therefore observed there was some asymmetric power relations between actors in the citrus value chain. The weakly organized farmers, who lacked a strong producers' platform could not exert pressure on government to improve R&D/extension services and so relied on their own initiatives to produce and share seedlings. They could also not attract formal funding from financial institutions for their farm operations and so relied on either own savings or high-cost advance payments provided by citrus traders who ultimately influenced the final producer prices. The traders, who bought oranges for the domestic urban markets and for exporting to neighbouring countries tended to dictate the

farm gate prices offered to farmers. They took advantage of the situation whereby farmers accepted advance payments from them for their farm operations, they were weakly organized, and lacked market information as a basis for bargaining better prices. Moreover, they could be accessed with difficulties through poor rural roads in scatted locations. Despite the perishable nature of citrus, the trade for the commodity provides huge profit margins for the traders who are very influential in the value in the chain.

Given the neglect of R&D needed to maintain the consistence of citrus cultivars for different consumer preferences, the citrus fruits are deemed unfit for high value juice making except for blending as they lack uniformity of fructose contents and size for processing purposes. Available information indicates that the most dominant citrus varieties are those meant for use as table fruits and for simple juice making, given that “Jaffa”, which is a special breed for industrial juice making has been adulterated.

The largest markets of the citrus fruits are for table use and table juice making in street-side kiosks and restaurants. We have therefore not found a strong base of SMEs engaged in fruit processing in Tanzania, with the few available complaining of sharp seasonality in supplies, with fluctuating prices. The medium and large fruit making factories depend on blending fruit juice concentrates and powdered formulations. Due to lack of a vibrant fruit processing industry the only noticeable change in technology over time has been the availability of low-cost vacuum sealing machines for packing juice in plastic and reinforced/stronger cups and containers. There are indications, however, that the demand for both fresh (or table) fruits and packed juice will keep on increasing due to increased urban consumers whose per capita income has also been on the rise.

Recommendations

The only way to support the growth and therefore inclusion of SMEs in the citrus processing industry lies in ensuring the supply side of the citrus value chain is sorted out by a number of policy interventions: (a) Revive the dormant institutional framework and funding needed for R&D and extension to support the citrus industry aiming to harmonize citrus cultivars needed for different market segments, including fruit processing; (b) establish a dedicated public agency that will complement efforts by TAHA, for the development of the citrus industry from production, transportation, storage, processing and marketing; (c) formalize the role of private establishments to multiply and distribute budded seedlings to farmers; (d) support farmers, traders and transporters to be organized and establish some formal forums; (e) support the growth of SMEs in citrus processing

and packaging by linking them to financial institutions; and (f) support the establishment of Processors and Exporters' Platform, that will also be a conduit for learning and adopting new technologies and innovation in the industry.

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List of Abbreviations

AMCOS	Agricultural Marketing Co-operative Societies
ASDP	Agricultural Sector Development Programme
DAICO	District Agriculture, Irrigation and Cooperative Societies
ESRF	Economic and Social Research Foundation
FAO	Food and Agricultural Organization
FYDP	Five Year Development Plan
GPV	Gross Production Value
HODECT	Horticultural Development Council of Tanzania
IGAs	Income Generating Activities
KII	Key Informant Interviews
LGAs	Local Government Authorities
MASEA	Organization of Orange buyers in Muheza District
MDAs	Ministries, Departments, and Agencies
MLFD	Ministry of Livestock and Fisheries Development
MoA	Ministry of Agriculture
MSME	Micro Small Medium Enterprises
MUVI	Muungano wa Ujasiriamali Vijijini
NBS	National Bureau of Statistics
NGOs	Non-Government Organizations
NHDS	National Horticulture Development Strategy
PHM	Post-Harvest Methods
R&D	Research and Development
SAPs	Structural Adjustment Programmes
SHFs	Smallholder Farmers
SIDO	Small Industries Development Organization
SMEs	Small and Medium Enterprises
SMED	Small and Medium Enterprises Development
SUA	Sokoine University of Agriculture
TADB	Tanzania Agricultural Development Bank

TAHA	Tanzania Horticulture Association
TBS	Tanzania Bureau of Standards
TPRA	Tanzania Pesticide Regulatory Authorities
TOSCI	Tanzania Official Seed Certification Institute
TZS	Tanzania Shillings
URT	United Republic of Tanzania
USD	United States Dollar
WB	World Bank

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1.0 INTRODUCTION

1.1 Background to the Citrus Sub-sector in Tanzania

Tanzania is the sixth largest orange producer in Africa, surpassed by Egypt, South Africa, Morocco, Algeria and Ghana. Citrus fruit production and trade is an important economic undertaking in Tanzania, employing around 80,000 direct operators in the orange value chain alone (URT, 2017). Other citrus fruits that are gaining importance in the country include lemons, limes and mandarins. Production of citrus increased from 7,000 metric tonnes (mt) in 1996 to 535,275 mt in 2019 (FAOSTAT, 2020). The highest growth rate was between 2002 and 2013, when there was ten-fold production increase from 35,000 mt to 360,000 mt (Figure 1). The quantity increase was largely due to an increase in area under production coupled with the small but steady growth in productivity. It is estimated that in 2019 there were about 41,600 hectares (ha) planted with citrus trees, of which 38,362 ha was harvested, producing around 12.3 tons of oranges per ha (FAOSTAT, 2020).

1.2 Status of Production and Growth Trend

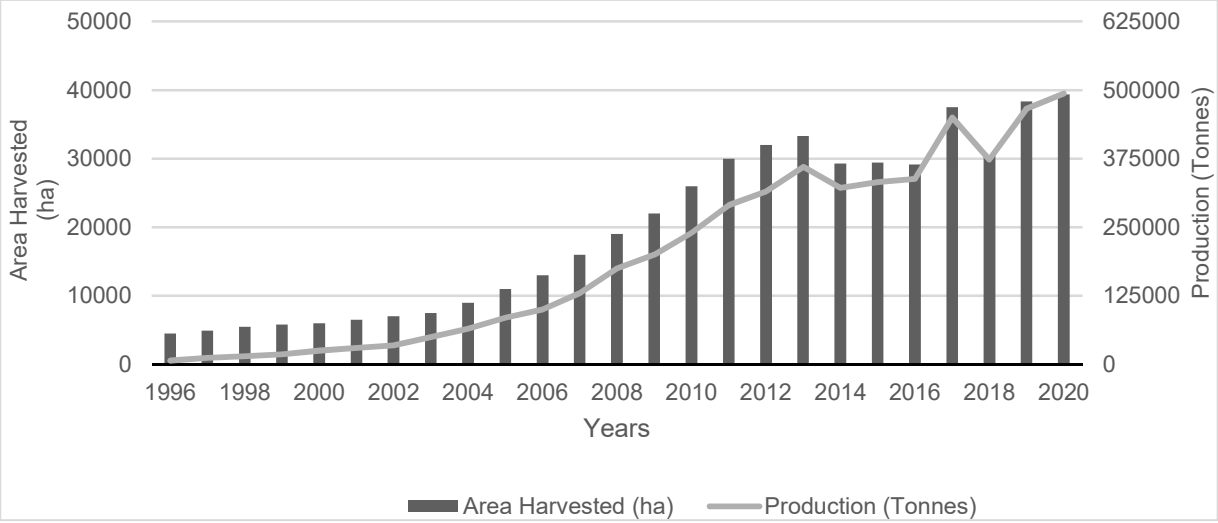
1.2.1 Geographical spread, Area Planted and Quantities

Citrus fruits are grown in most parts of Tanzania; however, the bulk is produced from Tanga Region, which has the best growing conditions. Other citrus growing regions are Pwani, Morogoro, Ruvuma, Lindi, and Zanzibar. Most of the oranges produced are sold for used as fresh fruits in the domestic and export markets within the region. This is because the processing industry has been slow to expand for various reasons to be explained later. The orange value chain in Tanzania is dominated by informally established small-scale privately operated tree nurseries who also offer propagation services; smallholder farmers (SHFs), some of them producing their own seedlings; layers of middlemen as wholesale and retail traders; transporters; and consumers (Tu, 2008; Mhando and Ikeno, 2018). The main fruit production season is between June and October, with peak harvests in the months June and August. There is second, but short production season, that starts from November to February. The lowest or fruit scarcity season is from March to May.

The increase in produced orange quantities over the years went hand in hand with the increase in planted area but with indications of unchanged productivity per unit area, implying the increase in quantities of oranges was driven more by increases in area planted and not

investments in productivity-enhancing technologies. However, signs of productivity increases started manifesting from year 2016 (Figure 1).

Figure 1: Production and Area Harvested Trend of the Oranges in Tanzania

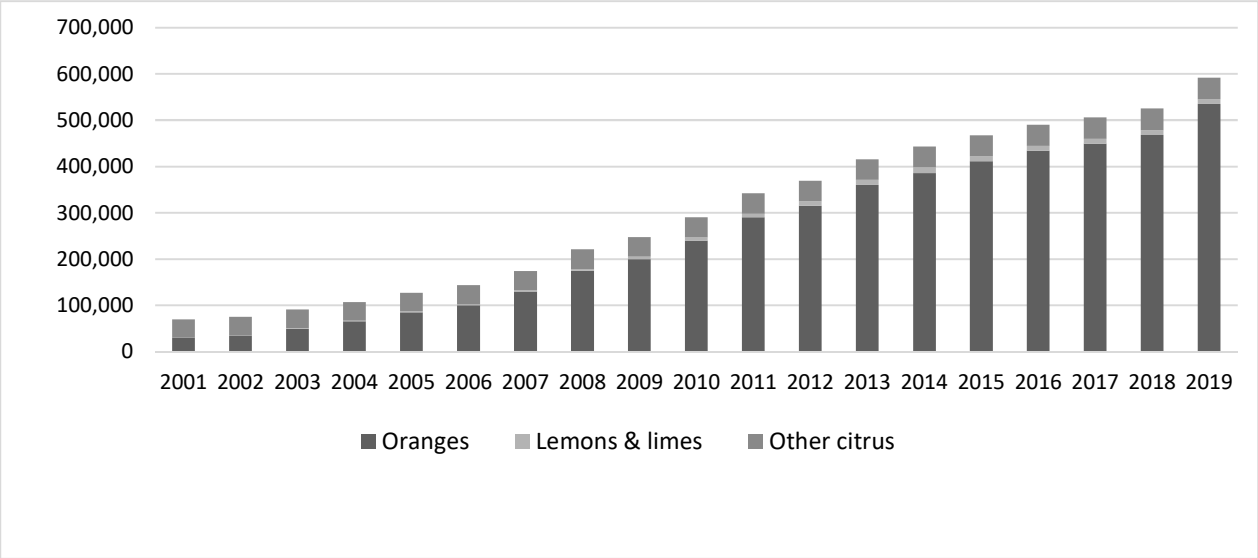


Source: FAOSTAT, 2020

1.2.2 Citrus Varieties

Several orange varieties are grown in Tanzania including Early Valencia (Msasa), Late Valencia (Valencia), Delta Valencia (Kitenesi), Mediterranean (Nairobi), Pineapple (Pamba), Jaffa (Shamoti), Washington (Kitovu) and Zanzibar (SCF 2008, Makorere, 2014). Most SHF are used to traditional varieties that they inherited on their plots and improved them. Oranges tend to dominate other citrus varieties as shown in Figure 2.

Figure 2 Trend of Hectares Planted with Oranges compared to other Varieties



1.2.3 Sub-sector's historical developments

There were several initiatives from the 1960s to the 1990s that were implemented by the ministry responsible for agriculture, in collaboration with development partners, to build the capacity of SHFs to access and adopt new varieties to enable access to better markets. The initiatives included the introduction of orange varieties that can be used for processing and can withstand transportation; capacity building for specialized extension services; development of seedling centres (nurseries) for production and supply of improved cultivars and investment in research for disease control and management (Dai PESA, 2003). Citrus orchards were developed in different zones that included Chereka in Morogoro, Chambezi in Dar es Salaam, Mkumbi in Muheza-Tanga and Tengeru in Arusha. Consequently, notable productivity improvement was observed in early the 1980s calling for the need to invest in orange juice processing facilities (Mhando and Ikeno, 2018). The initial efforts in the 1970s to establish state-owned fruit processing factories such as Tangold in Korogwe, were short-lived due to the fact that the established nurseries and processing factories were not operated commercially, thus leading to their collapse by mid-1980s. The government could not rescue them due to Structural Adjustment Programmes (SAPs) conditionalities imposed to the country by the International Monetary Fund (IMF) during that period. However, later on during the mid-1990s, the Government started to encourage private sector investments in agro-processing, leading to the establishment of new fruit factories such as UNNAT Fruit Processing Plant in Morogoro, Sayona

in Pwani, Azam Juice and Trans Zambezi Industries in Dar es salaam. The key products that can be obtained besides fresh citrus fruits include fruit juice, pulp, concentrates, jams, marmalades, and orange peel extracts. However, the factories faced two inter-related challenges, that of getting stable and reliable supplies of oranges from farmers, and competition from packed juices made using relatively cheaper imported fruit juice concentrates[1] (SCF, 2008; Makorere, 2014). Despite the challenges in value-addition, orange production started to increase again from the early 2000s (see Figure 1). The demand for fresh oranges for the Kenyan market seems to have contributed to the increase in both planted area for oranges and the corresponding quantities, especially during the period 2010 to 2020 (Figure 1). Tanga region is regarded as the main supplier of oranges exported to Kenya (TAHA, 2020). The positive trend of exported quantities of oranges is also attributed to improved export business enabling environment, with over 50 policy changes having been enacted over this period to ease the complexity of conducting export business in the horticultural sector (TAHA, 2020; WB-EDB, 2012; 2013; 2015). The oranges sold within the domestic market are mostly consumed as fresh fruits or processed into juice at homes, restaurants, hotels, hospitals, schools/colleges and factories (Dai PESA, 2003; SCF, 2008; Makorere, 2014; Mhando and Ikeno, 2018). The domestic market takes the bulk of more than 500,000 mt of oranges produced, with the rest, (e.g., about 24,651 mt in 2019, equivalent to 5 percent) exported to Kenya and other neighbouring countries (Figure 3).

1.3 Market for Citrus Fruits

1.3.1 Domestic Market

a) Individual and Household Market for Fresh Fruits

This is the leading category of domestic consumers and is based in both rural and urban areas. While rural consumers can have direct access to buy from farmers, urban consumers depend on supplies channels through different outlets such as street vendors, market places, grocery stores and supermarkets. It is estimated that own consumption of fresh fruits accounted for less than 5% of the harvest. The rural consumption is mainly seasonal as it occurs during the harvesting season on the specific locality (Dai PESA, 2003).

b) Institutional Market for Fresh Fruits

[1] For example, imports of fruit concentrates which amounted to more than 3,000 tonnes in 2019 while exports of concentrate were negligible at just 26 tonnes (TAHA, 2020)

This is done through a formal retail channel and usually includes institutions such as hospitals, defence forces, schools and colleges, hotels, restaurants, etc. This market is reportedly more profitable and significant to traders and farmers (Dai PESA, 2003). Most of the supplied institutions have a formal contract, either with the suppliers who are linked directly with traders or farmers from the production areas. Traders as middlemen control the trading systems and have automatically segmented themselves into at least three different levels of middlemen along the citrus value chain to facilitate trading after harvest: (i) those residing locally and operate as informers of traders or agents coming from towns (ii) agents of buyers interested in contract farming and offer some initial payment; and (iii) agents for international or regional-based wholesale buyers.

c) Industrial Demand for Orange Processing

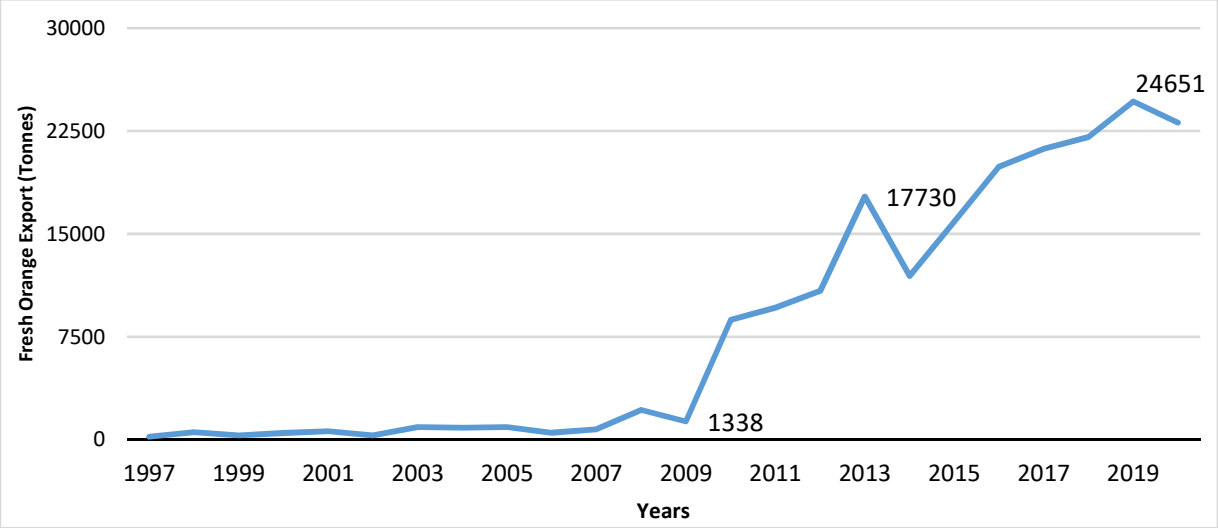
The processors purchase oranges mainly for processing into orange juice as the major product. Medium to large-scale processing plants are at the centre of the orange juice value chain. They mainly produce orange juice or tropical juice blends from imported concentrates or concentrates produced domestically. However, most of the large processing plants do not reach their maximum processing capacity due to low quantities of oranges supplied by the farmers and the seasonality of the supply. They instead import the fruit concentrates for their production of fruit juices. Micro and Small Enterprises are also involved in processing and distribution of orange juice in their local areas of operation. Basic processing technologies such as blenders for fresh juice production and packaging in bottles or plastic/disposable glasses are used.[2] Not much is done in terms of extending the shelf-life of the juice and thus their area of operation is limited by the perishability of the product. Nonetheless, the competition from these players as compared to large processors is stiff because they operate informally and are exempt from many regulatory and tax requirements.

1.3.2 Export Market

The oranges produced in Tanzania are exported to regional markets, the largest importer is the neighbouring Kenya, other regional buyers are Rwanda and Uganda (FAOSTAT, 2020; ITC, 2020). There has been increasing trend of citrus exports since 2010 (Figure 2).

[2] SIDO, 2019 – Key Informant Interview (TZKIG04)

Figure 3 Trend of Exported Quantities of Oranges to Kenya



Regional demand has underpinned the growth in fruit production with Kenya accounting for importing between 5 and 10% percent of fresh oranges produced nationally, mostly (60% taken from Tanga Region) (URT, 2015). The increased dependence of Kenya on imports from Tanzania was driven by disruption of production caused by pest outbreak in that country whereby orange farmers shifted to growing other crops (Mhando and Ikeno, 2018). This move by Kenya, however, did not help the growth of Tanzanian SMEs in agro-processing as they were interested in fresh fruits for their own factories. Contrary to the domestic market, the regional market has preferences for specific varieties such as Valencia and Washington (SCF, 2008).

1.4 Challenges Faced in the Sub-Sector

Key challenges for the sector include (i) poor organization of the actors along the value chain leading to serious challenges in accessing inputs, technology, information, skills and markets; (ii) lack of collective action among actors in the nodes; (iii) limited and/or non-existent institutional support for smallholder farmers who are the majority actors in the value chain; (iv) low investment in R&D, particularly of varieties and disease control; (v) poor transport and storage infrastructure and (vi) lack of or poor supporting policies for domestic development of the value chain.

1.5 Objectives and Motivation of the study

1.5.1 Objectives

The study has three main objectives: First was to explore how do differing institutional environments and value chain relationships shape opportunities for inclusion of agro-processing SMEs in Tanzania. Second, to find out key factors that enable or obstruct the upgrading of technological capabilities among the SMEs in citrus sector. Third, was to recommend some industrial policies that are needed to support the expansion of inclusive agro-processing of citrus fruits.

1.5.2 Motivation for the study

The study was motivated by the observation of me rapidly changing global food system driven by the urbanization and changing consumer habits, which is most likely going to push demand for processed foods. This motivation was later reinforced by the occurrence of COVID-19 that further stimulated demand for immune-boosting fruits rich in Vitamin C, which is the main attribute of citrus fruits. The developments have created an opportunity for Tanzania to ensure SMEs participate in the anticipated agro-processing and therefore their effective inclusion in industrial revolution. It is appreciated that the inclusion of SMEs in agro-processing will require some support for them to acquire new technological capabilities and, where possible, re-configuration of value chains and institutions. This implies that the anticipated inclusive industrialization will be a result of combining structural change leading to poverty reduction based on the fact that most of SMEs are also rural-based where more than two thirds of Tanzanians reside and derive their livelihoods.

1.6 Approach and Methodology

A cross-sectional design was used to collect data for this study. The value chain approach was adopted as the basis for data collection and analysis. The analysis employed both qualitative and quantitative research approaches, which were supported by on-the-ground triangulation using information provided by stakeholders on the key factors that determine innovation and inclusion of SMEs in the citrus processing industry. The obtained information helped to unpack the key challenges that inhibit the participation of SMEs in the citrus value chain in the country. The findings provided evidence-based recommendations on regional and national policy formulation in the citrus industry. The study areas focused on Tanga and Morogoro regions as the largest producers, but along the value chain, different actors were interviewed from Tanga, Morogoro, Coast and Dar es Salaam regions.

1.6.1 Study Approach

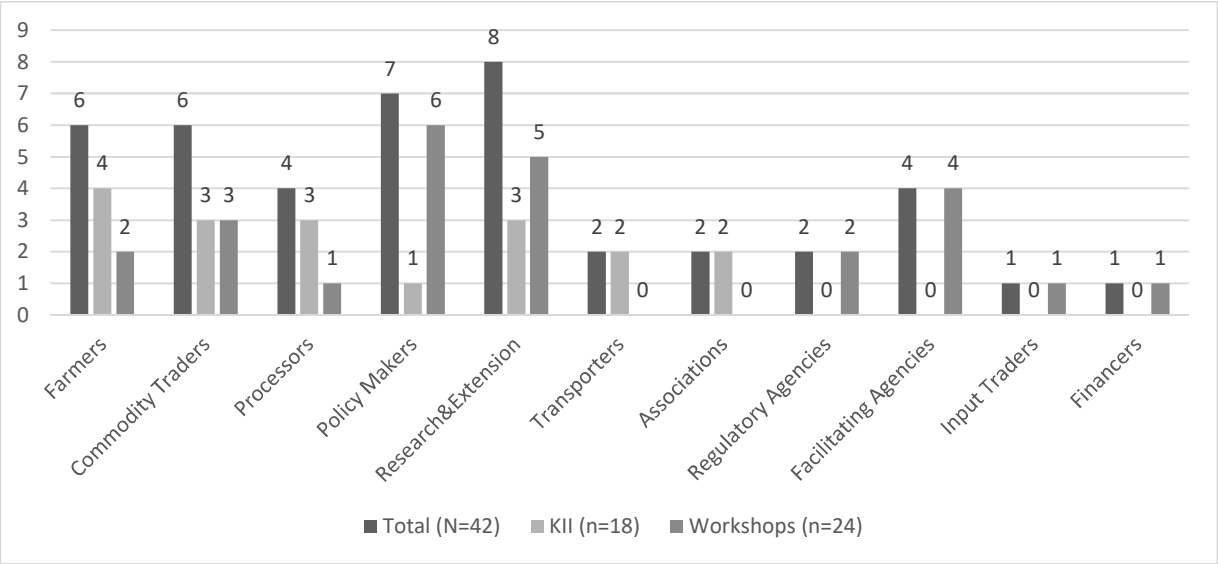
1.6.1.1 Value Chain Framework

A combination of literature and key informant search were used to map activities and key players in the citrus value chain, which informed the purposive sampling of firms to be considered for interviews. The focus was on small and medium-sized processors (SMEs) and their associated adoption of technology and innovations, as well as key challenges faced in the citrus value chain. The value chain framework was used to ensure coverage of all the actors along the chain for a more inclusive perspective of the sector. The interviews were conducted in three regions of Dar es Salaam (in Temeke District, Tandika ward), Pwani (in Kibaha District, Mlandizi ward), and Tanga (in Muheza, Amani ward). These regions were selected because of their domination in citrus production in the country as indicated in the previous sections. The regions also have some diversity of small, medium and large citrus processors applying varying levels of processing technologies. The processors are served by retail and wholesale traders who buy fruits from farmers. Despite the challenges posed by the Covid-19 pandemic, proper preventive measures were observed while conducting interviews with individual farmers, and key informants representing large and small processors, traders (wholesalers and retailers), brokers, and transporters, as elaborated below.

1.6.2 Qualitative Approach

The qualitative approach included getting views from 42 stakeholders experienced in the citrus sector. The individuals were consulted using two formats of interaction: through key informant interviews (KIIs) and during workshops convened for the purpose. The KIIs involved 18 respondents, while 24 people attended validation workshops as shown in Figure 4. The participants represented private sector actors who included farmers, citrus traders, input suppliers, associations, small and medium-scale processors, and transporters; and public sector officials from sector ministry, Local Government Authorities (LGAs), regulatory agencies, facilitating agencies, state owned agricultural development bank, research agencies and extension departments (Figure 4).

Figure 4: Categories of Participants during Key Informant Interviews and Workshops



Source: Record of Meetings Consulted by the Researchers (See Annex 1 and 2)

1.6.3 Quantitative Approach

The quantitative approach included collection of data from primary producers, traders and processors using some pre-coded and open-ended questionnaires. The quantitative approach employed tools which mainly focused on the small and medium citrus farmers, traders and processors. Also used was some statistics routinely prepared by different institutions such as the National Bureau of Statistics (NBS), the Food and Agricultural Organization (FAO) and World Bank (WB).

1.6.4 Types and sources of data

1.6.4.1 Secondary Data

A documentary review of the studies conducted in the citrus sub-sector was conducted including literature review on national and global agricultural, industrial, and trade policy papers, strategies and plans from the Government Ministries, Departments and Agencies (MDAs) such as NBS and the Ministry of Livestock and Fisheries Development (MLFD). Policy and strategy documents reviewed included the National Agricultural Policy 2013, Agricultural Sector Development Programme (ASDP II: 2016/17–2026/27); the Small and Medium Enterprises Development (SMED) Policy (2003); the Integrated Industrial Development Strategy (IIDS) 2011–2025; the Second Five Year Development Plan (FYDP II)

2016/17–2020/21 and the third FYDP 2021/22–2025/26. Other sources of information/data included official publications and annual reports from the related key citrus stakeholders' organizations/institutions, and refereed journals.

1.6.4.2 Primary Data

The primary data collection in all regions and districts observed the COVID 19 precautionary measures while interviewing stakeholders. The composition of interviewees in the value chain and geographical spread comprised of nursery owners, citrus smallholder farmers, transporters, traders, processors (both large and small), small and medium enterprises (SMEs) involved processing, fruit venders, middlemen in citrus trade, extension officers, academia and policymakers. Most of the smallholder farmers are in the Tanga, Morogoro and Coast Regions, with the greatest concentration in Muheza district (Tanga Region) which was therefore a focus for the interviews. At the downstream processing level, given the very few companies, two large processors were interviewed (Sayona Juice Processing Company and Bakhresa food and beverage processing Ltd), along with several smaller juice makers. Lists of participants in workshops and those interviewed as key informants are shown in Annex 1 and 2, respectively.

The conducted interviews, mainly through key informant interviews and roundtable discussion by main groups were as follows:

- Government Stakeholders: These included the Director of Crops Development (DCD) and Director of Policy and Planning (DPP) from the Ministry of Agriculture (MOA), Regional Agriculture Officers in Tanga and Pwani Regions, District Agriculture, Irrigation and Cooperatives officers (DAICOs), District Extension Officers (DEOs), District Trade Officers (DTOs).
- Public Sector Agencies and Institutions: Interviews were conducted with lecturers from the horticulture department at Sokoine University of Agriculture (SUA). Interviews with specialized agencies included the Small Industries Development Organization (SIDO). It is the implementer of Rural Micro, Small and Medium Enterprise Support Programme (in Kiswahili known as Muungano wa Ujasiriamali Vijijini (MUVI)). The programme aimed at improving skills, knowledge and access to markets of rural entrepreneurs to help increase household food security and incomes of poor rural households, in particular through the support for development of value chains. Although the MUVI programme was meant to solve some of these challenges, the government did not provide the required support to sustain some of

the initial successes and so citrus farmers have remained with more-or-less the same challenges[3].

- Private Stakeholders: These included different groups such as traders, middlemen, drivers, citrus growers, citrus associations, private nursery producers, and, large processing factories/concentrate importers. The private sector actors in horticulture are organised under the Tanzania Horticulture Association (TAHA), whose leaders were also interviewed.

1.7 Design of the interviews

1.7.1 KOBO software for survey

Semi-structured questionnaires were developed, which included closed and open-ended questions administered using KOBO software to tablets and computers for data collection with processors and citrus companies/growers. This facilitated all researchers conducting this study to be in control of information uploaded and having an opportunity to obtain follow-up information or detailed interviews in different formats.

1.7.2 Interview Checklists

The interview checklists were prepared for key informant interviews, roundtable discussion and other individual and general interviews. These included the following themes:

- Understanding key activities of the actors along the value chain
- Understanding the structure of the industry at each stage of the value chain (key players, large and lead firms within the value chain, governance, and competitiveness in the value chain)
- Technologies and process innovation for SMEs and large firms
- Trade and trading systems
- Access to markets and competition in SMEs and large firms
- The role of large firms, challenges faced by players at different levels of the value chain and in the industry as a whole
- The role of government in the industry including government support in the citrus value chain

1.8 Structure of the Paper

This working paper highlights, analyses and addresses the importance of economic and political factors in the growth of the Tanzanian citrus sector and how these influence the

[3] SUA, 2020 – Key Informant Interview (TZKIC01)

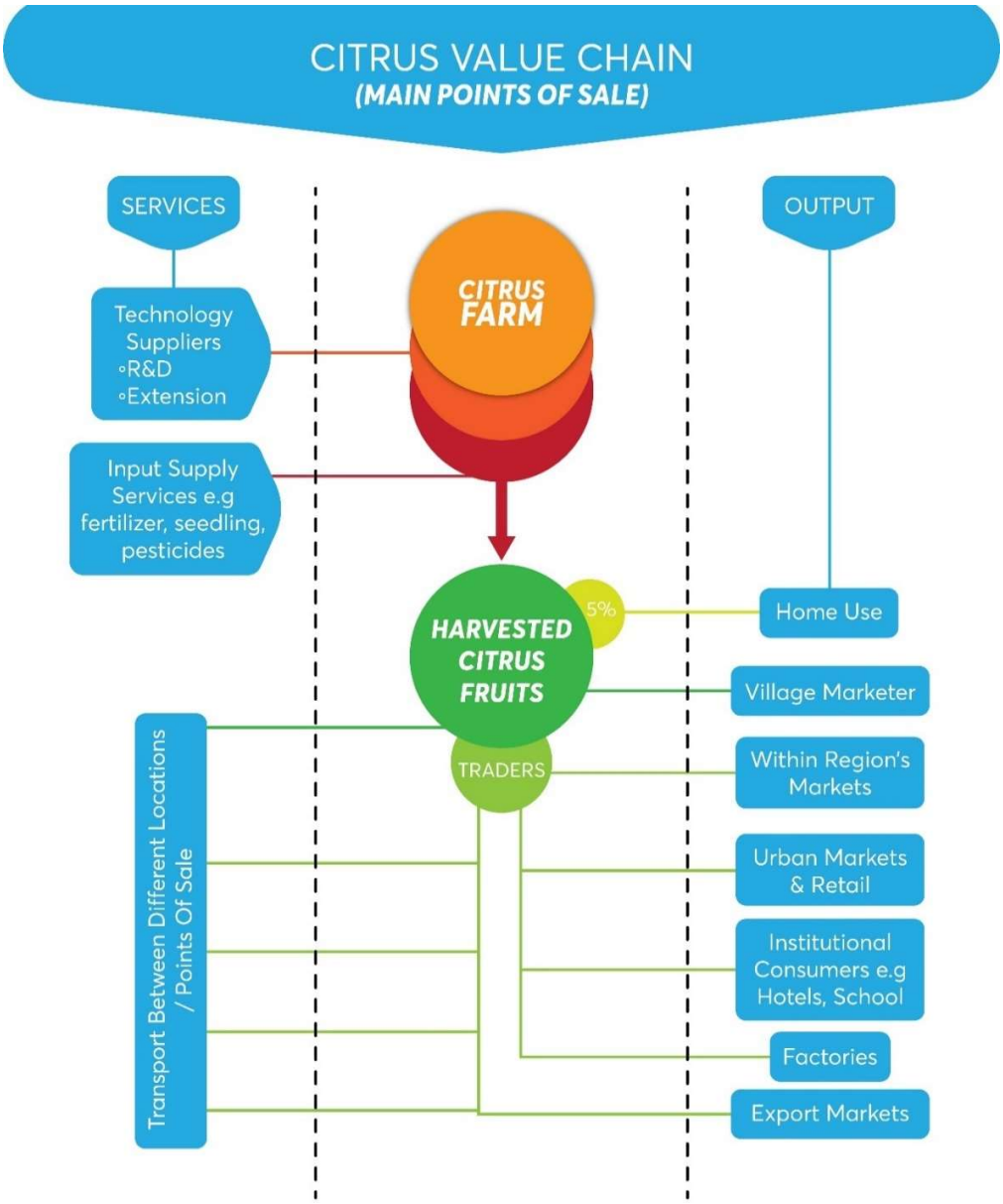
inclusion/exclusion of Small and Medium Enterprises (SMEs) in the orange value chain. Where applicable, the upgrading options and how these are shaped by the current policies are assessed.

The rest of the paper is organized as follows: Section 2 covers the background and development of the citrus sector in the country. Section 3 provides the methodology employed including the challenges under Covid-19. Section 4 maps the citrus value chain with focus on assessment of the development of the value chain including governance, institutions and stakeholders. Section 5 analyses the issues relating to inclusion in the value chain at different levels. In Section 6 questions of upgrading and innovation are considered. Section 7 examines the role of government policies and of industry organizations in the development of the sector in order to explain the outcomes observed through a political economy lens. Section 8 concludes and draws implications for policymakers.

2.0 Mapping the Value Chain: Development, Linkages and Governance

The value chain in citrus in Tanzania runs from the development of different cultivars at research stations, nurseries and provided to farmers to grow in their farms. Famers have to buy inputs agro-input dealers and provide labour for the trees to grow well before the first harvests from the 3rd year. Once the fruits are ready, exchanges through voluntary sales happens at the village level, within the district and regional markets and in other urban centres. The main points of interactions related to supporting citrus production and citrus marketing are in indicated in Figure 5. Part of the harvest is bought by traders who export to other countries, mostly within East Africa.

Figure 5: Main Points of Transactions along the Citrus Value Chain



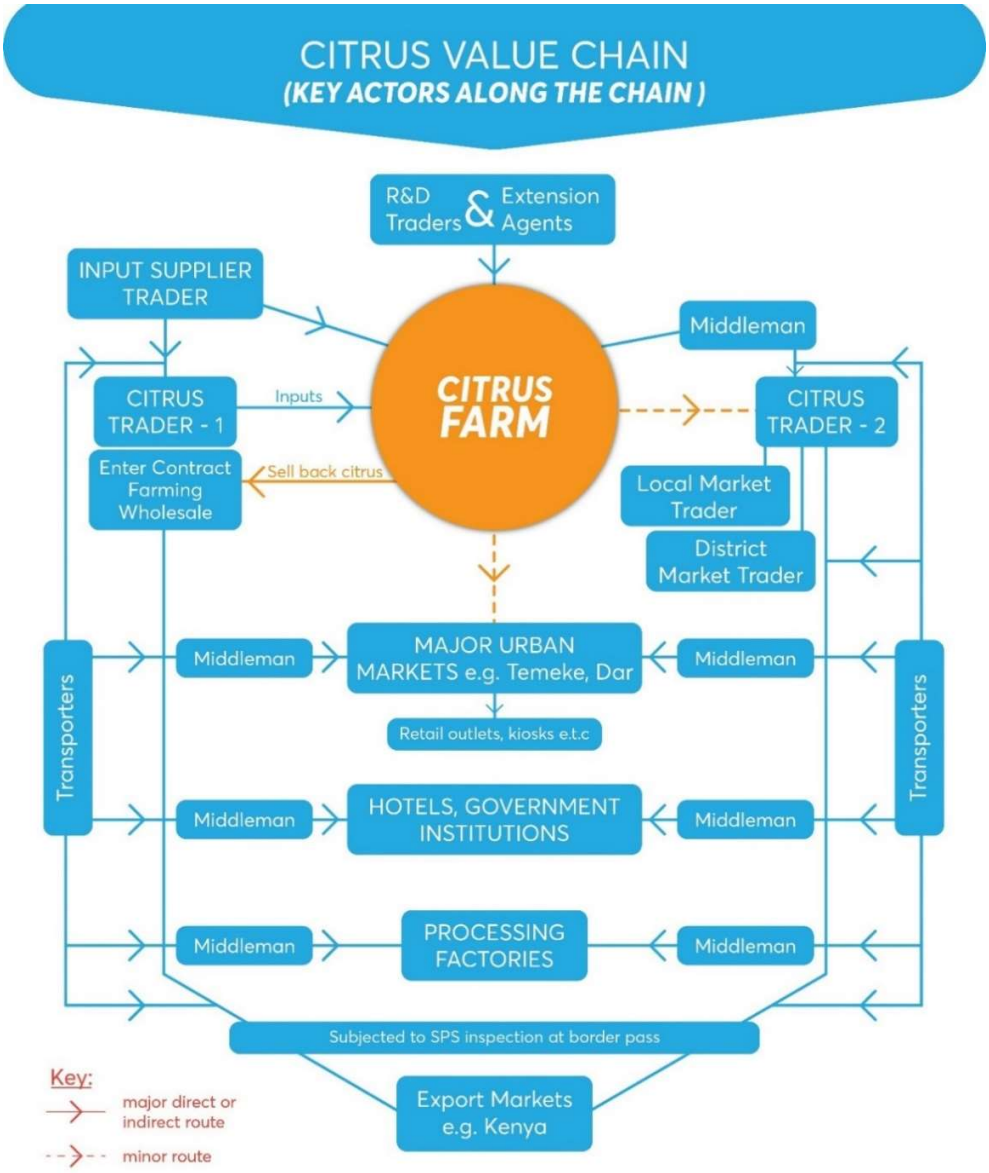
Source: Authors' Understanding of the Value Chain[4]

It is noteworthy that most farmers get their seedlings from individual persons with acquired skills in citrus grafting. This is because research stations have so far not invested enough in developing new seed cultivars or maintaining the certified cultivars in use or multiplying them

[4] Artwork designed by TB Graphic Design Services (2021).

for use by farmers. Farmers are almost on their own without support from extension services and therefore have learnt to prepare lemon seedlings, planting them, and then grafting with orange cultivars of their choice on the second year. They are self-reliant until the stage of harvesting and sale to different channels (Figure 5). The key actors along the citrus value chain are indicated in Figure 6. They consist of farm service providers such as input dealers, wholesale and retail traders, transporters, processors and consumers.

Figure 6: Key Actors along the Citrus Value Chain



Source: Authors' Understanding of the Value Chain[5]

In this section we review the key activities at each value chain level, the linkages between them and how the value chain is governed by lead firms and influenced by government policies. This provides a foundation for in-depth analysis of the issues of inclusion, innovation and industrial policies in subsequent sections.

2.1 Input Supply

Local input suppliers are important in the citrus value chain in providing quality inputs such as seedlings, fertilizers and pesticides. Obtaining and using appropriate varieties is among the key elements in sustainable growth of the citrus industry. However, following the collapse of government supported citrus nurseries, some of which established using funds provided by Development Partners (DPs), the main challenge faced by farmers has been reliable supply and access to clearly defined citrus cultivars. Privately owned backyard nurseries, and those established by individual farmers for own use have been the dominant sources of seedlings. These sources cannot be reliably expected to maintain the original purity of cultivars released by research stations in the 1970s and 1980s[6].

Citrus varieties in Tanzania

There are several varieties of citrus (*Citrus sinensis*) which are grown in Tanzania, each with important characteristics that influence their priced value and prospective markets. The most common varieties grown are as shown in Table 1. It is important to note that varieties are conventionally supposed to be associated with particular countries of origin who are also holders of the intellectual property rights. However, the varieties introduced into Tanzania have over time been adapted to the country and lost connections with the original suppliers. They are now broadly known as follows:

- Early Valencia: The harvesting season for this variety is from June to August each year.
- Late Valencia: This variety can stay longer in trees without dropping after maturity and so is most favoured by farmers. This is because they can be harvested up to late months after the peak season when the prices are relatively good for both farmers and traders.
- Mediterranean Sweet, also known (a.k.a) as Nairobi or Pamba or Matombo, whose origin is Kenya (Nairobi) and is highly preferred by customers in that country.

[5] Artwork designed by TB Graphic Design Services (2021).
[6] SUA, 2020 – Key Informant Interview (TZKIC01)

- Jaffa: This is the variety suited for processing as it can produce up to 3,000 oranges per tree. However, the variety cannot stay for long on trees after ripening and they easily fall after to the ground leading to relatively higher after-maturity losses.

Early and Late Valencia are the preferred orange varieties in most citrus growing parts of Tanzania because they are the most traded varieties along all marketing channels and are the preferred varieties for fresh sales, including to the Kenyan export market (Table 1)[7]. Nonetheless, farmers who are strapped for cash do prefer the early maturing varieties to meet their needs without waiting for so long. They judge that they are better-off solving their monetary needs early on, even if the prices are low, instead of waiting for better prices towards the end of the season (Mhando and Ikeno, 2018).

Table 1: Variety Characteristics & Growing Season in Tanzania

Varieties	Growing Season	Harvesting Season	Variety Characteristics
Early Valencia	Dec – March	June – August	• Can stay for a long time on the tree • Early maturity compared to other varieties • Nice yellow colour when ripe • Sweet and juicy when ripe • Skin is robust to transport • Most popular variety among farmers
Late Valencia	Dec – March	August –Dec	• This is considered to be the best variety as they tolerate on trees and can be harvested up to late months in a season when the price is better. • Long storage time on tree • Late ripening with green outer shell • Sweet and juicy when ripe • Robust to transport • Most popular variety
Nairobi (Matombo Sweet) or sometimes called Mediterranean Sweet or Pamba.	Dec – Jan	August – January	• Originated from Nairobi • A.k.a Matombo • Grown mostly in Morogoro region in Matombo division - Tanzania. • Sweet, medium-sized • Long storage time on tree.

[7] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

Varieties	Growing Season	Harvesting Season	Variety Characteristics
Jaffa	Dec – March	May – July in TZ but other part of the world the ripening is Jan – March	• Can produce up to 3,000 oranges per tree • Fall down early after ripening as they cannot be held long enough in the tree • Big Size fruit compared to other varieties • Juicy and sweet, almost seedless orange variety • It is special for industrial processing • It is also called Israel Fruit • Need high GAP and larger scale plantation • Developed by Arab farmers in the mid-19th Century. The variety takes its name from the city of Jaffa where it was first produced for export. • Need very high care during harvesting and transportation to avoid damages.

Washington Naval	Dec – March	March – July	• The Washington navel orange ripens from fall into winter and the fruit will keep on the tree for 3 to 4 months.
			  • It was originated from the mutation of a common sweet orange growing in an orchard at a monastery in Brazil in 1820. A cutting from that tree was sent to Washington D.C. in 1870 for propagation.
			  • Sweet orange that is large, seedless and has a rich, juicy flavour that is delicious for eating out of the hand.
			  • Washington Navel Trees prefer full sun and fertile, well-drained soil conditions.

Msasa	Dec –March	May – August	• Late maturing, medium-size, thin and smooth skin

Source: Authors Compilation from field information gathered 2019-2020[8], with seasons and variety names taken from Dai PESA, 2003.

Jaffa variety is most ideal for juice processing as it produces relatively more juice compared other varieties. Unfortunately, its soft skin and susceptibility to mechanical injury during transportation has given room to Early and Late Valencia to gain popularity and replacing Jaffa as a preferred variety for juice making. Experience from farmers have indicated that, if they

[8] SUA, 2020 – Key Informant Interview (TZKIC01)

mix Jaffa with other varieties during transportation, the Jaffa easily gets injured, leading to rotting that to spread to the whole orange load[9].

4.1.2 Nurseries

Dedicated centres for seed multiplication and supply of seedlings were established by MoA in collaboration with UN-FAO in the late 1970s and early 1980s. The centres were KATRIN[10] in Ifakara-Morogoro, Kareka in Morogoro, Muheza-Mkumbi in Tanga Region, and Tengeru in Arusha regions. These centres were responsible for the fast expansion of citrus area that led to the justification to build a fruit processing factory in Tanga Region. Jaffa orange variety, which is famous for its high levels of fruit bearing ability (up to 3,000 fruits per tree) and high juice content per fruit, was also introduced in Tanga and Morogoro regions for multiplication[11].

The National Horticulture Development Strategy (NHDS: 2012-2021), whose implementation is overseen by the TAHA, has supported district-based platforms for citrus fruits including addressing issues facing specifically smallholder farmers (MoA, 2011). The member-based TAHA and is supposed to provide a unified voice for producers, traders, exporters and processors of flowers, vegetables, horticultural seeds, spices and fruits. It has been relatively more active in crops such as flowers, spices and fruits such as mangoes and avocados but little has been witnessed with respect to the citrus industry. Despite such efforts in other commodities, there is a feeling among stakeholders that the government has not been enough effort to encourage properly functioning linkages between farmers with producers of citrus seedlings[12]. In recent years, seed multiplication has become managed almost entirely by private nurseries which have originated from the Agricultural Marketing Co-operative Societies (AMCOS), which were created as a result of government efforts. The private nurseries evolved to fill the void created by the collapse of public centres, which are no longer active, and in some areas don't exist. The boundaries for government nurseries were not well demarcated and/or monitored, leading to encroachment and change of their uses, including turning into residential/business areas. The team of researchers could not get hold of an official strategic plan to revive or set up new citrus multiplication centres, an intervention regarded as essential for encouraging investments in juice processing factories in SMEs[13].

[9] SUA, 2020 – Key Informant Interview (TZKIC01) and Citrus Farmers, 2021 – Key Informant Interview (TZKIC19; TZKIC20; and TZKIC21)

[10] Kilombero Agricultural Training and Research Institute *KATRIN*.
[11] SUA, 2020 – Key Informant Interview (TZKIC01)
[12] SUA, 2020 – Key Informant Interview (TZKIC01)
[13] SUA, 2020 – Key Informant Interview (TZKIC01)

2.2 Farming of citrus

The vast majority of citrus farms in Tanzania are classified as small-scale, whose domination is associated with the lack of investment in irrigation systems and infrastructures in citrus farming, making it difficult for farmers to manage large farms[14]. This means production of oranges in the country is dominated by smallholder farmers (SHFs) who own between 0.4–2.5 ha of land (Mhando and Ikeno, 2018; Dai PESA, 2003; SCF, 2008). No recent data is available but in the early 2000s SHFs were estimated to account for 70% of all citrus land, medium-scale farmers (owning 2.5–6 ha) around 23% and large-scale farmers (over 6 ha) around 7% of the producers (Dai PESA, 2003). Production is entirely rain-fed, irrespective of the scale of production. Farmers do purchase seedlings from private backyards nurseries (rare) or bud their own trees (most common practice) using a lemon tree as a rootstock, which is then budded with the desired variety after two to three years (Mhando and Ikeno, 2018). Despite the many challenges faced by the producers, the harvesting season in Tanzania is almost throughout the entire year due to the diversity of weather and varieties in the production localities.

The orange farming practices are mainly traditional and organic by default or with very few fertilizers and GAPs observed. Organic fertilizer is used during land preparation and transplanting for those who can afford to collect or buy cow dung/composite manure. The growing takes place during the rainy season and most of the smallholder farmers use an intercropping system with horticulture crops and legumes[15] because they fix nitrogen into the soil which helps to boost the soil fertility for citrus growing. This also helps farmers to automatic weed the citrus farm as they tender for other crops while waiting for the orange harvesting season[16].

Cost of Production

In order to engage in citrus growing one has to incur various costs as follows: purchase of seedlings, tools and equipment; and payment of labour and transport costs. But some financially-able farmers opting for improved good agricultural practices (GAP) also apply agro-chemicals (mainly pesticides) (Table 2). Assuming that the land has to be cleared for a new farm, this is estimated at around TSh 340,000 for an acre, including digging holes for the seedlings. The seedlings cost about TSh 250,000 for 100 trees on an acre. The revenue per acre, usually obtained

[14] TAHA, 2019 – Key Informant Interview (TZKIC02)

[15] The most common legumes used for citrus intercropping in Tanzania includes beans/pulses, peas, chickpeas, soybeans, peanuts, lentils and tamarind (ukwaju).

[16] Citrus Farmers, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

from the fourth years, is about Tsh 2.5 million or equivalent to 1,087 USD[17]. This is estimated from normal sales of oranges at farmgate price of about TSh 50 per orange and yield of 40,000 to 50,000 orange fruits (Citrus farmers, 2019 & 2020). The revenue and costs yield an estimated profit of USD 437 per one acre (see table 2 below).[18]

As we analyse in more detail below, the small-scale farmers face challenges in negotiating fair prices and terms with local agents, brokers and traders given the weak financial position of farmers.

Table 2: Citrus Cost of Production per 1 Acre for SHFs Using Improved GAP

Sn.	INPUTS REQUIRED	COSTS (TZS)	UNIT	TOTAL Costs (TZS)
A	EQUIPMENT			
1	Hand hoes	7,000	3	21,000
2	Heavy Knife	6,000	2	12,000
3	Sululu	10,000	2	20,000
4	Whip-Mpini	2,000	5	10,000
5	Knapsak Sprayer	130,000	1	130,000
6	Scissors	15,000	2	30,000
7	Saws	20,000	1	20,000
8	Manila Roaps	5,000	1	5,000
9	Hammer	10,000	1	10,000
10	Insecticides	20,000	10	200,000
11	Seedlings	2,500	100	250,000
	Total A			708,000
B.	LABORERS			
1	Land Clearing	40,000	1	40,000
2	Land/bush Cleaning	20,000	1	20,000
3	Removing tree stumps	100,000	1	100,000

[17] Exchange rate of 2300TZS2300TZS for 1 USD.
[18] Includes revenues per annum and off costs.

Sn.	INPUTS REQUIRED	COSTS (TZS)	UNIT	TOTAL Costs (TZS)
4	Tractor cultivation	60,000	1	60,000
5	Harrowing	40,000	1	40,000
6	Holes Measurements	30,000	1	30,000
7	Holes making	50,000	1	50,000
8	Growing Citrus Seedlings	20,000	1	20,000
9	Year 1 Weeding	30,000	2	60,000
10	Year 2 Weeding	35,000	2	70,000
11	Year 3 Weeding	40,000	2	80,000
12	Year 4 Weeding	45,000	2	90,000
13	Pruning	30,000	1	30,000
14	Insecticides	30,000	1	30,000
15	Transportation	30,000	1	30,000
16	Harvesting	30,000	1	30,000
	Total B			780,000
	A+B			1,488,000

Source: Interviewed stakeholders 2019 and 2021[19]

2.3 Storage issues

The absence of pack houses and storage infrastructure for small-scale farmers means that citrus (oranges) have to be sold in a short duration as the fruit can only be kept for five to seven days. The storage of fresh oranges is categorized into different forms depending on the location where oranges are stored or off-loaded[20].

- On tree storage: Farmers delay the harvesting of matured fruits for a couple of days to ensure they remain fresh at the point of sale. This is reported to be impossible for Jaffa variety where fruits fall immediately when they are ready for harvesting.

[19] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

[20] SUA, 2020 – Key Informant Interview (TZKIC01) and Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

- On farm storage after harvest: Are mainly through covering oranges with grasses on the ground to keep them fresh before loading for transport.
- At the destination markets (such as Buguruni markets in Dar es Salaam): Oranges are just offloaded on the ground, but the place is prepared by placing on used boxes and covering with grasses on the top to shield them from the sun and keep them fresh.
- Small processors: Normally keeps in cold rooms[21] or fridges before processing and after processing are being kept in fridges waiting for consumers.
- Medium and Large Firms: Have got a special storage cold room facility where oranges are stored after cleaning and sorting ready for juice processing.

2.4 Transport and Logistics

The transportation of oranges is mainly done through trucks on the road network. Fresh fruits are collected and transported from the farms using motorcycles and bicycles to the nearest collection area/motor-able road if the tracks cannot access the farms. The trucks (mostly hired by the traders and the brokers) then carry the consignments s to the destined markets i.e. Kenya and other regions of Tanzania. .

2.5 Brokerage, aggregation and trading

The middlemen control the trading systems and have automatically segmented themselves into different levels. There are at least three different levels of middlemen along the citrus value chain to facilitate trading after harvest as follows:[22]

- Local agents – these are local contacts residing in the producing areas and have good knowledge of the farms and producers. They work in contact with the brokers and traders to secure the fruits from the farmer. They perform the roles of information searching, connecting buyers with sellers and aggregation functions.
- Broker/first level trader – these are agents of the domestic and regional traders who directly contact the local agent to secure the fruits for their contracted supply. They normally leave the searching and identification of the best fruits to the local agent. The broker/first level trader will show up during harvesting to purchase the crop or during the initial agreement of sale of the fruits on the tree.

[21] Cold Rooms in Tanzania are referred as normal rooms which are a little bit cool but not designed with cold systems or facilities.
[22] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

- Trader – these are domestic and regional traders, usually residing in other regions out of the producing areas. They may visit the farms during the harvesting when all the contracting has been overseen by the agent and broker or if they have developed good business ties with their local contacts, they may choose to stay in their localities and receive and inspect the cargo on arrival.

Since the middlemen can connect farmers with buyers who offer advance payment, have knowledge of customers and the prevailing market prices in towns, they seem to be powerful and influential over citrus farmers due to that power imbalance of power between them. Since the citrus production is seasonal due to dependence on rainfall, the middlemen use that opportunity to finance farmers during low season with paperless contacts when farmers are cash struck. The middlemen use the trick of financing any amount of money in return to orange harvests in one or two seasons depending on the financial support offered (normally the farm gate price is controlled by middlemen during the low season when offering financial support). The credit serves as a quick cash earning to farmers in exchange for citrus farm output and the middlemen become the owner of that particular farm and will harvest for one or more seasons. There is weak or no-involvement of the government in the support and regulation of the practices along the citrus value chain. (DAICO Muheza, 2020).

2.6 Marketing channels

There are four market channels through which the products move from the farm to the consumer. These are the (i) local market channel, (ii) urban market channel, (iii) institutional market channel, and (iv) export market channel. Local agents, brokers and traders play varying roles into these channels.

2.6.1 Local Market Channel

The local/rural market channels involve the farmer selling directly to fresh fruits consumers at the farm gate or the farmers selling to local traders who then distribute to the local market outlets, including the open markets and street vendors. Processed consumption in the rural areas also occurs where the small juice processors purchase the fresh fruit from the producers/the wholesalers or retailers and produce juice for the rural consumers. This is mainly during the low season or off season as most rural consumers would prefer a fresh fruit than juice.[23] Farmers and local traders are key to this market channel.

[23] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07;

2.6.2 Urban Market Channel

In this channel the traders in the urban areas or other regions in the country have established a connection with the regional/district brokers/traders and local agents to purchase orange fruits for fresh consumption or processing. Local agents will then make the arrangement and inspection of the fruits as per buyer (trader) specification and also conduct the preliminary negotiations with the farmer. At the point of sale, the district/regional trader/broker works with the local agent to ensure the fruits are picked and selected according to the buyers' specifications.[24] Two main ways are used in this channel, the pre-harvest purchase agreement where the fruits are sold while they are on the trees and the spot market where the fruits are sold on harvest.

a) Pre-harvest Purchase Agreement

In this arrangement the fruits are sold on the tree before they mature. Local agents that have good knowledge of the farmers and crop scour around to identify the good crop for sale to their respective brokers and traders. The local agent initiates the negotiation and agrees on the price per fruit ranging from TZS 10 to 50 depending on the season and size of the fruits. An agreement is then made between the farmer and the trader for sale of the fruits at maturity at an agreed price. A percentage of the purchase amount is advanced to the farmer to secure the crop. The farmer is then not allowed to sell or use any of the fruits under agreement, they can only take care of the trees.

At maturity of the fruits, the trader sends and pays the harvesters (supervised by the local agent and the broker) to harvest the oranges. The practice is that the harvesters do harvest all the matured fruits and once they are on the ground, they start to sort and select the good ones in two sizes – small and large. The selected oranges are then counted and paid for at the farm (deducting the percentage that was already advanced to the farmer). However, the harvested oranges that were considered not good but were harvested and are laying on the ground are never paid for and are left for the farmer. Since the farmers are not informed well in advance on when the harvester is going to show up, they find it difficult to find a quick spot market for the discarded fruits and in most cases, they end up rotting, causing significant post-harvest losses.

TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

[24] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

b) Spot Market

The spot market channel happens where the producers and buyers had no prior arrangements or quality specifications/demands before the harvest. The local agents receive orders from either the traders or the brokers to supply an agreed number of oranges. They then scour around the producers' fields to secure the amount of the fruits required. After reaching the agreement on the price per fruit, they work with farmers to harvest and count the fruits to reach the desired amount and pay at the farm gate.

c) Direct sale to urban markets through brokers

Due to challenges encountered in dealing with brokers and middlemen, some farmers choose to bypass the initial layers of middlemen and traders. They instead sell directly to the urban market through a broker, who is the last layer among middlemen. The farmer hires a truck, sends the oranges to the broker at a particular market with whom the farmer had preliminary negotiations with. The broker then sells the oranges in retail or wholesale and gets a commission from the farmer.[25]

d) Processed Consumption Channel

There are currently no large-scale processors using the fresh orange fruits produced domestically, instead they use imported concentrates. Small-scale processors of orange juice in urban and rural towns secure their oranges mainly from wholesalers in the open markets or retailers located in their areas.

There are therefore substantial opportunities for growth to replace imported concentrate if appropriate policies to build linkages between industrial and agricultural sectors are enacted.

2.6.3 Institutional Market Channel

A few farmers and/or contracted traders do supply fresh fruits to different public and private institutions including schools, hospitals, collages, religious institutions etc.[26]

2.6.4 Export Market Channel

Fresh orange fruits produced in Tanzania are mainly exported to regional markets due to differences in production seasons and quantities produced. Kenya is the largest importer of Tanzanian oranges, others are Rwanda and Uganda (FAOSTAT, 2020; ITC, 2020). Up to 60 percent

[25] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

[26] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

of oranges produced in Tanga Region are exported to neighbouring Kenya (URT, 2015). Buyers from Kenya initiate the process by contacting the local agents and traders with specifications for the demanded fruits. The local agents and traders make the pre-harvest purchase agreements on behalf of importers or spot market purchases for the importer who then hires a truck and transports the fresh fruits to Kenya.[27]

Table 3: Profit Margins Incurred by Wholesale Traders of Oranges from Muheza to Dar-es-salaam[28]

Description	10-MT Lorry(A)	7-MT Lorry(B)	5 MT Lorry(C)
Number of oranges per lorry load	50,000	40,000	30000
Purchase farmgate price (TSh) per orange including picking and loading into trucks	20	20	20
Purchasing cost, average TSh per lorryload	1,000,000	800,000	600,000
Costs to collection points for large lorries from areas with poor roads	75,000	60,000	45,000
Loading cost per lorry (TSh)	50,000	40,000	30,000
Packing material cost per lorry (TSh)	12,000	8,000	5,000
Village and city cess per lorry (TSh)	6,000	6,000	6,000
Inter-regional transport cost per lorry (TSh)	800,000	700,000	600,000
Total costs per lorry (TSh)[1]	1,943,000	1,614,000	1,286,000
II-REVENUE:			
Selling price per orange (TSh)	85	85	85
Total income per lorry of 10 tonnes (TSh)	4,250,000	3,400,000	2,550,000
PROFITABILITY			
Gross margin/lorry (TSh/lorry) (Revenue (II) less Cost (I))	2,307,000	1,786,000	1,264,000
Gross margin/orange (TSh/orange)	46	45	42

[27] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

[28] using different capacity trucks during medium production season

Source: [A] MASEA (Organization of Orange buyers in Muheza District)[29]; [B] Citrus Farmers & Traders, 2021 – Key Informant Interview (TZKIC19; and TZKIC20).[30]

2.7 Wholesale trade

The wholesale market for citrus occurs in major urban centres such as Arusha, Dodoma and Tanga but Dar es Salaam dominates as the major destination of the fruits due to the large customer base. There are different wholesale routes with the two most common being: (i) traders supplying the citrus products to the wholesale markets, who in turn sell to retail traders and (ii) traders supplying directly to retailers who have made particular orders from their respective traders. There are also wholesalers who specialise in certain niches such as selling to retail outlets restaurants, institutions and hotels.

2.8 Retailing

The citrus retailing market includes different retailers from the large supermarkets, open market stalls, street vendors and smaller rural and urban shops (grocery stores). The retailers mainly source from the wholesale markets or from larger retailers in the open markets. Sometimes, large retailers like supermarkets source their fresh produce directly from farmers with the help of local government extension officers or local agents.

They sell their citrus products to the end consumer who could purchase single orangesorange which are either peeled or unpeeled by five, ten, or twenty oranges. The prices of oranges in the retailing market are highly determined by the size of orange, group of larger sized oranges are normally sold at higher pricesprice compared to smaller ones.

2.9 Handling and Processing

The handling and processing of orange fruits have been categorized into two segments namely, primary processing which includes grading and sorting depending on the size. Secondary processing is when they are being squeezed into juices. Most of the small vendor processors are located in urban centres and cities such as Dar es Salaam. Micro Small Medium Enterprises (MSME) engaging in processing juice of different varieties of fruits and vegetables such as oranges, lemons, pineapples use basic modern technologies such as blenders in juice processing.

[29] Information provided by MASEA leader in the presence of Muheza District Agricultural Officer
[30] Destination price average in Tegeta or Temeke market in Dar-es-salaam

One of the surveyed firms was using 10 blenders each with 64-ounce capacity. Refrigerators were the basic facility used to cool and store juice[31].

2.9.1 Primary processing

a) Grading

The proper orange grading must include sorting according to varieties, size and other market requirements. The grading of citrus in Tanzania is done at the point of sale by the buyer mainly by sorting into small, medium and large categories. For the export market, the sorting and grading done at the purchase point is mainly for choosing the large and appealing fruits, but further grading is done after arrival in the factories in Kenya. This contributes to loss of income by farmers as they sell the commodity dictated by the average price irrespective of the size and quality of oranges while the buyers perform the sorting and grading functions and charge different prices for the categories.

b) Packaging

The packaging of oranges has been classified into two categories namely, fresh oranges packaging and industrial processed fruits packaging. The fresh oranges packaging starts from the farm level to the market through distribution system, which is complex based on the buyer requirements, transportation methods and handling. The fresh fruits are packed and carried in sacks, baskets or crates depending on the buyer preferences. The handling and packaging means contribute significantly to the reported high post-harvest losses in the value chain – between 30–40% (Muyengi et al., 2014). Most of the post-harvest losses occur due to mechanical injury at the loading and offloading points, compression injury due to high stacking of crates/baskets and rough driving (Tu, 2008; Muyengi et al., 2014; Tanga and Buguruni Markets Orange Drivers & Buguruni Market Fruit Association[32]). Industrial packaging materials for the processed juice are mostly imported from other countries. The imported packaging materials are relatively cheaper and better prepared compared to locally manufactured items. Most of the SMEs and large firms therefore prefer using imported containers. Very few processors have their own packaging production specifically the larger ones. Technology and technological innovations, the level of Tetrapak[33], have been mentioned as the main reasons contributing to high costs of packaging production in the country[34]. Juice packed relatively more expensive containers tend to be sold in

[31] Necha Juice Small Processor, 2021 – Key Informant Interview (TZKIC22)
[32] Citrus Transporters, 2020 – Key Informant Interview (TZKIC11) and Buguruni Market Fruit Association, 2020 – Key Informant Interview (TZKIC04)
[33] Tetrapak is a registered tradename of specialized packaging containers of different sizes
[34] Large Processors, 2019; 2020 – Key Informant Interviews (TZKIC03; and TZKIC13)

large shops and supermarkets visited mostly by middle and high-income customers. On the other hand, juices packed in simple plastic cups and bottles are favourites of low- income consumers, mostly sold at small shops and by street food/fruit vendors.

2.9.2 Small Processors

These are MSME, Vendors and Juice Kiosks who normally undertake secondary processing after selecting the required fruits from the marketplace. The juice processing business is seasonal depending on the availability of raw varieties such as oranges, mangoes, etc. In the case of oranges, the business is at its height during July to September and from early December to late February the mango business is at its peak. Henceforth, in order to survive in the juice making business the MSME in Dar es Salaam do not specialize in one category. Most of the juice makers sell to passer-by consumers/customers in retail with prices ranging from TZS 500 to TZS 3,000 depending on the quantity of the package as observed in one of the surveyed firms (See figure 6).

Major costs incurred by these juice processing SMEs are packaging materials, the purchasing of raw materials, advertisement and rent. The packaging materials range from TZS 100 to 200 per one empty package and it depends on its capacity. Importantly, since there are numerous juice makers at Dar es Salaam, the firms are using a lot of effort in branding their products through social media networks such as Instagram, Facebook, Twitter, and Telegram. All the surveyed firms are purchasing their key raw materials (oranges, pineapples, avocados, mangoes etc.) from Buguruni, Manzese and Mabibo markets, which are the main reception markets for citrus from other regions. The prices of raw materials do differ depending on the season. During the peak of citrus, its raw price is usually low (TZS 100–200 per orange), while during scarcity season its raw price is high up to TZS 300 per orange.

Figure 7: Orange and lemon juice locally produced and packed

Source: ESRF Researchers at Necha's Juice Processor (smallscale) located at Mwenge near TRA Offices in 2021.[35]

The technology used by most of the SME processors are squeezing machines which are bought from China and other parts of the world. These are normally small squeezing machines which are also locally manufactured from SIDO. SIDO has established themselves in building internal/local capacity of processing industries for SMEs, most of the orange juice squeezing equipment can be fabricated by these local experts. They have revealed to contribute in technology, capacity building and marketing for Citrus SMEs.

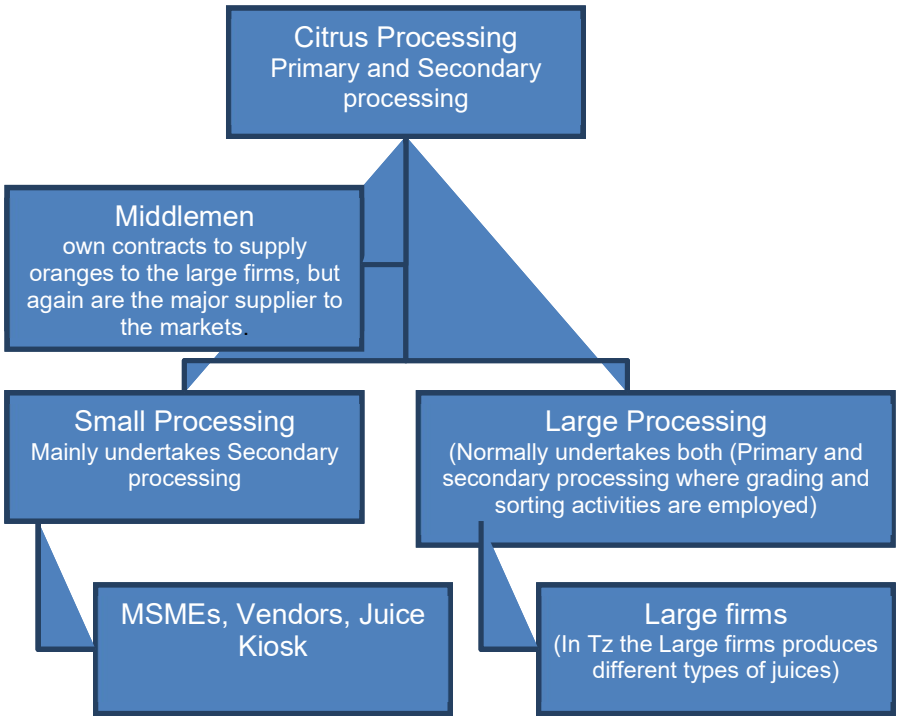
> "In citrus, we help (SMEs) in technology, training and even marketing. For instance, in the last three years, we had a project emphasizing the production of products from citrus in Muheza because it is one of the leading citrus producing districts, and we're trying to help them improve their farmers' production to meet the market demands and also add value to their product, even to produce simple juices, or pack them in different ranges, and labelling them well so that they can sell their products in super markets and even abroad. We achieve that through technology transfer and training"[36].

[35] Necha Juice Small Processor, 2021 – Key Informant Interview (TZKIC22)
[36] SIDO, 2019 – Key Informant Interview (TZKIG04) - One of the Senior Official from SIDO

2.9.3 Large Processors

Among the prominent processors are Bakhresa Food Products Ltd and Sayona Juice Processing Company, which were established under the assumption of getting adequate supplies of locally produced fruits. However, shortage of the fruits has compelled them to fill the gap by using imported juice concentrate.

Figure 8: Citrus processing value chain



2.10 Institutions

2.10.1 Support Institutions

Ministry of Agriculture is the lead ministry in the support of the citrus sector. A number of programmes have been initiated towards that end including:

- National Horticulture Development Strategy 2012–2021 prepared by Horticultural Development Council of Tanzania (HODECT). It sets a road map for transforming the horticulture sector in Tanzania.
- Post-Harvest Management Strategy 2017–2026: Prepared by the Ministry of Agriculture and Post-Harvest Management stakeholders aiming to transform post-harvest

management practices of food crops in Tanzania including the Post-Harvest Methods (PHM) practices of the horticultural industry.

Other institutions along the value chain that support the development of the orange value chain include training and education, research and development. The Key Agricultural Research Centres across the country including Horti-Tengeru in Arusha and Mlingano in Tanga have supported the sector in terms of research particularly on the production and supply of new orange varieties that are demanded by the market. However, the dwindling supply of the research funds have rendered these centres inactive towards supporting the nurseries and variety development in recent decades[37].

Sokoine University of Agriculture is still producing and supplying the seedlings for the orange varieties demanded by the market, but most farmers find the cost of buying one tree i.e. TSh.2,500–3,500 to be too expensive (Mhando and Ikeno, 2018)[38]. Support for farmers at the district level is provided under the National Horticulture Development Strategy (NHDS: 2012–2021), whose implementation is overseen by TAHA. The member-based TAHA provides a unified voice for producers, traders, exporters and processors of flowers, vegetables, horticultural seeds, spices and fruits (such as avocados and mangoes).

2.10.2 Regulatory institutions

Regulatory issues concerning the citrus sector including the export and import requirements are largely governed by the Ministry of Agriculture, Ministry of Industries and Trade and Tanzania Pesticide Regulatory Authorities (TPRA). All the standards and safety issues surrounding the fresh and processed orange products for domestic and export markets are governed by the Tanzania Bureau of standards (TBS) and specific departments under the Ministry of Agriculture and the Ministry of Industries and Trade regulate and facilitate the Sanitary and Phytosanitary Compliance.

2.11 Challenges in Citrus Value Chain

Several challenges facing the sector have been identified over the years. These include:

- Lack of reliable supply of cultivars due to closure of the public nursery system that was funded by the government and development agencies (KII, 2019: Academia Panel, 2019)

[37] SIDO, 2019 – Key Informant Interview (TZKIG04) and SUA, 2020 – Key Informant Interview (TZKIC01)
[38] The price range was the same during the researchers' field visit in Morogoro in 2019

- Pre-harvest fruit loss due to late show up of the traders who have bought the crop on the tree (Mhando and Ikeno, 2018)
- Crop Disease incidences and lack of effective disease control plan. Fruit flies and other common diseases are left to spread from one farm to another due to lack of control mechanism[39]
- Low prices received by farmers due to low bargaining power (Mhando and Ikeno, 2018; KII, 2020[40])
- Lack of processing which leads to loss of many fresh fruits in peak season (Makorere, 2014; Academia Panel, 2019[41])
- Significant post-harvest losses (up to 40%) caused by poor harvesting, storage and transportation techniques (Lugendo, 2012; Muyengi et al.,2014)
- Unethical conducts by the local agents, brokers and traders as they all attempt to pay farmers as low as possible during agreements and transactions (Mhando and Ikeno, 2018; KII 2019[42])
- Lack of credit which forces farmers to sell the crop on the tree leading to very low prices (Mhando and Ikeno, 2018; KII, 2019[43])
- Low bargaining power of the farmers. The intermediary players in the value chain, particularly traders and middlemen, are powerful and able to influence government or association initiatives to the detriment of farmers interests (DAICO[44] Tanga 2020).
- Lack of governing board to oversee price setting causing influx of middlemen/traders with exploitative prices causing significant income losses to farmers
- There are no strategic agricultural extension services to orange producers, the generic extension officers are mainly focused on the food crops.
- The road infrastructure in and out of the farms is not developed, some farms are completely inaccessible making the transport very difficult and expensive, hence low farm gate price offered by traders/middlemen for the oranges.

[39] SUA, 2020 – Key Informant Interview (TZKIC01)
[40] TAHA, 2019 – Key Informant Interview (TZKIC02)
[41] SUA, 2020 – Key Informant Interview (TZKIC01)
[42] Buguruni Market Fruit Association, 2019 – Key Informant Interview (TZKIC04)
[43] TAHA, 2019 – Key Informant Interview (TZKIC02)
[44] District Agriculture, Irrigation and Cooperative Officer-Muheza Tanga.

2.12 Major Changes Over time

Marketing: Previous (20 years back) it was very hard to search for markets. But due to ICT advancement it is now very easy to have market information including market price, trend etc.[45]Infrastructure: Road infrastructure has been improved compared to 30 years back. Currently there are enough road outlets linking rural districts, regions to urban towns.

3.0 Assessment of Patterns of Inclusion along the value chain

3.1 Marginalization/exclusion of SHF

In the current marketing arrangements, citrus growers (who are mainly smallholder farmers) are in the middlemen trap due to large dependence on them for marketing and market information, financial support and other minor farm operation requirements. SHF rely heavily on marketing their produce through middlemen to markets in Tanzania's major urban centres and across borders. For some unclear reasons, both the central and local governments have, to a large extent, withdrawn support for the development of the citrus sector including the regulatory functions. As a result of SHF continued indebtedness to middlemen and traders who advance them cash/lent them money during low season, some farmers end up losing their farms or lose the right to harvest their fruits for 3–4 years. This leads to marginalization of the poor producers as they become mere caretakers of their own orchard but have no right to harvest. Consequently, such farmers tend to abandon their orchards to concentrate on other Income Generating Activities (IGAs) that can give them income to survive (Citrus expert, 2020; DAICO Muheza LGA, 2020; KII, 2019[46]).

3.2 The Role of Collective Action

A few farmers' associations have been formed for the purposes of improving the marketing situation. However, they do not have enough power to finance all SHFs in low season as compared to middlemen who have strong financial muscles. The middlemen reportedly form cartels with buyers who discourage any form of association by convincing farmers either not to join the association or letting them join but restrict buyers from buying oranges coming from farmer associations citing poor quality and variety. As a result, many smallholder farmers do not

[45] SUA, 2020 – Key Informant Interview (TZKIC01) and TAHA, 2019 – Key Informant Interview (TZKIC02)
[46] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

join the association for fear of missing out on the market and financial support during low season (Citrus expert, 2020[47]; DAICO Muheza, 2020; KII, 2019[48]).

3.3 Micro, Small and Medium Enterprises (MSMEs) Inclusion in Processing

MSMEs are found in small and large urban centres and cities. They source their oranges from traders mainly wholesalers and retailers. The MSMEs depend on financial institutions for their financing needs. About six (6) MSMEs located in Dar es Salaam city revealed that their source of fund for financing the star-tup was exclusively financial institutions[49]. The MSME actors have a competitive advantage over the large processors because they face less tax and regulatory requirements compared to large-scale processors.

3.4 Governance and Coordination of the value chain

Although there are some producer associations for the citrus farmers, they are not strong enough as some of the farmers interviewed indicated lack of awareness. Producers' associations could play a key role in the growth and creation of market linkages with local and regional buyers that can forge lasting relationships to support and ensure better quality produce and thus better farm gate prices. Unfortunately, as it stands right now, the citrus value chain is not firmly coordinated but dominated by market type of governance characterized by firm capture of the post-harvest marketing functions by traders without reciprocal support to farmers to modernize their farming system . However, buyers provide farmers with their produce specifications in terms of size, colour or variety at the point of purchase; rejecting those that fail to meet the criteria. This causes significant losses to producers who provide the purchaser the flexibility of picking oranges of his/her choice and leaving behind those that are not wanted, or sold at throwaway price to other small-scale traders, if not left to rot on the farm.

Although the traders also don't have a functional association, they, as buyers, operate in cartel-like style as they drive the citrus value chain. They set the price and determine the quality specification for the fruits they wish to purchase in each harvesting season. The traders take advantage of the weak vertical integration of producers with higher-level functions beyond planting and harvesting. They have little influence over what happens in post-harvest functions

[47] SUA, 2020 – Key Informant Interview (TZKIC01)
[48] Buguruni Market Fruit Association, 2019 – Key Informant Interview (TZKIC04)
[49] Dar es Salaam Citrus SMEs (processors), 2020 - Key Informant Interviews (TZKIC14; TZKIC15; TZKIC16; TZKIC17; and TZKIC18)

such as packaging, transportation and wholesaling or retailing of the commodity, mainly handled by middlemen and brokers.

3.5 Relations between Suppliers and Buyers

Tanzanian traders and middlemen are very protective of their market, and so are the Kenyan traders. Kenyan traders are protective of their own market and do not allow Tanzanian traders into it. Very few traders and farmers from Tanzania have successfully penetrated the Kenyan market. To export oranges to Kenya, an importer contacts a local trader/middleman who in turn contacts the local agent to source the fruits for them. The local trader/middleman hands over the fruits to the importing middleman who arranges transport to their destination markets. Traceability is non-existent in this marketing arrangement, once the fruit crosses the border to Kenya, the identity is generally lost and it becomes the product of the importing country for selling to the processing firms, fresh fruit consumers and even re-exporting to other countries. The Covid 19 pandemic impacts in 2020 resulted in loss of business between Kenya and Tanzania due to transport restrictions. However, this paved the way for domestic buyers to re-establish their relations with producers and thus opened an opportunity for further growth of the domestic market (TAHA, 2020).

3.6 Competition

There is competition among large fruit juice processors, as well as between large and MSMEs[50]. As a result, the firms have diversified their produce to include new products apart from citrus such as pineapple, avocados, passionfruit, mango, etc. In line with this, large firms are investing in producing concentrates and/or importing concentrates for their juice production, citing the low sugar quantities in the domestic fresh fruit as a reason.[51] Other reasons include seasonality of the supply and low quantities supplied leading to significant underutilization of the firms' processing capacity in a year. Moreover, the large domestic citrus processing firms are also competing with foreign firms exporting citrus products particularly from South Africa, Brazil, Egypt, Rwanda and Kenya. This competition forces the domestic firms to improve their innovative technology and adopt new market trends to maintain their market share. Our interview with SIDO representative indicated that, the competition between domestic large firms and MSMEs is intense, particularly on the cost of production due to economies of scale enjoyed by large

[50] Large Processors, 2019; 2020 – Key Informant Interviews (TZKIC03; and TZKIC13)
[51] Large Processors, 2019; 2020 – Key Informant Interviews (TZKIC03; and TZKIC13)

processors. The large players can thus afford to sell their 350ml juice at 600TSh while the cost of production of the same by a small processor is 700TSh.[52]

Large fruit processors have wide distribution networks, and their juice brands are popular in Tanzania, but still face strong competition among themselves. For example, the main competitors of Bakhresa Food Product Ltd are other large companies such as Sayona who also produce similar juices and varieties and compete for the same local and East African markets. The large processors have the most advanced machinery and packaging and they lead in the juice market. They have established ties and contracts with producers in other fruits value chains, such as mangoes and pineapple, and have reported to be willing to do the same with the citrus producers if they produce the required varieties.[53] As one of the large processors key informants reported, "We have supported the mango growers' association in Mkuranga and Kisarawe in Pwani Region and we fund them for the agreement of selling all harvested mangoes to the company. We would be open to the idea of supporting citrus in the similar way as mango growers if they have their association."[54]

Figure 9: Jambo juice products

[52] SIDO, 2019 – Key Informant Interview (TZKIG04)
[53] Bakhresa Food Product (Juice) Ltd, 2019 – Key Informant Interview (TZKIC03)
[54] SAYONA Juice Ltd, 2020 – Key Informant Interview (TZKIC13) – One of the senior juice processing officers

Figure 10: Bakhresa Food Processor's Azam Juices and SAYONA Juice (Motisun Group)

4.0 Upgrading Capabilities and Innovations in the Citrus Value Chain

4.1 Processing technology upgrading

The common technology used by most of the SME processors are normal squeezing machines which are imported from China and other parts of the world. These are normally small squeezing machines which are also locally manufactured by SIDO, which has also been engaged in training of local artisans in the fabrication of juice processing equipment. A SIDO official was quoted saying.

> "In citrus, we help (SMEs) in technology adoption, training and even marketing. For instance, in the last three years, we had a project supporting value addition to citrus fruits in Muheza. This is because Muheza is the largest producer of citrus in the country, and we are trying to support the value addition to ensure the harvested fruits do not perish due to lack of markets. Production of simple juices and jams plus packaging and labelling to enable access to high level markets such as supermarkets and export market".[55]

Large firms normally use the hi-tech technology which is imported from China, India, Europe and some other parts of the world which are highly industrialized. For example, one of the large firms is using Indian technology and all big maintenance are done by experts from India while another large processor reported to use processing plant machinery imported from Fratelli Indelicate and FBR-ELPO in Italy. The firm recently expanded their production line and now have two production lines which are very technologically advanced. Very few spare parts can be modified by our own local experts from

[55] SIDO, 2019 – Key Informant Interview (TZKIG05) - One of the Senior Official from SIDO - Tanga

SIDO. And this is through technological capabilities received from high-tech expert from India and other parts of the world recruited to maintain the large firm juice processing plants.[56] In the aforementioned trend, the local capacity is slowly upgrading in terms of processing technology, skills and expertise in repair and maintenance of the high-tech machinery and equipment.

4.2 Seedlings Upgrading

In Tanzania, agricultural research institutes were established under the Tanzania Agricultural Research Institute Act, 2016 (No. 10 of 2016). The Act provides for the enhancement of an agricultural research system, effective coordination, governance, management and conducting of agricultural research activities and to provide guidance to growers on varieties, multiplication and protection.

The guidance and support of the citrus growers' varieties is lagging behind. In the 1970s and 1980s there were several orchards for the multiplication and maintenance of citrus varieties in Pwani, Tanga and Morogoro regions. All the public centres have been abandoned, with the exception of that at SUA. The private sector has thus dominated the seedling multiplication with small backyard nurseries operating in citrus growing areas. SHF have resolved to adopting the budding skills and upgrade their trees through budding with the selected trees that have shown better performance in the neighbouring orchard.[57] This type of upgrading lacks proper guidance on the true varieties sought and farmers are not sure of the resulting fruit standard in terms of sugar contents, water contents, acid content, skins resistance to physical abrasion, etc. All the upgrading processes by private individuals receives limited support from the government due to lack of governing systems along the value chain.

The role of academic and research institutions in upgrading

The role of academic and research institutes in upgrading of the varieties cannot be overemphasized. The varieties produced/improved at these stations have not been widely disseminated for adoption to the farmers leaving a gap between technology production and dissemination. There are opportunities to forge strong collaborations between the industry and research/academia in order to ensure quality varieties are adopted for improved production and productivity according to the market requirements.

[56] SAYONA Juice Ltd, 2020 – Key Informant Interview (TZKIC13) – One of the senior juice processing officers
[57] Citrus Farmers, Traders & Middlemen, 2019; 2020; 2021 – Key Informant Interview (TZKIC05; TZKIC06; TZKIC07; TZKIC08; TZKIC09; TZKIC10; TZKIC19; TZKIC20; and TZKIC21)

Since the seedling multiplication is largely privately owned and there in no governing board (horticulture board) to guide the protection of pure variety (mother tree). Seedling multiplication and distribution are done with no record keeping, and there is no specification from the private seedling multiplication on the variety characteristics such as sugar content, water content, acid content, etc.

The appropriate link from government through its institutional framework is missing due to a number or reasons including, but not limited to, lack of citrus governing board, lack of proper institutional arrangement on citrus value chain, lack of varieties upgrading strategy and ownership, middlemen strength over the government in terms of financial and influence to citrus growers.

4.3 Processing Downgrading

The large citrus processing plants have downgraded rather than upgrading. UNNAT processing plant operated for only one year and was closed due to, among other things, massive underutilization of the processing capacity due to the seasonality in production.[58] Other processing factories in Korogwe and Muheza in the mid-1980s through 1990s were also closed due to lack of continuous supply throughout the year, lack of the required industrial varieties, and small quantity of the fruits as compared to the processing capacity[59].

4.4 Seed Multiplication Centres Downgrading

The government through the Ministry of Agriculture created seed germination and multiplication centres which were KATRIN[60] in Ifakara-Morogoro, Kareka in Morogoro, Zigi, Chambezi, Mkumbi and SONGA-Muheza district in Tanga Region and Tengeru Horticulture in Arusha regions. These centres were responsible for seed multiplication, protection and distribution in order to facilitate the fast expansion of citrus value chain and encourage processing plants investments. However, due to a lack of governing board, and lack of government full ownership, this support system has collapsed with most of the seedling multiplication changing the use of the facility to another crop or even to residential uses and not crop development[61].

[58] SUA, 2020 – Key Informant Interview (TZKIC01)
[59] Muheza DC extension officers 2019
[60] Kilombero Agricultural Training and Research Institute *KATRIN*.
[61] SUA, 2020 – Key Informant Interview (TZKIC01)

5.0 Political Economy of the growth of the citrus value chain

5.1 Supporting policies and initiatives

The citrus sector in Tanzania, which in the 1970s and 1980s showed signs of advancement in terms of farm development, cultivar specifications within farms and linkage to the fruit processing factories (with canned juices and fresh fruits), has stagnated in the past 30 years after it was left more-or-less on its own in the hands of unstructured private sector operators[62]. The various government initiatives witnessed in the agricultural sector[63] have not been of positive consequences to the citrus sector. The sector lacks value chain coordination and governance regulations, which are badly needed in variety development and seedling distribution. Official and formal support to the sector has literally collapsed. Concerted effort is therefore needed for the development of the citrus value chain. The public sector investment in this support of the varieties and seedlings that a true to type to ensure production of fruits that can meet processes and fresh for consumer preferences is key. Coordination of the smallholder farmers that are currently fragmented is another key area of improvements required to ensure improved production quantity, quality, adherence to standards and thus better prices for the producers.

5.2 Farming practices and agricultural extension system

The citrus value chain has been reported to have poor farming practices in management of the orchards. This is caused by many factors including lack of funds to manage the farms due to very low prices paid at the farm gate by the middlemen. Most farms seemed abandoned as evidenced by very tall grass and bushes in the orchard. The reason for the abandonment or poor management of the farms was because they had sold the fruits on the trees and did not see any added value in taking care of the orchard. Inadequate agricultural extension support services is also reported as a serious impediment to citrus production. SHFs have very limited knowledge of the varieties and seedling management practices, especially disease management and marketing of their produce. An opportunity for private agricultural extension services can be explored.

5.3 The role of Collective Action in rebuilding the value chain

[62] The liberalisation of the agricultural markets as a result of the Structural Adjustment ProgrammeProgram, which also resulted to a drastic reduction of budget to support research, left the citrus value chain at a disadvantage.
[63] Several policies have been initiated by the Government on enhancing the citrus sector since the 1970s. Some of the significant policies include Kilimo Kwanza, Agricultural Sector Development Strategies 1 & 2, Horticultural Development Strategy 2012–2021, etc.

The SHFs are operating individually and are limited by the sheer size of their production. The organization of the SHF could improve their access to extension services, collective bargaining and access to market information. However, the history of the failed cooperative management in the country still lingers in the producers' minds and they are reluctant in forming the production/marketing cooperatives or associations. Collective action has a significant role to play in ensuring the governance and equitable sharing of the margins along the citrus value chain is achieved. Strong producer associations can solve the issues of access to true varieties through collective ordering from a reliable supplier and also increase the SHF bargaining power for the prices of the fresh fruits.

5.4 Support to the Citrus Processing Industry

The lack of variety development and seedling propagation services in the citrus sector has led to a situation where the produced fruits fail to meet the requirements by processors in terms of sugar, acid and water contents. They cannot comply to the criteria for mechanical strength to withstand transportation. This is consistent with the failure of a number of initiatives to expand processing over the past two decades. The poor linkages from fruit production to juice processing have forced major Tanzanian plants to rely on imports of citrus concentrate for their juice production. Building on these linkages represents a substantial industrial development opportunity given growing urban demand for fruit juice.

6.0 Conclusion and policy implications

6.1 Conclusion

The citrus sector was once among the most advanced sectors in the horticulture sector, with solid R&D and extension services to smallholder farmers who were assured of reliable supply of seedlings for their farms, and markets for their produce by supplying some established fruit processing plants in Tanga, Morogoro and Dar-es-salaam. The slow withdrawal of R&D, extension and closure of factories gradually led to the current situation whereby farmers are on their own and rely on an unstructured marketing arrangement operated by middlemen and traders who buy the crop at the price they dictate and take the fruits to urban centres as well as exporting some of them to neighbouring countries, mostly Kenya. Interestingly, although traders yield some influence in determining producer prices, they also lack formally registered institutions, just like the case of farmers, who are weakly organized. Given the neglect of R&D needed to maintain the consistence of citrus cultivars for different consumer preferences, the citrus fruits are deemed unfit for high value juice making except for blending as they lack uniformity of

fructose contents and size for processing purposes. The largest market of the citrus fruits is for table use and table juice making in street-side kiosks and restaurants. We have therefore not found a strong base of SMEs engaged in fruit processing in Tanzania, with few available complaining of sharp seasonality in supplies, with fluctuating prices. The medium and large fruit making factories depend on blending fruit juice concentrates and powdered formulations. Due to lack of a vibrant fruit processing industry the only noticeable change in technology over time has been the availability of low-cost vacuum sealing machines for packing juice in plastic and reinforced cups and containers. These are all indications, however, that the demand for both fresh (or table) fruits and packed juice will keep on increasing due to increased urban consumers whose per-capita income has also been on the rise. However, any investments by SMEs in processing of citrus will have to go hand in hand with that of improving production of the required varieties of citrus fruits.

6.2 Recommendations

The only way to support the growth, and therefore inclusion of SMEs in the citrus processing industry lies in ensuring the supply side of the citrus value chain is sorted out by a number of policy interventions:

- Revive the dormant institutional framework and funding needed for R&D and extension to support the citrus industry aiming to harmonize citrus cultivars needed for different market segments, including fruit processing
- Establish a dedicated public agency that will complement efforts by TAHA, for the development of the citrus industry from production, transportation, storage, processing and marketing
- Formalize the role of private establishments to multiply and distribute budded seedlings to farmers
- Support farmers, traders and transporters to be organized and establish some formal forums
- Support the growth of SMEs in citrus processing and packaging by linking them to financial institutions.
- Support the establishment of Processors and Exporters' Platform, that will also be a conduit for learning and adopting new technologies and innovation in the industry.

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ANNEX 1: LIST OF PARTICIPANTS

Innovation and Inclusive Industrialization in Agriculture and Agro-Processing In Tanzania and South Africa
Venue: Bio-Processing Conference Hall, Morogoro, Tanzania

Date: Thursday 5th March 2021

List of Participants

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Innovation and Inclusive Industrialization in Agriculture and Agro-Processing In Tanzania and South Africa
Venue: ESRF Conference Hall, Dar es Salaam, Tanzania

Date: Thursday 20th June 2019

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ANNEX 2: List of Key Informant Interviews

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6.	Juma Khalid	M	Secretary	UAWATBU Association
7.	Bernard Michael Mhagama	M	Medium-scale orange farmer (50 acres) - Tanga	Farmers
8.	Said Juma Kijinga	M	Orange Trader	Farmer
9.	Khalid Abdul	M	Economist	Ministry of Agricultural (MoA)
10.	Purushotam Gorasiya	M	Quality Assurance Manager	Elven Agri Company Ltd
11.	Khamis Omary Mungoma	M	Trader and Middleman - Buguruni Market	Trader
12.	Hamisi Kambi	M	Orange Trader	Trader
13.	Pembe Abas Dibibi	M	Farmer and Trader – Buguruni Market	Trader
14.	Baraka Xavery Kalimwa	M	Driver Buguruni Market	Transporter
15.				
16.	Godlove Andrew	M	Human Resources Manager	SAYONA Fruits

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