

AN EXPLORATION OF FACTORS AFFECTING DEVELOPMENT OF CITRUS INDUSTRY IN TANZANIA: EMPIRICAL EVIDENCE FROM MUHEZA DISTRICT, TANGA REGION

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Abstract

The paper stresses on understanding factors affecting development of citrus industry in Tanzania particularly in Muheza District, in Tanga region. Citrus fruit is one of the most important crops in Muheza District of Tanga region in Tanzania particularly in improving rural farmers' income. The study employed institutional framework methodology. The study disclosed that the government of Tanzania has been implementing various agricultural development programmes in improving citrus fruit production as well as to enhance farmers' income. However, yet the results reveal that the citrus farming practices in the surveyed area are not well developed. And these are because citrus are still grown under rain fed regime without any form of irrigation, citrus seedlings are produced by individual farmers locally in their backyard nurseries. There is no professional company responsible for seedling production. Also, citrus farmers' skills in citrus husbandry practices are limited. Lastly, all citrus varieties used contain many seeds in the citrus fruits whereas the market demands seedless citrus fruits. It is therefore, recommended that the policy maker should focus on development of citrus industry in Tanzania using proper institutional framework support, which could increase growth and development of citrus production through the provision of subsidies for inputs to reduce cost of production and enlightenment campaigns to improve farmer's knowledge and technical skills on how to reach lucrative markets.

Key words: *Citrus fruit, citrus production and marketing development*

1. Introduction

Since independence in 1961, Tanzania has been largely dependent on agriculture as its main economic activity. For example, in 2011 agriculture contributed 26% to the country's GDP. However, the sector provides 85% of the country's export earnings, employs 75% of the country's work force, and generates 95% of the food consumed in Tanzania (URT, 2013). Due to these roles, the sector's role to the country's efforts towards poverty reduction cannot be overemphasized as 80% of the Tanzanians live in the rural areas and depend on agriculture for their livelihood. Majority of Tanzanian farmers are smallholder farmers cultivating horticultural crops (URT, 2004). Thus, the importance of agriculture in both poverty reduction and economic growth deserves a special attention (URT, 2012).

Citrus fruit is one of the important horticultural cash crops in Tanzania. The fruit is produced in the tropical climate (URT, 2008). The largest citrus producer in the world is

Brazil while South Africa is the largest citrus producer in Africa. Tanzania has become the largest citrus fruit producer after Kenya faced greening disease, a problem that affects Kenya's higher elevation growers in the East Africa (URT, 2008). Tanzania's production of fruits is much higher than is the case with her neighboring Kenya and Uganda. Although her exports seem to be much lower relatively (MMA, 2008). For example, out of an average of 160 thousand tons of citrus fruits produced in a year in Tanzania, more than 85 tons are sold in the Kenyan markets (ECI, 2003). In Tanzania, Citrus fruits are grown in most parts of Tanzania. About 41,642.91 hectares of land are planted with citrus trees and produce about 100.18 tons of citrus per hectare per year (URT, 2003). However, Tanga region is the largest citrus fruit producer in Tanzania with productivity of 22.41 t/ha citrus fruits, followed by Coast region (18.31 t/ha¹ citrus productivity), and Morogoro (10.9 t/ha citrus productivity) (URT, 2003).

Despite the citrus fruit being one of the important horticultural cash crops, but still development of citrus sector has not improved in Tanzania (MMA, 2008). There are limiting factors that jeopardize the development of the citrus sector (URT, 2011). For example, in Muheza district, it is estimated that about 32,000 tons of citrus fruits produced each year go bad every year after harvesting in rural area (Lugendo, 2012; URT, 2003; Mwanakatwe, 2006; Makange, 2009; Mbiha *et al.*, 2004). Although, Eaton *et al.*, (2007) link this *post-harvest losses* with "high dependence on spot markets contracts" which are dominated by "weak institutional structures". However, the market for citrus fruits is dominated by wholesale traders in Muheza district. The common marketing practice is for the trader to purchase the fruits while still on the trees (Mbiha, 2004). Traders use to buy citrus at the farm-gate leaving the farmers with very minimal margins. Lack of infrastructures that could be used to process citrus juice and hence improve income of a farmer also seems to be a limiting factor to smallholder farmers to access lucrative markets. Third, most of citrus farms were not connected to good feeder roads (DAI PESA, 2003). Thus, rural poverty remains a critical economic problem in Muheza district. This is so, because of the poor infrastructure in term of feeder roads between the markets and the farms.

Thus, this manuscript intended to analyze the factors affecting development of citrus sub-sector in Tanzania particularly in Muheza district, Tanga region. Based on the above foregoing arguments, this manuscript see there is a need of addressing the existing knowledge gaps, especially on factors affecting development of citrus fruit production and trade in Tanzania. Therefore, this manuscript aimed at coming up with outputs that would help in the formulation of citrus development policy that would stimulate investment in citrus production and marketing systems and which would subsequently improve smallholder farmers' income in Tanzania.

2. Literature Review

2.1 New Institutional Economic (NIE) Framework

The new institutional economics framework consists of four levels or institutions of social analysis: the level of social embeddedness, the institutional environment, institutional arrangements, and finally resource allocation and employment. These four levels refer to the branches of thought, each of which addressing a specific social issue. To get a better perspective, the four levels of social analysis are depicted in Figure 1.

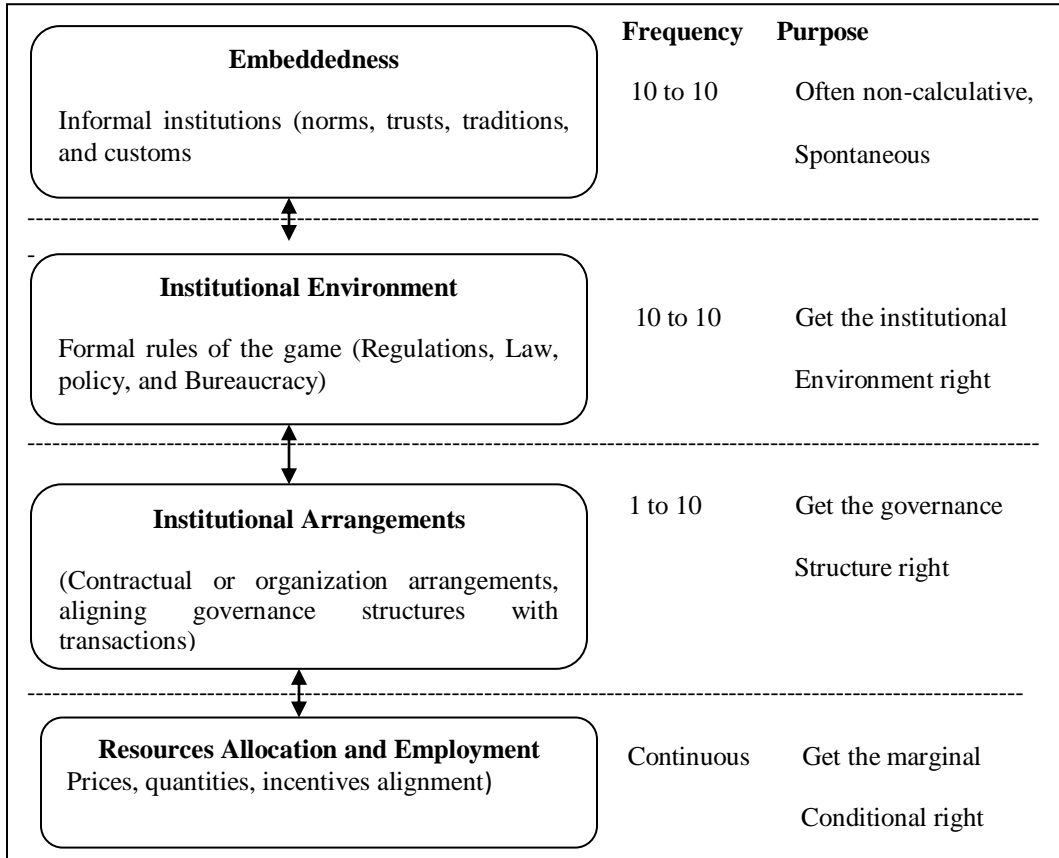


Figure 1: New Institutional Economics Framework

The four levels or institutions are fully interconnected with each other. However, Williamson (2000) notes that the NIE is principally more concerned with the institutional environment and governance structures. However, this does not mean that the other two levels are not important. Besides, these four levels are integrated with each other, with each one influencing developments within the other. The following sub-sections will therefore detail a discussion on all four levels to highlight the institutional aspects that each of these levels addresses.

Therefore, in summary, new institutional economic is very good at identifying and explaining problems such as factors that slow down agricultural development and what needs to be done to solve these problems. According to Omamo (2006), “new institutional economic” is *well-suited* in framing and answering the how-questions. The authors suggests further that institutional economics is well suited to asking and answering a set of questions that raises the relevance and potential impact of agricultural development policy design and implementation. But it is largely strong in answering the question “*how*” to go about it. Following this fact, therefore, this manuscript adopted institutional economic theory in developing conceptual framework. This is because this manuscript aimed at identifying the factors affecting development of orange sector in Tanzania as well as providing agricultural development policy recommendations using institutional economics frame.

2.2 The institutional factors influence agricultural development in Tanzania

The manuscript reviews institutional environment characteristics that may influence agricultural development in Tanzania. Following the discussion on the different levels of the NIE and how they could relate to rural transformation or development. According to FAO (2007), developing countries such as Tanzania are characterized by a lack of proper institutions when it comes to rural agricultural development initiatives. And further noted that having unsuccessful agricultural development and increasingly of poverty in developing countries is due to several institutional shortcomings, which include among others a lack of structures that insure the timely (transport costs) and adequate supply of inputs (storage facilities) to small-scale and rural farmers, a lack of agricultural credit facilities, a lack of risk management and price formation mechanism, and poor feeder roads. Moreover, in many developing countries, weaknesses in basic infrastructure (such as for transport, utilities and communications) are major constraints for agricultural development and market development initiative. Infrastructure constraints affect the cost of continuity of production and the quality of products. Good infrastructure is also known to promote establishment of processing factory, promote better information flows between communities and the rural and urban areas, and thus has the potential of linking farmers to markets for goods, input supplies and agricultural services (FAO, 2007).

In most developing countries like Tanzania, the institutional capacity for horticultural research and extension is also weak. As a result, the technology available is insufficiently adapted to local conditions and research results do not come up with a variety of technological solutions adapted to the range of socio-economic and agro-ecological conditions existing in the country. Lack of technology alternatives is often a constraint to irrigation development. Where techniques and technologies developed by research are available, their dissemination is faced with a number of difficulties, such as poor delivery of extension and training services that are not necessarily targeted to the appropriate users (FAO, 2007).

Furthermore, the study reviewed study by Valentinov and Baum (2008) and found they have the same view, arguing that agricultural development initiatives are often faced with weak markets that are characterized by a “weak institutional environment”, which causes high transaction cost, significant business risk, weak information flows, poor infrastructure, and weak enforcement of contracts. Kydd and Dorward (2004) elaborate by stating that the rural areas in developing countries, by virtue of their reality, often exhibit poor roads and telecommunications; lack of a well-developed and diversified monetary economy; thin markets for agricultural inputs, outputs, and finance; weak flows of market information, difficult and weak contract enforcement, and high risk of opportunistic behavior from contractual partners of agricultural producers. Terluin (2001), as cited by Valentinov and Baum (2008), suggests that the level of transaction cost due to insufficient governance in rural areas is much higher than in urban areas, making it the single biggest cause of failure.

Therefore, the picture portrayed by institutional environment in developing countries reflects one of inefficient governance structures and arrangements. The situation seems similar to that of Tanzania and especially the case area of the Muheza District. Valentinov and Baum (2008) suggest that rectifying the institutional environment *is the only means of addressing agricultural development*. Thus, this study used the same approach in identify and explain factors affecting growth and development of orange sector in Tanzania.

3. Materials And Methods

3.1 The Study Area

The study was carried out in Muheza District of Tanzania Mainland. Muheza district was purposively selected because is the largest citrus producer in Tanga region and Tanzania a whole (Makange, 2009; Mwanakatwe, 2006; Erick, 2008). Muheza District lies south and west of Tanga district and is bordered by Mkinga to the north, Pangani in the south and Korogwe district in the west. Muheza district has a total area of 1,974 km² and arable land covers 1,145 km².

Approximately 70% of the arable land is utilized and the rest unexploited. Tanga region is located in the northeastern side of the Tanzania mainland. It is bordered by the republic of Kenya in the north, Kilimanjaro region in the northwest, Manyara region in the west, Morogoro and Coast region in the south and the Indian Ocean in the east. Administratively, the region is divided into eight districts, namely Handeni, Kilindi, Korogwe, Lushoto, Muheza, Pangani, Tanga and recently Mkinga. The region has an area of 26,770 Km² or 3.0% of total land in Tanzania, of which about 75% of the land (approximately 2 million hectares) is estimated for agriculture accounting for 20% of the regional total land. Agriculture in this region is the major economic activity of the people and the major crop being oranges. Tanga is the largest citrus grower in the country (URT, 2007). Muheza district is the largest citrus producer within the Tanga region.

3.2 Sampling and Data Collection Method

The selection of a sample from the population is commonly used in economics, marketing and other disciplines because of limitations of covering the whole population (Barnett, 1991; Kinnear & Taylor, 1987). Sampling theory provides an opportunity to minimize cost and to achieve acceptable results (Casley & Kumar, 1988; Kinnear & Taylor, 1987).

This study employed a sample size of 246 respondents, and which comprised 152 citrus fruit farmers, 54 citrus fruit traders (32 wholesalers, 22 retailers), and 40 key informants (1 District Agriculture and Livestock Development Officer, 6 Ward Extension Officers, 1 District horticulture specialist, 13 Village Chairpersons, 6 Ward Executive Officers, and 13 Village Executive Officers). The data on factors affecting development of citrus industry in Tanzania particularly in citrus production and trade were collected from these categories of people.

Despite the estimated sample size being 376, the study interviewed 246 respondents. This was because of non-response rate and budget constraints. Moreover, a sample size of 246 was sufficient, since according to Bailey (1994) a sample size of 100 is sufficient to be used for most researches. Moreover, Roscoes (1975) uses a rule of thumb and argues that a sample size of more than 30; and less than 500 is sufficient (Musa *et al.*, 2012) On the other hand, the study employed simple random and purposive sampling techniques to arrive at a sample size of 246.

A simple random sampling technique was used to select citrus fruit farmers and traders while purposive sampling technique was used to select key informants for this study. Key informants were selected basing on their positions and ability to provide the required information from the district, ward, and village levels. Moreover, the study employed purposive sampling technique because it (the study) was interested in interviewing respondents who were *knowledgeable, experienced and who could provide accurate information concerning the subject matter.*

A pilot survey to pre-test data collection instruments and to gain familiarization with the study areas was conducted in three villages namely Mkuzi, Bwembela and Mtindiro. Using a closed- and open-ended administered questionnaire, data was then collected on demographic characteristics; number and names of citrus varieties produced; farmers’ preferences for certain varieties; production practice; citrus output; volume of citrus sold; production cost per output and average selling price per citrus produced in the agricultural season of 2010. Questionnaires were administered by two trained enumerators together with the researcher from May, 2010 to December, 2010.

3.3 Analytical Technique

Descriptive analysis employed in describing factors trickledown development of citrus sector in Tanzania particularly in Muheza district, Tanga region. The study deployed the framework of NIE as a guideline to develop an institutional framework that would address both the institutional limitations as described by Casson *et al.* (2008) as well as the challenges that inhibit development of citrus fruit subsector in the study area.

4. Results and Discussion

4.1 Demographic Characteristic of Sampled Respondents

Agriculture is the dominant preoccupation of the district’s inhabitants. The importance of this sector is reflected by the fact that 80% of the economically active population of Muheza district depend on agriculture (NBS, 2013). The dominant tribe in the study area (Muheza district) is “*Wabondeyi*”. Citrus is a dominant orange fruit produced in Muheza district as well as a main source of income in rural area. NBS (2012) estimated the contribution of citrus to total household income to be 75% in the year 2011. This implies citrus fruit play an important role to the people of Muheza district.

Table 1. Demographic Characteristics of Respondents

Characteristics	Category	Frequency	Percent
Age Distribution	18 – 25 (Young Age)	14	9.2
	26 -55 (Adult Age)	93	113.2
	56 and above (Old Age)	45	29.6
Gender Distribution	Male	116	76
	Female	36	24
Education Distribution	No schooling	6	3.9
	Primary Schooling	128	84.2
	Secondary Schooling	18	11.9

Source: Surveyed Data (2010)

4.1.1 Age Distribution

Table 1 shows respondents surveyed were middle aged ranging between 26-55 years with an average of 48 years of age. This means that majority of citrus farmers were within the working age group. This brings an implication on the roles and responsibilities in the society in terms of citrus production and marketing throughout the year. Therefore, according to Regnard (2006), the total accumulation of wealthy is highly dependent on age of an individual, whereby a direct relationship is experienced. Likewise, age determines

individual maturity and ability to make rational decisions. Moreover, Mlambiti (1994) supplements that age structure can be used to facilitate an understanding about labour potential of a specific population.

4.1.2 Education Distribution

Existing literatures show that education contributed 50% of variation in the total agricultural output in Tanzania (Amani *et al.*, 1989). Table 1 shows that majority of respondents (84.2%) have acquired primary education. This implies that citrus farmers in the study area have a modest basic knowledge that can be used to improve production of citrus fruits (Ohler, 1979). This literacy level of the farmers is encouraging because it has an influence on development of citrus sector. However, citrus sector is still remained underdeveloped in Tanzania.

4.1.3 Gender Distribution

The Table 1 shows both men and women were citrus fruit producers. Men accounted for about 76%. This is probably because, in most poor to average income Tanzanians' families, men are in charge of family activities involving cash transactions while women are in charge of taking care of their homes and children and therefore, spending most of the times at home.

4.2 Citrus Production Status in Muheza District

4.2.1 Citrus Farm Size

In Muheza district, citrus fruit farmers are divided into three main citrus fruit farm sizes namely small, medium, and large farmers. Similarly, Mbiha and Maerere (2002) classify citrus farm size into three groups: small (0.4ha – 2ha), medium (2ha – 6ha), and large (6ha and above). There is a slight change in farm size distribution in this study. The change is made to take into consideration farmers with 0.2ha farm size. Accordingly, the farm size groups obtained using the above classifications were as shown below (Table 2).

Table 2. Classification of Farm Size

Categorization	Farm Size	Number of farms	Percentage
Small-Scale Farm	0.4ha – 2ha	111	73
Medium-Scale Farm	2.2 ha – 6ha	35	23
Large-Scale Farm	6.2 ha and above	6	4

Source: Surveyed data (2010)

Table 2 shows that most (111 or 73%) of the surveyed citrus fruit farms, out of 152 surveyed farms, were small farm, followed by 35 (23%) medium, and 6 (4%) large farms. These categories of citrus fruit farm size distribution in the study area base on the information obtained from interviews.

4.2.2 Citrus Fruits Production

Citrus fruit farmers in the surveyed area were not different from the farmers of other crops such as maize. Majority of them diversified production so as to allow economies of scale. In the last five years from 2006 to 2010, citrus fruit production increased from 67,250 tons to 79,830 tons; and citrus fruit production increased by 12,580 tons from 2006 to 2010. The rise in citrus fruit production is mainly due to good weather (rainfall) and an increase in citrus trees bearing citrus fruits. Table 3 shows the level of citrus fruit production since 2006 to 2010:

Table 3. Citrus Fruits Production Status from 2006 to 2010 (in Tons)

Year	Citrus	Mango	Banana	Tangerines	Jackfruits
2006	67,250	104,858	32,904	6,725	1,250
2007	68,500	105,066	56,220	6,850	1,150
2008	69,500	105,274	52,253	6,950	1,050
2009	70,500	105,482	17,240	7,050	950
2010	79,380	105,690	48,970	7,983	750
Total	355,550	526,370	207,587	35,558	5,150

Source: Muheza Production Statistics for horticultural crops Report (2010)

Muheza District produces more mangoes than citrus fruits recently. However, citrus sub-sector is reported to absorb a large number of workforce and thus contributing to the reduction of income poverty. Table 3 shows that Muheza district produces more Mangoes, followed by citrus fruits, bananas, tangerines and jackfruits in that order. According to Table 3, mangoes produced were 526,370 tons, followed by 355,550 tons of citrus fruits, 207,587 tons of bananas, 35,558 tons of tangerines and 5,150 tons of jackfruit in five years. Similarly, for the year 2010 the leading fruits were mangoes 105,690 tons, followed by citrus fruits (79,830 tons), bananas (48,970 tons), tangerines (7,983 tons) and jackfruits (750 tons). The implication is that mangoes production is growing rapidly compared to citrus fruits production in Muheza district. However, the production of mangoes and other fruits should not therefore be undermined by stakeholders as income collected from these fruits could be used to reduce income poverty in rural areas.

4.2.3 Types of Citrus Fruits Produced in Muheza District

There are seven citrus fruit varieties are grown in Muheza District Early Valencia (Masasa), Late Valencia, Delta Valencia, Nairobi, Washington, Jaffa, and Pamba. Farmers indicate that Early Valencia (45.8%), Late Valencia (31%) and Nairobi (10%) varieties are the most popular in the district (Shown in Table 4). An important characteristic of some popular varieties is that they do not have to be picked immediately when ripe, but they can last for some time on the trees. Table 4 shows a summary of varieties with their respective local names, harvesting seasons, general characteristics, and ranking by farmers.

Most farmers have a mixture of Early Valencia (Msasa) and Late Valencia. Early Valencia and Late Valencia are more preferred citrus fruits by citrus traders. However, Mbiha and Maerere (2002) found Nairobi as the most preferred citrus fruit variety. By-then, Valencia has not been introduced to local farmers of Muheza district. Early and Late Valencia are more preferred because of their characteristics as shown in Table 4. Early maturing citrus fruits enable farmers to sell when there is orange scarcity in the market. On

the other hand, late maturing citrus fruits enable farmers to sell after the peak harvesting for the other varieties.

Table 4. Major Citrus Varieties Grown in The Study Area and Their Importance

Varieties (*)	Local Name (*)	Harvesting Season (**)	General Characteristics (*)	Rank (**)
Early Valencia	Msasa	May to September	Early maturing, High yield, Medium size, Thin and smooth skin, Very sweet and, more juice.	1 st
Late Valencia	Valencia	January to March	Late maturing, High yield, Sweet and juicy when ripe, Robust to transport, Good price, Tolerant to various environment, Long storage time on tree and, Most popular variety.	2 nd
Delta Valencia	Kitenesi	May to August	Early maturity, Seedless, Smooth skin, More juice and sweeter, High yield	7 th
Mediterranean	Nairobi	May to July	Sweet, Medium Size, Highly flowering, Fruits drop down, Low Yield, long storage on tree, Popular in the Kenyan mark and, produced also in Matombo (Morogoro region) when the supply of orange is low.	3 rd
Washington	Kitovu	July, March and, April	Poor juice content, not sweet, thick skin, Robust to transport, Seedless and, Late maturing.	5 th
Jaffa	Shamoti	May to July	More juicy but not sweet, big size fruit, not robust to transport, high yield	4 th
Pineapple	Pamba	October to January	Very sweet, Late ripening variety, Slow matured	6 th

Source: *Modified from Mbiha & Maerere (2002); ** Author's inputs (Harvesting season and rank of scale)

Although citrus fruits are produced throughout the year, the main harvesting season starts in May through October each year. The picking of citrus is done six months after the flowering period. Moreover, Muheza district experiences two rain seasons, that is, October to November, and March to April. Therefore, citrus fruits are picked twice a year.

4.3 Analysis of Performance of the Citrus Industry in Tanzania

4.3.1 Factors affecting the Development of Citrus Industry in Tanzania

Table 5 indicates factors affecting development of the citrus sub-sector. The technical factors that relate to development of citrus sub-sector are categorized into three groups: namely production limitation, weak human capacity, and market constraints.

Table 5. Factors Affecting the Development of the Orange Sub-Sector

Major constraining factors	Indicators such affecting development of citrus industry in Tanzania
Production Constraints	Inputs and Seedling, Shortage of rainfall, Farming Practices, and Thieves
Human Capacity Constraints	Contract capacity, Farmers' Organizations, Extension and Support Services, and Farmers' Collective Actions
Marketing constraints	Working capital, Trade restriction, Citrus fruit quality, Low value additional activities, Delayed instalment payment, Too much selection of citrus fruits done by traders, lack of transparency during exchange process, Late harvest behaviour displayed by traders

Source: Surveyed Data (2010)

It is important to understand and analyze the problems according to the broad categories above. As Norton and Alwang (1993) argue, agriculture can make a major contribution to economic development through the production of surplus food, creation of income, and improvement of rural welfare. Moreover, the four categories are closely related to the institutional environment's "rules of the game" and the governance structures' "play the game" of Williamson's institutional framework. It can be recalled that these two levels are principally defined by the New Institutional Economics (NIE). The study furthermore uses this framework to develop the necessary institutional arrangements required to address the factors inhibiting the growth and development of orange sub-sector in Muheza District.

4.3.1.1 Production Constraints

In respect to citrus fruit production constraints, it has been found that the greatest constraints relate to availability and affordability of key citrus input and seedling suppliers. Inputs supply includes such things as pest control products and machinery for cultivation of the fields. While agro seedlings supply includes such things as improved (budded) seedling trees supply. In the past, farmers were assisted by government agencies, which have now been dismantled as part of the ongoing agricultural restructuring process. Without any prior experience of how to cope with these production eventualities, many farmers have had to abandon farming altogether, while others have been trapped into contract arrangements that do not benefit them and further reduce the profitability of farming. The agricultural reform programme in Tanzania has also resettled many rural small scale farmers who do not have the financial means to acquire the necessary inputs.

4.3.1.1.a Citrus Inputs and Seedling Trees

Most of the small-scale farmers fail to develop their citrus farms due to financial inability. Farmers fail to buy even pesticide, fertilizers or cleaning the farm throughout the year. Thus, most of small-scale farmers go to traders and invest his/her farm by asking for down payments before citrus fruits are mature. Moreover, there are many problems associated with high input costs and lack of capital. Acquisition of production capital presupposes acquisition of goods inputs such as high quality seed and better pest control. Sustainable citrus fruits production greatly depends on using good inputs and pesticides. Therefore, lack of capital is the most important constraint against the growth and development of citrus sub-sector in Tanzania.

Farm management becomes more difficult when availability and affordability of inputs become restrictively high. Low quality inputs and seedling trees are then used, leading to a decrease in yields and productivity. The upcoming farmers become more dependent on input as well as seedlings supplies as their demand for improved supplies increases. In Muheza district, small-scale farmers tend to experience more difficulty in acquiring new and technologically improved inputs and seedling trees than large-scale farmers.

There was also poor pesticide input supply which then caused a tremendous drop of citrus fruits, production resulting from pest and diseases attack. Observation revealed that, small-scale farmers face a big challenge from "*Bactocera-dorsalis*". Citrus fruits spoiled because of "*Bactocera-dorsalis*" problem. According to European Plant Protection Organisation (EPPO), *Bactocera-dorsalis* is a new fruits fly species which was discovered in 2003 in Sri Lanka. The fly is morphologically very similar to "*Bactoceras-dorsalis*" which was reported to be spreading rapidly in central Africa. The new pest, which attacks mangoes, citrus fruits and other tropical fruits, was discovered for the first time in Tanzania in 2003 (Lugendo, 2012). The fly attacks citrus fruits during the early ripening stage, making the citrus fruits fruit change its colour before normal ripening time. According to MUVI report, about 32,000 tons out of 79,830 tons of citrus fruits produced in the entire district in the agricultural year 2010 got spoilt because of *Bactocera invadens*" (Lugendo, 2012; Muheza Horticultural Crops Report, 2010). Moreover, about 40% of citrus fruits produced in Muheza District are estimated to be damaged with pests and diseases every year (Lugendo, 2012). Thus, pests were found to be a very serious problem in the study area.

Moreover, "*Gummosis*", "*Ants*" and root rot are considered to be the major problematic diseases in Muheza district. The ants infestations are generally removed manually and diseased trees pruned or uprooted to prevent the spread of the disease. Alternatively, the infected citrus fruit tree can be treated using Dithan M45. As for the pests the most notorious are aphids and orange fly which damage the fruits. Citrus tree affected by these pests can be treated using Sumouthion. This problem of pests and diseases is mainly linked to pre-harvest losses.

4.3.1.1.b. Poor Farming Practices

Insufficient knowledge and skills on citrus farming practices and low application of manure among farmers the study also found to be among the major critical factors constraining citrus fruits production in the district. During the study it was observed that farmers apply minimal crop farming practices. Indeed, pruning and weeding are just performed twice or three times a year: Where citrus fruits are grown in monoculture (single orange plantations), slashing of undergrowth and grass take place twice or three times a year. Intercropping is farming practice meant to improve production and increase annual benefits from citrus fruits production. Therefore, poor crop husbandry practices such as pruning and weeding affect citrus fruits production negatively. During the field work many citrus farms were found engulfed with tall grass, which inhibit citrus trees from producing better citrus fruits in terms of quality, shape, and quantity.

Indeed, application of fertilizers such as industrial chemical or non-industrial manure is important for high yield and fruits quality. This study observed that the use of manure was being done within large scale and medium scale farms. Small scale farmers never used manure on grounds that the soil was sufficiently fertile thus there was no need of using manure. A few of the families were found to keeping livestock such as cattle, goats, and poultry as well, which could help in the production of manure for citrus fruits production and for other food crops. Fertilizer application is important for high yield and fruits quality.

However, the use of chemicals was also observed to be very limited in the study area. Therefore, according to farmers citrus fruits are generally produced organically, without any fertilizers or pesticides, the practice is often by default partly due to the high costs of those inputs. This finding, however, confirms the finding by ECI (2003), which shows that citrus fruits are produced without any fertilizers or pesticides.

4.3.1.1.c. Shortage of Rainfall

Shortage of rainfall was found to be another major problem facing citrus fruits production in Muheza district. This is because most of the citrus trees fail to flower properly due to climatic changes especially poor rainfall. As a result, most of the citrus fruits produced become small in shape and with unattractive skin colour. Shortage of rainfall makes citrus farmers produce citrus fruits that are small in shape and with poor citrus production as can be seen the photos below. Some of the citrus trees were found to have shrunk while others were found to have shed their leaves because of drought caused by shortage of rainfall.

Citrus fruits on the tree are shrinking due to drought (shortage of rainfall). No irrigation farming were found to be practiced in the district despite the existence of an important river namely Zigi. As a result, the production of citrus fruits and other agricultural crops are subject to seasonality. There is a room to improve farming through irrigation by using those rivers (Muheza District Council Report, 2007). If done, this could reduce dependency on rain fed agriculture for all crops including citrus fruits, as the area is of great potential. Indeed, according to Chang and Petersen (2003) citrus fruit requires water at different stages of growth in order to achieve good fruit yields and quality. These stages are namely the flowering, fruit set, and new flush development period, fruit development period and after harvesting period. Thus, shortage of rainfall was found to be reducing citrus fruits production in the case surveyed area.

4.3.1.1.d. Problem of Theft

Most of the farmers were complaining about theft that was done by trespassers on their farms. Many citrus fruits were picked from the trees by thieves hence reduce farm income. Theft is done especially to the farms located in the remote areas with no proper supervision or less supervision.

Also theft was reported to be a serious problem during citrus fruits counting process. There is no transparency during orange counting process between trader and farmer. Farmers do not do the counting themselves, citrus fruit traders hire other people to do the counting on behalf. In the counting process, most of the citrus fruit traders at the farm gate plot their citrus fruit counters to cheat during the process of counting citrus fruits. For instance, when the enumerator reaches ninety citrus fruits, he shouts loudly sixty, which is not correct. Theft behaviour during counting process was found to be holding back citrus fruit farmers especially illiterate farmers in rural area. Because of this, most of the earnings are lost.

4.3.1.2 Human Capacity Constraints

According to the observation made, restructuring of development programmes should not be implemented if they do not improve the human capacity of small-scale farmers in rural areas. Without skills, small-scale farmers would be unable to apply new knowledge to

improve citrus fruits production and their incomes. Most of the small-scale citrus fruit farmers rely on guidance of extension officers. However, these extension officers are facing constraints of their own.

4.3.1.2.a. Inadequate of Extension and Support Services

There is no sufficient capacity in terms of the number of extension officers. However, according to the study findings, extension services are seriously constrained by their lack of sufficient experience and knowledge, poor infrastructure, inadequate financial resources and weak institutional structures. These factors combine to limit the extent to which extension services can support poor farmers, who are invariably located in the remotest areas.

Within the Muheza district context, social capital is thus of great importance since coordination and cooperation between emerging farmers and extension services could be solution good mechanism of including emerging farmers into the mainstream agricultural economy.

With respect to support and services, the emerging agricultural sector cannot rely only on the government. Other institutions from both the private and public sectors should also be involved in programmes of promoting skills training, extension services, development of organizations and institutions, financial assistance, creation of markets, as well as other activities.

4.3.1.2.b. Poor Citrus Farmer Organizations

Most of the citrus fruit producers were working individually not belonging to any farmer's group. Working in groups or collectively, farmers would be able to exploit some advantages and opportunities offered by organized farmers groups such as a link to various market networks. Organized farmers groups could exploit economies of scale by performing some of the functions like marketing and purchasing inputs together and sometimes working together in the farms. Organized farmers groups could powerfully bargain for better prices of their produce. It is also easy to provide business development services (BDS) and other support services to farmers who are organized into groups than to those working individually. This is challenge for MUVI whose major role is to organized farmers into groups and networks so that they could fight for their rights. Working individually makes farmers operate with high transaction costs. Farmers in groups can be able to share market price information, transport citrus fruits to distance market jointly and enjoy cost benefit advantages in citrus fruits production as well as in marketing process.

4.3.1.3 Market Constraints

Despite the availability of markets, certain barriers with regards to market access were found to be a constraint among small-scale farmers. Among the most important market access obstacles in Muheza district include lack of processing and storage facilities in citrus fruits production areas, trade restrictions, lack of entrepreneurship skills, and lack of basic management and business skills.

4.3.1.3.a. Limited Working Capital

Lack of capital is a common problem among citrus fruit farmers in Muheza district. Many groups of citrus fruit farmers fail to sell their oranges to the distance and lucrative

markets such as DSM, Arusha, Nairobi and Moshi due to transportation cost. As a result, farmers sell their citrus fruits at the farm gate prices which are relatively unfavourable. On the other offhand farmers were also found to have limited production capital. Most of the farmers fail to maintain their citrus farms due to financial problems. Evidence shows that almost all farmers interviewed fail to buy even pesticides or fertilizers or fail even to clean the entire farm throughout the year. With these problems, most of the citrus fruit farmers would go to traders to ask for down payment before citrus fruits have ripened in order to have funds for farm maintenance.

The farmers are further constrained with lack of storage facilities. That is why the produce is often sold directly from the field at farm gate price (Mkunda, 2006), mostly while the citrus fruits are still on the trees. Handling systems during harvest also contribute to post-harvest losses. Most of the citrus fruits were found to be falling down and getting spoilt after ripening due to the fact that farmers have got no storage facilities that could preserve citrus fruits for a long time without problems. In another study, Fatuma (2010) also confirm the fact that storage facilities are not available in the study area. Obviously, storage of the fruits could be used to add value to citrus fruits, since citrus fruits deteriorate fast under poor storage facilities. The problem is also compounded by the fact that traders prolong harvesting or collecting time; in this case, producers suffer losses from damaged citrus fruits caused by lack of storage facilities. This problem prompts most of the farmers to sale citrus fruits immediately before maturity stage at an average of 20 TZS² per citrus fruits, which is an unfavourable price.

4.3.1.3. b. Trade Restriction from Local Traders in a Respective Market

Other technical barriers are the specific codes of conduct on citrus fruits standards and certification regarding international market systems. It was observed that almost all Tanzanian citrus fruits farmers in the surveyed area were selling their citrus fruits locally because they fail to comply with the requirements of international standards, Kenyans were found to have imposed total market ban to Tanzanian traders from selling citrus fruits directly to Mkulima market without using Kenyan's market brokers.

4.3.1.3.c. Poor Citrus Fruit Quality

The quality of a product is a critical factor in establishing a share in the world liberalized market. Local farmers are threatened by citrus fruit diseases in the surveyed area; as a result, a sizeable portion of the citrus fruits produced by the Tanzanian farmers is not consistent at all. The main challenges faced by most farmers, especially in accessing international markets or Tanzanian supermarkets such as Shoprite, Imalaseko supermarkets include low and inconsistent quality resulting from the use of poor technology, low level of processing knowledge, shortage of rainfall as well as unattractive packaging and labelling materials. This impedes improvement of farmers' revenue.

4.3.1.3.d. Low Value-Additional Activities and Lack of Processing Factories in Muheza District

Low value-additional activities and unreliable market prices offered by traders seem to affect market access. Value additional is an important aspect in increasing the prices of the

² TZS refers to Tanzanian Shillings: 1 USD is equal to TZS 1620.

produce in the orange market chain. Value can be added in various forms; and of them is improving the quality of the citrus fruit through processing into juicy; another way is sorting, and grading of the fruits. Obviously, farmers who add value to their product, such product stand a better chance of receiving higher selling price. Farmers cannot process their products because the once famous foods and vegetables processing factory, namely MUWAMU Enterprises, had stopped its operations for quite some time. For example, the establishment of Tangold Food Products limited in Korogwe in 1980 and Muheza Fruits canning Co. Ltd (MFCC) in 1982 were expected to reduce the problem of markets for citrus fruits in Muheza district. Also, farmers were expected to get higher prices for citrus fruits. These factories were buying citrus fruits in large quantities from citrus farmers at better marketing prices. However, despite the high level of citrus fruits production in Tanga region, these projects were not successful and the factories closed down. This has left farmers selling unprocessed citrus fruits at the lowest price and most of which are sold before ripening time. In this aspect, collective action among producers could probably help farmers to add value to their produce.

4.3.1.3.e. Delayed Payment of the Instalments

In most cases, most of the rural citrus fruit farmers are paid the selling price in advance before the citrus fruits have matured. Traders are asked to complete payment of their outstanding amount during harvest time. This is in contravention of the prior agreement made between the two parties. Traders do this because they already know that farmers have no storage facilities for the harvested citrus fruits and also they (farmers) were afraid of experiencing losses if they breach a contract with traders. Thereafter, most of the citrus fruit traders delay deliberately to settle the last payment to farmers. This behaviour forces many citrus fruit farmers into extreme poverty. The study revealed that some traders are not honest because they disappear with farmers' income. Those who show up do not promptly pay farmers what is due to them.

4.3.1.3. f. Too Much Unfavourable Selection/Sorting done by Traders

The study observed that citrus fruits are not properly picked from the trees by citrus fruit pickers. Also, mature citrus fruits are mixed with immature citrus fruits during harvesting time. After harvested, traders would select citrus fruits for transport to the markets; however, the selection of the citrus fruits is done to thousands of citrus fruits picked in this rough way. Rough harvesting of citrus fruits normally leads to unfavourable sorting of citrus fruits by traders.

Findings show that some citrus fruits are not taken by traders because they do not reach maturity stage; in that they are small in shape, or/and diseased. In some cases, observation shows that some traders instruct harvesters to do so deliberately; this is done with the intention helping traders buy the unselected citrus fruits, though have a good status, at a minimum price so that traders can increase the profit margin. This is one of the marketing constraints facing many of the citrus fruit farmers in the surveyed area.

Below is one of the cases where a smallholder farmer became a victim of poor citrus fruits selection, a case of Mr. X:

CASE 1: Rough orange harvesting habit

Mr. X is a smallholder citrus farmer. He was farming citrus fruits as his primary economic activity in Mbwembela village, at Bwembela Ward in Muheza district, by then. He started citrus farming in the year 1998. During the field work, he had 1.5 acres planted with Nairobi and Early Valencia type of citrus trees. However, in the year 2009, one acre started to produce citrus.

As usual, due to financial problems in 2009, Mr. X decided to enter into informal contract arrangement of selling citrus fruits to a junior broker located in the same village. This agreement was done when citrus fruits were at a pre-maturity stage. They both agreed that one citrus fruit would be sold at 11 TZS³ and the trader would pay 50,000 TZS in advance after the signing of the contract. The contract was written and signed without any prior assistance of any legal expert.

In July, 2010, the senior broker (investor) accompanied with his harvesters went to harvest the citrus fruits. He picked and assembled 16,000 citrus fruits and then left without carrying the citrus fruits for 7 days because he had more than two places to visit. On his absence, Mr. X was forced to be a watchman until he came back because he was not paid. However, when he came back to collect his citrus fruits he had a FUSO truck full of citrus, so he collected and paid for only 9,000 citrus, out of 16,000 citrus. 7,000 citrus fruits were left down unpaid because of poor contract terms. Mr. X had nothing to do and he encountered a loss of 7,000 citrus.

Therefore, the senior broker (investor) paid (9,000 x 11/=) 99,000 TZS/= after deducted down payment of 50,000 TZS/=. However, 16,000 citrus fruits could give him TZS 176,000 TZS/=.

Despite the fact that Mr. X was connected to the market, still the price he received did not favour him as a farmer. In spite of the fact that he received a total cash of 99,000 TZS, he sustained a big loss of 77,000 TZS/= as the result of 70,000 unsold citrus fruits. At the time the researcher arrived to Mr. X houses (a farmer), he (Mr. X) had nothing to do till when the researcher went for data collection in August, 2011.

Indeed, this is one of the factors that accelerate poor citrus production development as well as accelerate income poverty at surveyed area. During the field work, farmers were found to experience income poverty because of poor contract arrangement signed with traders. They signed contracts which gave traders (Investors) chances to do whatever they wanted. The vivid example here is Mr. X who got a big loss out of contract he signed. The contract did not have any statement that endeavour to protect farmer's rights especially on how to harvest/pick citrus fruits from the trees, and fix adequate harvesting time.

"Normally, contract agreements serve as a means of market access, access to agricultural inputs, and ways for a farmer to cut-down transaction costs such as the cost of transportation, market search and other costs accompanied with citrus fruits marketing". Here, most of junior trader/brokers go directly to citrus farmers and ask to invest. In relation to purpose of contract arrangement, in turn, it is discourages citrus farmers from continuing with the production of citrus fruits as a cash crop. Again, most of citrus fruit farmers especially smallholder farmers ignore to follow the best practice of citrus farming.

Furthermore, poor citrus fruits picking behaviour seems to be a common practice among citrus traders. They just pick citrus fruits randomly without considering the trader's demand. They pick citrus fruits by shaking citrus trees without putting enough grasses under the trees; moreover, they carry citrus fruits using sacks when they are transporting them to the

^{3 3} TZS refers to Tanzanian Shillings: 1 USD is equal to TZS 1620.

assembly point for selection and package. As a result, more citrus fruits are left to rot at the farm gate and hence affect the farmer's revenues. Another similar case is that of Mr. Z who got his right through the court as a result of rough citrus fruits picked by citrus trader's pickers:

CASE 2: Court resolution on rough harvesting habit against un-innocent trader

On 28th August, 2011 the researcher interviewed Mr. Z who is one of the smallholder citrus farmers farming in Kivindo village at Lusanga Ward. Apart from being a citrus farmer, Mr. Z is also a retired officer from Tanzania Defence Forces known by its Kiswahili abbreviation JWTZ) *Jeshi la Ulinzi la Wananchi wa Tanzania*. Mr. Z was 68 years old at the time of the interview. Mr. Z started citrus farming in 2004. In his farm, he planted Early and Late Valencia citrus trees. During the interview, Mr. Z had 6 acres of citrus. In 2010, Mr. Z managed to produce and harvest 20,000 citrus fruits.

In March, 2010 Mr. Z entered into a business contract with a junior broker/trader on behalf of a senior broker who lives at Muheza town, for the sales of citrus fruits at a price of TZS 20/= per citrus. Secondly, a broker was to pick only those citrus fruits demanded, and not otherwise. They both agreed on the terms and conditions by signing a selling and buying contract.

After some times, the senior broker went to harvest the citrus fruits, in which he hired three citrus pickers. Citrus pickers picked from the trees a total of 20,000 citrus fruits four times of the required amount by the trader, which were 5,000 citrus fruits. The trader was asked to pay for all 20,000 citrus fruits by the farmer but he refused. Instead he paid TZS 100,000/= for 5,000 citrus fruits only and left 15,000 citrus fruits at the farm gate decaying.

Eventually, Mr. Z (farmer) sent the matter to the primary court and asked to be paid 15,000 citrus fruits which were left unreasonably. The court ordered that Mr. Z shall be paid for his 15,000 citrus fruits immediately. He was paid TZS 300,000/=. If Mr. Z couldn't take the matter seriously to the court, obviously he could have lost TZS 300,000/=.

A bad practise by unfaithful traders of picking citrus fruits inappropriately and finally selecting some and live the others to rot at the farm gate at the expenses of farmer. This unusual behaviour is practiced mostly during the peak harvesting season such as June, July and August each year. Most of the citrus farmers were complaining against this practise. This practise discouraged farmers from continuing with citrus farming due to the fact that much money was lost as a result of inappropriate picking and poor citrus fruits selection done by citrus traders.

4.3.1.3.h. Lack of Transparency during Exchange Process

Lack of transparency during the exchange process between farmers and traders or brokers was reported to be a marketing problem in the surveyed area. Most of the farmers interviewed were complaining against traders or brokers who do not want to be open on the marketing price, or customers' information and marketplace where citrus fruit is going to be sold. This market practice was most among village brokers. Most of the time, these village brokers, would, not allow farmers to have direct communication with traders. Indeed, they would be very angry against farmers who engage into direct talks with traders without broker's permission. This research observed about 99% of citrus farmers interviewed failed to get traders' market price during the exchange process.

4.3.1.3.i. Late Harvesting Practise done by Citrus Investor

During the survey, many citrus fruits were found rotting as a result of late harvesting and collection practise. This is, some traders were found engaged with more than one contracts to buy citrus fruits on contract basis. This practise has a negative impact because traders who have more than one contract at the same time would normally harvest and collect citrus fruits late. As stated earlier, they would harvest in the first contracted farm and then proceed to the next contracted farm, before they come to the final contracted farm. Furthermore, after harvesting the citrus fruits, they would go to the next farm, before collecting the citrus fruits harvested in the previous farm. Thus, the citrus fruits harvested earlier would usually be collected late and thus many citrus fruits would be rendered unfit for sale.

5. Conclusion and Recommendations

It is concluded that for the case of the factors affecting development of citrus industry in Tanzania particularly in Muheza district, in Tanga region, the results revealed that in recent years, the government of Tanzania has been implementing various agricultural development programmes to improve citrus fruit production as well as to enhance farmers' income. Such programs are Green Revolution (*Kilimo Kwanza* Program) and Agricultural Marketing Reforms Programs. Despite these programmes, yet the findings reveal that the citrus farming practices in the surveyed area are not well developed. Yet there are constraining factors that impede growth and development of citrus industry, which consequently affecting farmers' income as well. This is because, citrus are grown under rain fed regime without any form of irrigation. Also, citrus seedlings are produced by individual farmers locally in their backyard nurseries. There is no professional company responsible for seedling production. At the same times, citrus farmers' skills in citrus husbandry practices are limited. All citrus varieties used contain many seeds in the citrus fruits whereas the market demands seedless citrus fruits. In light of aforementioned, it is recommended that policy makers need to focus on providing institutional support to farmers rather than focusing on voucher system program, which if the necessary technical and managerial skills are not in place may result in continued inefficiencies in citrus production and marketing.

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