

# ECONOMIC CONSTRAINTS IMPACTING THE FOOD SUPPLY IN TANZANIA : A Focus on Select Economic Aspects of the Tanzania Food Supply

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## **Abstract**

The problem of food supply is a critical issue in developing countries such as Tanzania, where the mainstay of these countries economies is extremely dependent upon the agricultural sector. The food supply system in Tanzania and other developing countries is highly sensitive to factors such as food transportation and distribution, food pricing income levels, food consumption patterns, agricultural marketing and trade, technologies employed, food storage systems, food processing facilities, and agricultural productivity. This paper will examine and analyze the economic constraints impacting the Tanzania food supply. An investigative methodology was used; the economic constraints impacting food supply were analyzed, including issues such as food transportation and distribution, food pricing, income levels, food consumption patterns, agricultural marketing and trade, technologies employed, agricultural, extension services, food storage systems, food processing facilities, and the agricultural productivity affecting the ability to produce agriculture were all evaluated. Thus based on fundamental, significant factors that cause most food supply and agriculture related problems in Tanzania, this paper will provide a comprehensive analysis of the economic constraints impacting the food supply in that country next, a better understanding of the economic constraints impacting the food supply in Tanzania, as well as how and to what extent those factors play out, will be provided. In addition, using the analyzed data output and this author's conclusions, suggestions and policy implications to improve the food supply (both in specific and general agriculture policies) will be drawn, thus giving insight and helping policy and decision makers to systematically consider the complex food supply equation problems.

**Keywords :** Food Supply, Food Supply System, Agriculture, Tanzania, Economy, Food Transportation, Distribution, Food Pricing, Income Levels, Food Consumption Patterns, Agricultural Marketing, Trade, Technologies Employed, Food Storage Systems, Food Processing Facilities, and Agricultural Productivity.

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<sup>1)</sup> I am extremely thankful to Professor Yonggwon Park and Professor Hirohiko Shimpo for giving various valuable advices, suggestions and comments during drafting this paper.

## 1. INTRODUCTION

### 1.1 Background Information

Rural economics is an important determinant of agriculture production that plays a significant role at the household, community and national level in any country's food supply achievements. Different parts of the world vary in their abilities to supply food; as a result some areas have greater food supplies than other places. The food supply problem in Tanzania and other developing countries is highly sensitive to factors such as food transportation and distribution, food pricing income levels, food consumption patterns, agricultural marketing and trade, technologies employed agricultural extension services, food storage system, and food processing facilities. The rural economic sector plays a significant role in the Tanzanian national economic. In fact, the rural economic sector contributes more than half of the country's GDP; more than half of the Tanzanian population lives in rural areas, where the major means of employment is subsistence agricultural production. The agricultural sector is indeed a very important factor in rural development because this sector contributes to growth and reduces poverty. According to the World Bank (2001), 84 percent of the Tanzanian population is involved in agricultural production<sup>2)</sup>.

### 1.2 Statement of the Problem

Tanzania for many years has been struggling with the linked problems of food supply and poverty. These problems are the result of existing poverty levels and the low priority placed on implementing policies to benefit the rural sector and address the country's food supply related economic issues. This pattern results in continued low agricultural productivity, hunger, food shortages, food insecurities poverty and over-dependence upon other countries<sup>3)</sup>.

Sub-Saharan Africa remains the primary exception to these general developments of food supply and agriculture production by being the last, despite of it struggle with

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<sup>2)</sup> Agricultural production as a sector of the economy it includes crops production, livestock production, and forestry production.

<sup>3)</sup> Since we have always experienced budget deficit for many years, it depends on both food aid and country budget.

the problems of insufficient food supply and poverty, with stagnant or even declining per capital consumption levels. Population growth in this region has increased by 3 percent per annual. Serious problems of hunger and malnutrition have developed (Mitchell 1997: 1-2). Among developing economies, production has increased in all major regions, except in Africa where a decline of 16.5 percent in per capital food production has been experienced. To a large extent, the world's food shortage is largely concentrated in Africa (Mitchell 1997: 28)<sup>4)</sup>. To enable the food supply system to operate efficiently and effectively, economic policies in the rural sector should be well analyzed, improved and implemented to maximize food supply system development and alleviate poverty in the country. Thus the survival of the impoverished rural community and their food supply depends greatly on rural sector policies prevailing within the country that facilitate an efficient national food supply.

### 1.3 Objectives of this Paper

Many other researchers and scholars including R. Larsson, A. C. Isinika, G. C. Ashimogo, J. E. D. Mlangwa, H. R. Amani, D. A. Francis, G. Lieblein, T. A. Breland, L. Salomonsson, U. Geber, N. Sriskandarajah, V. Langer, D. Schmied, E. A. Lazaro, J. Makindara, F. T. M. Kilima, M. Mbilinyi, B. Koda, C. Mung'ong'o, T. Nyoni, and N. Visram, as well as the FAO, WFP, and World Bank<sup>5)</sup> to mention a number, have addressed the problems of food supply and agriculture while also discussing the issues of poverty reduction, economic growth and development, gender, natural hazards such as drought, flood, pests, and disease. However, sometimes the problems of food supply were addressed only in relation to the problems of poverty reduction, economic growth and development, natural hazards such as drought, flood, pests, and disease. The above-mentioned researchers' and scholars focuses were solely upon problems of poverty reduction, economic growth and development, gender, natural hazards such as drought, flood, pests, and disease. Therefore, food supply problems have yet to be seriously addressed to enable the finding of clear solutions, not only for the food supply but for

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<sup>4)</sup> This was observed by Mitchell D. O., Ingco M. D., and Duncan R. C. on the study analysis on world food outlook.

<sup>5)</sup> These are only some of researchers and scholars addressed the problems of the food supply and agriculture with relation to the various variables other than variables under this study.

related problems as well. From that view point the primary contribution of this paper is addressing the most practical economic causes of food supply problems in Tanzania, those primary factors that severely and negatively affect the food supply from the household to the national levels.

Even during years with good harvests, the negative effects of the factors discussed and analyzed in this study can cause regional food shortages within the country. Furthermore, this study provides a comprehensive and in depth analysis of the economic constraints impacting the food supply in Tanzania and addresses those basic and important economic factors that most cause food shortages and agricultural problems. Therefore, this research has great significance to both policy and decision makers for solving food supply related problems. In short, food supply issues are among the most critical and challenging of current global problems.

#### **1.4 Summary**

First, in chapter 1, section 1.1 I describe the food supply problem in Tanzania and other developing countries as being highly sensitive to factors such as food transportation and distribution, food pricing, income levels, food consumption patterns, agricultural marketing and trade, technologies, employed, agricultural, extension services, food storage systems, and food processing facilities. These factors have led to decreasing agricultural productivity, accelerating hunger, food shortages, food insecurities, and poverty in Tanzania, in addition to an over-dependence upon other countries.

Second, as I explain in section 1.3 many other researchers and scholars have been addressing the problems of agriculture and food supply while also discussing the issues of poverty reduction, economic growth and development. These researchers' and scholars focus has been limited to examining the problems of poverty reduction, economic growth, and development. This paper's contribution, however, is in providing an original comprehensive and in depth analysis of those economic constraints that impact the Tanzanian food supply. The paper focuses upon basic and important selected economic factors that most causes the food supply and agriculture related problems in that country. Therefore, the paper has great significance to both policy and decision makers for solving food supply related problems.

## 2. THE AGRICULTURAL SECTOR IN TANZANIA<sup>6)</sup>

### 2.1 Performance in Tanzania

Tanzania has some of the greatest agricultural potential among all the East African and Southern African countries (Beir et al, 1990). Mainland Tanzania has an area of 88.6 million hectares 39.5 million (44.6 percent) of which can be cultivated under rain fed conditions. Tanzania's agricultural potential is also reflected in agriculture's role as the single most important economic sector. Agriculture in Tanzania accounted for 45.1 percent of the country's GDP in 2000 (World Bank, 2002). Further, more than 80 percent of the country's population relies directly on some form of agriculture for their livelihood<sup>7)</sup>.

Agriculture links to agro-processing consumption agriculture's export provides raw industrial materials as well as a market for manufactured goods. Only 3.3 percent of Tanzanian cropland was irrigated as of 1999 (World Bank, 2002). The country's four most important crops remain maize, beans, coffee and cotton with maize and beans serving as the major food staples and coffee as the major export crop grown on large plantations (making significant contribution to the GDP). Cotton is another cash crop grown largely by smallholders. Cotton has linkages to agro-processing consumption and its export provides raw materials to industries as well as a market for manufactured goods. Figure 2-1 shows the growth of the agricultural sector<sup>8)</sup> as well as overall GDP growth<sup>9)</sup> in Tanzania from 1990 to 2006.

At the beginning of 1990, the agricultural sector growth rate was high owing to good climate and weather conducive cultivating various food and cash crops. Also, many crop prices the previous year had been promising. However, crop prices began

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<sup>6)</sup> Agriculture sector under this study focused much on the food crops and exports crops production as sub sectors.

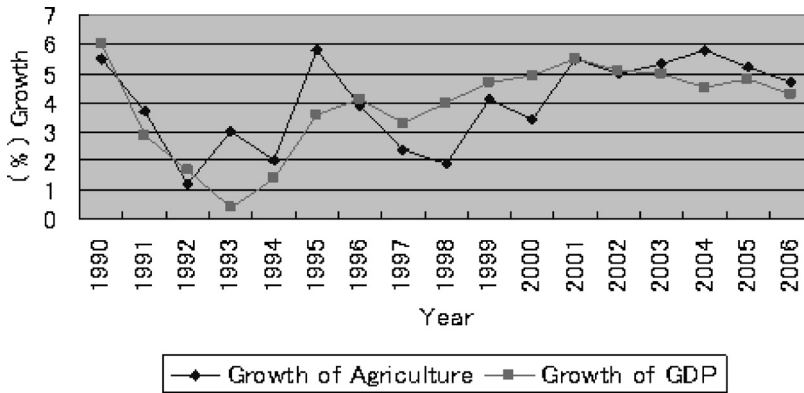
<sup>7)</sup> Agriculture is the back bone of the Tanzania economy together with people livelihood, therefore this sector needs first priority on policies making and implementations, due to its importance and contribution.

<sup>8)</sup> Growth of agriculture includes the contributions of food crops, export crops and livestock production.

<sup>9)</sup> Growth of GDP includes the contributions of not only agriculture, but also from other sectors such as services, mining, tourism etc.

their decline in both regional and international market rates from 1990 to 1994, spurred by factors such as unpredictable weather conditions (both low and late rains) and pest infestations, such as armyworms and *Quelea quelea*. This decrease in production was exacerbated by farmers not growing certain crops in response to low pricing, the soft market, and the scarcity of inputs.

Figure 2-1 Performance of Agriculture and Growth of GDP 1990-2006



Source: Economic Surveys – Different Years

As shown in Figure 2-1 the rise of the agricultural growth rate in 1995 was caused by favorable climate, especially, sufficient rains in many parts of the country. This contributed to an increase in the production of different crops, the availability of good pastures and available water for livestock. Further, sustained efforts to combat destructive pests, including small animals and insects, such as rats and cockroaches, as well as the absence of disease outbreaks, contributed to this achievement. From 1996 to 2000, the agricultural growth rate in Tanzania was equal to or less than 4 percent due to drought in some areas of the country. The rainy season affect the production of various food and cash crops and pastures. The rise of the agricultural growth rate from 2000 to 2004 stemmed from sufficient rain in many parts of the country, promising prices, input availability and crop products market sources. From 2005 to 2006, however, a decrease in the agricultural growth rate was brought about by the drought that affects many regions in Tanzania, even during the rainy season; such drought dictates the production of various food crops, cash crops, and pastures.

Agricultural performance and agricultural growth are generally influenced by the

interactions of other variables such as economics, social and political conditions, climate variability and weather extremes, environmental issues, population growth, and the ability to produce agriculture in some parts of the country. Despite this growth trend in Tanzania agriculture, the sector still has great opportunities for further expansion and the capacity to contribute much more to Tanzania's economic growth and standard of living.

The agricultural sector's contribution to GDP is very important. In 1990 the GDP growth rate in Tanzania was high, almost on a par with its agricultural growth. The high GDP growth rate was attributable to large contributions of agricultural output, resulting from a very good harvest, which was applied toward that year's GDP.

From 1991 to 1995, however, due to decreasing agricultural outputs, GDP growth in Tanzania amounted to less than 4 percent. The exception to this trend was in 1993 and 1995, when agricultural outputs rose while GDP growth remained low. Low values among most agricultural outputs contributed to this phenomenon. Apart from that, and especial in 1993, GDP growth was affected by the severe economic crises prevailing in the country brought by both monetary and fiscal policy failures. From 1996 to 2006, the GDP growth rate hovered at or close to 4 percent. This reflected the promising value of various agricultural products, together with contributions from other economic sectors resulting from the implementation of privatization policies in sectors such as mining, industry, trades, and services. Except in 1997, when the agricultural growth rate was 3.3 percent, this GDP Growth rate was due to low agricultural production output, together with that year's low valuation of agricultural products.

## **2.2 Structure of Tanzanian Agriculture**

Agriculture is the main source of livelihood for the majority of Tanzanians. Some 85 to 90 percent of the labor force, which includes approximately 20 percent of the urban population, is engaged in agricultural activities (Beir et al, 1990). Most agricultural production takes place on small scale, labor-intensive farms that use primitive technology and reap poor production. This type of subsistence farming comprises about 70 to 75 percent of the country's total food production. Agriculture also provides raw materials for over 85 percent of Tanzania's industrial production. Nearly 80 percent of the sector's output is generate by small holders, each operating an average – sized farm

of two 2.0 hectares.

This is typical of Tanzanian agriculture, where production is dominated by small holders (peasants) cultivating a farm averaging in size between 0.9 and 3.0 hectares. Approximately 70 percent of Tanzanian crop area is cultivated by hand hoe, 20 percent by ox plough, and 10 percent by tractor. Agriculture is rain fed<sup>10)</sup>, food crop production dominates the agricultural economy and 5.1 million hectares are cultivated annually, among which 85 percent grow food crops. Women constitute the majority of the agricultural labor force (URT- Ministry of Agriculture and Food Security, 2005). The production of agricultural cereal crops plays a significance role in Tanzania's national food security. Most of the cereals agricultural production is used to meet the people's subsistence needs; the remainder of the cereal crop serves as a source of income for farmers. Tanzanian agriculture until now has generally been cultivated using primitive techniques with a high dependence upon rainfall. The potential for irrigations systems in Tanzania has yet to be tapped.

### 2. 2. 1 Food Crop Production and Consumption

Food crops are plants grown and harvested for human consumption, e. g. maize, rice, wheat, beans, vegetables, and fruits. Sometimes food crops can also be sold for cash earnings. The surplus of crops available for sale depends upon variables such as the quantity of food crops produced, as well as incomes at the individual, household and national levels. When a surplus of food crops is available, that surplus can be sold for cash or used for other purposes, such as animal feed. This is possible only when a surplus of food crops is available for such redirection. Whenever there is deficient food crop production crops cannot be repurposed to raise cash or feed animals. Food crops can also be redirected from their primary human consumption objective depending upon the particular farmer's income level. For instance, suppose a poor farmer in a rural area with primitive cultivation methods needs cash to remedy his or her family's medical or health problems, fill a need for clothing or farming inputs, or purchase transportation or education. The only solution for this farmer is to sell food crops in order to obtain cash

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<sup>10)</sup> Rain fed agriculture is the agriculture practice which farmers depends much on seasonal rainfall, associated with no use of irrigation system.



and solve whatever problems face him or her. Unfortunately, to gain cash, the farmer must sell food, regardless of how large his or her stock of food or the total food crop harvest that season. Table 2-1 shows food crop production data from 2001 through 2006.

**Table 2-1 Food Crops Production 2001-2006 Tons ( '000)**

Crops	2001	2002	2003	2004	2005	2006	Total
Maize	3,348	3,515	3,129	4,286	3,131	3,423	20,832
Rice ( Paddy)	1,010	1,081	921	1,030	1,077	805	5,924
Wheat	65	67	72	66	44	109	423
Millet/ Sorghum	688	757	986	937	721	941	5030
Cassava	2,017	2,058	2,656	2,470	2,851	2,052	14,104
Beans	527	574	517	603	650	1,049	3920
Bananas	2,007	2,067	2,501	2,576	2,007	1,169	12,327
Sweet Potatoes	958	1,025	1,197	1,245	1,300	1,396	7121
<b>Total</b>	<b>10,620</b>	<b>11,144</b>	<b>11,979</b>	<b>13,213</b>	<b>11,781</b>	<b>10,944</b>	<b>69,681</b>

Source: Ministry of Agriculture, Food Security and Cooperatives & National Bureau of Statistics

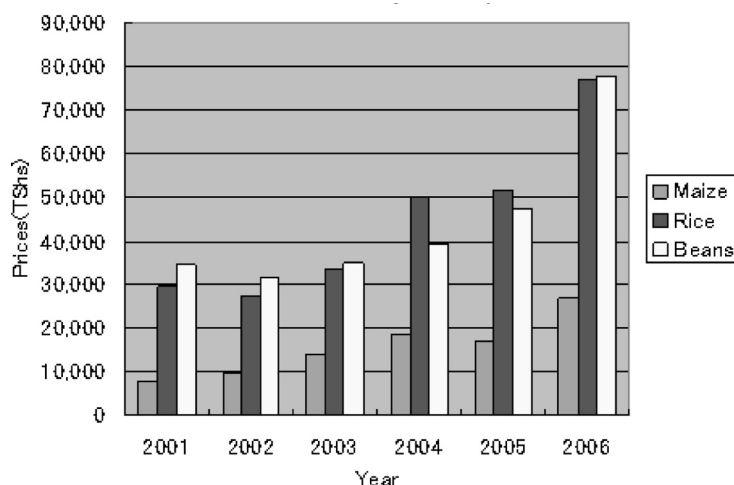
Table 2-1 demonstrates that during 2006 the production of some food crops, particularly wheat, maize, millet/sorghum, beans, and sweet potatoes, increased. However, there was a simultaneous decline in the production of cassava, bananas, and rice (paddy) when compared to 2005 outputs. In nearly every year, from 2001 to 2006, the production of maize, rice, wheat, millet/sorghum, cassava, beans, bananas, and sweet potatoes increased. Except for the production of maize in 2005, rice in 2003 and 2006, wheat in 2005, millet/sorghum in 2002 and 2005, cassava in 2006, beans in 2003, and bananas in 2006, all other food crops show a production decrease in remain years of output production. This means output production in remain year continued decreasing. This decrease in food crop production during those years was attributable to problems relating to the availability of farm inputs unpredictable climate and weather conditions (both low and late rains), input and output prices diseases and pests. Only the production of sweet potatoes reveals a constant increase every year from 2001 to 2006.

Figure 2-2 sets forth the prices (TShs) per 100 kilograms (kg) for major food crops. Prices for all major food crops increased almost every year except in 2005, when the price of maize decreased slightly because of a quit resulting from Tanzania's excessive maize importation from neighboring countries. In addition, high food price usually hinder the majority of impoverished households from purchasing and accessing their daily food

requirements. Again, most Tanzanian households live with the problem of being income – poor.

Not only do poor farmers lack cash income many are also sometimes induced by increased prices to oversell all of their food harvest to obtain cash for living expenses such as education, medical or health needs, clothing, transportation, and farming inputs. In the end having oversold their crops, those farmers and their families will then suffer food shortages.

Figure 2-2 Prices (TShs.<sup>11)</sup>) per 100 kg for Major Food Crops 2001-2006



Source: URT-The Economic Survey-Variou Years

### 2. 2. 2 Production and Consumption of Export Crops

Exports crops are those grown and harvested to obtain cash and are exported as foreign exchange. Most export crops are not consumable until they have been processed, e. g. coffee, tobacco, sisal, and tea. In 2006, as compared to 2005 sugar, tea, sisal, and coffee production all increased, while pyrethrum, tobacco, cashew nuts, and cotton production all decreased. On-traditional export crops are those that are not part of the local population’s customary diet but are grown primarily for their high cash value and export potential. Such crops include fruits, vegetables, and flowers. (J. Janick and A. Whipkey eds, 2002). Alternatively traditional export crops include, coffee, cotton, sisal,

<sup>11)</sup> TShs means Tanzania Shillings, it’s a unit of currency used in Tanzania.

tobacco, and raw cashew nuts. These traditional export crops have long been the main source of Tanzanian foreign exchange earnings, contributing up to 60 percent of the country's total export volume (Bank of Tanzania, 1999 economic Bulletin for the quarter ending June, 1999: 90). Table 2-2 shows export crop production from 2001 to 2006.

Table 2-2 illustrates an increase in sugar, tea, sisal, and coffee production, while the production of pyrethrum, tobacco, cashew nuts, and cotton all decreased in 2006 as compared to 2005. However, from 2001 to 2006, the production of almost all export crops, i. e. cotton, tobacco, sugar, tea, pyrethrum, coffee, sisal, and cashew nuts increased. Except for the production of cotton in 2006, tobacco in 2003, tea in 2003 to 2006, pyrethrum in 2004, coffee in 2005, and cashew nuts in 2002, 2005, and 2006, all export crops decreased in both production and year of output production. This means that the crop amount decreased further in each subsequent year.

**Table 2-2 Export Crops Production 2001-2006 Tons ( '000)**

Crops	2001	2002	2003	2004	2005	2006	Total
Cotton	171,000	178,100	190,153	344,207	378,000	130,565	1,392,025
Tobacco	48,000	59,000	32,693	51,972	56,500	50,617	298,783
Sugar	NA	NA	190,120	223,889	263,317	290,863	968,189
Tea	78,000	81,000	28,028	30,249	30,000	31,348	278,625
Pyrethrum	1,000	1,000	3,000	897	2,500	2,046	10,443
Coffee	43,000	44,000	46,205	51,970	34,334	45,534	265,043
Sisal	22,000	23,000	23,641	26,800	27,794	30,847	154,082
Cashew nuts	95,000	78,000	90,000	100,000	90,385	88,213	541,598
Total	458,000	464,100	603,841	829,984	882,830	670,033	3,908,788

Source: Ministry of Agriculture, Food Security and Cooperatives & National Bureau of Statistics

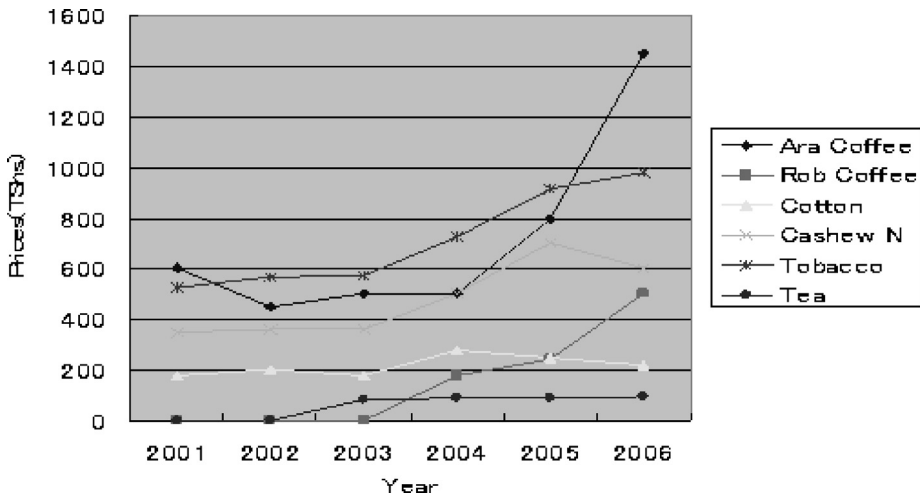
NA=Not Applicable

The decrease in export crop output from 2001 to 2006 was attributable to problems with farm input supplies unpredictable climate and weather conditions (both low and late rains) input and output pricing diseases and pests, marketing and investors jacking the capital investments needed to run some of the export crop plantation businesses. Only the production of sugar and sisal demonstrated a consistent increase every year between 2001 and 2006. This trend was brought about by implementations of a privatization policy, whereby most sugar and sisal plantations were privatized to foreign investors possessing the huge capital investments necessary to run such plantation

businesses.

Tanzania remains heavily dependent on traditional export crops. Cashew nuts, coffee, cotton, sisal, tea, and tobacco currently amount for 21 percent of Tanzania’s total agricultural exports (BOT, 2003). As world prices have trended. Downward an increased production of traditional export crops has not translated into significantly higher farm income. The challenge posed by weak international demand for these crops is further compounded by competition from many Asian and Latin American exporters who have improved their product differentiation and quality, features that wealthy importing countries are increasingly demanding. Figure 2-3 below, illustrates the prices (TShs) per kilogram for major export crops.

Figure 2-3 Prices (TShs.) per 1 kg for Major Export Crops 2001-2006



Source: URT - The Economic Survey - Various Years

### 2. 2. 3 Summary

Pursuant to my chapter 2 discussion about the Tanzanian agricultural sector I will set forth my conclusions below.

First, in section 2.1 mention that the agricultural sector is very important because of its contributions to the GDP, employment, foreign exchange, and daily livelihood. Nevertheless, the amount of cropland in Tanzania per person or household is very small and is cultivated with primitive agricultural techniques, which leads to low productivity and output. An emphasis should be given to the application of mechanized agriculture.

Its use will enable cultivation of a larger area. The application of scientific agricultural methods and techniques can then improve and increase productivity per units of land and labor.

Second, as I discuss in subsection 2.1.2 it is necessary to improve both the quality and quantity of export commodities and food crops. This will on one hand ensure a sustainable national food supply and food security while, on the other hand, present greater global opportunities. Both factors are direct benefits of increasing exports, which in turn generally expand the Tanzanian economy.

Third, also in subsection 2.1.2 I emphasize that the fluctuation of agricultural commodities prices in international markets only further destabilizes those countries like Tanzania that are highly dependent upon cash crop exports.

### **3. PRODUCTION NETWORK AND FOOD SUPPLY PROBLEMS IN TANZANIA**

It may be helpful at this point in the discussion to provide some key term definitions. As used in this paper, the term food supply refers to both the availability and accessibility of food, from the household level to the national level. The term food supply system refers to all processes and activities from the production level on up to the consumer level. The term food supply problems, refers to any problems that occur, whether such difficulties arise at the production level the consumer level, or at any point between. Food supply problems are also anything that hinders the availability and/or the accessibility of food from the household level to the national level. This definition of food supply differs from the World Bank's and FAO's definitions of food supply because my definition takes into consideration the availability and accessibility of food at every level, from individual households to the entire nation. Again, my definition is in contrast to the World Bank's and the FAO's definitions, below, which only consider accessibility to food.

The World Bank defines the food supply as the access by all people at all times to enough food for a active, healthy life." (Where did that quote begin). The FAO Committee on World Food Security defines the food supply as "all people at all timesaving both physical and economic access to the basic food they need."

### 3. 1 Food Transportation and Distribution Infrastructure

Rural infrastructure in general and poor transportation networks in particular have been among the greatest impediments to the Tanzanian food supply, especially in rural areas. Inferior rural roads are one of the major barriers to increasing agricultural development in Tanzania. When roads are improved transportation costs decrease and year round market access becomes possible. Such benefits create incentives for farmers to grow not only their crops, but also their businesses. As agricultural business flourishes, then other rural businesses can also develop, which leads to overall rural social and economic growth. Although the main truck roads between major cities are often in good condition, these roads are scarce. Only 5 percent of the Tanzanian road network is bituminized or paved (National Transport Policy, 2003).

The poor condition of rural roads typically affects the marketability of agricultural products. Because substandard roads increase the risks to any vehicles traveling to the village, few vehicles undertake such travel. Due to high transportation demands the cost of hiring vehicles is high. Many farmers find they are being exploited when the high cost of transporting their crops translates into such high agricultural production costs that de facto make transportation unaffordable to the majority of rural farmers. Rural farmers thus become forced to sell their crops to those middlemen who can afford the transportation costs of moving crops to urban areas. In this way, the agricultural sector largely benefits the middlemen. This situation also leaves most rural farmers without the means to process their own crops or bear storage costs such as fumigation, drying, and packing.

Judging from these facts the improvement of rural roads will positively affect farmers when easy accessibility to markets results in a rise of agricultural products, a decrease in the cost of transportation and a consequent contribution to the food supply, along with a general increase in agricultural performance. As a result of poor infrastructure and social services in rural area, most of the agricultural extension officers who could dispense important advice to farmers about optimal farming approaches are reluctant to remain in rural areas. Instead, these agricultural extension officers choose to live in urban areas. Even those officers who remain in rural areas tend to largely concentrate, on their personal commercial activities rather than advising farmers on best practices for farming. This results in contributing to continued food insecurity in

Tanzania.

The issue of improving transportation and distribution for agricultural production, as well as input supplies, must be an integral part of the nation's food strategy. In most developing countries, the population is thinly scattered and road and rail communications are difficult and costly to maintain.

Transportation rates vary substantially between road and rail, especially over the longer interregional hauls, but the choice between road and rail is often constrained by a shortage of wagons at the loading station. The high cost and limited capacity of Tanzania's transport facilities are major constraints facing its agricultural sector particularly those districts where long distance interregional transport is necessary.

Besides trade facilitation, investing in roads would have larger economic effects. Developing and improving roads encourages economic investment, including in those productive areas that are currently isolated. Roads also facilitate access to social services and networks (Mwingira, 2002). The total magnitude of the cost of insufficient roads to the Tanzania economy is estimated to be 9 percent of that country's GDP (Haule, 2002).

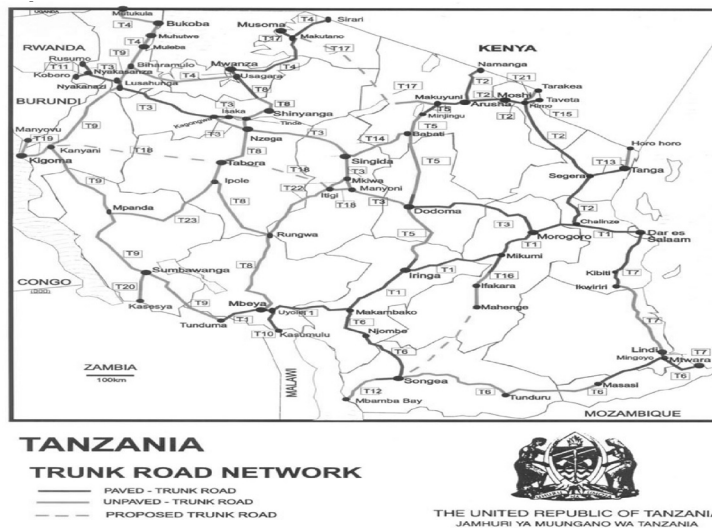
Another roadblock to the Tanzanian Food supply is its farmers' limited knowledge. For instance, the production of agricultural cereal crops has been increasing over the past years. However, farmers continue to lack adequate understanding about food processing and technology for handling their crops crop storage and transportation infrastructures are of such poor quality that large quantities of crops, measured in the tons, are lost during the processes of drying and storage. Still more crops fail to reach their storage sites and market areas because of the unimproved transport network.

Apart from higher transportation costs, poor infrastructure also limits market size and blocks interregional trade between non-capital regions, trade that might provide a viable customer source for easily perishable goods in remote areas. Currently horizontal integration at the markets is underdeveloped and the trade benefits between regional markets other than capital cities are eaten up by high transportation costs. In addition to trade between larger markets interregional trade, access to regional markets from the small village level markets intraregional trade, is dependent upon feeder roads that remain in poor condition. Inferior road conditions can sometimes completely stop tracks from moving through rural regions. The risk of getting stuck is reflected in the seasonal fluctuation of transportation prices to remote locations. Perishable goods suffer from

such delays in transport, which altogether increases the difficulty of trading agricultural products grown in remote locations. That is poor feeder roads block consumers and producers from accessing regional and national markets. This leaves people with very little choice but to rely on subsistence farming. Figure 3-1 and table 3-1 respectively, provide a map of Tanzania's trunk roads network and detail its road network by type and length.

Figure 3-1 and table 3.1 each demonstrate that transportation and distribution networks in Tanzanian are insufficient both in number and condition. Rural road infrastructure is poor and limited in scope. Adding to these difficulties are high transportation costs and great difficulties accessing markets or even market information. As indicated earlier, only 5 percent of road networks are bituminized (paved) and can function as all - weather roads. This means that 95 percent of Tanzanian roads are unpaved and can only be used seasonally. This is especially in true in rural areas, where there are exceedingly few paved roads. All these factors contribute to high costs in both agricultural production and the food supply.

Figure 3-1 Map of Tanzania with Trunk Roads Network



Source: Adapted from TANROADS 2005



**Table 3-1 Roads Network in Type, Length (Km) and Ratio (%)**

Type of Road	Paved (km)	Paved (%)	Unpaved (km)	Unpaved (%)	Total (km)
Trunk roads	3,830	37.2	6,470	62.8	10,300
Regional roads	100	0.4	24,600	99.6	24,700
District roads	30	0.2	19,970	99.8	20,000
Feeder roads	0	0.0	27,550	100	27,550
Urban roads	470	19.2	1,980	80.8	2,450
Total	4,430	5.2	80,570	94.8	85,000

Source: Ministry of Infrastructure Development

### 3.2 Agricultural Productivity

For many years in Tanzania, there has been a trend of stagnating production in the agricultural (peasant) sector. It is suggested that this trend can be understood as a long-term tendency for labor's average productivity to decline while the pattern of land-use intensifies. Land use intensification typically leads to higher output per cultivated unit of land (land productivity) while a gradual labor productivity decline is offset by the number of hours worked. For large parts of Tanzania, however, land productivity has tended towards stagnation and even decline as a result of poor farming methods.

Poor farming methods have important economic, social, and environmental consequences. Per capital agricultural productivity has consistently fallen in Tanzania since the 1970s, and yields of both food and export crops remain well below their potential.

The decline in both labor and land productivity reduces the capacity of the agricultural (peasant) sector to produce the surplus necessary to sustain both the country's food supply and food security as well as provide income and generate employment. Therefore, good farming methods are critical to realizing potential expansion in labor and land productivity, which in turn increases surplus production of agricultural products.

Total productivity growth takes into account all the primary measurable inputs invested in agriculture. This includes labor, land, fertilizer, tractors, and livestock inputs. Productivity growth can be measured as the Solow residual that is a measure of the change in total factor productivity in a Solow growth model. Any discrepancy between ancient agricultural practices and modern technologies must be overcome. Any new technology propagated in rural development must lead to both increased labor and land

productivities. The decline of both labor and land productivity rates largely caused by inferior and primitive farming methods, becomes especially evident during the rainy season. An increasing population urbanization (rural to urban migration), a shortage in agricultural inputs, transportation difficulties in market accessibility and distribution infrastructure problems all contribute to this decline in Tanzanian productivity as well. Table 3-4 illustrates productivity and output data (in percentages) from 1970 to 2000. Land productivity decline sharply, from 3.014 during 1970 to 0.89 during 1990 to 2000 concurrently labor productivity declined from 0.869 during 1970 to 1.47 during 1990 to 2000.

### 3.3 Food Consumption Patterns

Another way of assessing the world's food situation is to see if people's nutrition is improving. Although not a complete measure of nutritional content, per capital calories consumed or per capital calories available for consumption, can be a useful indicator. Increases in domestic food production and imports have assisted these increased levels of per capital calorie consumption. While these gains appear impressive, they cannot lead us to the conclusion that an entire population eats an adequate diet. Averages for all developing economies hide the distribution of calories both within and among economies. Hunger, under nutrition (insufficient food) and malnutrition (an improper balance of food) are serious problems for many people. Under nutrition which is caused by a dietary energy intake below the required minimum level is both obvious and of major concern in many developing economies. Under nutrition is often accompanied by inadequate levels of protein or specific nutrients (Mitchell 1997, 23). Alternatively in industrial economies the principal dietary problem is over nutrition, or malnutrition caused by improper diet composition (Mitchell quoted in FAO, 1987a).

### 3.4 Food Prices

Food pricing is one of the most important measures of the world's food situation since these numbers reflect an overall demand or supply balance. If the price of food rises faster than prices of other goods, it is more expensive for consumers to purchase. A price index relative to income levels is also an important measure of the costs of food. For instance if per capital incomes rise faster than food prices, a declining proportion of

income is spent on food (as the income elasticity of demand for food is less than one).

Food is the largest single expense for most people in developing economies food expenses in these nations often account for more than one-half of a persons total expenditures. In sub-Saharan Africa up to two-thirds of total personal consumption expenditures are dedicated to food. Even in developing countries that have in recent years sustained rapid economic growth food still accounts for one-half of total personal consumption expenditures (Mitchell, 1997: 17).

Food's share in total personal consumption expenditures declines quickly when incomes rises. Economies with lower incomes are likely to spend a smaller share of total food expenditures on food that is consumed at home. The price of food is composed of multiple factors such as the price of raw food products and marketing costs, such as transportation, processing, retailing and preparation. Marketing costs are closely linked to overall price levels within an economy and marketing costs tend to increase at about the same rate as the consumer price index (CPI).

This increase in marketing costs reduces the impact of any changes in raw food prices on retail food prices. Such increase also causes retail food prices to closely follow general consumer prices. As farm values of retail food costs decline, consumers can have a greater influence on their food costs by purchasing food that requires greater or less preparation, or by eating more often or less often in restaurants (Mitchell, 1997: 18-19).

### **3. 5 Crops Price Trends**

The average prices of major crops in the Tanzanian domestic market reflect a mixed trend that is dependent upon supply and demand factors. The tables and figures below illustrate average prices (TShs) per 100 kilograms for the major food crops, as well as average prices (TShs) per kilogram for the major cash crops from 2001 to 2006.

Table 3-2 and table 3-3 show respectively the average prices (TShs) per 100 kilograms for Tanzania's major food crops and the average prices (TShs) per kilogram for Tanzania's major exports crops. The average prices for all major food crops increased almost every year except in 2005, when the price of maize decreased slightly. This was due to a glut of maize imported into Tanzania from neighboring countries. When food prices reach such high levels, they usually hinder the majority of poor households from purchasing their daily food requirements. This problem is compounded

by the situation in which many poor farmers are often induced by increased crop prices to oversell their food harvest in the farmers' attempts to earn money for their daily needs, including healthcare, education, clothing, transportation, and farming inputs those farmers paradoxically create their own food shortage. Overall, average prices for major Tanzanian export crops reflect unstable trends when tracked over a period of years. These crop price fluctuations, however, tend to move crop prices only very slightly upwards or downward. Nevertheless, an exception to this occurred in 2006, when the price of Arabic coffee nearly doubled as the world supply decreased. Apart from that instance, figure 3-2 illustrates food crop output from 2001 to 2006 in tons (000).

**Table 3-2 Average Prices (TShs.) per 100 kg for Major Food Crops 2001-2006**

Crops	2001	2002	2003	2004	2005	2006
Maize	8,120	9,653	13,890	18,470	16,774	26,767
Rice	29,576	27,439	33,430	50,260	51,461	76,830
Beans	34,700	31,500	34,910	39,060	47,637	77,750

Source: URT – The Economic Survey - Various Years

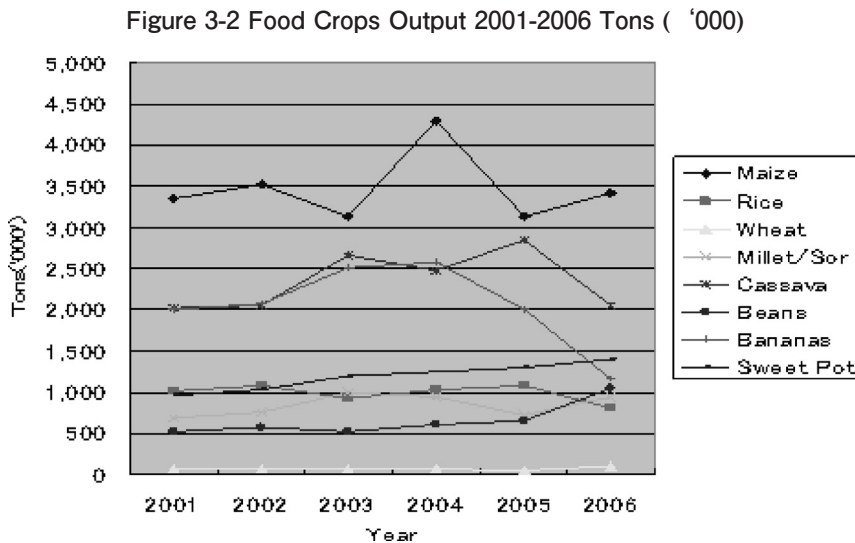
**Table 3-3 Average Prices (TShs.) per 1 kg for Major Export Crops 2001-2006**

Crops	2001	2002	2003	2004	2005	2006
Arabica Coffee	600	450	500	500	800	1,450
Robusta Coffee	NA	NA	NA	180	240	500
Cotton	180	200	180	280	250	220
Cashew nuts	350	360	360	500	700	600
Tobacco	527	567	574	729	918	983
Tea	NA	NA	80	86	90	95

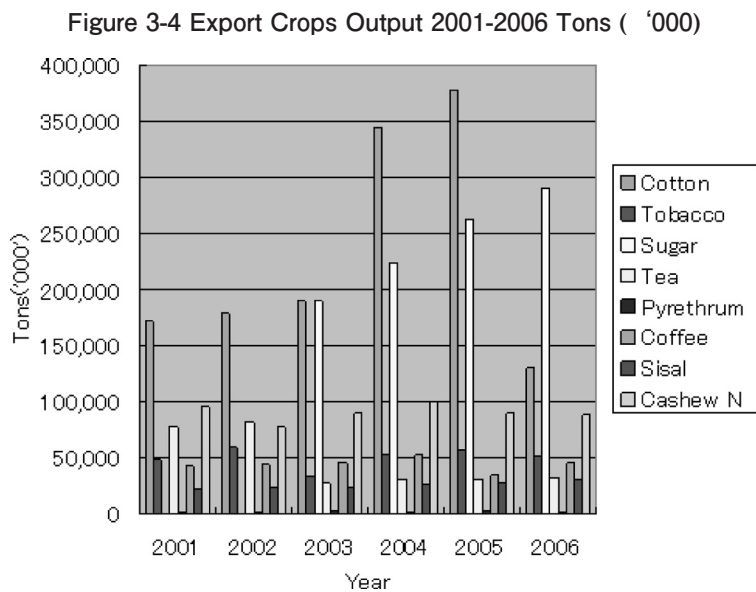
Source: URT – The Economic Survey - Various Years; NA=Not Applicable

Figure 3-2 demonstrates that during 2006, the output of some food crops, particularly wheat, maize, millet/sorghum, beans, and sweet potatoes increased. However, cassava, bananas, and rice (paddy) outputs all declined as compared to 2005 outputs. In almost every year from 2001 to 2006 the maize, rice, wheat, millet/sorghum in 2002 and 2005, cassava in 2006, beans in 2003, and bananas in 2006, all other food crops reflected a production decrease that grew each year. The decrease in food crop production during those years was attributable to problems relating to farms input supplies unpredictable climate and weather conditions (both low and late rains), input and output pricing

diseases and pests. Only the sweet potato output revealed a continuous increase from 2001 to 2006. Figure 3-3 illustrates export crop outputs from 2001 to 2006 in tons (000).



Source: Ministry of Agriculture, Food Security and Cooperatives & National Bureau of Statistics



Source: Ministry of Agriculture, Food Security and Cooperatives & National Bureau of Statistics (2003, 2006)

Figure 3-3 shows an increase in sugar, tea, sisal, and coffee outputs, while at the same time pyrethrum, tobacco, cashew nut and cotton outputs all decreased in 2006 as compared to 2005. However from 2001 to 2006, the output of almost all export crops cotton, tobacco, sugar, tea, pyrethrum, coffee, sisal, and cashew nuts increased. Except for the outputs of cotton in 2006, tobacco in 2003, tea in 2003 to 2006, pyrethrum in 2004, coffee in 2005, and cashew nuts in 2002, 2005 and 2006, all other export crops decreased in annual production. The drop in export crop production during those years was attributable to problems in farm input supplies unpredictable climate and weather conditions (both low and late rains), input and output pricing diseases and pests, marketing, and some investors jacking sufficient capital investments to run their export crop plantations. Only the production of sugar and sisal increased each year from 2001 to 2006. This trend resulted from the implementation of privatization policies. That is most plantations growing these export crops were privatized, sold to foreign investors who possessed the huge capital investment required to run such business.

### 3.5 Income Levels<sup>12)</sup>

As a result of the low salaries paid to agricultural extension officers, most officers, despite their important role in advising farmers about best practices for farming, are not willing to remain in rural areas. Instead, these agricultural extension officers move to urban areas. Even those officers who stay in rural areas concentrate their efforts largely upon their personal commercial activities rather than advising farmers about better farming methods. This lost resource is yet another contributor to continued food insecurities and shortages in Tanzania.

For the majority of Tanzania farmers insufficient income and the inability to meet daily needs are the primary factors affecting food availability. Farmers need to remain flexible to respond to day-to-day problems. Where small-scale farming is the main source of food and a major source of cash income, farmers resolve all their day-to-day problems by managing their store food and their farm crops. Green beans or maize can be harvested and hold to pay for medical services, education, or other needs for household members, even if the farmer's initial goal had been to grow those beans or

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<sup>12)</sup> An income level discussed as income poverty in Tanzania and other developing countries.

that maize for seed. This situation adds to the persistent problem of income shortfall that plagues the majority of Tanzanian farmers.

When household income declines because of the lack of reliable market access for farm produce an even greater economic limitation that of access to food presents itself liberal policies have led to price increase for both goods and services. This increase equally limits the economic capacity to access to food because of the simultaneous increase in the share of household expenditures on non-food items (Njobvu, 2004).

### **3.6 Food Storage Systems**

Post harvest management at both the industrial and community levels is inadequate in Tanzania, because of poor handling and limited facilities. Food storage at both levels results in losses that are reported at approximately 30 percent for cereals and as high as 50 percent for fruits and vegetable during the harvest season of plenty in some communities. These losses are primarily inflicted by the insects, rodents, biochemical and other physical losses that stem from poor handling.

Most of the food storage facilities used by many farmers are technologically substandard and inadequate. These storage facilities are not sufficient durable or reliable to store food crops for long periods of time. Insects and birds very easily breach these food storage facilities. As well in cases where fire breaks out and even during heavy rainfall, food crops are easily destroyed, thus causing food shortages in many areas for Tanzanian families even in good harvest years. Thus the food storage facilities that are available do not provide the necessary sustainability for the country's food supply and food security Tanzanian still lacks food availability, food accessibility, and food utilization in its rural households. The need to change the type of food storage facilities are more reliable and can sustain food for long period of time persists. Such improvements should go hand-in-hand with technological changes in how rural farmers use their food crop storage facilities.

Such difficulties can be overcome either by lengthening the production season for perishables, or by partially or completely processing them into a more concentrated form.

### Storage Requirements

The crop product must be stored so that.

- a. The quality does not deteriorate during storage.
- b. It is secure against pests, diseases, and physical loss.
- c. It is accessible at the time and in the quantity required.

**Figure 3-5 Food Storage Facilities in Tanzania Rural Areas**



Source: Designed by Writer, 2008

### **3.7 Food Processing**

Tanzanian food processing capabilities are inadequate when compared to the requirements essential for enhancing food security at the national and household levels. In order to fulfill the country's production potential, foods, such as livestock products, fruits, and vegetables, have to be available to some extent throughout the year in both urban and rural areas. However, access to food by low income earners has been diminished by the high cost of processed products. Most of the crops produced in Tanzania are sold unprocessed to traditional and world markets. In almost all cases, these crops are processed in the countries that import them and then re-imported into Tanzania. The solution is for Tanzania to process most of its own crops. This crop processing solution has the following advantages; (a) in some cases, processing and



packaging will open new markets for the crop. For example, the primary market for raw cashew nuts is India, but processed cashew nuts, kennels. Have ready markets all over the world. (b) Value is added by processing. In fact, a processed product can be worth as much as three times the price of the raw commodity. (c) Processing may make it possible for products to be sold in the local market. (d) Other advantages include employment generation, ease of storage, including the elongation of shelf life, and transportation.

### **3. 8 Agricultural Marketing and Trade<sup>13)</sup>**

Tanzania food marketing systems appear to be increasingly segmented into two poorly integrate channels. On the one hand, a formal marketing system links commercial farmers to large grain trading, processing, and retailing firms with growing subsidiary distribution networks throughout the country. On the other hand most small scale farmers rely on a more informal marketing. System that is generally characterized by (a) spot market transactions with weak mechanisms for market-based risk management; (b) weak information systems for reporting local market conditions; (c) limited coordination between input delivery, farm finance, and crop sales, all the partial result of poorly functioning input credit systems where non-repayment remains a big problem; and (d) small businesses with relatively little political influence in determining agricultural sector regulations. Tanzania relies on traditional export markets for over 50 percent of its export revenue. Tanzania continues to face price fluctuation problems in the world market for its exports ad deteriorating trade in the agricultural sector.

Food marketing costs account for a large amount of the total cost paid by consumers. Successful strategies can drive down marketing costs and simultaneously raise farmers' incomes which in turn improve poor people's food supply and security and increase their disposable incomes. Policy actions that better integrate both formal and informal food marketing channels in the country can increase competition, provide greater access to the range of less expensive food products preferred by low - income consumers, and improve production incentives for small scale farmers capable of

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<sup>13)</sup> Technology used as technology applied by Tanzania farmers, is very primitive and not mechanized. Therefore, it does not allow intensive massive agriculture production.

growing a surplus. The small scale farming sector's future ability to prosper from maize production and marketing will depend upon strengthening the marketing system that serves small – scale farmers. Such prosperity also hinges upon integrating the informal marketing system with the more developed formal marketing system that has been rapidly expanding in the region. It can be observed that imports outnumber exports, which implies that Tanzania has a trade balance deficit. Thus there is a need to properly allocate available resources to balance this import export gap and avoid overdependence upon other countries. Buy harnessing the comparative advantages of productions and exports, this balance can be achieved.

### **3. 9 Applying Technology**

Deprivation and low standards of living in developing countries are characterized by relatively low levels of labor productivity. The concept of systematically relating production function outputs to different factor combinations of inputs for a given technology is often used to describe the way in which societies provide for their material needs (Michael P. Todaro, 2003: 63).

However, food supply largely depends on the level of technologies employed in food production on farms, including processing and storage. In most developing countries like Tanzania, crop production (including food crop production) is greatly dependent upon the traditional hand hoe wielded by most farmers and their family labor. This technology apart from being crude is inadequate to produce any storage surplus that can be available for distribution as needed. Because of the difficulty in producing such a surplus there is minimal chance for farmers to sell crops and access needed agricultural inputs. Purchase of these inputs would be re-invested in the farms and produce further surplus that could guarantee consistent communal food security. The level of technology employed by rural farmers on their farms is not only limited at the cultivation level but also in the pre-harvest processing of crops and post-harvest crop storage. Most rural farmers in developing countries like Tanzania traditionally process their agricultural crops locally. This results in a massive kilogram loss of grain the drying process is an example of how this loss occurs. Sometimes the crops are store in local storage facilities before they have properly dried. Thus, the still – wet crops rot, making them unavailable for distribution to the people where needed.

The pattern in Tanzania, as well as in other developing countries, has been to attempt to increase production by expanding the area of cultivation instead of focusing upon improving productivity. The productivity of most crops can be increased many fold by adopting improved agricultural practices. First, in order to raise productivity both domestic savings and foreign finance must be mobilized to generate new investments in physical capital. The key to this strategy is human capital that is the development of managerial skills must also be increased investments in education and training. Institutional changes are needed to maximize new physical and human investment potential (Michael P. Todaro, 2003: 64).

Furthermore, educating farm labor can enhance agricultural production as is demonstrated in gross output or transformed on functions and in value – added or profit functions. These effects are frequently referred to as technical efficiency effects, locative efficiency effects, or educational economic efficiency effects (Gardner B. L. and Rausser G. C., 2001: 356).

The Tanzanian food supply both at the household and community levels is typically a function of the type of agricultural inputs used to produce surplus outputs. Agricultural inputs are distributed and sold at prices higher than most farmers can afford. As a result most farmers do not buy improved technology for farming. Instead, they continue to use the traditional production technology that cannot guarantee them the surplus crops necessary to food security. Even those farmers who do manage to buy new technology remain constrained by market uncertainty and sometimes may be forced to sell their produce at low prices, leaving farmers incapable of affording agricultural inputs for the next farming season. In this manner they cycle of food insecurity in Tanzania continues.

Education appears to be a major factor in propelling a long-term rise in the labor productivity, real wage rates, and per capita incomes of market economies. First, when knowledge grows; opportunities arise for individuals to invest in further specialized knowledge schooling, training (Gardner B. L. and Rausser G. C., 2001: 335).

Second, as knowledge grows, so do opportunities to produce new technologies that will then translate into new capital goods and intermediate goods. These innovations are frequently adopted in manufacturing, agriculture, and other sectors (Gardner B. L. and Rausser G. C., 2001: 336).

Most rural farmers in Tanzania know little about basic business skills. In rural

areas traders are generally unable to distinguish between revenues and profits, and thus sometimes they end up eating their own working capital while believing that they are running a profitable business. This lack of entrepreneurial skills is also a constraint for farmers who have traditionally produced the same crops but only sought their markets at harvest time when market demand is low and prices have fallen.

### 3. 10 Summary

In chapter 3, I examined the dual problems of the Tanzanian production network and food supply. Below I set forth my conclusions.

First, in section 3.1 describe how food transportation and distribution networks are often inadequate to the task of ensuring the availability of sufficient food at the local level. Trends in food crop production and supply are affected by Tanzanians severe internal transportation and distribution problems as well as other related infrastructure deficits in rural areas. To improve and maintain food crop production and supply priority must be given to improving and developing national transportation and distribution infrastructures as well as other infrastructures that facilitate product movement from rural production areas to market areas of consumption.

Second, as I discuss in section 3.2 there is generally no serious application of mechanized agriculture that would enable cultivation of a large area and increase agricultural output per unit. Thus, the need remains to apply scientific methods and agricultural techniques to improve productivity per units of land and labor. In other words, Tanzanian agriculture has to date been dominated by stallholders (peasants) cultivating very small areas per family. As a result those farmers, with their primitive production methods have generated small outputs and remained dependent upon rain-fed agriculture.

Third, also in section 3.3 I emphasize that, in assessing the food situation, we need to determine whether people's level of nutrition is improving. Although it is not a complete measure of nutritional content, per capital calories consumed or available for consumption can be a useful indicator. Increases in domestic food production and imports will assist These increased levels of per capital calories consumption. While these gains are impressive, they nevertheless cannot lead us to the conclusion that an entire population has access to an adequate diet.

Fourth, apart from that, in section 3.4 I also mention that the global market price fluctuations in agricultural commodities increase the instability of countries like Tanzania, a developing nation that is highly dependent on cash crop exports. Price stability is extremely crucial in determining what gets produced. Just as unstable prices discourage farmers from producing crops, stable prices generally offer incentives to agricultural producers to increase their crops. In this way, price stability becomes a catalyst stimulating agricultural producers to increase their production.

Fifth as I explain in section 3.5 insufficient income and the needs for cash flow among the majority of Tanzanian farmers are primary factors affecting food availability and accessibility. Most of the agriculture extension officers, people who play a critical role in advising farmers about best farming practices are unwilling to remain in rural areas. Instead these officers, hampered by their own low salaries, choose to live in urban areas. Many farmers cannot afford to buy the necessary agricultural inputs, including agricultural machinery that would increase their food and export crops. For these reasons including inadequate income and cash flow deficiencies, many households are unable to meet their own food requirement.

Sixth in section 3.6 I describe how Tanzanian farmers continue to lack improved knowledge about food crop handling technology. Therefore, most rural farmers still use substandard storage facilities. These poor storage systems result in the direct loss of large crop quantities measured in tones, during the drying and storage processes. Still other crops altogether fail to reach storage sites and market areas because of unimproved transportation and distribution networks. In order to solve the twin problems of food supply and agricultural production much need to be done to improve and strengthen the big crop storage facilities. If these improvements are accomplished, individual households can be empowered to store their own large volume of crops. This will in turn increase food crop availability and accessibility.

Seventh, in section 3.7 I describe how both food and export crop processing facilities remain inadequate. Most crops grown in Tanzania are sold unprocessed to traditional and world markets. In almost all cases, these crops are processed in the countries that import them and then re-imported into Tanzania. The solution lies in improving processing facilities for both Tanzania food and export crops. Small scale food processing enterprises can contribute greatly to both food supply and rural economic development.

The value added to agricultural produce from the point of production to the consumer's household through processing storage and trading is very significant. Rural based, small – scale food processing enterprises can play a major role in retaining some of this added value in rural economies. This fees both income and employment generation.

Eighth in section 3.8 I explain how poor marketing and pricing policies lead to no profit or extremely little profit to farmers. Tanzania suffers formats generally weak market infrastructure, one that lacks market information about prices and input costs as well as the availability of transport and storage facilities. The development of competitive markets requires that a foundation of market institutions be in place, as well as essential public goods and services. Sustainability requires infrastructure, including financial services, technology and information services, marketing services, and business skill development through training.

Ninth, in section 3.9 I emphasize how the food supply depends heavily upon the level of technology employed to produce both food and export crops. Current farm technology in Tanzania largely consists of the traditional hand hoe being wielded by most farmers and their family labor agricultural production in Tanzania still uses primitive non – mechanized methods of production. This technology part from being crude is also inadequate for producing the necessary food surplus for storage and distribution to other places.

Therefore, pursuant to the chapter 3 discussion of production network and food supply problems in Tanzania, I draw the following conclusions. Food supplies are highly influenced by economic factors such as transportation and distribution, food pricing income levels, food consumption, agricultural marketing, and technologies employed agricultural extension services, food storage systems, and food processing facilities. Transportation, distribution and agricultural marketing are the basic and most important issues requiring attention. These are the functions driving the engine of the sustainable development sector.

Analysis on the relevant collected data reveals that in Tanzania there is a positive relationship between the food supply as a dependent variable and other economic variables, such as food transportation and distribution infrastructure, food pricing income level, food consumption patterns, agricultural marketing and trade, technologies employed agricultural extension services, food storage systems and food processing

facilities, which function as independent variables. Systemic inadequacies in these independent variables severely constrain both food supply and agricultural development in the country. Again, transportation and distribution and agricultural marketing are the important basic building blocks. These act as the engine for the sustainable development sector. Without addressing these issues, the engine of development stalls.

#### **4. SUMMARY AND CONCLUSIONS**

First, in chapter 1, section 1.1 I describe how the food supply problem in Tanzania and other developing countries is highly sensitive to multiple factors, including food transportation and distribution, food prices, income level, food consumption patterns, agricultural marketing and trade, technologies employed agricultural extension services, food storage systems, and food processing facilities. Inadequacies in these areas decrease agricultural productivity while accelerating hunger, food shortages, food insecurity, and poverty at the national level; these inadequacies also create overdependence upon other countries.

Second, as I explain in section 1.3 many other researchers and scholars have been addressing the agricultural and food supply problems in Tanzania in conjunction with discussions of poverty reduction, economic growth and development issues. Whereas these researchers' and scholars' focus has been on poverty reduction, economic growth and development this paper's original contributions in providing a comprehensive analysis of all economic constraints impacting the food supply in Tanzania, this paper focuses on the basic and important economic factors that are causing that nation's severe food supply and agriculturally related problems. Therefore, this paper's findings have great significance to both policy and decision makers who are working to solve Tanzania's food supply related problems.

Third, in section 2.1 I mentioned that the agricultural sector, with its contributions to GDP, employment, foreign exchange, and daily livelihood is very important. However, the amount of farmed land per person or household is very small, and it is cultivated with primitive farming methods that lead to low productivity and output. Emphasis should be given to the application Mechanized agriculture, which will then enable cultivation of a larger area. The application of scientific methods and more advanced

agricultural techniques will improve and increase productivity per unit of are and labor.

Fourth, as I explain in subsection 2.1.2 on the one hand there remains the need to improve the quality and quantity of both export commodities and food crops to ensure a sustainable national food supply and food security. On the other hand, these improvements provide opportunities to compete in the global market with increased exports thus generally expanding the economy.

Fifth, also in subsection 2.1.1 I emphasize that the global fluctuation of agricultural commodity prices increases instability in places such as Tanzanian, developing countries that are highly dependent on cash crop export.

Sixth, in section 3.1 I mention that existing food transportation and distribution networks are often unable to ensure the sufficient availability of food at the local level. Food crop production and supply trends are affected by severe problems in internal transportation and distribution and other related rural infrastructure. To improve and maintain food crop production and its supply, priority must be given to improving and developing transportation and distribution infrastructures, as well as other facilitating infrastructure that moves crops from the rural areas where they are produced to the market areas where they are consumed.

Seventh, as I explain in section 3.2 generally there is no serious application of mechanized agriculture in Tanzania that would enable cultivation of a large area and thus increase agricultural output per unit of land. Therefore, there is a need to apply scientific methods and agricultural techniques to increase the productivity per units of land and labor. To date, agriculture in Tanzanian has been dominated by smallholders (peasants) and each family ahs cultivated a very small area. Such approach, with its very primitive methods of production, has also resulted in a very small output. A dependence upon rain fed agriculture is a further limiting factor.

Eighth, also in section 3.2.1 I emphasize that when assessing the Tanzanian food situation we need to determine if people's nutritional levels are improving. Although it is not a complete measure of nutritional content, per capital calories consumed or available for consumption, can be a useful indicator. Increases idiomatic food production and imports have assisted these increased levels of per capital calorie consumption. While these gains are impressive, they nevertheless cannot lad us to a conclusion that the entire population has an adequate diet.



Ninth, in section 3.4 I mention that global price fluctuations for agricultural commodities increase the instability of countries like Tanzania, developing nations that are highly dependent upon cash crop exports. Price stability is crucial in determining what gets produced. The greater a crop's price stability the more incentive exists for its production, which then benefits both agricultural producers in particular and the nation in general. Hence, while price stability functions as a catalyst, stimulating agricultural producers to increase more profitable production, unstable prices have the opposite effect.

Tenth furthermore as I explain in section 3.5 for the majority of Tanzanian farmers, inadequate income and cash flow needs are the primary factors that affect food availabilities and accessibility. Most agricultural extension officers' people who play a critical role in advising farmers about best farming practices are unwilling to remain in rural areas. Instead these agricultural extension officers live in urban areas, hampered by their own low salaries. Moreover, many farmers cannot afford to purchase the agricultural inputs and machinery required to increase food and export crops. Therefore, many householders remain unable to meet their own food requirements, trapped in a cycle of insufficient income and inadequate cash flow.

Eleventh in section 3.6 I emphasize that farmers in Tanzania continue to lack improved knowledge about food crop handling technology. Therefore, most rural farmers still use substandard storage facilities. These poor storage systems result in the loss of large quantities of crops, measured in tonnes, during the processes of drying and storage. Still more crops fail to reach storage sites and market areas due to the unimproved transportation distribution network. In order to solve the twin problems of food supply and agriculture much will need to be done to improve the storage system by strengthening facilities so they can handle large scale crop storage. Success in this arena can then enable the storing of large crop volumes per household, thus increasing food availability and accessibility.

Twelfth, in section 3.7 I mention that both food and export crop processing facilities remain poor. Most crops produced in Tanzania are sold unprocessed to traditional and world markets. In almost all cases, these crops are processed in the countries that imported them and then re-imported into Tanzania. The solution lies in improving processing facilities for both the food and the export crops produced nationally. Small –

scale food processing enterprises make a great contribution to both the food supply and rural economic development. A very significant value is added to agricultural produce as it moves from the point of production to the consumer's household through processing, storage and trading. Rural-based, small-scale food processing enterprises can play a major role in retaining some of this added value within the rural economy leading to income and employment generation.

Thirteenth, in section 3.2 I explain that poor marketing and pricing policies lead to no profit or very little profit to farmers. Another detriment to farmers is the weak market infrastructure that is a dearth of market information, including pricing and input costs, lack of transportation and inadequate storage facilities. The development of competitive markets requires supportive market institutions and adequate provision of essential public goods and services. The market sector requires financial services, technology and information services, marketing services, and the development of human capital through training.

Fourteenth in section 3.9 I emphasize that food supply greatly depends on the level of technology used to producers both food and export crops. Current farm technology in Tanzania largely relies upon use of the hand hoe, which is wielded by most farmers and their family labor. In other words, agricultural production in Tanzania continues to use primitive or non-mechanized methods of production. This technology apart from being crude is also inadequate for producing surplus for storage and later distribution as needed.

In chapter 3 I discuss the Tanzanian production network and food supply problems. My conclusion is that the food supply is highly influenced in Tanzania by economic facts such as transportation and distribution, food pricing income levels, food consumption, agricultural marketing, technology agricultural extension services, food storage systems, and food processing facilities. Transportation distribution and agricultural marketing are the basics of the food supply network. They function as the engine of the sustainable development sector and are therefore the most important to change and improve.

According to analysis conducted on relevant collected data there is a positive relationship in Tanzania between the food supply as a dependent variable and other economic independent variables such as food transportation and distribution infrastructure, food pricing, income level, food consumption patterns, agricultural

marketing and trade, technologies, employed agricultural extension services, food storage systems, and food processing facilities. When these variables function inadequately, they severely constrain the development of the Tanzanian food supply and its agricultural development again, transportation and distribution and agricultural marketing demand immediate work because these systems form the basics of the sustainable development sector.

## 5. POLICY RECOMMENDATIONS

In this chapter, based upon the research and analysis conducted in this study, I make my recommendations. I would like to emphasize that the following recommendations take into account points previously elaborated in this paper. In short, if priority can be given toward rural transportation and distribution infrastructures, the application of mechanized agriculture, improvements in both the quality and quantity of output, and the formation of strong small to medium sized farmers groups these measures will automatically solve the problem food supply and benefit development in the agricultural sector.

First, as previously set forth, this paper's contribution is in providing an original comprehensive analysis of economic constraints impacting the food supply in Tanzania. A basic yet important selection of economic factors is responsible for the food supply and agriculturally related problems in the country. Therefore, the arguments raised and solutions I offer therein have great significance to both policy and decision makers in their work toward solving food supply related problems. Many other researchers and scholars have been addressing the twin problems of agriculture and food supply and have been discussing the issues of poverty reduction, economic growth, and development. Those researchers and scholars; focus, however has shone only on poverty reduction economic growth and development.

Second, rural transportation infrastructures should be given first priority in any governmental policy implementation. This important infrastructure is the foundation for developing all economic sectors in the country. In a country like Tanzania, the agricultural sector is the most crucial sector. In developing nations, the economy depends heavily on output from its rural sector. It should be noted that a strong rural

transportation infrastructure enables sustainable, reliable and effective distribution of food supply and other agricultural products within a country. In addition, effective rural transportation network increases food accessibility rates, as well as those of others agricultural outputs. The key to food accessibility rates is market accessibility and market information. Further, rural transportation helps to reduce the current wastage of food crops and other agricultural products that are not now accessible and marketable because of Tanzania's limited and substandard rural transportation infrastructure in order for developing countries to solve these problem of food supply, food insecurity, and other related issues, transport accessibility, market accessibility and market information should all be accorded great importance regardless of the type of economy. The key is enabling the efficient distribution of food crops and other outputs from the point of production (surplus) to the needed (deficit) area.

Development of rural transportation infrastructures automatically benefits agricultural inputs distribution, which in turn is crucial to development the use of mechanized agriculture. Farmers who cultivate larger land areas using scientific agriculture methods will improve and increase their agricultural output productivity per units of area and labor. In addition when rural transportation infrastructures are properly developed, then food pricing income levels, food consumption patterns, agricultural marketing and trade technology, agricultural extension services, food storage system, and food processing facilities will all automatically be sustainable regulating. The food supply, specifically, and rural development in general, will benefit from the development and proper functioning of rural transportation infrastructures.

Third, indeed, emphasis should be given to mechanized agriculture, the application of which enables cultivation of a larger area. As previously discussed, agricultural scientific methods can improve and increase productivity per units of land and labor. In this way, both individual households and the nation as a whole will increase agriculture output. Such progress results in greater food supply stability, allows a surplus to be exported, and generates further economic stability while simultaneously reducing economic dependence upon other countries. Economic self-reliance is possible in a country like Tanzania.

Fourth, while on the one hand it is necessary to improve the quality and quantity of both export commodities and food crops to ensure a sustainable national food supply

and food security, on the other hand, such improvements will also prevent winning opportunities in global markets. These improvements should be implemented in every stage: from production, harvesting, storage, processing, packaging, and distribution, right down to the final consumers. Foreign currencies will increase with the additional value of higher quality products, which in turn reduces the balance deficit. In this manner, national economic stability enables the importation of other foods, especially valuable during any food shortage caused by natural disaster.

Fifth, there is a need to form small farmers can start each group. They can formulate their own rules and regulations to best guide their organization for the benefit of all its members. This type of group is important because it can lead in various ways, such as strengthening bargaining and negotiating powers in pricing and market issues to over all increased economic power for the groups' members.

Through the exercises of such groups agricultural production will increase as the result of farmers' abilities to access modern mechanized agricultural farm inputs. These steps will decidedly result in a subsequent increase in agricultural productivity though both labor and land productivity increases.

The formation of farmers groups makes recourses more easily accessible. Working together, farmers can access:

- Financial institutions that offer joins and credit to serve as initial financial capital
- Loans and credit for agricultural inputs such as tractors, fertilizers, pesticides, insecticides, etc.
- Market and price benefits that result from the group's collective strengthened position, including increases in both bargaining and negotiating powers not available at the individual level.
- Strong and reliable storage and processing facilities developed from technical utilization of the groups increased financial capital.

In this manner the agricultural sector can grow rapidly, develop sustainable, and reach stability in Tanzania, a stable food supply, food security, and general national economic, growth such as standard of living and quality of life concerns, are obviously all issues on the table.

Meeting the following criteria best serves the small-to-medium-sized farmers groups:

- Each farmers group should have a minimum of 10 members' farmers.
- Each farmers group should be operated under profit maximization.
- Each farmers group should provide all its group members with equal benefits, rights, and treatment.

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