Appendix F

Marketing and Agro-Economy

THE STUDY
ON
THE NATIONAL IRRIGATION MASTER PLAN
IN
THE UNITED REPUBLIC OF TANZANIA

MASTER PLAN

APPENDIX F

MARKETING AND AGRO-ECONOMY

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MARKETING AND AGRO-ECONOMY

CHAPTER 1 MARKETING

1.1 Introduction

This section provides an overview of the present conditions of marketing of major food crops in mainland Tanzania. To get a proper picture of these conditions the section presents (i) a summary of the trends in supply and demand conditions over a period of years, (ii) the distribution systems prevailing, and (iii) the pricing mechanisms and structures operating for food crops in mainland Tanzania. One also needs to get a picture of who are the major players in the marketing of food crops including the role of the government in facilitating the functioning of this sector.

The marketing conditions prevailing at the moment are far from perfect and an analysis is made of the weaknesses in the system including the main constraints that affect the proper functioning of this sector. The focus of this report is also on the major food crops, which are the cereals: maize, sorghum, millet, rice and wheat, and the non-cereals: pulses, cassava, bananas, and potatoes. Situational conditions and the differences in the nature of the crops have resulted in variations in the way they are marketed and hence the report will start with general conditions and move to crop-specific analyses.

1.2 Present Condition

1.2.1 Marketing Channel of Staple Foods

Preamble

This report on the marketing distribution systems covers the (i) marketing channels and (ii) physical distribution. Channel dynamics include the major producers who are at the top of the structure, the intermediaries, and the final consumers. A discussion is also presented on transfer of ownership and risk assumptions. Physical distribution includes transportation and storage facilities as well as an overview of the physical infrastructure for transportation.

The distribution of the selected food crops from producers to final consumers follow a multi-channel structure ranging from direct marketing to intensive

distribution involving several intermediaries. The distribution structures also vary with location. Three major categories exist depending on the location. (a) Those where produce is targeted for major urban areas (cities and municipalities such as Dar es Salaam, Mwanza, Arusha, and Tanga). (b) Those targeted for smaller urban areas (district towns). (c) Those found in rural areas.

Producers

The major producers are small-holder farmers and a few medium to large scale farmers. For the case of rice for example, it is mainly small holder farmers some of who are assisted by the Agricultural department in certain areas (Mbarali-Mbeya and Kilombero). Wheat is cultivated at a larger scale in Arusha region in the North. Peasants and small-scale farmers almost exclusively produce Millet and Sorghum.

The main surplus regions for maize are Iringa, Mbeya, Rukwa and Ruvuma, which collectively supply most of the country. Rukwa mainly supplies the North-Western Region, which also receives maize from Moshi and Arusha. Most of the maize from Iringa and Mbeya is destined for Morogoro and Dar es Salaam. Dodoma receives most of its maize from Iringa, Singida and Arusha, whilst the main source of supply for Lindi and Mtwara in the south, is Ruvuma.

Intermediaries

Trade in food crops in rural areas is mainly by direct marketing where producers sell directly to consumers. In places where crops are produced in surplus petty traders serve as intermediaries by purchasing them directly from producers and later selling them at retail or other retailers in areas where there is a big demand. This is usually in urban centers. What is distinct about the food marketing intermediaries in all urban centers in the country are the retailers operating in the 'masoko'. These are the semi- open-air multiple food stalls located in areas designated by municipal authorities. For most urban dwellers they form the key link between producers and consumers especially for foodstuffs like pulses, bananas and potatoes.

In larger urban areas, especially in Dar es Salaam, there are specialized wholesalers. These have taken over the role played by the former National Milling Corporation (NMC), a state owned company, that monopolized this activity in the previous socialist centralized economy. At present the most prominent wholesaler of cereals is a company called AZAM Enterprises. This company operates extensively throughout the country and has elaborate transportation and storage facilities. The company has also bought most of the facilities that were

formerly owned by the NMC. Food crop marketing in the country is not handled by cooperative societies which have focused solely on cash crops.

There are more intermediaries involved in paddy (rice) marketing partly because of the greater demand this cereal has from the more affluent citizens and the higher prices it fetches as a result. Rice is not a staple of the Tanzania populace when compared to maize, and it is mainly out of the regular reach of most people. Rice is also not produced in as great quantities as maize in the country and there are considerable variations in grade quality. Bananas, potatoes and peas, which have very short shelf lives, are normally sold directly by producers and in surplus areas, petty traders do most of the selling direct to consumers.

Customers

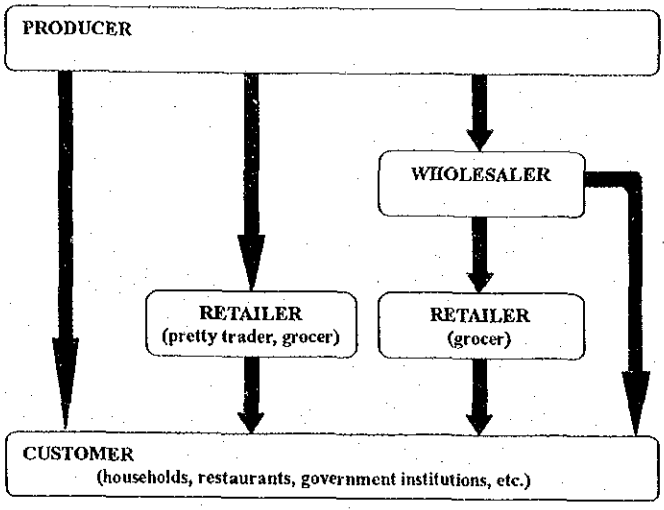
The main form of consumption is at the household level for most of the cereals and non-cereals. However, this should not obscure the fact that a significant amount of surplus production is purchased by institutional and organizational buyers. Restaurants, hotels, schools, colleges, hospitals, and the army are examples of customers who purchase these produce at quite a large scale.

Channel Structures

Direct marketing and a large number of small traders, operating from main producing areas and urban centers (FAO 1999) characterize maize marketing in Tanzania. Domestic trade is mostly undertaken directly between traders and producers with a limited role played by middlemen. In the main surplus areas retailers take on the functions of intermediaries (inter-regional traders and wholesalers) as in normal years there is easy access to plentiful supplies. In areas where there is usually a deficit in maize, however, there is clearer distinction between producers, traders and retailers. The presence of bigger specialized wholesalers is largely confined to Dar es Salaam.

Millet and Sorghum marketing is almost exclusively characterized by a large number of small traders, again, operating from main producing areas and urban centers. Rice marketing has characteristics of both the presence of many petty traders as well as wholesalers who mainly supply retailers in urban centers. In case of Wheat, the marketing cannel is differs from the other cereals' one. Wheat is first sold almost entirely to large grain millers who process grain and package flour for selling to urban retailers or wholesalers. The structures of the channels may be depicted by the chart in the figure below.

Marketing Channel



1.2.2 Marketing Facilities

The physical exchange process in the marketing of the major cereals in rural areas takes place mainly through periodic food market fares, which usually take place once to three times a week. They are commonly called 'gulio', and its where producers from neighboring villages meet to sell their surplus produce. Exchanges can be in cash or in barter form. It is also at these 'gulios' where petty traders mostly from urban centers come to hawk their factory wares and/ or purchase the produce in order to resell it at the cities.

In urban centers physical exchange of cereal and non-cereal produce occurs mainly at the open food stalls (masoko), or at grocery retailers. . The local authorities own and maintain the premises housing these 'masokos' including taking care of sanitation although the efficiency with which they carry out these activities is very poor. In general there is no formal packaging unless one buys in larger quantities such as 100-kilogram sacks. The advantage of the cereals is that they have longer shelf lives compared to potatoes, bananas, and pulses.

Transportation

Transportation of the major cereals and non-cereals in the country is done by various means. This ranges from the use of human couriers and bicycles to pickup trucks, buses, and heavy-duty lorries for inter-district/regional transportation. The former are mainly practiced where distances are short and it is common for producers themselves to perform the carrying (women usually carry produce on top of their heads). The latter is done for longer distances in which the price of the produce will obviously have to include the additional costs of transportation.

The main impediments to transportation of cereals from surplus to deficit regions are the extremely large distances and the agro-diversity of mainland Tanzania. The flow of food from surplus to deficit regions is heavily constrained by grossly inadequate transport systems and insufficient haulage capacity, vehicles and rail wagons (FAO/WFP 1999). Most commercial transporters operate out of Dar es Salaam, along main routes, and have little incentive to transport food grain to remote and distant areas, where roads are difficult, markets restricted and purchasing power generally low.

Storage Facilities

The storage facilities for most cereals are far from perfect. At the small holder level, producers store grain in traditional silos whose sizes are roughly equal to the one room huts that peasants occupy. A silo might have the capacity to store the equivalent of between 10 and 40 one hundred kilogram sacks of grain. This method of storage is vulnerable to some degree of pests.

1.2.3 Price Fluctuation of Staple Foods

In contrast to cash crops such as coffee, tea, and cashew nuts, there is currently no institution that is mandated to control the marketing of food crops. The pricing of all food crops in Tanzania is completely market determined, since the time the government liberalized the marketing of most agricultural products. Prices therefore depend on the supply-demand situation and for many of the foodstuffs they fluctuate considerably according to seasons of the year. High and sometimes exorbitant prices are common during seasons of high demand for food crops and low prices during the high supply season. In urban areas the prices of commodities such as rice, cassava, bananas, potatoes, and pulses also generally shoot up during the Muslim month of fasting known as Ramadan. The pricing problem is compounded by the unavailability of facilities such as packaging and temporary storage, which leads to an unstable pricing system. Monthly fluctuations of maize, rice, and beans wholesale prices for the period July 2000 to December 2001 may also be seen in the tables in Table 1.2.1, 1.2.2, and 1.2.3 and Figure 1.2.1 present a graphical illustration of the fluctuations.

Prices in Relation to Production Costs

In previous times, the government used to subsidize small holder farmers on the purchase of fertilizers and seeds during the planting season, as well as pesticides. At present all the costs of production are borne by the farmers and many are not able to purchase artificial fertilizers in the required quantities, or prepared seed for

planting. For those who do purchase these and other inputs, the costs are considerable in relation to the prices. Since the prices are market determined, farmers have little room to maneuver on setting profit margins and the outcome is that many small holder farmers hardly realize any meaningful profit.

1.2.4 Problems and Constraints

The marketing of foodstuffs in Tanzania Mainland has a lot of problems facing this sector and the solution to these problems is probably not to be found in the short term. Among the major problems facing the efficient functioning of food crop marketing in the major cereals and non-cereals is the unregulated market which mainly disadvantages the small producers, most of whom are semi-literate. Other major constraints are the underdeveloped transportation infrastructure, poor storage facilities, and absence of market information and promotion.

Small and medium sized producers are also facing a lot of problems in terms of financing and insurance. This is especially so when it comes to obtaining vital inputs or when they face adverse conditions. There are also natural physical constraints such as the diversity and vast geographical terrain as well as the erratic weather patterns, which are often experienced, in non-periodic cycles. From the motivational point of view, these factors and the country's historical past serve as disincentives to small holders to produce food crops in greater surplus. Finally, from the consumer point of view, the problems they face mainly center on their vulnerability to exploitation in the form of hiked prices and sometimes limited product choices as a result of the periodic fluctuations in the supply-demand conditions.

An Unregulated Market

There are no guidelines regulating the local market and therefore trading in foodstuffs follows its own heuristic path. The authorities in most areas do not have clear regulations or guidelines for the collection and distribution of cereals and other major food crops. Exceptions exist in a few cases and mainly on an ad hoc basis where district authorities may impose some restrictions on the trading of some cereals. For example, in Handeni district (in Tanga region), which grows maize in large quantities, road blocks are set up for a good part of the year after harvests, to prevent traders from ferrying maize destined for the neighboring country of Kenya. The move is intended to protect the peasants from being lured to sell their own reserves at the risk of facing starvation later on in the year.

In urban areas what the local authorities do is mainly to impose license fees on

traders with fixed premises such as food stalls (masoko) and groceries. Other than that there little else done in terms of quality inspection and consumer protection. The government also takes very little interest in monitoring the trading of maize, rice, cassava, and other foodstuffs unless there is a serious crisis. For example, when there are acute and prolonged shortages, such as in years of famine, the Strategic Grain Reserve (SGR) is utilized to alleviate these shortages. The capacity of SGR is however very limited and often it is subsidized by imports and food aid from United Nations' organizations.

Underdeveloped Infrastructure and Poor Storage Facilities

Infrastructures such as feeder roads are not very well developed. The country has a total of 88,200 kilometers of highways of which only 3,704 kilometers are paved (CIA 2001). During the rainy seasons many places are inaccessible to motor vehicles. Rukwa region for example, which is one of the "big four" grain basket regions has for many years been unable to sell its surplus maize due to its remote location and poor roadways leading to the region. As a result, maize has been rotting in farmers stores causing considerable loss to the producers while people in Dodoma region have been reported to have died of starvation (Guardian 2000).

Most small-holder producers still do not have adequate capital to be able to construct and maintain modern storage facilities. They still use traditional methods of constructing "vihembas" or "echitalas" and/or storing grain or beans in the attics of traditional residential huts. The produce is severely vulnerable to rodents and pests which deplete the stock often up to a quarter of its original volume. Many traders in urban centers also do not have modern facilities such as silos store sufficient quantities of grain that can remain un-infested for long periods. Most just have ordinary warehouses where grain stocks are stored in gunny bags.

The situation is worse for products like bananas and potatoes, which have short shelve lives. Typically, when these are harvested, they have to be transported within three days to one week if their destined for distant regions such as Dar es Salaam. They also have to be sold within a short period otherwise they will decay. This is because transport trucks are not refrigerated and the retailers do not possess enough capital to invest in refrigeration facilities at the point of sale.

Absence of Market Information

The small holder farmers in the cereal and non-cereal marketing system do not have formal and reliable means of communicating their offers or of obtaining information about prices and other related information. They cannot get timely

information on where their produce can fetch competitive prices and the general trends in production and demand for their produce. It has created opportunities for many intermediate middlemen to buy products at cheaper prices from producers and resell them at exorbitant prices. These middlemen travel to the producers and succeed to obtain large quantities cheaply because the producers are lured by the immediate 'lump sum' rewards that are dangled before their eyes.

Financing and Insurance

Small holder farming is faced with a lot of risks that impede the proper development of this sector. Producers do not always have assured markets for their produce. There is a serious lack of agricultural credit facilities because of the reluctance of financial institutions to offer credit to this sector, which is considered to be of very high risk (Kilindo 2002). For the case where credit may be available, small-scale farmers are discouraged by the high interest rates charged. Another impediment is the lack of collateral as most farmers lack title deeds for their farms. The formal banking system therefore finds little use in financing agricultural production, trade and agribusiness, besides, the rate of loan repayments from farmers is very low.

Physical Hazards

The physical hazards that confront the marketing of staples in mainland Tanzania include the unpredictable weather pattern, which often tends to be adverse. In rainy seasons a lot of inland roads become inaccessible, and therefore cannot be ferried to high demand areas. It often ends up rotting because of the poor storage facilities. In times of drought, the shortages result in hiked prices which tend to affect both producers and consumers. Other hazards are not exactly physical , but as a result of poor storage facilities, a lot of produce is damaged by pests, particularly rodents.

Economic Motivation

The economic motivation for producing surplus by small scale farmers is often not there, particularly because of the lingering effects of a state controlled economy in which producer prices were determined by the state. The colonial legacy whereby settler farmers were favored and local ones discouraged to progress might also still have some effect on farmers' motivation to produce surplus. There is also a lot of informal trading in staples with neighboring countries.

Consumers' Vulnerability

Consumers have very little influence about the marketing and pricing of the major staples. This is because supply has rarely outstripped demand and the lack of a mechanism which can effectively provide information to consumers regarding the availability of alternatives in terms of quality and price. Consumers are therefore mostly at the mercy of distributors who often charge as high margins as is possible given the prevailing market situation.

Lack of Incentives to Produce Surplus

The socialist ideology that was inculcated in Tanzanians has made traders to be seen as pariahs for decades. This contradiction can partly explain why food production in the country has remained primarily a subsistence activity and why surplus production for sale has been difficult to encourage (Wye 1999). Difficulties in encouraging smallholders to produce for markets have arisen from a fundamental mis-match between the motivation of the state and the markets on the one hand and the peasant farmers on the other. Much of the activity in relation to food crop production and marketing is not necessarily motivated by a purely economic logic.

Two other factors which account for low cereal production within most of the small holder sectors is also rooted in the colonial legacy which shaped the evolution of the food production and marketing systems in Tanzania. First, the controlled marketing system which is now being dismantled through economic reform programs, and secondly, the deliberate policies of undermining the efficiency of small holder producers to protect large scale settler farmers during the colonial era (Kujeke 1998).

In summary, it may be concluded that the production and marketing of major food cereals and non-cereals will develop after concerted efforts are made by the government and other interested organizations in creating a conducive environment that will assist small holder farmers to be encouraged to produce more. Also, that the distribution system is facilitated so that produce can be efficiently transported from surplus to deficit regions.

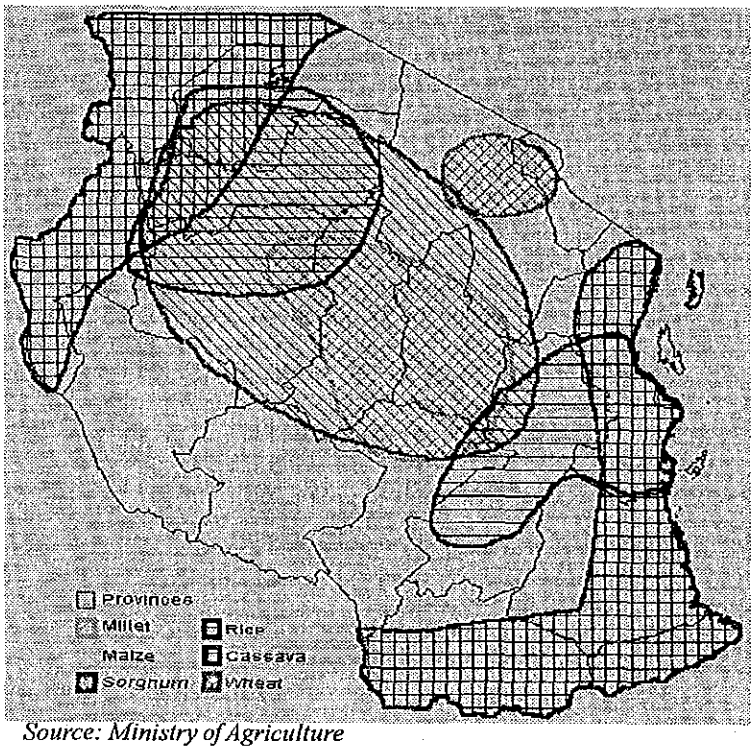
CHAPTER 2 PRESENT CONDITIONS OF DEMAND AND SUPPLY OF STAPLE FOOD

2.1 Demand and Supply Condition

2.1.1 Composition of Staple Foods

Due to differing climatic conditions in mainland Tanzania which has 21 administrative provinces (previously it was 20 until June 2002 when Arusha region was split into two) different areas support the growth of different major crops as shown in the map in the figure below. There are actually 63 agro-ecological zones based on variations in altitude, soil type and rainfall pattern (FAO/WFP 1999). Such diversity supports a wide range of cash and food crops from some 100,000 km^2 under cultivation. Total food crop production was estimated to be 7.32 million tons cereal equivalent in the year 1999/00 and 2000/01 it was estimated to be 7.70 million tons.

Major food crops grown in areas of Mainland Tanzania



Source: Ministry of Agriculture

The crops are not grown exclusively in the areas shown but are predominant in those areas and surplus production occurs which is exported to other provinces and/or neighboring countries. For example, maize and millet are also grown in many other areas but at a smaller scale. The major banana producing areas

producing areas are Kagera region in the north-western corner of the country, Kilimanjaro region which is situated north north-east, and Mbeya region which is in the Southern Highlands region of the country. Large-scale production of potatoes takes place in two districts Mbeya in the Southern Highlands, and Lushoto district in Tanga region (north-eastern Tanzania). Pulses are also produced in surplus in Mbeya and Tanga regions. These are mainly beans and peas.

2.1.2 Per Capita Consumption of Staple Foods

National food balance can be viewed as a function of total food production and national requirements. Consumption estimates are based on the percent contribution of each commodity to the diet, the net energy content of the commodity and minimum daily energy requirements. Other uses of total production include seeds, feeds, losses, and informal cross-border trade. The estimates used by the CMEWU to calculate total food crop requirements are presented in the table below. These estimates are based on various studies undertaken by FAO and the MDB. Table2.1.1 presents per capita annual consumption requirements in kilograms and summarized below.

Per Capita Consumption of Staple food crops for Tanzania Mainland

Commodity	Tanzania (M)*1 (kg/person/year)
1. Maize	74.5
2. Rice	14.1
3. Wheat	4.3
4. Sorghum	15.5
5. Millet	15.5
6. Pulses	11.4
7. Cassava	38.2
8. Bananas	15.3
10. Potatoes	16.3

*1: Dry Edible

Source: Food Security Bulletin, 1997, Ministry of Agriculture, Crop Monitoring and Early Warning Unit

2.1.3 Self Sufficiency of Staple Foods in Regions

Table 2.1.2 shows the demand-and-supply balance of the staple-food crops by the regions in the Tanzania countries from here 1992 to 2003 (forecast). For a certain reason, data for several years were not available. The data obtained consists of seven actual data and one forecast data. Maize, Sorghum, Millets, Paddy, and Wheat are classified as Cereals among staple-food crops, and Pulses, Cassava, Banana, and Potatoes are classified as Non-Cereals as shown in Table 2.1.2.

Frequency of Self-sufficiency Status of Stable Foods

Region	Surplus 120≦SSR*1	Self Suf. 100≦SSR<120	Deficit SSR<100
1. Arusha	1	0	7
2. Coast/DSM	0	0	8
3. Dodoma	0	1	7
4. Iringa	5	3	0
5. Kagera	3	1	4
6. Kigoma	0	2	6
7. Kilimanjaro	1	1	6
8. Lindi	2	1	5
9. Mara	0	2	6
10. Mbeya	4	3	1
11. Morogoro	0	3	5
12. Mtwara	4	1	3
13. Mwanza	2	4	2
14. Rukwa	8	0	0
15. Ruvuma	5	2	1
16. Shinyanga	5	1	2
17. Singida	3	1	4
18. Tabora	2	0	6
19. Tanga	0	2	6
Total	45	28	79

*1: Self Sufficiency Ratios
Unit: year
Source: *Food Security Bulletin, Ministry of Agriculture, Crop Monitoring and Early Warning Unit, 1992/93 – 2002/03*

The above table is the summary of Table 2.1.2. According to the table, in recent years the Mainland is not self-sufficient for cereals, but is self-sufficient for non-cereals at national level. Out of 19 regions, 10 regions have experienced the food deficit more than 4 years out of 8 years. This situation is too far from the food security. The food self-sufficiency rate by the regions has a lot of fluctuations. These are more pronounced in the drought years when many regions experience food shortage. Moreover, the table shows that there is a clear difference on the supply capability of the staple-food crops among the regions. For example, in Arusha, Coast, and DSM, Dodoma, Kigoma, Kilimanjaro, Mara, Tabora and Tanga, the quantity of production is constantly less than demand. These areas are located in the north of the central part of Tanzania. In contrast to them, the regions which has attained the stable self-support, or the regions which has produced the surplus are Iringa, Mbeya, Mwanza, Rukwa, Ruvuma, Shinyanga, etc. These regions also produce much quantity staple-food crops both cereals and non-cereals, and form the granary of Tanzania.

Furthermore, the table shows the very interesting fact. It is clear that the nutrition status of the some regions which produce a surplus in the quantity of production of staple-food crops is not desirable condition. According to the report which directed its attention to people's nutrition status, the result highlights the fact that per capita food production or per capita food availability is not a good measure of food security or nutritional status. Table 2.1.3 shows the rate of child malnutrition

according to place or region (Tanzania Demographic and Health Survey, 1996). Although three different indexes (rate of moderate stunting, wasting and underweight) are shown in the table, the moderate stunting is fit to evaluate the nutritional status because the measure is less affected by seasonal and annual variation. Iringa, Mbeya, and Ruvuma are regions which production of staple-food is stabilized and attain self-sufficiency statistically. However, the nutrition condition of people who live there is not so good. The statistic data on staple-food production is inconsistent with the study result on nutrition status. This situation shows that while excessive staple-food crops are produced and circulating commercially, the poverty class which cannot fully catch food exist even in a granary zone. This result highlights the fact that per capita food production or per capita food availability is not a good measure of food security or nutritional status.

2.2 Per Capita Calorie Intake

Based upon existing per capita consumption, the per capita calorie intake of Tanzania (Mainland) and that of Zanzibar have been worked out respectively, the result of which is shown in the table below. The calculation result closes to the estimation value of FAO as well as the result of recent house-hold survey in the Tanzania, which supports the general validity of the estimated value obtained this time.

Comparison of calorie intake of subject regions

Source			
FAO The State of Food Insecurity in the World 2001	HBS	Estimated from the average per capita consumption, Tanzania (M)	Estimated from the average per capita consumption, Zanzibar
Kcal/person/day			
2,100 ('90-'92) 1,930 ('97-'99)	2,200	1,865 (Staple food product only) *1 2,235 (Estimated calorie intake)	1,793 (Staple food product only)*1 2,163

FAO, HBS data concerns calorie intake of all the food, while estimate this time has been obtained from the figures concerning staple food only

*1This figure, when added to the 370Kcal/perspn/day that has been estimated from the data of 2010 world agriculture prepared by FAO, is supposed to constitute the estimated amount of all the intake.

According to the state of food insecurity in the world 2001 prepared by FAO, we understand that the condition of food in countries around Tanzania is in a very strained state as summarized below. Besides one can easily perceive that an improvement of that particular state is hard to be expected even as the years go by. The condition of food supply in Tanzania is worse in 1997-1999 than in 1990-92,

as shown in the table below, with the estimated percentage of people in malnutrition reaching as much as about 46% of the entire population.

Dietary Energy Supply and Undernourished In Total Population

Country	Total Population		Per Capita Dietary Energy Supply		Number of People Undernourished		Proportion of Undernourished in Total Population	
	1990 -92	1997 -99	1990 -92	1997 -99	1990 -92	1997 -99	1990 -92	1997 -99
	(millions)		(kcal/day)		(millions)		(percentage)	
Tanzania	27.0	33.5	2,100	1,930	9.1	15.5	34	46
Kenya	24.3	29.4	1,880	1,930	11.5	13.4	47	46
Uganda	17.8	22.0	2,280	2,190	4.2	6.2	24	28
Malawi	9.6	10.7	1,880	2,120	4.8	3.8	49	35
Mozambique	14.1	17.6	1,710	1,920	9.6	9.5	69	54
Zimbabwe	10.5	12.2	2,010	2,080	4.6	4.8	43	39

Sources: Total population: UN World Population Prospects, 2000, revision, dietary energy supply and undernourished in total population: FAO estimates.

During the course of the survey this time, we obtained a material supporting figures in the above table. According to the survey made in 1993 (Sarries and Tinios) , when the intake of 2,000kcal is set as the uppermost of the poverty line, 50% of the people of Tanzania will be classified into the poverty group. Also, the survey of citizen conducted in 2000-01 resulted in revealing the estimated calorie intake obtained from the pattern of food intake of the poorer half to be 2,200kcal. Based upon the FAO report and the results of the above two surveys, we cannot deny the fact that in Tanzania almost half of its people is in a state of malnutrition, being classified into the poverty group, with the calorie intake of about 2,000kcal, or the lowest possible level for an adult.

CHAPTER 3 DEVELOPMENT STRATEGY

3.1 Food Policy for Irrigation Sector

From a macroeconomic view, it might look more economical to import food than to produce it domestically, but from the point of microeconomic view, or rather from the point further down, that is to say, from the viewpoint of rural community, villages, as well as farmers, it is apparent, from the results of various studies and surveys, that there are cases to which the logic can not be applied. As mentioned in 2.1.3, the study this time has shown the similar result.

It is obvious that alleviation of poverty and agricultural activities are closely related where the agriculture creates employment and it is the main activity to secure not only food but also income. In rural areas where it is difficult to find major industries other than agriculture, the majority of the poor is engaged in agriculture, which suggests that the promotion of agriculture through the agricultural development that is capable of providing food and income to the poor will surely play an important and straightforward role for the alleviation of poverty in rural villages.

In the poor villages of the Mainland the one and only way of achieving the improvement of food conditions (the achievement of self-sufficiency) and the securing of income (sales of surplus agricultural products and promotion of the sales of cash crop), which are the two main challenges of the country, is the vitalization and continuous improvement of the industrial activity called agriculture by making effective use of existing resources. The development of irrigation, in particular, is expected to be effective as a measure for stable food supply as well as stable source of income, capable of realizing much-desired alleviation of poverty.

When the efforts for the development are made, putting maximum priority on the macro-economical efficiency without taking into consideration the narrowing of the gap between the rich and the poor, the poor will always remain as they are and the gap between the haves and have-nots will ever increase with the resultant distorted, lopsided social structure. The result of the survey shows that a trend of malnutrition (denutrition) can be seen in religions located in farm belts where a large amount of food is produced, which suggests the existence of poor people unable to buy food even though they can find it in the market. A lopsided society is definitely on the way.

As shown in the estimate of per capita caloric consumption, it is necessary in

Mainland to try to secure a stable supply of staple food with the improvement of nutritional state of the people in mind. It is not inevitable to try and secure the stable supply only through the enhancement of domestic production. Food import should naturally be taken into consideration from the point of adequacy of food variation as well as from the point of economy. Increase of production of food, however, should be continuously strived for as long as domestic production is found to be more economical than import, as shown in the table below. It can be said that domestic agricultural products are competitive internationally, as they are more easily accepted by consumers in Mainland, that is, when their taste is taken into consideration, people of Mainland tend to prefer rice with a flavor peculiar to Mainland rice as well as white maize.

Tanzanian Agricultural Sector Comparative Advantage Indicators
(Domestic Resource Coefficients)

Crops	Average	Improved	Potential
1. Maize (Iringa)	0.93	0.72	0.61
2. Maize (Dodoma)	0.66	0.71	0.96
3. Rice (rainfed, upland)	0.82	-	-
4. Rice (rainfed, lowland)	0.60	0.78	-
5. Rice (irrigated, Morogoro)	0.63	0.72	0.66

Note: The DRC measures the opportunity cost of the domestic resources required to save (or earn) US$ foreign exchange. A coefficient of 0.61 indicates that there is a potential for only spending US 61 cents to US$ 1.0 in maize imports. Any coefficient less than 1 implies that it is competitive at world prices.

Source: URT/WB, op. Cit., Table 7.2.8, SADS

As the buying ability of food of the poor people living in rural areas is exceptionally low, security of self-sufficiency through the increased production of staple food in rural areas and the enhancement of buying ability through the expansion of the cultivation of cash crop are needed by all means, both of which should be promoted as much as possible.

The government of Tanzania should set up the target of food self-sufficiency ratio within the framework of food security and needs to draw up and implement plans to achieve the target. Even though decentralization is the general trend, a nation should point the way it intends to take as a nation, and let it known to people all over the country. Without a definite national policy, the decentralization will leave a nation in chaos and in complete collapse just like a wooden pail that has lost its hoops.

3.2 Staple Food Demand Forecast

3.2.1 Basic Assumption

As mentioned in 2.1.2, the Crop Monitoring and Early Warning Unit, Food Security Department, Ministry of Agriculture and Food Security in Tanzania

(Mainland), with the collaboration of FAO and others, has set up the annual per capita intake of staple food product, the outline of which is shown below. The Crop Monitoring and Early Warning Unit annually monitors the state of production of staple food product, based upon the forecast of weather conditions and degree of damage made by harmful insects. At the same time it estimates possible demand based mainly upon per capita consumption, and puts the results in the form of Tanzania Food Security Bulletin.

Per Capita Consumption of Staple food crops for Tanzania Mainland

Commodity	Tanzania (M)*1 (kg/person/year)
1. Maize	74.5
2. Rice	14.1
3. Wheat	4.3
4. Sorghum	15.5
5. Millet	15.5
6. Pulses	11.4
7. Cassava	38.2
8. Bananas	15.3
10. Potatoes	16.3

*1: Dry Edible

Source: Food Security Bulletin, 1997, Ministry of Agriculture, Crop Monitoring and Early Warning Unit

Along with the acquisition of Tanzania Food Security Bulletin, collection of information on per capita consumption and calorie intake, interview survey were done in order to gather information on predicted calorie intake, forecast or target value, expected fluctuation of composition ratio of staple food product in per capita consumption, as well as information on probable demand and supply of various foods. It is regrettable to note that it has been made clear that no researching efforts have been made concerning these figures, and accordingly, there exist no concrete mid- to long-term forecast nor official vision.

Consequently, we made an estimate of expected demand for staple food products, as part of the survey this time, in order to evaluate the possibility of self-sufficient food production in Tanzania (Mainland), to clarify the positioning of irrigation sector in the overall agricultural development, and, among others, to examine the relevance of the reinforcement and promotion of irrigation sector from the point of food supply.

The following conditions have been set up in making the demand forecast:

Estimate of basic demand:

The calculation has been made based on the assumption that the current pattern of food intake will not change in the future. Accordingly, the current calorie intake of about 2,300kcal stays the same with demand increasing as much as the increase

in population.

Increase of calorie intake and pattern of food intake:

Two cases have been set up where the future increase in calorie intake is forecast along with the probable economic development in Tanzania so that enough room could be allowed in the prediction and several options in the development plan could be enjoyed, and demand forecasts for respective cases have been made. It has been reported in a case study of FAO that the ratio of malnutrition amounts to about 10% when the daily per capita food supply is 2,700kcal. It has also been reported that when the figure is between 2,200 and 2,500kcal, the rate of under-nourished population ranges between 15 and 35%. In this study, taking into due consideration the present state of Tanzania (Mainland) and the results of the above case study, the feasible goal of calorie intake of 2,500kcal and the desirable target of calorie intake of 2,700kcal have been set, taking the possible improvement of living standards into account. It has been assumed that these target values are to be attained in 15 years, or by 2017.

Other conditions:

"Agriculture in Tanzania Since 1986, WB" analyzed the relationship between income and food expense. The result of comparison of income elasticity of food expense (the rate of increase of expense at the time when the income increases 1%) among households in urban and rural areas, which have been the subject of the survey, is shown below:

Income Elasticity by Food Material

Crops	Income Elasticity		
	Urban	Rural	All
Maize	0.38	0.63	0.53
Rice	0.84	1.25	0.97

Source: Expenditure shares calculated from Human Resource Development Survey (HRDS) 1996. Agriculture in Tanzania Since 1986, WB, 2000.

The result of this study shows that when we take a look at the share of relevant expenditure in food expense, the figure for rice is always higher than, or as much as two times higher than that for maize, when the income elasticity of rice and maize are compared, irrespective of the area. This means that when the income increases, the consumption of maize increases gradually, while that of rice increases a lot faster than the increase of the former. Based on these results, with the target values set at 2,500kcal and 2,700kcal, the increase in volume has been calculated with the assumption that the rate of increase of rice consumption will be twice as much as that of maize consumption. The figures for other food

products have been estimated to show average amount of increase.

3.2.2 Staple Foods Demand Forecast

In accordance with the 3 scenarios set in 3.2.1, the future demand of staple food products has been assessed. The result is shown in Table 3.2.1, the summary of which is as follows:

Future Demand of Staple Food Products

(Unit: ton)

Crop	Year 2017		
	2,232kcal	2,500kcal	2,700kcal
	Estimated Population 53,463,961		
Maize	5,151,431	5,676,946	6,015,765
Rice	1,238,620	1,510,941	1,756,908
Wheat	321,853	360,726	389,218
Sorghum	1,117,723	1,252,719	1,348,478
Millets	916,533	1,027,230	1,105,752
Pulses	655,201	734,335	793,138
Cassava	6,006,833	6,732,326	7,249,084
Bananas	4,069,645	4,561,168	4,920,812
Potatoes	3,417,500	3,830,259	4,130,353

Source: *Food Security Bulletin, 1997, Ministry of Agriculture, Crop Monitoring and Early Unit*

Estimation: *JICA Study Team estimated based on the population forecast and per capita consumption in Mainland*

Even in a rather pessimistic assumption in which Tanzania is supposed to enjoy little economical development with calorie intake kept at the current level, the pressure from the increased population will require a demand for rice 1.6 times bigger than the current amount as well as that for maize 2.6 times more in the year 2017.

With the attainable level of calorie intake of 2,500kcal, 2.1 times the current amount of rice and 2.8 times the current amount of maize will be in need, while the desirable level of calorie intake of 2,750kcal for the nutritionally better state of people, 2.4 times the current amount of rice and 3.0 times the current amount of maize will be required. It can be said that these figures would never be achieved without a suitable strategy and a program to implement the same. Furthermore, although the increase in food import is possible, it is necessary, from the point of food security, to set up the target value of self-sufficiency ratio and to establish a production system that enables an intentional production increase.

The main target of this master plan is in the alleviation of the poverty and the correction of the disparity of the living standard between the rich and the poor instead of superfluous development. Therefore, it is important to solve the existing problems, aiming at maintaining the present self-sufficiency rate in staple foods or about 2,300 kcal/day/head of per-capita calorie intake rather than it holds up a high development target.

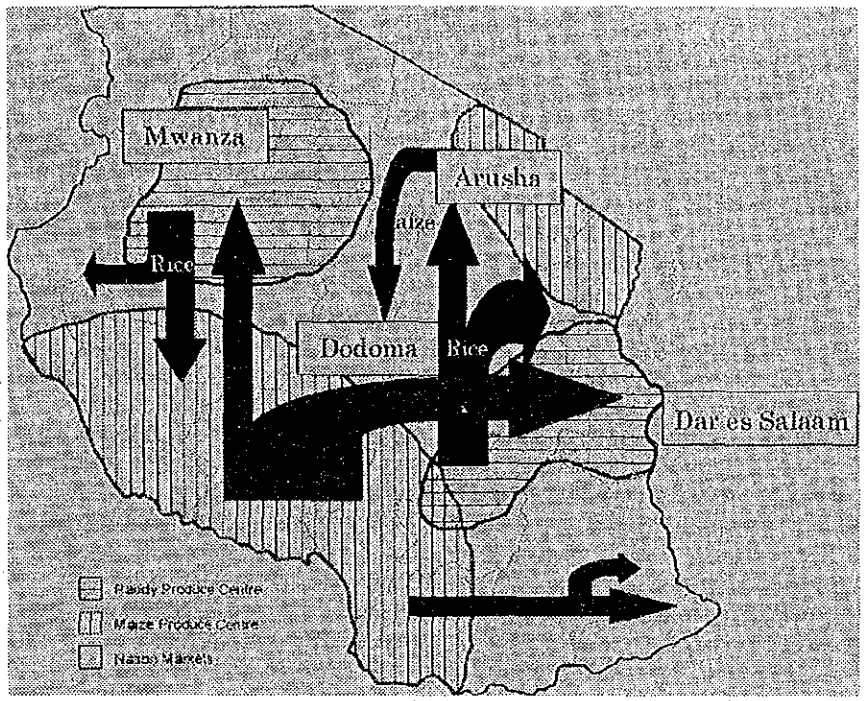
The future increase in population and the subsequent need for increased food production in rural areas and accelerated urbanization will make it possible to have staple food products distributed as commercial products. In order to realize an efficient use of land resources and water resources so that food products would be distributed efficiently, it is important to draw up and implement effective plans, in cooperation with other sectors, concerning the improvement and maintenance of roads as well as the improvement of marketing system.

3.3 Spatial Development

From the viewpoint of agricultural development potential in Tanzania (Mainland), the "suitable product in suitable land" policy should be promoted, as a prerequisite for an effective and feasible development. It is advisable to try to secure the self-sufficiency of food at the national level by putting priority on projects with higher investment efficiency, which enables increased production of agricultural products and the subsequent efficient distribution of surplus agricultural products in regions that lack in sufficient amount of food so as to optimize the overall effect within the confinement of limited budget.

The following figure has been prepared by the Ministry of Agriculture, showing main production regions of rice and maize. As to rice, the currently producing districts are expected to remain as main area of production, judged from their potentials. It would be necessary to distribute the surplus from Mbeya and Mwanza, both of which are main production regions, to Dar es Salaam and Arusha, main rice markets with large consumption areas nearby as shown by arrows in the figure. The same can be said for maize. It is essential to distribute the product from main production areas such as Mbeya and Iringa to the area where the deficiency is obvious through main markets that have adjacent large consumption areas.

Flow of Rice and Maize



As mentioned before, the vital and essential factor is the participation of other sectors (roads, methods of transportation, facilities for distribution and establishment of marketing system) for the smooth implementation of the "suitable production in suitable land" policy. The establishment of a system for distributing agricultural product without hitch, among others, is essential.

In a social environment in which decentralization is promoted, it is not our intention to deny the efforts made by respective regions to draw up and implement an individual development plan. We believe, however, that it is an essential part of decentralization to strengthen ties between regions in an effort to complement each other. Concerning food security in particular, it is very important for adjacent regions plagued by food scarcity or over-production to cooperate with each other and to complement each other. The mechanism is important from the point of mutual development as well. The decentralization can be promoted only with the mutual complement as a prerequisite. The enhancement of cooperation among sectors as well as regions is essential to enable the agricultural (irrigation) development in accordance with the potential based upon the effective use of useful resources in regions and in the investment efficiency.

Table

Table 1.2.1 Average Wholesale Prices for Maize in Selected Markets, Tsh/100kg Bag

Region	Month																	
	Apr-00	Jul-00	Oct-00	Nov-00	Dec-00	Jan-01	Mar-01	Apr-01	Jun-01	Jul-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Average	Min	Max
1 Arusha	11,375	13,250	12,167	12,800	13,409	13,208	13,000	12,333	8,143	7,627		7,300	7,825		14,000	11,264	7,300	14,000
2 Bukoba	7,500	12,300	14,000	14,323	14,225	13,755	10,779	8,750	7,700	7,850					7,850	10,821	7,500	14,323
3 Dar Es Salaam	12,375	14,083	13,250	13,077	15,545	17,000	15,000	16,500	10,458	9,167	9,500	9,591	10,744	13,200	17,317	13,120	9,167	17,317
4 Dodoma	11,000		10,500	10,608	10,609	9,767	11,581	10,750	7,060	7,317	8,200	7,800	8,400		14,273	9,836	7,060	14,273
5 Iringa	8,833	9,682	8,763	9,182	10,000	9,800			11,929	11,444	10,000	9,750	10,000	10,000		9,949	8,763	11,929
6 Kigoma	10,569	7,775		10,978	10,250	11,100										10,134	7,775	11,100
7 Lindi	12,214	10,500	11,400	13,545	15,591	17,375	17,192	7,500	8,711	11,625	12,500	13,000				12,596	7,500	17,375
8 Mbeya	7,333	6,775	6,000	6,000	6,143	6,167										6,403	6,000	7,333
9 Morogoro	10,838	9,575	10,225	10,592	10,800	11,350	12,000	9,500	8,533	8,225	8,886	9,188	10,857	12,000	16,986	10,637	8,225	16,986
10 Moshi	12,000	13,808	10,657	11,967	12,000	11,971	11,135	10,583	10,600	9,638					13,571	11,630	9,638	13,808
11 Mtwara	12,000	9,522	10,929			18,625	19,269	8,500	8,200	11,027	16,583	16,833	17,500	18,000	21,933	14,532	8,200	21,933
12 Musoma	10,063	12,875	12,875	12,375	13,727	14,000									10,643	12,365	10,063	14,000
13 Mwanza	9,286	10,400	11,813	11,492	11,800	12,242	11,462	7,000	7,375	8,075	8,250	8,317	9,750	11,500	11,167	9,995	7,000	12,242
14 Shinyanga	8,675	9,500	9,000	9,550	10,750	10,700	10,618	8,000	5,833	8,450	9,200	8,200	8,629	9,700	9,500	9,087	5,833	10,750
15 Singida	9,117	10,160	9,960	10,588	11,525	11,818					6,400	6,840	6,650	10,800	11,500	9,578	6,400	11,818
16 Songea	8,500	7,500	7,600	7,733	8,027	7,850			6,900	6,358	7,200	7,700	12,000	12,500	13,900	8,751	6,358	13,900
17 Swanga	5,743	5,783	5,000	5,433	5,500	5,500	5,900	6,500	5,455	6,575	7,450	11,260	11,100	11,500	15,929	7,642	5,000	15,929
18 Tabora	12,000	7,800	8,400	8,583	9,000	9,100			7,200	8,564	9,300					8,883	7,200	12,000
19 Tanga	11,656	10,600	10,188	10,260	11,100	11,125									16,233	11,595	10,188	16,233
Average	10,057	10,105	10,152	10,505	11,111	11,708	12,540	9,629	8,150	8,710	9,456	9,648	10,314	12,133	13,914			
Min	5,743	5,783	5,000	5,433	5,500	5,500	5,900	6,500	5,455	6,358	6,400	6,840	6,650	9,700	7,850			
Max	12,375	14,083	14,000	14,323	15,591	18,625	19,269	16,500	11,929	11,625	16,583	16,833	17,500	18,000	21,933	198,820	145,170	53,650

Source: Marketing Department, MCM

Table 1.2.2 Average Wholesale Prices for Maize in Selected Markets, Tsh/100kg Bag

Region	Month																		
	Apr-00	Jul-00	Oct-00	Nov-00	Dec-00	Jan-01	Mar-01	Apr-01	Jun-01	Jul-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Average	Min	Max	SSR
1 Arusha	40,438	39,917	38,000	39,417	41,318	39,667	37,000	37,000	34,929	33,500		32,000	31,000		34,214	36,800	31,000	41,318	119
2 Bukoba	40,500	41,250	41,900	40,038	44,813	43,773	40,979	40,500	29,000	28,100					28,000	38,078	28,000	44,813	136
3 Dar Es Salaam	43,563	38,833	38,857	42,077	42,409	43,500	37,692	36,500	40,000	35,583	36,958	39,091	38,000	38,000	38,917	39,332	35,583	43,563	111
4 Dodoma	44,500		36,500	39,567	40,909	39,167	40,154	37,500	29,880	30,000	30,000	28,000	30,000		33,455	35,356	28,000	44,500	126
5 Iringa	40,833	32,091	34,929	35,455	35,000	37,500			28,671	29,944	35,000	35,000	35,000	35,000	32,500	34,379	28,671	40,833	120
6 Kigoma	44,250	32,813		43,222	43,625	44,000										41,582	32,813	44,250	127
7 Lindi	45,000	39,458	40,750	42,591	44,727	42,292	43,346	45,000	33,313	34,625	36,833	38,000				40,495	33,313	45,000	122
8 Mbeya	38,167	29,933	35,000	35,000	37,500	37,167										35,461	29,933	38,167	118
9 Morogoro	42,500	31,000	30,814	32,946	36,545	36,833	35,400	42,500	29,091	29,875	25,357	27,667	28,143	28,500	31,714	32,592	25,357	42,500	129
10 Moshi	32,500	35,667	35,500	36,886	34,400	39,071	35,538	36,833	29,500	28,125					32,071	34,190	28,125	39,071	122
11 Mtwara	43,750	39,056	42,500			47,188	47,500	47,500	37,500	36,409	39,000	39,714	40,000	40,000	37,333	41,342	36,409	47,500	114
12 Musoma	44,750	46,545	47,143	46,875	50,273	47,500									32,857	45,135	32,857	50,273	137
13 Mwanza	40,143	37,300	38,214	40,208	44,182	43,125	39,962	39,500	27,364	27,625	26,917	26,826	25,813	27,000	27,333	34,101	25,813	44,182	132
14 Shinyanga	36,500	35,000	38,643	40,708	40,700	41,000	39,727	36,000	22,909	23,500	21,000	22,500	23,643	22,500	21,357	31,046	21,000	41,000	148
15 Singida	39,833	40,700	41,125	41,313	40,938	40,318					26,250	25,167	25,750	26,500	27,750	34,149	25,167	41,313	136
16 Songea	38,500	29,000	37,375	38,958	40,445	39,658			28,900	22,833	24,000	29,000	29,000	33,500	36,083	32,866	22,833	40,445	144
17 Swanga	40,786	30,000	38,000	38,000	38,000	35,958	33,167	31,000	25,682	24,833	24,500	24,500	24,786	23,500	29,000	30,781	23,500	40,786	131
18 Tabora	39,000	37,727	37,500	40,292	42,111	42,500			26,063	24,682	24,000					34,875	24,000	42,500	145
19 Tanga	40,500	34,875	34,429	36,900	34,545	37,583									33,667	36,071	33,667	40,500	107
Average	40,843	36,176	38,177	39,470	40,691	40,937	39,133	39,076	30,200	29,260	29,151	30,622	30,103	30,500	31,750				
Min	32,500	29,000	30,814	32,946	34,400	35,958	33,167	31,000	22,909	22,833	21,000	22,500	23,643	22,500	21,357				
Max	45,000	46,545	47,143	46,875	50,273	47,500	47,500	47,500	40,000	36,409	39,000	39,714	40,000	40,000	38,917	688,630	546,041	142,589	126

Source: Marketing Department, MCM

Table 1.2.3 Average Wholesale Prices for Maize in Selected Markets, Tsh/100kg Bag

Region	Month															Total Non-Cereals			
	Apr-00	Jul-00	Oct-00	Nov-00	Dec-00	Jan-01	Mar-01	Apr-01	Jun-01	Jun-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Average	Min	Max	SSR
1 Arusha	26,313	25,708	34,500	33,417	39,182	37,333	22,000	25,167	25,145	19,000		22,000	22,425		28,786	27,767	19,000	39,182	146
2 Bukoba	12,300	16,600	18,750	23,423	22,188	15,136	15,392	20,000	17,500	16,250					15,800	17,576	12,300	23,423	143
3 Dar Es Salaam	30,750	28,875	36,500	41,385	41,955	46,167	35,385	30,000	30,083	28,333	27,583	27,364	30,000	33,000	35,208	33,506	27,364	46,167	122
4 Dodoma	18,667		29,000	33,875	31,227	30,500	25,538	21,000	20,500	20,333	18,000	22,000	20,000		26,455	24,392	18,000	33,875	136
5 Iringa	29,000	24,818	30,500	31,409	40,600	35,000			28,286	30,778	35,000	35,000	35,000	35,000	42,500	33,299	24,818	42,500	134
6 Kigoma	21,786	20,000		33,667	33,500	33,500										28,491	20,000	33,667	142
7 Lindi	40,500	39,125	42,200	44,773	52,518	52,100	49,892	41,000	39,667	35,625	34,667	35,000				42,256	34,667	52,518	122
8 Mbeya	22,792	19,808	25,000	26,818	30,000	30,000										25,736	19,808	30,000	130
9 Morogoro	30,438	27,438	25,500	30,591	30,000	29,833	30,600	27,000	30,000	26,333	17,786	20,944	27,643	27,500	38,814	28,028	17,786	38,814	158
10 Moshi	29,900	26,167	29,286	30,500		43,571	30,808	27,500	26,400	25,813					30,357	30,030	25,813	43,571	116
11 Mtwara	43,000	41,833	42,857		41,875	57,500	61,269	57,500	40,200	40,200	33,500	33,500	33,500	33,500	31,750	42,285	31,750	61,269	133
12 Musoma	25,000	20,000	32,313	40,000	30,000	37,500									32,857	31,096	20,000	40,000	155
13 Mwanza	15,000	22,950	28,125	31,292	18,150	22,167	18,750	23,000	24,167	25,000	20,917	26,000	23,500	23,000	22,750	22,985	15,000	31,292	153
14 Shinyanga	15,000	20,000	29,000	31,292	17,275	21,000	19,545	21,000	21,317	20,167	21,333	21,500	24,500	22,000	17,667	21,506	15,000	31,292	143
15 Singida	20,000	30,700	32,100	36,375	22,250	31,415					22,500	24,444	25,000	24,500	26,833	26,920	20,000	36,375	135
16 Songea	26,125	26,650	30,100	27,583	35,050	29,000			25,250	21,167	21,000	25,000	28,125	27,000	29,167	27,017	21,000	35,050	129
17 Swanga	21,429	14,875	18,500	24,708	22,200	28,625	10,100	12,000	14,364	14,625	18,500	28,400	30,643	29,000	20,929	20,593	10,100	30,643	204
18 Tabora	30,000	30,455	37,500	40,417	28,611	42,200			26,250	25,000	27,500					31,993	25,000	42,200	128
19 Tanga	24,000	20,833	29,250	31,500	25,200	38,667									27,500	28,136	20,833	38,667	135
Average	25,368	25,380	30,610	32,946	31,210	34,801	29,025	27,742	26,366	24,902	24,857	26,763	27,303	28,278	28,492				
Min	12,300	14,875	18,500	23,423	17,275	15,136	10,100	12,000	14,364	14,625	17,786	20,944	20,000	22,000	15,800				
Max	43,000	41,833	42,857	44,773	52,518	57,500	61,269	57,500	40,200	40,200	35,000	35,000	35,000	35,000	42,500	543,611	398,239	145,372	137

Source: Marketing Department, MCM

Table 2.1.1 Food Crop Proportions Used to Estimate Requirements

Tanzania (Mainland)

	Commodity	Consumption*1	Seeds*2	Feed*2	Losses*2	Trade*2	Kcals/ 100g edible stuff	Extraction rate (%)	Kcals 100g unprocessed
		(kg/person)	(%)	(%)	(%)	(%)	*10	*10	*10
1	Maize*3	74.5	1.3	2.0	8.7	4.4	335	90	302
2	Rice*4	14.1	2.5		2.5	1.8	335	65	218
3	Wheat	4.3	2.5		2.5		340	75	255
4	Sorghm	15.5	1.5	0.6	8.5		345	82	283
5	Millets*5	15.5	2.3	0.6	7.7		340	100	340
6	Pulses*6	11.4	5.0		2.5		320	100	320
7	Cassaba*7	38.2					320	(Dry)	
8	Bananas*7, 8	15.3					106	(Raw)	
9	Potatoes*7, 9	16.3					93	(Raw)	

*1: Per capita annual consumption

*2 Percent used of total consumption

*3 Whole grain

*4 Paddy converts to rice at 65% conversion ratio

*5 Includes bulrush and finger millets

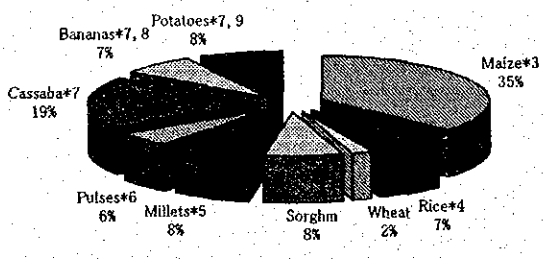
*6 Mainly beans, but other pulses included

*7 Based on dry weight, fromwhich waste is alredy subtracted

*8 Includes sweet and cooking bananas

*9 Includes sweet potatoes, irish and round potatoes

*10 Souce: Stury on Food Consumption Patterns and Nutrtional Economic Values of Common Foods in Dar es Salaam, Tanzania, 2000, TFNC supported by JICA



Commodity	Yield (Raw)	Waste		Moisture Content		Waste and Moist	Yield (Dry wt)
	(ton/ha)	(%)	(ton/ha)	(%)	(ton/ha)	(ton/ha)	(ton/ha)
Banana	15.0	33	4.95	70	7.035	12.0	3.0
Cassaba	7.5	15	1.125	60	3.825	5.0	2.6
Potato	5.0	15	0.75	70	2.975	3.7	1.3

Source: Tanzania Food Security Bulletin, June/July 1997, Dar es Salaam, 15 August 1997

Energy Content of Common Commodities

Table 2.1.2 Tanzania Food Supply Analysis and Self Sufficiency Ratios for 1992/93 - 2002/03

Region	Fiscal Year										
	92-93	93-94	94-95	95-96	97-98	98-99	01-02	02-03 Projection	Surplus (P) 120≤	Self Suf. (S) 100≤, <120	Deficit (*) <100
1 Arusha	*	*	*	*	*	P	*	*	1	0	7
C	91	59	96	110	38	161	73	65	161		76
NC				51	33	89	73	64	89		55
Total				88	36	137	73	65	137		66
2 Coast/DSM	*	*	*	*	*	*	*	*	0	0	8
C	12	9	16	15	9	29	19	18			16
NC				54	50	53	76	79			62
Total				30	25	38	41	42			35
3 Dodoma	*	*	S	*	*	*	*	*	0	1	7
C	70	78	106	127	80	117	75	76		106	89
NC				15	14	30	61	64			46
Total				90	57	88	70	72			94
4 Iringa	P	P	P	P	S	P	S	S	5	3	0
C	177	121	145	145	128	211	137	128	160	131	
NC				76	73	29	79	77	53	76	
Total				122	109	156	116	109	139	111	
5 Kagera	*	*	*	S	*	P	P	P	3	1	4
C	38	1	56	55	28	46	43	40	43	55	31
NC				216	187	466	248	269	328	216	187
Total				116	90	207	123	130	153	116	90
6 Kigoma	*	*	*	*	*	*	S	S	0	2	6
C	46	37	59	61	54	53	86	81		84	52
NC				125	128	112	127	133		130	122
Total				85	82	75	102	101		102	81
7 Kilimanjaro	*	*	*	P	*	S	*	*	1	1	6
C	43	26	64	64	28	72	90	82	64	72	56
NC				219	212	200	106	115	219	200	144
Total				122	99	119	96	95	122	119	97
8 Lindi	*	*	*	S	*	*	P	P	2	1	5
C	89	57	89	82	70	71	78	74	76	82	75
NC				149	135	131	184	205	195	149	133
Total				106	94	93	120	125	123	106	94
9 Mara	*	*	*	*	*	*	S	S	0	2	6
C	90	57	71	80	42	68	83	82		83	68
NC				95	107	109	133	142		138	104
Total				86	67	83	102	105		104	79
10 Mbeya	P	*	P	P	S	P	S	S	4	3	1
C	138	97	151	143	106	118	118	111	138	112	97
NC				114	109	140	93	95	127	99	
Total				133	107	126	108	105	130	107	
11 Morogoro	*	*	S	S	*	*	S	*	0	3	5
C	86	93	116	124	66	69	105	99		115	83
NC				85	74	19	96	100		91	64
Total				110	69	51	102	99		106	73
12 Mtwara	*	*	*	P	S	P	P	P	4	1	3
C	58	37	67	62	43	59	60	59	60	43	54
NC				293	242	245	251	277	267	242	
Total				148	119	128	135	145	139	119	
13 Mwanza	S	*	P	P	S	*	S	S	2	4	2
C	103	71	142	133	69	59	79	77	138	82	65
NC				179	170	151	142	142	179	151	151
Total				149	106	94	104	103	149	104	94
14 Rukwa	P	P	P	P	P	P	P	P	8	0	0
C	186	149	225	193	196	147	164	151	176		
NC				233	183	188	75	72	150		
Total				204	192	161	129	120	161		
15 Ruvuma	P	*	P	P	P	P	S	S	5	2	1
C	153	95	151	154	138	126	103	94	144	99	95
NC				205	182	141	138	142	176	140	
Total				171	153	131	117	113	152	115	
16 Shinyanga	P	P	P	P	S	P	*	*	5	1	2
C	172	135	177	161	111	121	110	105	153	111	108
NC				122	102	142	80	78	132	102	79
Total				*148*	*108*	*129*	*98*	*94*	*139*	*108*	*96*
17 Singida	P	S	P	P	*	*	*	*	3	1	4
C	121	108	125	134	79	113	62	61	127	108	79
NC				122	54	60	58	54	122		57
Total				130	70	95	61	58	130		71
18 Tabora	*	*	P	P	*	*	*	*	2	0	6
C	88	104	131	141	59	71	92	87	136		84
NC				113	95	110	79	79	113		91
Total				132	73	85	87	84	132		82
19 Tanga	*	*	*	*	*	*	S	S	*0*	*2*	*6*
C	51	46	36	51	42	53	81	76		79	47
NC				155	125	86	137	145		141	122
Total				90	74	66	103	104		104	77
Total	*	*	*	S	*	S	*	*	0	2	6
C	97	77	110	109	73	95	83	79		102	87
NC				130	114	130	112	115		130	114
Total				117	88	108	94	93		113	92

Source: Tanzania Food Security Bulletin, Crop Monitoring and Early Warning Unit, Ministry of Agriculture and Food Security

C: Cereals, NC: Non-Cereals, T: Total

*P: Surplus, S: Self sufficiency, *: Deficit*

Table 2.1.3 Nutrition Status of Children in Tanzania

Region	Moderate Stunting (percent below 2.5 s.d. the median height for age) (%)	Moderate Wasting (percent below 2.5 s.d. the median weight for height) (%)	Moderate underweight (percent below 2.5 s.d. the median weight for age) (%)
Residence			
Mainland	43.6	7.1	30.5
Total Urban	32.9	7.6	19.5
Total Rural	45.9	7.0	32.9
Zanzibar	37.1	11.0	33.8
Region			
1 Arusha	43.7	7.2	35.1
2 Coast	51.7	11.2	34.3
DSM	30.6	8.1	22.2
3 Dodoma	48.1	8.0	34.2
4 Iringa	70.5	6.2	48.2
5 Kagera	41.6	10.8	36.0
6 Kigoma	52.5	7.6	43.1
7 Kilimanjaro	33.5	5.6	21.0
8 Lindi	58.6	7.0	41.4
9 Mara	32.6	8.4	18.9
10 Mbeya	46.9	6.2	20.8
11 Morogoro	52.7	4.1	25.5
12 Mtwara	58.0	5.9	35.6
13 Mwanza	33.8	7.6	27.0
14 Rukwa	42.0	9.7	30.5
15 Ruvuma	53.5	5.2	29.4
16 Shinyanga	31.3	6.8	27.8
17 Singida	38.6	7.0	28.4
18 Tabora	25.7	4.4	14.2
19 Tanga	55.3	4.9	36.2
Total	43.4	7.2	30.6

Source: Bureau of Statistics (Tanzania) and Macro International Inc (1997a)

Table 3.2.1 Staple Foods Demand Forecast

	Percapita consumption (Dry) kg	(Raw) kg	Kcal /100g		Total Kcal	Ratio	Unmilled kg	2002	2007	2012	2017
								Required Production (1,000ton)			
								33,897,966	39,458,095	45,930,230	53,463,961
Maize	74.5		335	Dry	249,575	36.7%	96.4	3,266	3,802	4,426	5,151
Rice	14.1		335	Dry	47,235	6.9%	23.2	785	914	1,064	1,239
Wheat	4.3		340	Dry	14,620	2.1%	6.0	204	238	276	322
Sorghum	15.5		345	Dry	53,475	7.9%	20.9	709	825	960	1,118
Millets	15.5		340	Dry	52,700	7.7%	17.1	581	676	787	917
Pulses	11.4		320	Dry	36,480	5.4%	12.3	415	484	563	655
Cassaba	38.2	95.5	320	Dry	122,240	18.0%	112.4	3,809	4,433	5,160	6,007
Bananas	15.3	51.0	106	Raw	54,060	7.9%	76.1	2,580	3,004	3,496	4,070
Potatoes*1	16.3	54.3	93	Raw	50,258	7.4%	63.9	2,167	2,522	2,936	3,418
Total	205	kg/person/year			680,643	Kcal/person/year					
	562	g/person/day			1,865	Kcal/person/dey					

*1 Consistof Potato and Sweet Potato

Intake Calorie (Unit: Kcal/person/day)

	Staple food	Other food	Total
Present Condition	1,865	367	2,232
Case 1 (2,500)	2,090	410	2,500
Case 2 (2,700)	2,250	450	2,700

Demand Projection

(Unit: 1,000 ton)

	year 2017		
	2232Kcal (present condition)	2500Kcal	2700Kcal
	53,463,961 (estimated population in 2017)		
Maize	5,151	5,677	6,016
Rice	1,239	1,511	1,757
Wheat	322	361	389
Sorghum	1,118	1,253	1,348
Millets	917	1,027	1,106
Pulses	655	734	793
Cassaba	6,007	6,732	7,249
Bananas	4,070	4,561	4,921
Potatoes	3,418	3,830	4,130

Figure

Figure 1.2.1 Monthly Wholesale Price of Maize, Rice and Beans