

**ANALYSIS OF PROCESSING, MARKETING AND DEMAND FOR
PROCESSED FRUITS AND VEGETABLES IN TANZANIA**

BY

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**THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS
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ABSTRACT

This study was carried out to analyze processing, marketing and demand for processed fruits and vegetables in Tanzania. Data for the study were collected from a sample of 320 households, 77 traders and 59 processors using structured questionnaire. Both qualitative and quantitative methods were used to analyze the data. The results of the study show that fruit and vegetable processing firms were not able to utilize their capacities almost throughout the year with very low capacity utilization during off season. Likewise, processors had difficulties of marketing some of their processed products during both harvest and off season, partly due to stiff competition from imported products. With the exception of locally processed tomatoes, households consumed significantly larger quantities of imported processed products than similar products processed locally. Based on econometric analysis results, the study revealed that location of household and preference of consuming particular type of processed mangoes were the most important factors affecting the probability of consuming processed mangoes. Although education level attained by respondents, age of the household head, household size and availability of processed mangoes had no significant influence on probability of consuming processed mangoes, they significantly influenced the quantity of locally processed mangoes consumed as indicated by linear regression results. For tomatoes, the frequency of promotion and household preference for consuming particular type of processed tomatoes significantly influences the probability of consuming processed tomatoes. Contrary to the multinomial logit model results, the results of OLS regression model show that age of the respondents, household size, awareness of vital nutritional role that tomatoes play in the human diet, price of fresh tomatoes and household income

had significant influence on the quantity of locally processed tomatoes consumed. The study recommended that strategies towards stimulating and promoting processing, marketing and demand for locally processed fruits and vegetables should focus on improving capacity utilization of processing firms, improving market access, improving and maintaining quality standards of processed products and establishment of advertisement and promotion campaigns and programmes. Above all, a similar study should be undertaken in other areas to ascertain the extent of applicability of the findings of this study.

DECLARATION

I, Frank George Haule Hawassi do hereby declare to the Senate of Sokoine University of Agriculture that the thesis presented here is my own original work and that it has not been submitted for a degree award to any other university.

Signed

Date

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LIST OF ABBREVIATIONS AND ACRONYMS

CBO's	Community Based Organizations
CEFA	European Committee for Agricultural Training
DSM	Dar es Salaam
HSD	Honestly Significant Difference
ICBS	Indonesia's Central Bureau of Statistics
ISO	International Standard Organization
IPEME	Internal Productive Efficiency of Marketing Enterprises
MAFSC	Ministry of Agriculture, Food Security and Co-operatives
MATG	Markets and Agribusiness Thematic Group
MITM	Ministry of Industry, Trade and Marketing
MLE	Maximum Likelihood Estimation
MTS	Multilateral Trading System
NBS	National Bureau of Statistics
NTP	National Trade Policy
OLSRM	Ordinary Least Square Regression Model
QMC	Quality Management Control
rBST	Recombinant Bovine Somatotrophin
SPS	Sanitary and Phytosanitary
SCPM	Structure Conduct Performance Model
SIDA	Sweden International Development Authority
SIDP	Sustainable Industrial Development Policy
SMEDP	Small and Medium Enterprise Development Policy
SOLS	Standard Ordinary Least Square

TFDA	Tanzania Food Drugs and Cosmetics Authority
TAFOPA	Tanzania Food Processors Association
TAVICO	Tanganyika Vineyard Company Limited
TFNC	Tanzania Food and Nutrition Centre
TFNP	Tanzania Food and Nutrition Policy
VIF	Variance Inflation Factor
WED	Women Entrepreneurs Development
WEOs	Ward Executive Officers
WHO	World Health Organization
WLS	Weighted Least Squares

CHAPTER ONE

INTRODUCTION

1.1 Importance of Food Processing

The contribution of agro-processing industry to economic development can be traced through four stages of development (FAO, 1997a). First, in the early stage of growth, food processing can be an important direct complement to agriculture as a source of employment opportunities for seasonal labour and provides ample opportunities for expanding value-addition by using underemployed resources as well as improving income and nutrition status. Second, in an advanced stage of development of agro-processing industry, the presence of a well-developed food processing industry such as canned fruits and vegetables ensures stronger links with sectors other than agriculture, both as providers of inputs and as dependent sectors of further processing as well as performing marketing services. Thus, a well-developed food processing industry can lead, through forward linkage, to a number of more advanced industries.

Third, in a further stage of development of agro-processing industry, food processing is characterized by full development of forward linkage chain, with several marketing and other services incorporated in the final product, and product innovation prevailing over process innovation to provide a competitive advantage and sources of growth to the firms in the market. The linkage with the marketing chain tends to be well established, with both organizational and financial links between the producers and retail outlets. The pace at which new products are introduced is extremely high and this testifies to the importance of product innovation in this phase of the industry cycle.

Finally, in the mature stage of agro-processing industry, although forward and backward links do not go much beyond what has already been achieved in the third stage, a separate series of linkages develop through the production of specialized machinery and process innovation. Because of their size, market leadership and degree of internationalization, the food producing companies located in the high-income countries are often instrumental in setting the base for a whole technology of processed food production. The areas involved range from the planning and quality control of agricultural products and other raw materials, to the design and manufacture of machinery, specification and monitoring of the production cycle and provision of specialized financial and other services. Thus, the contribution of food processing industry to economic development through the linkage effects is deemed to be an important factor of growth both for developed countries and developing countries including Tanzania. Undoubtedly, processing seems to be the most effective technique for providing an important link in a continuous chain between production of raw materials sub-system and final consumption sub-system to allow the full exploitation potential of fruits and vegetables in Tanzania. Definitely, processing is a powerful weapon of growth, diversification and poverty reduction for Tanzania.

Despite the fact that agro-processing firms play an important contribution to economic development, available literature indicates that only 5-10% of fruits and vegetables produced in Tanzania are processed to meet only 8% of the domestic demand (Dietz *et al.*, 2000). Thus, over 90% of the processed perishable agricultural products such as fruits and vegetables consumed in the country are imported. The following section describes the current status of fruits and vegetable processing in Tanzania.

1.2 Status of Fruit and Vegetable Processing Industry in Tanzania

Despite the country's potential of producing a variety of fruits and vegetables almost throughout the year and the significant role that agro-processing firms can play in economic development, the fruit and vegetable processing industry in Tanzania is still in its infancy stage in comparison to South Africa, Zimbabwe and Kenya (Commonwealth Secretariat, 1997). There are currently very few fruits and vegetables processing plants in Tanzania. These plants include Dabaga Fruit and Vegetables Canning Industry Limited in Iringa region; Vitamins Food Limited, Tropical Food Products Limited, Noble Food & Beverage Limited in Dar es Salaam region; Soni Fruit Canning Company Limited in Lushoto district and Tan Dan Exotic Jams Limited in Arusha region. Of all the companies, Dabaga Fruit and Vegetable Canning Industry Limited is the largest and most important plant in terms of processing different fruits and vegetables. Other processing plants rely heavily on serving local communities partly due to inconsistency in delivery, little innovation, low quality products and poor packaging materials. The processing plants under this group include European Committee for Agricultural Training (CEFA) in Kilolo district, Iringa region; Sakarani Farm in Lushoto district, Tanga region; Tanganyika Vineyard Company (TAVICO), Bihawana mission and Veyula mission in Dodoma region. Taking into account the size of the country as well as the geographical dispersed nature of potential agro-ecological zones producing fruits and vegetables, these plants are inadequate to address the need of reducing post-harvest losses in Tanzania.

In terms of production, the trend of actual production of canned fruits and vegetables in the country increased from metric tons 985 in 1990 to 8595 metric tons in 2002

(Figure 1). The production of canned fruit and vegetable products over the period 1985 to 2002 averaged 2701 metric tons.

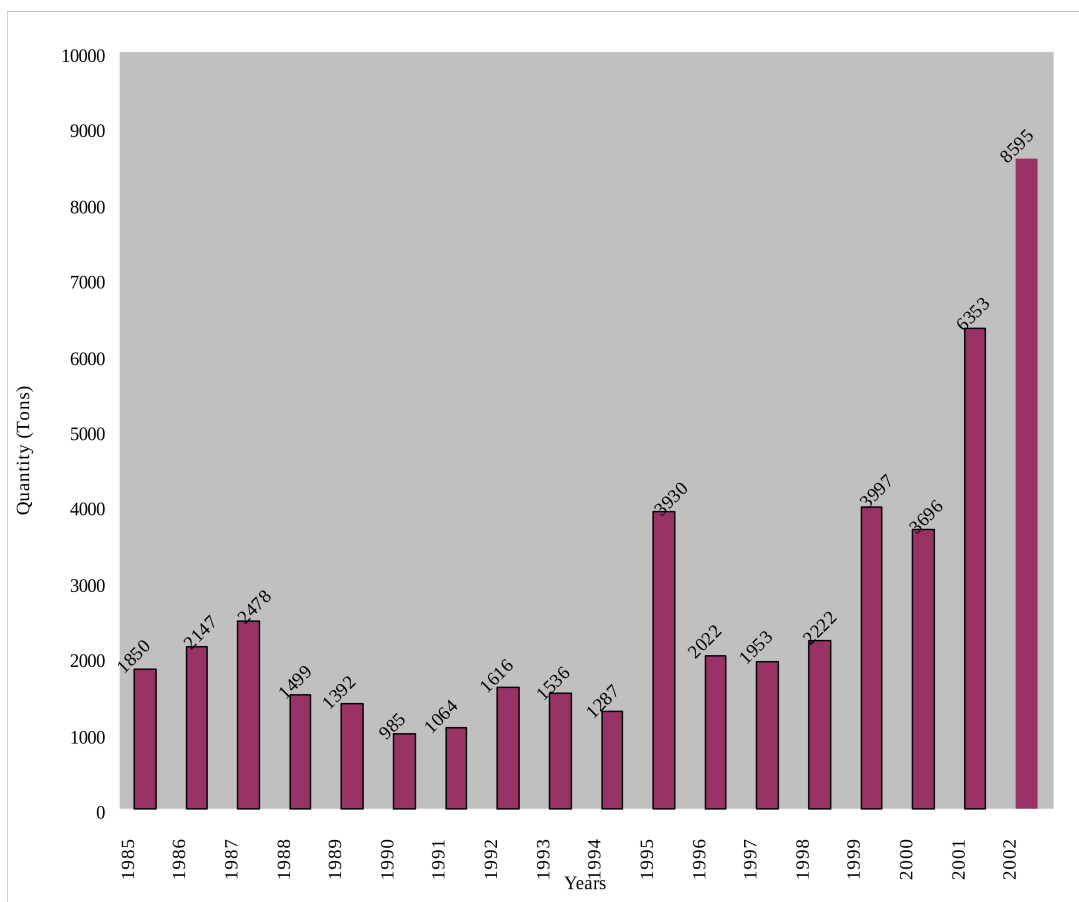


Figure 1: Domestic production: Quantity of canned fruits and vegetables produced between 1985 and 2002 (in tons)

Source: National Bureau of Statistics (NBS), 2003

Taking into account the population size of 35 millions people in the country, the domestic production of canned fruits and vegetables is inadequate to meet WHO/FAO minimum recommended intakes of 400g per capita per day or 146 kg per capita per year (International Agency for Research, 2003 cited by Ruel *et al.*, 2005). Consequently, the commercial imports of canned fruits and vegetables have been

increasing tremendously in recent years and most of the markets are flooded with imported fruits and vegetables. The next section describes policy, legal and institutional framework for promoting the food processing sub-sector in Tanzania.

1.3 Policy, Legal and Institutional Framework for Food Processing

There are a number of policies, laws and institutional framework in place aimed at promoting the food processing sub-sector in the country.

1.3.1 Policy framework

Most of policies related to processing of agricultural produce are documented in the Sustainable Industrial Development Policy, Small and Medium Enterprise Development Policy, Tanzania Food and Nutrition Policy, National Trade Policy and the Agricultural Policy.

The Government of Tanzania launched the *Sustainable Industrial Development Policy (SIDP)* in the mid-1990s which articulates the framework for the country's industrial development process within short, medium, and long-term perspective (URT, 1996). The SIDP systemically itemizes the motive of the government to utilize local resource endowment in order to: (i) encourage investment in industries utilizing local raw materials and inputs through incentive package within the Investment Promotion Act, (ii) establish public procurement mechanism at central, regional and district levels which will give preference to bids based on utilization of local resources and (iii) establish an effective inter-sectoral mechanism for procurement of locally produced raw materials by domestic industries. SIDP also recognizes the role

of the private sector as the principal vehicle in carrying out direct investments in the industry.

The *Small and Medium Enterprise Development Policy (SMEDP)* places specific emphasis on promotion of Small and Medium Enterprises (SMEs) through the following measures: supporting existing and new promotion institutions, simplification of taxation, licensing and registration of SMEs as well as improving access to financial services. The overall objective of SMEs Development Policy, therefore, is to foster job creation and income generation by promoting the creation of new SMEs and improving the performance and competitiveness of the existing ones, to increase their participation and contribution to the Tanzanian economy (URT, 2003a).

The *Tanzania Food and Nutrition Policy (TFNP)* is another important policy relating to the food processing industry. The policy states that processed food can meet the nutritional requirements of the target group, if the following efforts will be put in place (URT, 1992) that is: (i) adherence to appropriate procedures pertaining to food crop harvesting and storage before processing, (ii) the processed food should be well stored for the recommended period after processing, (iii) processing plants should be constructed near to or in the areas where the relevant crops are abundant to avoid destruction and loss of their nutritional quality due to transportation constraints and (iv) food quality and standards must be controlled. TFNP has also the mandate to formulate and carry out research on food processing technology which is appropriate at village and household levels (URT, 1992).

Likewise, the issue of marketing of locally processed fruits and vegetables is given special consideration in the *National Trade Policy (NTP)* of 2003 (URT, 2003b, c). Interestingly, NTP responds to and builds upon the internal economic reforms that have been under implementation since the mid 1980s, and the unfolding events on the international economic scene. The vision of the Tanzania's trade policy is to transform the economy from a supply constrained one into a competitive export-led entity responsive to enhanced domestic integration and opening up of wider participation in the global economy through national trade liberalization.

NTP has the following specific objectives that is:- (i) to stimulate a process of trade development as the means of triggering higher performance and capacity to withstand intensifying competition within the domestic market. This includes the establishment of improved physical market-place infrastructure and stimulating dissemination of market information and increasing access to the market; (ii) to enhance economic transformation towards an integrated, diversified and competitive entity capable of participating effectively in the Multilateral Trading System (MTS); (iii) stimulation and encouragement of value-adding activities on primary exports as a means of increasing national earnings and income flows even on the basis of existing output levels; (iv) stimulate investment flows into export-oriented areas in which Tanzania has comparative advantages as a strategy for inducing the introduction of technology and innovation into production systems as the basis for economic competitiveness; (v) attainment and maintenance of long-term current account balance of payments through effective utilization of complementarities in regional and international trading arrangements as a means of increasing exports combined with initiatives for higher efficiency in the utilization of imports. The underpinning emphasis of NTP is

that of enhancing income generation and people's earning power at the grass-roots level which is important to poverty reduction and fulfilment of the fundamental human right of equal opportunity for all citizens.

1.3.2 Legal framework

The Tanzania government established laws which govern different activities carried out within the food processing sub-sector which aimed at protecting users of the products. These, among others, include regulations with regard to registration of processing and business premises, regulations related to licenses and permits of performing business activities and regulations pertaining to composition of food. The detailed explanations of the afore-mentioned regulations are clearly documented in the Tanzania Food, Drugs and Cosmetics Act of 2003 (URT, 2003d).

1.3.3 Institutional framework

It should be borne in mind that the successful implementation of the afore-discussed policies and laws depends on the existence of a well established, coordination and collaboration mechanisms of various institutions. The major institutions which are vital actors in the fruits and vegetables processing sub-sector include government ministries such as Ministry of Industry, Trade and Marketing (MITM); Ministry of Agriculture, Food Security and Co-operatives (MAFSC); Ministry of Health; President's Office, Regional Administration and Local Government (PO-RALG); and Ministry of Finance. Other institutions include Tanzania Bureau of Standards (TBS), Tanzania Food and Drugs Authority (TFDA), Non-Governmental Organizations (NGOs), Community-Based Organizations (CBOs), International Organizations such as UNIDO and the private sector.

TBS and TFDA are the most vital agencies that have direct impact on promoting the fruits and vegetables processing sub-sector in the country, partly due to their responsibilities of enforcing food legislations and product quality control. For instance, the main activities of Tanzania Bureau of Standards (TBS), among others, are:- (i) formulation and promulgation of standards in all sectors of the country's economy, (ii) implementing the promulgated standards through a third party standards Mark Certificate Scheme, (iii) improving the quality of industrial products both for export and local consumption through various certification schemes like pre-export and pre-import inspection and testing, the tested product certification scheme and quality system registration, (iv) promoting standardization and quality assurance services in industry and commerce through training of personnel in company standardization, quality assurance and quality improvement and laboratory techniques, (v) testing of product samples drawn by TBS inspectors in the course of implementing standards (certification samples) or as requested by manufacturers (type-testing samples) and (vi) calibrating industrial and commercial measuring equipment and instruments in the areas of mass, length, volume, energy and temperature (URT, 1997).

The TFDA is charge, among others, with the task of (i) regulating all matters relating to quality and safety of food; (ii) regulating the importation, manufacture, labelling, marking or identification, storages promotion, selling and distribution of food and any substances used in the manufacture of products; (iii) ensuring that evidence of existing and new adverse events, interactions and information about pharmacovigilance of products is monitored, analyzed and acted upon; (iv) approving and registering products regulated under this Act, manufactured within or imported

into, and intended for use in the country; (v) examining, granting, issuing, suspending, cancelling and revoking certificates and licenses or permits issued under this Act; (vi) prescribing standards of quality in respect to products regulated under this Act, manufactured or intended to be manufactured or imported into or exported from the country; (vii) attending to and where possible take legal measures on complaints made by consumers against food manufacturers and (viii) fostering co-operation between the authority and other institutions or organizations and other stakeholders (URT, 2003d).

Apart from TBS and TFDA, Small Industrial Development Organization (SIDO) in collaboration with the United Nations Industrial Development Organization (UNIDO) embarked on extensive programme of training women entrepreneurs in food processing especially food preservation techniques. The programme started in 1993 and was scheduled to end in July, 2003 covering six regions in mainland Tanzania, namely, Arusha, Kilimanjaro, Tanga, Morogoro, Iringa, and Dar es Salaam. The main objective of the programme was to strengthen capacities at institution and enterprise levels in order to improve the competitiveness of small entrepreneurs in the agro-food industry. Specifically, the programme strove to achieve three outputs, namely, (i) strengthening capacity of Tanzania Food Processors Association (TAFOPA) as a private sector institution by providing integrated support to small entrepreneurs in agro-food processing, (ii) offering specific tailor-made training courses to meet the needs and demands of small entrepreneurs in the agro-food industry to increase their competitiveness in the local and regional markets and (iii) strengthening capacity of SIDO projects to ensure sustainability of its services (WED, 2003).

Available statistics indicate that since 1993 to date, over 1934 entrepreneurs have been trained, more than 70% of trainees are engaging in business, 50% of those who started business are producing regularly, 20% of those producing regularly are operating at a small scale level whereby the annual average turnover stands at 15 105 US dollars. Almost 1620 job opportunities have been created as well as over eleven women entrepreneurs have registered their business (WED, 2003).

1.4 Problem Statement and Justification

Although agriculture remains by far to be an important sector in Tanzania in terms of employing over 80% of the population and contribution to Gross Domestic Product (GDP) and nation's foreign exchange for about 50% and 54% respectively (Tanzania Diagnostic Trade Integration Study, 2005), processing has not developed and most of the agricultural products are consumed or exported in unprocessed form. In the case of cashew-nuts, for example, 83% of the production is exported to India in its raw form and only 17% is processed domestically (Tanzania Diagnostic Trade Integration Study, 2005). This makes Tanzania to lose the opportunities to earn value added to raw materials as well as its agricultural products are largely influenced by price fluctuation. In fact, the prices of many traditional cash crops such as coffee, cotton, sisal, tea and cashew-nuts have been decreasing (Bank of Tanzania, 2004; President's Office, Planning and Privatization, 2005). Other agricultural products such as fruits and vegetables face the same problem of price fluctuation. During the peak (harvest) season, for example, they "flood" the domestic market and their prices decline drastically.

A more serious problem concerns the huge losses of fruits and vegetables due to their perishability. Substantial quantities are wasted during the peak period. Available literature indicates that over 35% of agricultural products produced in most countries in Africa are lost as post harvest losses and only 20-25% of the produce is marketed (Yumkella *et al.*, 1999). With regard to Tanzania, post harvest losses undoubtedly are one of the main causes of food deficits. A study conducted by Commonwealth Secretariat (1997) indicated that between 40% and 80% of an estimated production of 2.75 million tons of fruits and vegetables produced in the country are lost as post-harvest losses due to lack of efficient and effective post-harvest handling techniques such as processing and preservation facilities. Specifically, the study done by Mathooko *et al.* (2000) found that post-harvest losses of fruits and vegetables in Dar es Salaam, Chalinze, Morogoro and Dodoma markets are quite high and vary between 5% and 80%.

Despite the fact that Tanzania faces a serious problem of post-harvest losses particularly for perishable products such as fruits and vegetables, available statistics indicate that only 1.5% of the available fresh fruits and vegetables are processed, compared to 40-50% in Thailand; 60-70% in the USA; 70% in Brazil; 78% in Philippines and 83% in Malaysia (Commonwealth Secretariat, 1997). Worse still, a number of large scale fruits and vegetables processing plants such as Tangold Products Company in Dar es Salaam and Korogwe branch in Tanga, and Morogoro have collapsed. Most of them have been operating under their processing capacity, varying between 25% and 40% of their capacity (Kuzilwa, 1997; Kurwijila, 1999; Commonwealth Secretariat, 1997; URT and JICA, 2000).

On the other hand, a number of shops in urban areas are flooded with imported processed fruits and vegetables following the policy of market liberalization. Imported processed products such as fruits and vegetables constitute a huge ratio of the processed products on shelves of local stores and supermarkets as well as juices served in hotels and to passengers flying by airlines like Air Tanzania Co-operation (ATC) Limited. The raw materials for these products are exactly what Tanzania grows in almost all regions. It is generally acknowledged that the imported processed fruits and vegetables are superior to local products in terms of both qualities and prices. Studies conducted by the Commonwealth Secretariat (1997), Dietz *et al.* (2000) and Nyagori (2001) indicate that low demand for products processed in the country compared to imported processed products is one of the most crucial factors contributing to poor performance of most of the agro-processing firms in the country. However, none of the cited studies attempts to provide statistical evidence related to demand for locally processed fruits and vegetables in Tanzania. Thus, the reasons for low demand for locally processed fruits and vegetables compared to imported processed fruits and vegetables are not clearly known. Consequently, the country has continued to import such items as fruit juices, canned tomatoes and sauces, although a surfeit of the natural raw materials—albeit seasonally, is produced in the country.

The importation of processed fruits and vegetables is an indication that there is demand for processed fruits and vegetables. However, processing of fruits and vegetables locally is justifiable not only because of demand but also because of presence of raw materials. It is documented that Tanzania has the potential to produce 2.0 millions tons of fruits worth at least one billion dollars and 1.2 millions tons of vegetables worth at least 621.8 million dollars per annum (Private Agriculture Sector

Support, 2002). Indeed, the agro-ecological characteristics of the country provide an excellent resource base, which favour the production of different varieties of both tropical and temperate fruits and vegetables almost throughout the year. In view of this, the development of agro-processing industry would contribute not only to getting rid of wastages of fresh fruits and vegetables but also to secure additional stable income to farmers.

It is widely reported by Kejriwal (1989), Damardjati (1995) and Hicks (2001) that development of agro-processing help to achieve the following vital objectives: (i) preventing loss and increasing food supplies, (ii) generating value addition and hence increasing producers' income and profitability, (iii) improving storability and/or nutritive value of the products, (iv) generating a large amount of employment opportunities and reducing poverty in both rural and urban areas, (v) reducing migration of people from the rural to urban areas to avoid a number of social, environmental and political crises, (vi) increasing foreign exchange earnings, (vii) stimulating agricultural production through diversification of marketable products within and outside the country, (viii) improving livelihood by shifting from the traditional thinking of production only to product chain approach, which emphasizes adding value and marketing and (ix) providing incentives for increased production and productivity amongst smallholder farmers.

Despite the tremendous potential of the agro-processing sub-sector in development processes, the government and other stakeholders devoted minimal efforts to promote and strengthen this sub-sector in the country, particularly so, for fruits and vegetables. As a result, the current status of the agro-processing sub-sector in Tanzania is still in

its infant stage compared to other developing countries such as South Africa, India and Kenya. Nevertheless, there is some information gap pertaining to the processing potential at firm level, constraints to markets and factors influencing demand for processed fruits and vegetables in Tanzania.

Based on the above background, a comprehensive analysis of processing, marketing and consumption of processed fruits and vegetables was carried out to provide information on the issues of processing potential at firm level, marketing and demand for processed fruits and vegetables in Tanzania. This would help to guide future policy initiatives in promoting and facilitating greater processing, marketing and consumption of locally processed fruits and vegetables in the country. The findings also bridge the gap in the existing studies relating to processing, marketing and demand for processed fruits and vegetables in Tanzania. Findings emanating from this empirical study and its recommendation will be an important tool for different stakeholders, especially policy makers and development agencies/practitioners to better design or fine-tune development policies and design specific interventions aimed at stimulating and promoting the consumption of locally processed fruits and vegetables. Indeed, the findings emanating from this empirical study will provide information to both policy makers and other development practitioners on issues pertaining to implementation of National Strategy for Growth and Reduction of Poverty (NSGRP) especially to strengthen and promote backward and forward linkages to agricultural production through agro-processing and value-addition.

1.5 Objectives

1.5.1 General objective

The general objective of this study was to analyze processing potential, marketing and consumption of processed fruits and vegetables and suggest strategies for stimulating and promoting fruit and vegetable processing and consumption in Tanzania.

1.5.2 Specific objectives

The study was guided by the following specific objectives:

- (i) To assess processing potential at firm level and identify constraints affecting the performance of fruits and vegetables processing firms.
- (ii) To examine the marketing system for processed products and identify constraints to marketing of locally processed fruits and vegetables.
- (iii) To analyze the consumption pattern for processed fruits and vegetables and determine the main factors affecting their demand.
- (iv) To suggest strategies for stimulating and promoting processing, marketing and consumption of locally processed fruits and vegetables.

1.6 Research questions

To effectuate research problems and objectives requires carrying out an empirical analysis, the results of which should provide answers to the following questions:-

- (i) What quantities of different varieties of fruits and vegetables are processed in the study areas?
- (ii) Are the processing firms able to utilize their capacities throughout the year?

- (iii) What are the marketing channels for processed fruits and vegetables in the study areas?
- (iv) What type of processed fruits and vegetables prevail/dominate in the market?
- (v) Is there any difference between the consumption patterns of locally and imported processed fruits and vegetables?
- (vi) Are imported processed products more preferred than locally processed products?
- (vii) What are the main factors that influence processing, marketing and consumption of locally processed fruits and vegetables?
- (viii) How can processing, marketing and demand for locally processed fruits and vegetables be stimulated and promoted?

1.7 The Conceptual Framework

Figure 2 presents the conceptual framework of the study. It is worth to note that the consumption of processed fruits and vegetables is determined by the households' preferences. However, preferences are influenced by many interrelating factors which include the household decision making process, households' characteristics and marketing system. Specifically, households' decision making process located at the centre of this framework partly because decisions about consumption of processed fruits and vegetables and the allocation of food among household members in the study areas will be influenced by the role of women in making household decisions

(Figure 2). Empirical evidence indicates that households in which women have more control over resources (partly due to legal rights; greater inheritance; high share of assets or absence of the husband) or higher social status tend to place a higher priority on child health and nutrition in allocating household resources (Ruel *et al.*, 2005). For this reason, this study assumes that gender is amongst the intra-household decision-making process which influences consumption of the processed fruits and vegetables.

Both classical and neo-classical consumer theories acknowledge the significant contribution of the household's characteristics on consumption of the agricultural products in a given area. In this study, it is assumed that age of the household heads, household income and education level, household size, preferences and awareness about nutritional value of processed products are some of the household characteristics influencing the consumption of processed fruits and vegetables (Figure 2).

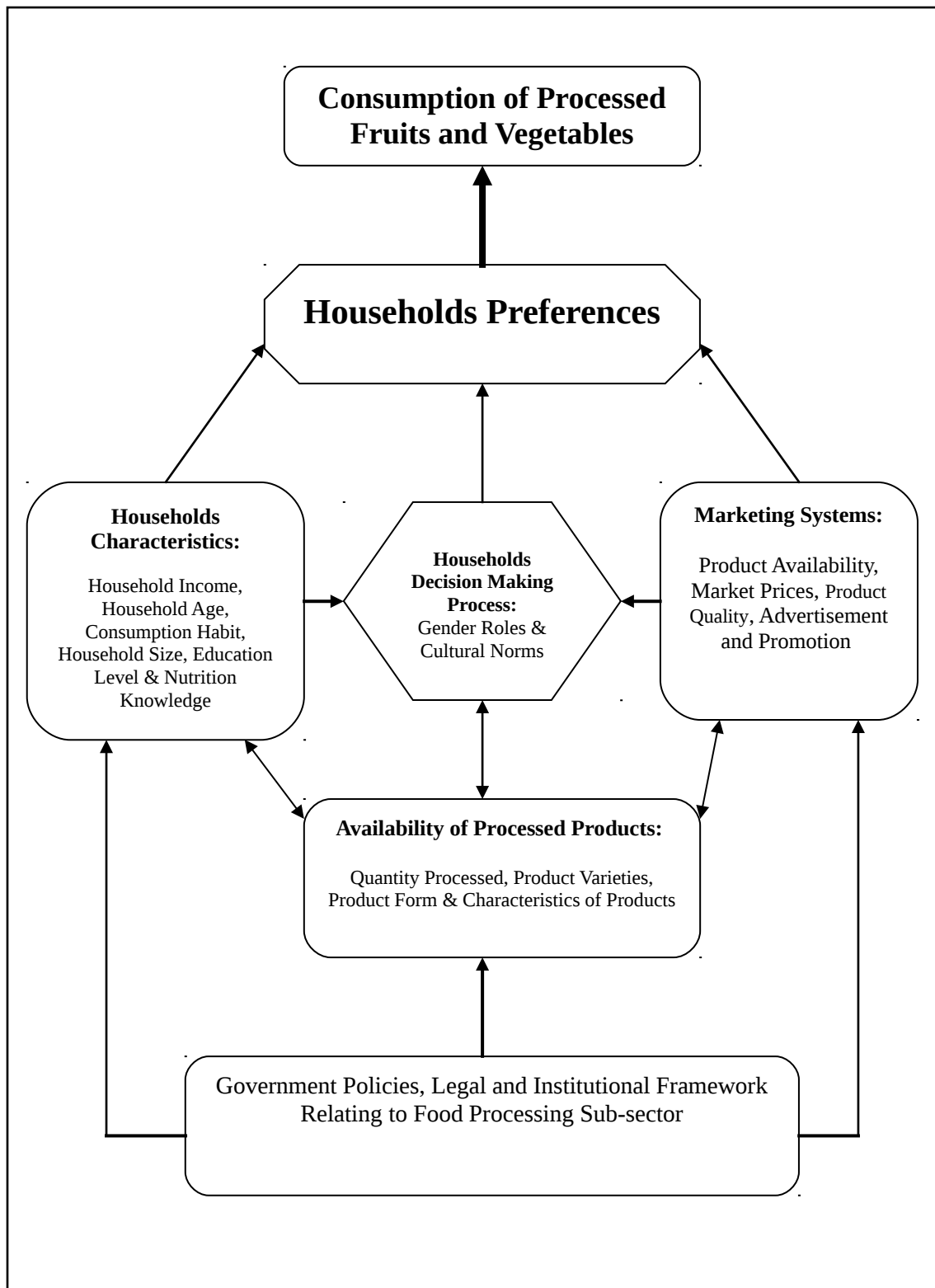


Figure 2: The conceptual framework for analyzing factors affecting consumption of processed fruits and vegetables

It was also assumed in the same figure that marketing systems have an important role to play in order to promote the consumption of processed fruits and vegetables. For this reason, factors such as prices of processed and fresh fruits and vegetables, availability of processed products and frequency of promotion have significant effects on the consumption of processed fruits and vegetables among households in the study areas. It must be clearly understood, however, that the effectiveness of the marketing systems to a greater extent depends on the processing potential in terms of quantity and quality of the products, product varieties, product form and characteristics of the processed products. Hence, this study put more emphasis on the quantity of the products consumed by households and the effect of the product quality on the consumption of the processed fruits and vegetables. The concentration on product quality was based on its significance in influencing household's acceptance of consuming a particular type of food products (Figure 2).

Furthermore, information in Figure 2 also assumed that government policies, legal and institutional frameworks related to agro-processing sub-sector have a vital role to play in stimulating and promoting processing, marketing and consumption of locally processed fruits and vegetables in Tanzania. Finally, with regard to the conceptual framework presented in Figure 2, the information collected relating to aforementioned variables was used in the empirical analysis in order to achieve the study objectives. However, most researchers have found it difficult to include all the stated variables or factors in the empirical models, either due to non-availability of data or problems of not having enough observations (Agarwal and Drinkwater, 1977; Saxauer, 1979). Such a problem results in specification problems. However, Mrema

(1984) suggests that economic theories of consumer behaviour are generally used to guide the researchers in developing appropriate models for empirical specification.

1.8 The Study Area

The study was conducted in Dar-es-Salaam, Tanga, Iringa and Dodoma regions with main focus in Dar es Salaam region (Figure 3). Several factors were considered in reaching the decision to choose Dar es Salaam. These include existence of many and diverse agro-processing firms as opposed to other regions in the country, existence of different categories of consumers in terms of economic status, ethnicity and culture as well as high consumption of fresh fruits and vegetables. Data indicate that the average expenditures of vegetables and fruits between May 2000 and May 2001 in Dar es Salaam city were 57 411.00 TShs and 17 037.00 TShs compared to 37 140.00 TShs and 10 964.00 TShs in other urban areas as well as 13 256.00 TShs and 3 720.00 TShs in rural areas, respectively (National Bureau of Statistics, 2003). Tanga and Iringa regions were included in the study due to their high potential for producing and processing varieties of fruits and vegetables while Dodoma region was included in the study due to its potential for producing and processing grape vines. Moreover, accessibility to transportation was considered in selecting the four regions.

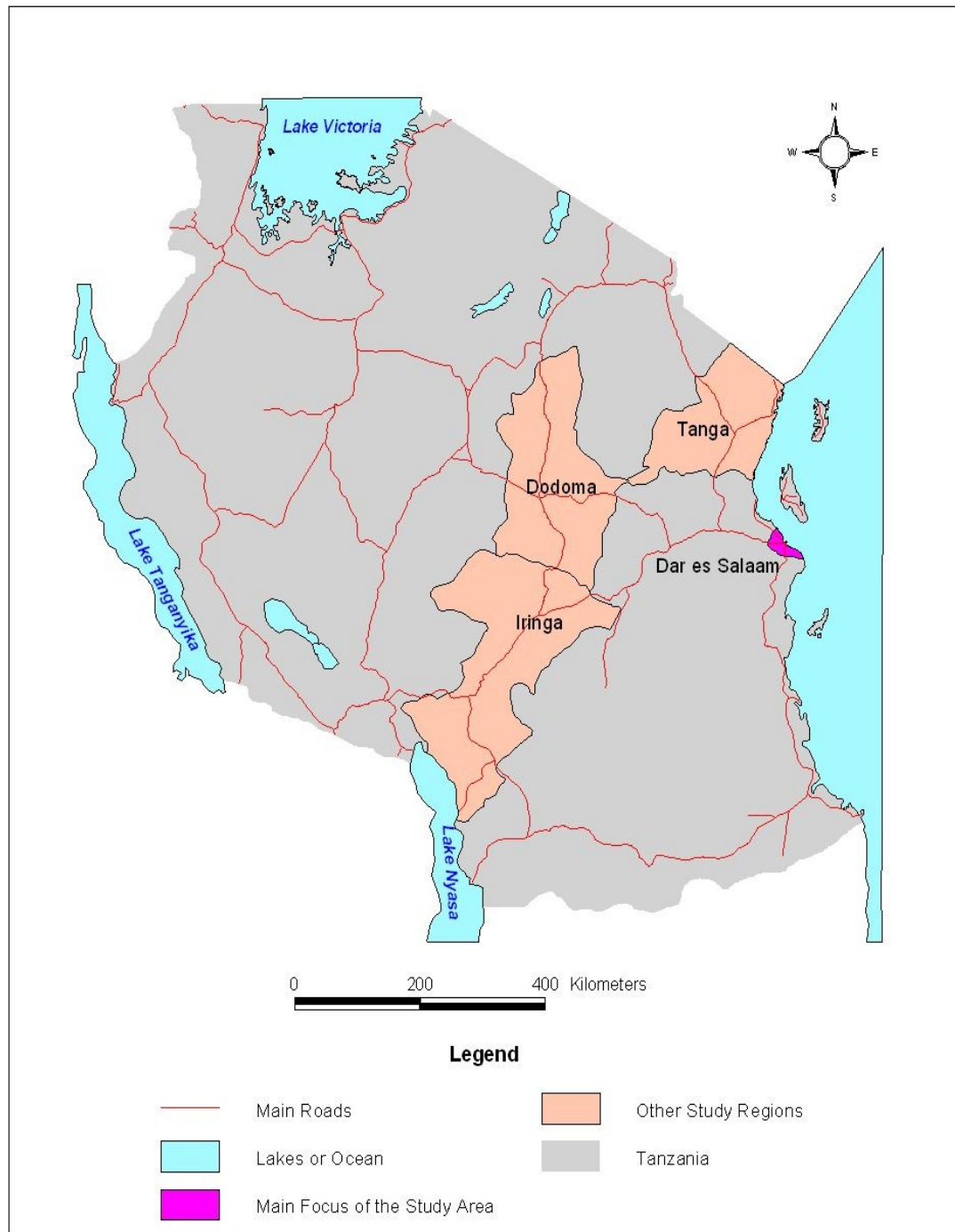


Figure 3: Locations of study regions in Tanzania

Source: Ministry of Education and Swedish International Development Authority (SIDA), 1987

Dar es Salaam region is located approximately 800 kilometres south of the equator along the East African coast, between latitudes 6° 34' and 7° 10' south of the equator

and longitudes 39° 00' and 39° 33' east of Greenwich. The region occupies an area of 1 393 km² or 0.2% of the total land in Tanzania, where 448 km² is reserved for city expansion while 945 km² is known as greenbelt area, which is suitable for both agriculture and livestock keeping. The region is composed of three administrative districts namely Kinondoni, Ilala and Temeke.

According to the 2002 National Population Census, Dar es Salaam is the third region from Mwanza and Shinyanga regions in terms of total population. It has a total population of 2 497 940 people which is 7.2% of total population in Tanzania. Out of its total population 1 236 863 are males and 596 264 are females. The average household size in the region is 4.2 persons (URT, 2003e). In addition, the region has highest population density of 1 793 persons per km² in the country, growing at an average of 4.3% per annum based on the 1988 National Population Census (URT, 2003e). In response to this, the population statistics seem to suggest that the region has adequate potential demand for processed fruits and vegetables, *ceteris paribus*.

Main fruits and vegetables grown in Dar es Salaam region are oranges, mangoes, pineapples, papaya, bananas, lemons, okra, eggplant, cabbages, onions, spinach and tomatoes (Ministry of Agriculture and Co-operatives, 2000). Most of the agro-processing businesses are concentrated in Dar es Salaam region followed by Arusha region. The two regions accounted for about 52.0% and 18.0% respectively of total proportion of licensed food manufacturers in Tanzania during the 2002/2003 period (Tiisekwa *et al.*, 2005). Dar es Salaam is ranked first in Tanzania in terms of number of industries producing different products, although there are very few fruit and vegetable processing industries. Those available include Vitamins Food Limited,

Tropical Food Products Limited and Noble Food & Beverage Limited. It should also be noted that most of the factories producing different varieties of juices in Dar es Salaam region are not really processing raw fresh fruits and vegetables but rather use flavour or chemicals to produce products with fresh fruit and vegetable flavour. However, there are no reliable statistics on quantities of fruits and vegetables processed, marketed and consumed in Dar es Salaam region. Undoubtedly, most statistics on the fruits and vegetables sub-sector in the country indicate the quantities and prices of fresh fruits and vegetables traded in the markets and give no indication of actual production of processed fruits and vegetables products and their consumption.

Tanga region is situated in the north eastern part of Tanzania, the northern boundary coincides with the international frontier with Kenya, in the east the region borders the Indian Ocean, in the west and south it borders Kilimanjaro, Arusha, Morogoro and Coast regions respectively. The region has an area of 26 808 km² or 3.0% of the total land in Tanzania, of which about 75% of the land (approximately 2 million hectares) is estimated to be suitable for agricultural and livestock production. Of the total land for agriculture activities, only 20% is cultivated. Tanga region is divided into seven administrative districts namely Tanga city, Lushoto, Korogwe, Muheza, Handeni, Pangani and Kilindi.

Based on the 2002 Population Census, Tanga is one of the regions in Tanzania, with lowest inter-censal population growth rate. It has a total population of 1 642 015, which is 4.8% of total population in Tanzania, growing at an average of 1.8% annually based on the 1988 National Population Census (URT, 2003e). Out of the

total population, there are 797 240 males and 844 775 females with an average household size of 4.6 persons (URT, 2003e). However, the region has moderate population density of 61 persons per km² compared to densely populated regions like Dar es Salaam (1793 persons per km²), Mwanza (150 persons per km²) and Kilimanjaro (104 persons per km²). Likewise, the region has adequate potential demand for processed fruits and vegetables.

Tanga is one of the potential regions in the country for production of tropical and temperate fruits and vegetables. The major fruits and vegetables grown in the region are citrus, pineapples, papaya, mangoes, jackfruits, pears, apples, plums, peaches, passion fruits, avocados, guavas, tomatoes, cabbages, onions, spinach, okra, sweet peppers, carrots and *amaranthus species* (Ministry of Agriculture and Co-operatives, 2000). Soni Fruit Canning Company Limited which is located in Lushoto district is the famous fruit and vegetables processing factory in the region. Other processing firms include Sakarani Farm and Montessori both located in Lushoto district as well as Akili Company Limited located in Tanga city.

Iringa region lies in the Southern Highlands of Tanzania mainland. The region has an area of 56 864 km² or 6.4% of total land of Tanzania, 73% of which is arable land. Iringa region is composed of seven administrative districts, namely, Iringa Municipality, Iringa rural, Kilolo, Mufindi, Njombe, Ludewa and Makete. Based on the 2002 Population Census, Iringa is one of the ten regions in Tanzania, which have large population with a total population of 1 495 333, which is 4.3% of total population in Tanzania, growing at an average of 1.5% annually based on the 1988 National Population Census (URT, 2003e). Out of the total population of Iringa

region there are 708 927 males and 786 406 females with an average household size of 4.3 persons (URT, 2003e). However, the region's population density according to 2002 National Population Census is relatively low, averaging 26 persons per km² compared to densely populated regions like Dar es Salaam, Mwanza and Kilimanjaro. Overall, the population statistics seem to suggest that the region has adequate potential demand for processed fruits and vegetables.

Agriculture is the most reliable source of household income for over 80% of residents in Iringa region. Indeed, both tropical and temperate fruits and vegetables are produced in substantial amounts by smallholder farmers. The prominent fruits and vegetables grown in this region are tomatoes, passion fruit, peaches, plums, apples, onions and hot peppers (Ministry of Agriculture and Co-operatives, 2000). Apparently, there are two fruit and vegetable processing plants, namely, Dabaga and European Committee for Agricultural Training (CEFA) Fruit and Vegetables Canning Plants.

Dodoma region is situated in the central part of Tanzania, where the administrative capital city of Tanzania is located. Geographically the region lies between latitudes 4° 7' and 7° 21' south of the Equator and between longitudes 36° 43' and 35° 5' east of Greenwich (URT, 2003f). The region has an area of 41 311 km² or 4.7% of total land in Tanzania, making it the 12th largest region in Tanzania Mainland in terms size. Available statistics indicate that the region has 2 593 million hectares of arable land of which about 550 000 hectares or 21% of land is suitable for crop production. The region is divided into five administrative districts, namely, Dodoma Municipality, Dodoma Rural, Kondoa, Kongwa and Mpwapwa.

Based on the 2002 Population Census, Dodoma is one of the regions in Tanzania that has a large population with a total population of 1 698 996 accounting for 4.9% of the total population in Tanzania, growing at an average of 2.3% annually based on the 1988 National Population Census (URT, 2003e). Out of the total population there are 823 504 males and 875 492 females with an average household size of 4.5 persons (URT, 2003e). However, the region has relatively moderate population density of 41 persons per km² compared to densely populated regions like Dar es Salaam, Mwanza and Kilimanjaro. The relatively high population partly suggests that there is adequate potential demand for processed fruits and vegetables.

Dodoma region has a comparative advantage in production of grape vines compared to other regions in the country. Tanganyika Vineyard Company (TAVICO) is the most famous processing plant engaged in processing grapes in this region. Other processing plants include Bihawana mission and Veyula mission. These plants rely heavily on serving local communities.

1.9 Organization of the Thesis

The thesis is organized into five chapters with chapter one being the introduction. Chapter two reviews the empirical literature in areas of processing, marketing and demand for agricultural products. Chapter three describes the methodology of study. The description covers data needs and sources, sampling, technique of data collection, preliminary survey, recruitment and training of enumerators, operationalization of the fieldwork and data processing and analysis. This is followed by empirical findings and discussion in chapter four. The last chapter gives conclusions and recommendations based on the major findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter reviews existing literature on issues related to the study. Special attention is directed on reviewing the factors significantly influencing processing, marketing and demand for agricultural products. The remainder of the chapter is divided into four main sections. The second section presents an overview of the food processing industry in Tanzania whereas section three provides literature on the concept of marketing and models for evaluating market performance, followed by factors influencing demand for agricultural products in section four. Finally, the chapter concludes with a review of literature relating to demand including theoretical and empirical methods employed in previous studies.

2.2 An Overview of Food Processing Industry in Tanzania

Food processing industry is the generic term applied to industries processing raw food related products derived from crop production, animal husbandry as well as fishing. Specifically, FAO (1997b) has defined food processing as a scientific and technological activity covering a broader area than food preparation and cooking. Basically, it involves the application of scientific principles to slow down the natural processes of food decay caused by micro-organisms, enzymes and/or environmental factors such as heat, moisture and sunlight. A more comprehensive definition of food processing is the activity of converting the raw food commodity into a desirable form that facilitates matching demand and supply (Nyanteng, 2001). This study has adopted this definition.

Strategies to promote and strengthen agro-based industries in Tanzania including food processing firms dates back to independence in 1961 when the government introduced the long-term industrialization strategy known as the basic industrial strategy during the preparation of the third five-year plan (1976-1981) (URT, 1998). The main objective of the plan was to focus on those industries producing goods for the basic needs of the people and utilizing the local resources as much as possible. Special emphasis was devoted to promoting agro-based industries such as food processing, textiles, clothing and leather products. As a result, the Tanzanian agro-processing industries were categorized into four main groups (Kurwijila, 1999): These include, (i) import substitution agro-industries such as textile industries; (ii) import dependent agro-industries that depend on imports for processing technology including requirement for technical assistance, spare parts, packaging materials, raw materials and other important inputs such as Tanzania Diaries Limited (TDL); (iii) export depended agro-processing industries, which increase shelf life of agricultural produce such as the former Tanganyika Packers located in Dar es Salaam region and (iv) domestic market agro-processing industries such as Dabaga Fruit and Vegetables Canning Industry Limited, which is located in Iringa region.

According to Amani (1992) and Kavishe (1993), in the late 1970s and 1980s the Tanzania government owned and operated most of agro-based industries. Indeed, food processing sector was dominated by a few major enterprises including government parastatals, village co-operatives and private investors. For instance, milk processing was entrusted to the Tanzania Dairies Limited, with processing plants located in Dar es Salaam, Tanga, Arusha, Mbeya, Musoma and Tarime (Kurwijila, 1999). Another parastatal, the National Milling Corporation (NMC) was involved in

canning fruits and vegetables. However, the major weakness of the parastatals was that they operated inefficiently and depended on government subsidies (Temu and Due, 1998).

Following economic liberalization policies, a number of government policies were put in place aimed at facilitating economic growth, which have a bearing on the development of the agro-processing sector. The Sustainable Industrial Development Policy (SIDP) launched in the mid-1990s, for example, has defined the framework for the country's industrial development process within short, medium, and long-term perspective (URT, 1996). Interestingly, SIDP recognizes the role of the private sector as the principal vehicle for carrying out direct investments in industry with emphasis on promotion of Small and Medium Enterprises (SMEs). National Micro-finance Policy, on the other hand, puts emphasis on the provision of financial services to Micro and Small Enterprises (MSEs) in rural areas as well as in the urban sector that are engaged in all types of legal economic activities (Tiisekwa *et al.*, 2005). Despite these seemingly impressive policies relating to agro-processing sector, a number of fruits and vegetables processing plants such as Tangold Products Company in Dar es Salaam and Korogwe branch in Tanga, and Morogoro fruits processing plants are no longer operating because they are out of order since the mid-1990s.

Available statistics indicate that most agro-processing industries in the country are operating under capacity (Commonwealth Secretariat, 1997; Kuzilwa, 1997; Kurwijila, 1999; Tiisekwa *et al.*, 2005). For example, a study by Tiisekwa *et al.* (2005) found that about 75% of the agro-based industries in Tanzania operate below their capacity, some of them recorded as low as 15% of total capacity utilization.

Surprisingly, most local processors are concentrating on processing cheaper products to secure their dwindling market share. This has in turn eroded profits and ability to invest in new and quality products in order to compete with the often better-financed and larger importing companies (Tiisekwa *et al.*, 2005).

It is generally acknowledged that efforts to promote agro-processing industries including food processing firms in Tanzania have neither been well-coordinated nor linked to the larger national economic strategy covering all sectors of the economy (Commonwealth Secretariat, 1997; URT, 1998). As a result, agro-processing industries particularly Micro and Small Scale Enterprises (MSEs) have been facing many constraints (Commonwealth Secretariat, 1997; Minga, 1998; Nyagori, 2001; Tiisekwa *et al.*, 2005). These constraints include lack of appropriate and adequate working premises, lack of working capital, low level of technical and management skills, low level of technology, irregular and expensive power supply, high and many levies at various stages of the production chain and unfair taxation system that lead to unfair competition. Other constraints include inadequate quantity and quality of raw materials, poor infrastructure, limited access to market information and few alternative markets, lack of strong processors association as well as lack of research and development (Commonwealth Secretariat, 1997; Minga, 1998; Nyagori, 2001; Tiisekwa *et al.*, 2005).

According to Markets and Agribusiness Thematic Group (MATG) (2001), agro-food systems in many developing countries remain in a state of transition because firms were privatized into weak regulatory environments, key public assets were not in place to enable a broad array of firms to take advantage of new markets and little

thought was given to corollary impacts resulting from the privatization. Thus, many firms found it difficult to obtain (debt and equity) financing to maintain or expand their operations. The withdrawal of the state from food processing, and commodity and inputs trade was not followed rapidly and automatically by a well-equipped and well-organized private sector. Furthermore, many of the collateral services provided by the state in the one-channel monopsony systems have not spontaneously emerged from the new set of actors.

Likewise, the set of laws, regulations and other institutions that are needed to support and facilitate efficient market activity remain under construction, even in countries where policy reform and privatization process is most advanced (MATG, 2001). Hence, most developing countries including Tanzania continue to face enormous challenges of institutional restructuring and re-engineering within their agro-food systems (MATG, 2001). Undoubtedly, these situations have either direct or indirect impact on overall performance of fruits and vegetables processing industry in the study areas, in particular, and the country as a whole and hence undermine the efforts of the local industries' including fruits and vegetables processing firms' ability to transform their activities from a domestic to an international focus. Nevertheless, there is a paucity of information pertaining to processing potential at firm level, constraints affecting performance of processing firms and strategies to promote processing of fruits and vegetables in study areas.

2.3 The Concept of Marketing and Models for Evaluating Market Performance

2.3.1 The agricultural marketing concept

Marketing can be defined as a process that involves finding out what customers want and supplying it to them at a profit or directing production in accordance to clear signals from the market place as to what is needed by customers (FAO, 1997c). Marketing may also be defined as the process of creating form, time and space utility (Kohls and Uhl, 1990). Form refers to processing or value adding, time to storage and preservation, and space to transportation of the products. A more comprehensive definition of marketing is the process of planning and executing the conception, pricing promotion, and distribution of ideas, goods, and services to create and maintain exchanges that satisfy individual, organizational and societal goals in the systematic context of global environment (Czinkota *et al.*, 1997). This study has adopted this last definition of marketing.

For the sake of clarity, marketing deals with three separate but related problems, that is consumers' demand for farm products, the price system that reflects these demands back to distributors and producers, and the methods or practices used in exchanging title and getting the physical product from producers to consumers in the form that they want and at the time and place desired (Shepherd and Futrell, 1982). Thus, the crucial role of agricultural marketing is to determine accurately and in quantitative and qualitative terms what consumers demand in time, place and form and what changes are taking place in those demands with the passage of time. Based on this scenario, the producer's job does not begin and end with producing a product. Rather, it begins with finding out what potential customers want, producing the product and then seeing that it reaches the consumers in the form and time they want it.

It is worth noting that an efficient marketing sector does not merely link sellers and buyers and react to the current situation of supply and demand (Abbott, 1993). It has also a dynamic role to play in stimulating output and consumption, the essentials of economic development. Likewise, it creates and activates new demands by improving and transforming farm products, and by seeking and stimulating new customers and new needs. Moreover, it guides producers toward new production opportunities and encourages innovation and improvement in response to demand and prices. Its dynamic functions are thus of primary importance in promoting economic activity and creating employment as well. For this reason, an efficient marketing sector has been described as the most important multiplier of economic development (Drucker, 1958, cited by Abbott, 1993). This argument has also been supported by Fuglie (1995) who argues that improving the productivity of agricultural marketing services will increase social welfare by reducing the cost of transforming agricultural commodities through space, time or form, and thereby extend the market for agricultural products including processed fruits and vegetables.

2.3.2 Models for evaluating market performance

The need to analyze the performance of the marketing system for processed products stems from its fundamental role in the development process. Scarborough and Kydd (1992) reported that markets can potentially contribute to the development process in two ways. First, they can provide a way to allocate resources ensuring the highest value production and maximum consumer satisfaction. Second, they may stimulate growth by promoting technological innovation and increased supply and demand. Basically, there are three main models or schools of thought for evaluating the

performance of agricultural marketing systems (Scarborough and Kydd, 1992). The explanation for each school of thought is offered below.

2.3.2.1 The Internal Productive Efficiency of Marketing Enterprises (IPEME)

Scarborough and Kydd (1992) report that between 1940s and 1950s the main emphasis in marketing economics was on the internal technical and operational efficiency of marketing firms. In this intra-firm organization, management structures, motivation and incentive arrangements, and decision-making rules and processes were seen as important influences in the efficiency of operations. Technical efficiency refers to the efficiency with which resources are used in marketing in terms of physical inputs and output ratios. Thus, a technically efficient market produces the maximum possible output from the inputs used, given location and environmental constraints, and it minimizes resource inputs for any given level of output. Operational efficiency, on the other hand, is defined as the provision of goods or services, at least cost and at a level of output, or combination of inputs, which ensures that the value of marginal product equals marginal factor costs ($MP = MFC$). Operational efficiency is also sometimes referred to as allocative or pricing efficiency (Scarborough and Kydd, 1992). French (1977), cited by Scarborough and Kydd (1992) argued that the approaches to estimating firm's level economic efficiency and cost relationships aimed at improving technical and operational efficiency are grouped into three categories, namely, (i) descriptive analysis of accounting data used to calculate average costs, and provide standards and data for comparisons between different types or sizes of firms, (ii) statistical analysis of the data, using econometric approaches to estimate production function relationships and (iii) analysis which

combine physical production and cost relationships, using data on inputs and outputs of the production function. All are aimed at improving technical and/or operational efficiency of marketing firm. However, Scarborough and Kydd (1992) warns that there is a problem in attempting to make generalizations about, and postulating causality, relationships between costs and firm characteristics because there are so many factors which affect costs. For example, amongst other factors, economies of scale, different production techniques and organizational structures, location and environmental conditions, vertical or horizontal integration, managerial and other employee efficiency, remuneration and motivation, capital intensity and utilization, rates of physical losses and inputs prices, all affect the costs of producing marketing services (Scarborough and Kydd, 1992).

2.3.2.2 The Structure-Conduct-Performance Model (SCPM)

The major proponents of the SCP Model are Bain (1968), Shaffer (1983), Marion (1986) and Reid (1987), cited by Ashimogo (1995). The analytical core of this model is the assessment of markets on the assumption of a two-way causal and feedback relationship between its three major components of markets, which is structure, conduct and performance. The model claims to explain the relationships between functionally similar firms, and their market behaviour as a group. Specifically, the model assumes that given certain basic conditions, the performance of particular industries depends on the conduct of its sellers and buyers, which in turn is strongly influenced by the structure of the relevant market (Scarborough and Kydd, 1992).

According to Bain (1968), quoted by Ashimogo (1995) the structure of a market entails the organizational characteristics of a market that appears to exercise a strategic influence on the nature of competition and pricing within the market. The most important measures of market structure are the degree of sellers and buyers concentration, the degree of product differentiation and entry barriers. Likewise, market conduct refers to firm behaviour in adopting or adjusting to the markets in which they buy or sell (Scarborough and Kydd, 1992). These include things like pricing and selling policies and tactics, overt and tacit inter-firm co-operation, or rivalry, and research and development activities (Scarborough and Kydd, 1992). Performance is the end result of a firm's objectives and therefore its definition is much debatable. The following characteristics of an industry and its markets are commonly referred to, although the focus is usually only upon the first two: (i) productive and allocative efficiency, (ii) progressiveness, (iii) equity and (iv) employment (Scarborough and Kydd, 1992).

Nevertheless, Scarborough and Kydd (1992) identify some of the major problems associated with SCP model in its empirical application as follows:- (i) under some circumstances a given structure may not lead to theoretically anticipated conduct and performance. For instance, aggressive rivalry among participants in an oligopolistic market may result in conduct and performance similar to those found under perfectly competitive model, (ii) industrial organization studies focused mainly on structure and performance, undervaluing conduct due to data and measurement problems and the under developed nature of theory of conduct, and (iii) markets depend not only on relationships among similar firms, but also on the nature of relationships among different categories of firms within the marketing system.

Furthermore, Scarborough and Kydd (1992) argue that the most important hypothesis generated by the S-C-P school of thought and tested by a number of marketing economists is that as the market structure moves away from perfect competition, the degree of competitive conduct will decline and there will be a consequent decrease in output and allocative efficiency, and prices will rise. Thus, the model provides the best tenets of mirroring markets on the assumptions of perfect competition theory. Based on this, Smith (1972) argues that the applicability of S-C-P model in developing countries has been questioned due to the under development of market infrastructure, inter-sectoral relations, and development of objectives, as well as the unique social and political structure found in the developing countries. However, many economists agree that it is only the performance measures, which need to be carefully revised to fit the developing countries situations (Cubbin, 1988, cited by Temu, 1999).

2.3.2.3 The Food Systems Framework School of Thought

This emerged in the late 1960s out of dissatisfaction with IPEME and SCP school of thoughts that jointly failed to examine the nature of the vertical as well as horizontal relationships between firms in assessing market performance (Shaffer, 1973). In addition, the IPEME and SCP models failed to identify binding constraints on or in the system, and opportunities for enhancing its productivity and performance. Instead, the food systems framework combines elements from both the IPEME and SCP models and therefore, the model goes beyond industry boundaries and assesses the structure and conduct vertically and horizontally over the entire commodity flow from input supplier to the ultimate consumer. Scarborough and Kydd (1992) argue

that the rationale behind this extension is that structure and behaviour at one level in the system influences similar aspects in others.

A further advantage of this approach is that it recognizes the importance of the complimentary nature of farm resources in both production and consumption. It is also a broad approach that considers such aspects as the economic, infrastructural and institutional environments in which markets operate as given, but are studied in terms of (i) their impact on market performance and (ii) the constraints and opportunities for markets to contribute to improved economic performance (Scarborough and Kydd, 1992). Such constraints and opportunities are defined either through interviews with market participants, or through classical market analysis tools. Furthermore, Scarborough and Kydd (1992) conclude that a comprehensive standardized analytical and methodological approach has yet to be developed within this framework that emphasises on identifying constraints and opportunities as well as on the interdependence between various markets and marketing functions.

With regard to the foregoing models, Mdoe (1993) argues that economists have faced great difficulty defining an aggregate norm for evaluating the performance of marketing systems partly because no single criterion of performance seems to exist and each of the above models contains elements that provide insights to particular issues relating to market performance. However, it is important to note that most researchers have used individual or a combination of performance measures with elements of these approaches in assessing performance of marketing systems. Similar views have also been acknowledged by Patnaik (1985) who reported that a single measure seems to be inadequate in assessing the overall performance of marketing

systems especially when market participants have some choice of operating in different channels and where the structure of the channel varies. However, the volume and trend of marketed output through alternative marketing channels or agents have normally been used to compare popularity of market intermediaries or channels. For instance, the study conducted in India by Hugar and Hiremath (1984) used market shares of commission agents and cooperatives to compare their popularity in vegetable marketing.

However, a study conducted by Thakur (1974) employed marketing problems enumerated by producers as one of the indicators of the performance of the grain marketing system in Gujarat, India. The results suggested that lack of timeliness in effecting payments to grain producers was among the problems of great concern to the grain producers in India. Level and stability of producer and consumer prices were other indicators of the performance employed by McCalla and Schmitz (1979) to compare the performance of grain marketing systems over time in Canada and the United States. Likewise, many researchers have used marketing cost per unit of product marketed as an indicator in marketing performance comparisons between market intermediaries or channels (McCalla, and Schmitz, 1979; Patnaik, 1985; Rajagopal, 1986).

Briefly, Mdoe (1993) has categorized indicators of marketing performance to include effectiveness and efficiency of the market intermediary and distribution of commodity to consumers in distant markets. He has further categorized effectiveness indicators to include:- (i) level and stability of product prices received by producers, (ii) level and stability of consumer prices, (iii) timeliness in effecting payments to

producers and (iv) volume of product marketed through the market intermediaries. Whereas, efficiency indicators include:- (i) marketing costs handled by each market intermediary and (ii) marketing margin over capital deployed. Mdoe (1993) applied both effectiveness and efficiency approaches to examine the performance of the marketing system for dairy products in Hai district, Kilimanjaro region. This study has adopted the approaches used by Thakur (1974) and partly approaches proposed by Mdoe (1993) in order to evaluate the marketing system for processed fruits and vegetables.

2.4 Factors Influencing Demand for Agricultural Products

Many studies have examined factors affecting the consumption of agricultural products among households (Swartz and Strand, 1981; Devega and Fisher, 1983; Lund and Derry, 1985; Mrema, 1984; Kotler *et al.*, 1988; Chang and Kinnucan, 1991; Evans, 1992; Mdoe and Wiggins, 1996; Miladi, 1998; Nyange, 2000; Price and Gislason, 2001). For example, it is generally acknowledged that food consumption patterns in a given country are affected by prices and consumer income. A study by FAO (1989), cited by Miladi (1998) reported that there is a positive relationship between increase in consumer income and consumption of food. Consequently, the low-income groups tend to be conservative in their food choices and resistant to change, while high-income groups show increased demand for convenient foods and eating meals away from home. Similar findings were observed by Mdoe and Wiggins (1996) who reported that household income significantly affected demand for milk amongst households in Hai district, Tanzania. Demand for food is also affected by prices. The cheaper a product becomes the greater will be the demand for it for the case of its own price and the converse holds true. For example, a study by Nyange

(2000) found that the uncompensated own price elasticity estimates for almost all food groups carry the expected negative sign and statistically significant except sugar in urban, and dairy and oil in rural areas.

Apart from consumer income and prices of products which have often been singled out as the most influential factors affecting household food consumption, other determinants such as household size; composition; location; education and age of household head; consumer awareness of the product in question; consumer preferences; cultural; social; personal and psychological characteristics of the consumers as well as consumption habits are also important in explaining variation in household food consumption choices (Swartz and Strand, 1981; Devega and Fisher, 1983; Lund and Derry, 1985; Mrema, 1984; Kotler *et al.*, 1988; Chang and Kinnucan, 1991; Evans, 1992; Mdoe and Wiggins, 1996; Price and Gislason, 2001).

Chang and Kinnucan (1991) have, for instance, argued that although increased consumer awareness of the health effects of blood cholesterol has contributed to the decline in butter consumption amongst consumers, the industry advertising campaign between late 1970s and 1990s by the Dairy Bureau of Canada has had a positive effect on butter demand in Canada. Similarly, a study by Price and Gislason (2001) found that consumption habit was among the most important factor explaining the consumption of food among households in Japan. That is, in the Japanese diet, the group “seafood” consists of numerous “seafood” species, whereas meat consists of mainly beef, pork and poultry. Thus, in response to a price increase for “seafood”, there is more opportunity to substitute cheaper species than there is for meat. Kotler

et al. (1988), on the other hand, argue that consumer purchases are strongly influenced by cultural, social, personal and psychological characteristics.

Similarly, Evans (1992) argues that studies carried out in America and England suggested that people in the same social status had similar buying habits, and that these habits varied from class to class. With regard to Tanzania, Mdoe and Wiggins (1996) found that the demand for whole milk in both rural and urban areas among households in Hai district, Kilimanjaro region is influenced by household income, number of children below 8 years of age and price of milk. A study by Nyange (2000) found that urban food demand is more responsive to demographic changes than rural demand, partly due to low incomes and limited food choice in rural areas. According to Nyange (2000), in both rural and urban households, food demand is influenced by number of males more than the number of females. Such difference could be attributed to the African culture where males have an upper hand in control of resources.

It was also reported by Nyange (2000) that while availability of milk substitutes in urban areas could explain why a similar age group has no effect on milk demand in urban households, the number of children of ages between 0 to 5 influences demand for milk positively amongst households in rural areas of Tanzania. With respect to fruit and vegetable products, researches carried out in various places acknowledge that the demand for fruit and vegetable products is influenced by socio-cultural, economic, demographic and institutional factors (Ruel *et al.*, 2005; Han and Mittel, 2001; Nayga, 1995). Not surprising, higher income is associated not only with an increase in the volume of fruits and vegetables consumed, but also with an increase in

the diversity of fruits and vegetables in the menu. For example, a study by Minot (2002), cited by Ruel *et al.* (2005) found that the average number of distinct fruits and vegetables consumed rises from 4.5 out of 10 in the lowest income quintile to 6.9 in the highest income quintile. Specifically, while the average number of fruits and vegetables consumed in Ghana rises from 1.4 out of 10 in the poorest quintile to 3.1 in the richest quintile, the corresponding numbers in Uganda are 4.8 and 6.2 from a list of 17 fruits and vegetables (Ruel *et al.*, 2005). It is also apparent that the income elasticity of demand for fruit and vegetable products was between 0.60 and 0.70 in most African and South Asian countries; 0.30 and 0.44 in most Latin American countries as well as 0.20 and 0.37 in industrialized countries (Ruel *et al.*, 2005). It appears that increases in income are associated with greater increases in the demand for fruit and vegetable in poorer compared to wealthier countries; and income increases are generally associated with larger increases in the demand for fruit than vegetables (Ruel *et al.*, 2005).

It was also reported by Ruel *et al.* (2005) that low income households are more sensitive to prices than higher income households. For example, the own price elasticities of demand for fruit and vegetable ranging from -0.35 to -0.50 among most African and South Asian countries; -0.35 to -0.45 in most Latin American countries and between -0.10 and -0.30 in the industrialized nations. Almost similar results were reported by Han and Mittel (2001) who found a significant difference in consumption patterns for different households with levels of self-sufficiency in China. While households that purchase but do not produce fruits and vegetables exhibit a notably more market-oriented price responsive behaviour, the consumption decisions of

households which do not purchase fruits and vegetables are influenced more heavily by implicit income effects than by implicit price effects.

Apart from income and prices, several non-economic factors such as gender, age, education, preferences, consumption habit, household size and non-smoking status are also associated with greater fruits and vegetables intake amongst households. According to Ruel *et al.* (2005), female-headed households allocated a larger share of their budget to fruit and vegetable products than male-headed households in many sub-Saharan African countries. The difference is statistically significant in Ethiopia, Malawi, Tanzania, Rwanda, Kenya, Uganda and Ghana. However, the pattern was stronger and more consistent in the case of the demand for vegetables than in the demand for fruits. In addition, Ruel *et al.* (2005) found that urban residence is significantly associated with a greater share of budget allocated to fruits and vegetables in Ethiopia, Tanzania, Kenya and Guinea, but a smaller share in Malawi, Mozambique and Ghana. It was as well reported by the same author that households with a member who has secondary or higher education tended to consume smaller quantities of fruit and vegetable products than those with lower education in Sub-Saharan countries. Similar results were also found in the case of household size whereby households with many members allocated smaller share of their budget to fruits and vegetables products purchases than those with fewer members.

Furthermore, Pollard *et al.* (2002) argue that non-economics factors such as sensory appeal, familiarity and habit, social desirability, personal and food ideology, convenience and media and advertising are important factors influencing consumption choices of fruit and vegetable products amongst customers in a given

area. There is evidence that taboos and cultural beliefs are likely to play a significant role in many populations, especially for selected physiological or age groups such as pregnant and lactating women or young infants. Mangoes, example, are believed to cause diarrhoea in young children in many cultures in developing countries and therefore intake of this vitamin A excellent source by young children who are also at highest risk of vitamin A deficiency is often constrained (Ruel *et al.*, 2005).

It is worth noting in Indonesia that mothers who have greater nutrition knowledge allocate a large share of their budget to foods that are rich in micro-nutrients, including fruits and vegetables (Block, 2003 cited by Ruel *et al.*, 2005). Experience from the United States shows that factors such as income, aging of a population, market promotion and consumer awareness of the importance of produce contribute to increased fruits and vegetables consumption (Pollack, 2005 cited by Ruel *et al.*, 2005). Other factors such as availability of the products; consumer taste and preferences; habit of eating the products; age; education; income and gender are also associated with greater fruit and vegetable intake in United States (Nayga, 1995).

It should, however, be noted that food demand patterns change as a country's level of economic development changes (Mitchell and Ingco, 1993). Taking cognizance of this and following trade liberalization undertaken by Tanzania government, behaviours among consumers towards consumption of food and foodstuffs have changed significantly leading to increased volume of imported foodstuffs. At the same time, evidence from literature shows that the demand for locally processed products is generally low compared to imported processed products (Commonwealth Secretariat, 1997; Dietz *et al.*, 2000; Nyagori, 2001). Unfortunately, the reasons for

low demand for locally processed products such as fruits and vegetables are not clearly known.

2.5 Demand: the Theoretical Framework and Empirical Methods

2.5.1 The theoretical framework

The theoretical framework explained in this study follows the frameworks proposed by both classical and neo-classical consumer theory. *Classical consumer theory* assumes that consumers are rational in that they allocate their limited scarce financial resources among a variety of goods and services in a way that maximize utility. The theory is built on the premise that a consumer will choose a good and/or service from a basket that will maximize utility and utility is measured after a choice is made. The choice, however, is constrained by the consumer's purchasing power or income, and will be influenced by the prices of the goods available. In order to attain this objective the consumer must be able to compare the utility (satisfaction) of the various "*baskets of goods*" which he/she can purchase with his/her income (Colman and Young, 1989).

Often literature indicates that there are two basic approaches to the problem of comparison of utilities, namely, the cardinalist approach and ordinalist approach. The *cardinal utility theory* asserts that utility can be measured by using the amount of money the consumer is willing to sacrifice for another unit of a commodity under certainty and by means of subjective units called *utils* (Koutsoyiannis, 1979; Colman and Young, 1989; Reekle and Crook, 1995). Despite the perceived usefulness of the cardinal utility theory in assessing consumer behaviour, Koutsoyiannis (1979) argues that the approach has following criticisms:- (i) the satisfaction derived from various commodities cannot be measured objectively, (ii) the assumption of constant utility of

money is also unrealistic because as income increases the marginal utility of money changes and (iii) the axiom of diminishing marginal utility has been established from introspection, it is psychological law which must be taken for granted.

In addition, *the ordinal utility theory* postulates that utility is not measurable, but is an ordinal magnitude (Koutsoyiannis, 1979; Colman and Young, 1989; Reekle and Crook, 1995). They further argue that consumer needs not know in specific units the utility of various commodities in order to make his/her choice. It suffices for him/her to rank the various “*baskets of goods*” according to the satisfaction that each bundle gives him/her. Therefore, the role of consumer is that he/she must be able to determine his/her order of preference among the different bundles of goods. However, it is questionable whether the consumer is able to order his/her preferences as precisely and rationally as the theory implies (Koutsoyiannis, 1979). Nevertheless, utility function is often a very convenient approach for describing consumers’ preferences, but it should not be given any psychological interpretation (Varian, 1992).

While the classical theory of consumer behaviour does not attempt to explain the formation of tastes and preferences (this is left to the behavioural scientists) but rather it asserts that at a given point in time, a consumer’s tastes and preferences can be taken as given. Several studies have shown that even in the short-run period, tastes and preferences have a marked effect on food consumption patterns across households (Staehle, 1939; Purcell and Raunika, 1967; Burk, 1967; Thurow, 1969; Lazaer and Michael, 1970; Serow, 1972; Salathe, 1979; Mrema, 1984). In response to this, Salathe (1979), Pollack and Wales (1978) and Howe (1977) suggest that in order

to explain temporal consumption decisions, the static theory should be extended to incorporate expectation formation and dynamic elements, partly due to the fact that goods and services are entities with different attributes.

These concerns prompted the modification of the traditional consumer theory to what is termed as the *neo-classical consumer theory*. According to the neo-classical consumer theory, consumers typically purchase attributes which are embodied in goods, rather than purchasing goods for their own sake (Lancaster, 1966). This argument suggests that goods are not the direct objects of utility, but it is from their attributes that consumer derive utility. For example, the characteristics of a food product would include the *nutrients, calories, protein, vitamins, minerals* and so forth, therefore a desire to obtain a healthy diet which is reflected in the purchase of foods that contain relatively low fat levels. In line with this argument, a consumer might purchase a low fat yogurt to satisfy this desire, rather than yogurt for itself (Kuperis *et al.*, 1999). This argument is supported by Colman and Young (1989) who argue that Lancaster's theory of consumer behaviour can be useful in a number of areas in which the traditional theory is barren:- (i) the theory suggests that goods which provide the same characteristics will be closely related in consumption and in particular will have larger cross-price elasticities, (ii) the theory helps us to understand two pervasive phenomena of every day life, that is, the significant role that product differentiation and advertising can play to stimulating and promoting consumption of the products in question.

However, Makokha (2005) argues that both traditional and new consumer theories are complementary in the sense that the traditional consumer theory determines the key

characteristics that determine consumption of a certain bundle of goods and services, while the new consumer theory determines the salient attributes that condition the observed choice behaviour. Thus, studies based on the new consumer theory can go further to determine additional attributes that can increase consumption of a certain bundle of goods and services. In line with the theories of consumer behaviour, the present study assumes that consumers make decisions to purchase particular processed fruits and vegetables after careful considerations, the best from a set of alternatives available to them. Consequently, some consumers may make decisions to consume processed fruit and vegetable products while others may not. The assumption of rational behaviour which leads to discrete choice behaviour has been supported by Kuperis *et al.* (1999), Tambi *et al.* (1999) and Senkondo *et al.* (2005) and has been confirmed by several econometric tests.

2.5.2 Empirical methods

Based on the assumption of rational behaviour of the consumers which leads to the discrete nature of management decisions, qualitative choice models were developed to overcome several problems encountered when Ordinary Least Square (OLS) regression model is used to analyze non-continuous dependent variables (Gujarati, 1988; Liao, 1994; Tambi *et al.*, 1999; Kuperis *et al.*, 1999; Powers and Xie, 2000; Franses and Paap, 2001; Senkondo *et al.*, 2005). This is the case because OLS regression model requires the dependent variable to be continuous while the independent variables can either be dichotomous, nominal, ordinal or continuous (Frone, 1997). Although the exact set of problems of OLS regression model may differ across the various types of outcome variables, the following four problems are most common (Frone, 1997): (i) nonsensical predicted values that is predicted values

falling outside the possible range of the outcome, (ii) biased regression coefficients, (iii) non-normally distributed error terms and (iv) presence of heteroscedasticity. The first two problems undermine one's ability to trust predicted values and the direction and size of estimated relations whereas the last two problems undermine one's ability to produce unbiased standard errors and to conduct tests of statistical significance.

Alternatively, four qualitative models are commonly used by researchers to analyze non-continuous dependent variable. These include the Linear Probability Model (LPM) (Gujarati, 1988; Falusi, 1995; Long, 1997); the logit model (Capps and Kramer, 1985; Gujarati, 1988; Liao, 1994; Long, 1997; Kuperis *et al.*, 1999; Franses and Paap, 2001; Senkondo *et al.*, 2005), the probit model (Capps and Kramer, 1985; Gujarati, 1988; Liao, 1994; Long, 1997; Tambi *et al.*, 1999; Nyange, 2000; Franses and Paap, 2001) and the complementary log-log model (Long, 1997). LPM has been used extensively because of its simplicity. However, the model has a number of drawbacks: (i) the error term may inherit heteroscedastic properties, which lead to the OLS estimator of parameters being inefficient and the standard errors being biased resulting in incorrect test statistics (Gujarati, 1988; Long, 1997; Tambi *et al.*, 1999; Powers and Xie, 2000; Wooldridge, 2003), (ii) it may also possess elements of non-normality (Gujarati, 1988; Long, 1997; Tambi *et al.*, 1999; Wooldridge, 2003) and (iii) the predicted value of the dependent variable may not fall within the unit value (Wooldridge, 2003; Powers and Xie, 2000; Tambi *et al.*, 1999; Gujarati, 1988; Falusi, 1995) and unrealistic application of functional forms (Long, 1997). For this reason, LPM is not useful for modelling binary responses compared to other alternative models.

The limitations of the LPM can be overcome by using more sophisticated binary response models. The two most popular models applied in the estimation of demand for agricultural products and services are probit and logit (Liao, 1994; Tambi *et al.*, 1999; Kuperis *et al.*, 1999; Nyange, 2000; Senkondo *et al.*, 2005), partly because these models provide greater reliability and statistical sophistication in analyzing binary choice decisions (Amemiya, 1981). It is important to note that the probit model is more appealing than the LPM, partly because it accounts for heteroscedasticity of the error terms restricting predictions to lie between 0 and 1 range (Mazuze, 2004). The probability of consuming a particular commodity in the probit model is defined in terms of an index that may have a value between negative and positive. This index is converted into probability values by using standard normal cumulative distribution function (cdf), which is expressed as an integral and this transformation guarantees that all corresponding probability values are confined between 0 and 1 (Pindyck and Rubinfeld, 1997; Maddala, 1983).

Economists tend to favour the normality assumption for error term, as such the probit model is more popular than logit in econometrics (Wooldridge, 2003). A study by Nyange (2000) used probit model to compute the inverse Mill's ratio for each household for 11 food groups. He found that the parameter estimates for the inverse Mill's ratios for all urban and most rural demand equations were statistically significant which confirms that estimating the system ignoring the presence of zeros for budget shares would result in biased and inconsistent parameter estimates. Likewise, a study by Tambi *et al.* (1999) employed the probit model to estimate demand for private veterinary services in the high potential agricultural areas in Kenya using Maximum Likelihood Estimation (MLE) and Weighted Least Squares

(WLS) estimation methods. Tambi *et al.* (1999) found that the above model correctly classified the demand for artificial insemination and clinical services to be higher than demand for vaccination and heard health services.

Nevertheless, Powers and Xie (2000) argue that the logit model is more useful when assessing the effects of explanatory factors on the relative risk of outcomes because it enhances the ability of testing the negative effect when independent variables have an ordinal categorical nature (Senkondo *et al.*, 1998). According to Mazuze (2004), the parameter estimates of the logit model are linear and assuming a normally distributed disturbance term. The most frequently used estimation technique for dichotomous logit model is Maximum Likelihood estimation (MLE) method, partly due to its ability to obtain efficient, consistent and asymptotically normal estimators (Wooldridge, 2003).

Despite the wide range of application of logit model in the field of agricultural sector over the last decade, the model has received much attention in the estimation of demand for agricultural products and services in recent years. For instance, a study by Saleth (1991), using the MLE technique, employed logit model to assess the factors affecting farmers' decision to buy groundwater in Indo-Gangetic region in India. The specified logit model fitted very well the data as measured by McFadden's (R^2), partly due to the high level of McFadden in all five states which suggest a good predictive ability of the model. Similarly, a study by Kuperis *et al.* (1999), designed to evaluate consumer's responses to the potential use of bovine somatotrophin in Canadian dairy production used conditional logit model. The estimates of the conditional logit suggest that the model fitted well the data because chi-square test

was highly significant at the specified confidence level. In addition, a study by Senkondo *et al.* (2005) designed to analyze the determinants of demand for private veterinary services in Tanzania used binomial logit model. Like in the other studies, MLE technique was used to estimate the coefficients and the results of estimated coefficients suggest that the model fitted well the data as evaluated using likelihood ratio and chi-square tests and had high explanation power as evaluated using McFadden (R^2).

Although complementary log-log model was developed as an asymmetric alternative to the probit and logit models (Long, 1997), it appears that the model is not widely used in the estimation of demand for agricultural products. Nonetheless, there is adequate evidence that both probit and logit models yield similar results (Senkondo *et al.*, 2005; Nayga and Capps, 1992; Maddala, 1983; Amemiya, 1981). Therefore, a choice between the two models is not an important one and can often be ruled by convenience after considering factors such as availability of appropriate software and significance of independent variables. It is for this reason that the logit model has been selected for this study to determine the main factors affecting the demand for processed mangoes and tomatoes. The decision to choose logit model over probit model was dictated by its ability of providing statistical significance of the coefficients for explanatory variables included in the empirical model.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter describes the methodological aspects of this study. The remainder of the chapter is divided into seven main sections. The second section presents data needs and sources. This is followed by sampling procedures, data collection instruments and preliminary survey in sections three, four and five respectively. Section six explains recruitment and training of enumerators while section seven describes operationalization of the fieldwork. The chapter winds-up with the discussion pertaining to data processing and analysis of empirical.

3.2 Data Needs and Sources

Data for the study were obtained from primary sources during a field survey carried out between 16 February and 31 December, 2003. Mostly, data related to characteristics of respondents, characteristics of processing and business firms, production, marketing and consumption of processed fruits and vegetables were collected by single visit interview (cross-sectional survey) to target group and key informants in order to achieve the objectives of the study.

3.3 Sampling

A multi-stage sampling technique was used. The first stage involved selection of districts or councils, wards and streets using purposeful sampling technique from which sample households, processors and traders were obtained. The choice of the districts or councils, wards and streets was based on the availability of firms processing fruits and vegetables as well as shops and supermarkets selling processed fruits and vegetables. In the *Dar es Salaam region*, sample wards and streets were obtained from all the three districts or municipal councils, namely, Kinondoni, Ilala

and Temeke. Table 1 shows the sampled wards and number of administrative streets sample while the names and locations of the selected wards are shown in Figure 4. The selection of sample wards and administrative streets was done during preliminary survey while selection of sample respondents was done during the main field survey.

Table 1: Dar es Salaam region: Sampled wards and number of sample streets by district

District	Wards	Sample Wards	Sample Wards as Percent of Total (%)	Streets	Sample Streets	Sample Streets as Percent of Total (%)
Kinondoni	27	12	44.4	113	38	33.6
Ilala	22	14	63.6	65	35	53.9
Temeke	24	11	45.8	97	25	25.8
Total	73	37	50.7	275	98	35.6

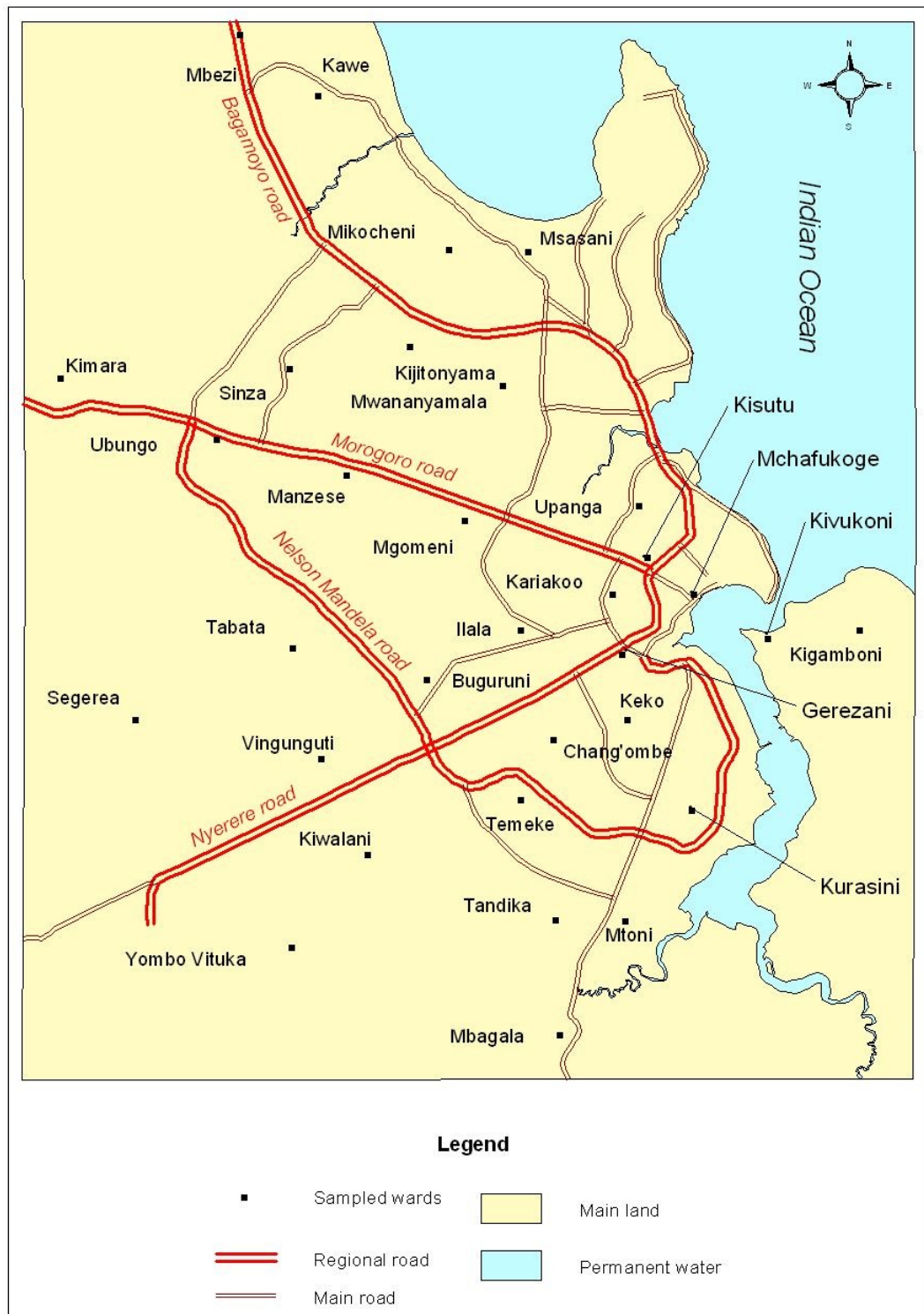


Figure 4: Locations of sampled wards in Dar es Salaam region

Source: URT, 1995

In *Tanga region*, three out of six districts were purposely selected. The selected districts were Tanga city, Muheza and Lushoto districts. In *Iringa region*, two out of seven districts were purposely selected while in *Dodoma region* one district out of five was purposely selected. The selected districts were Iringa Municipal Council and Kilolo in Iringa region and Dodoma Municipal Council in Dodoma region. Contrary to Dar es Salaam region, the task of selecting districts or councils and sample respondents in these regions was done during the main field survey.

The second stage involved selection of different categories of respondents within value-added commodity chains. Both probability (such as simple random and systematic) and non-probability (purposive) sampling techniques were employed to select the respondents. The different categories of respondents selected were processors, traders and consumers (households). Fruit and vegetable processors were selected from lists of processors obtained from various sources such as Tanzania Bureau of Standards (TBS), Tanzania Food, Drugs and Cosmetics Authority (TFDA), Tanzania Food Processors Association (TAFOPA), Small Industrial Development Organization (SIDO), Ministry of Agriculture, Food Security and Co-operatives (MAFSC) and district officials. Table 2 shows the distribution of sample processors by region and district. Dar es Salaam region has a relatively higher number of sample processors than the other three regions mainly because of the concentration of processing activities in the city. Proportion-wise, most of the licensed food manufacturers available in Tanzania during 2002/2003 production year were located in Dar es Salaam region which accounted for about 52%, followed by Arusha region which accounted for 18.2% (National Food Control Commission, 2002 cited by

Tiisekwa *et al.*, 2005). Purposive sampling technique was used to obtain sample processors in all four study regions.

Table 2: Distribution of sample processors by region and district, 2003

Region	District	Number of Processors Interviewed
Dar es Salaam	Kinondoni	12
	Ilala	11
	Temeke	10
	Sub-total	33
Tanga	Tanga city	4
	Lushoto	4
	Muheza	4
	Sub-total	12
Iringa	Iringa Municipal	2
	Kilolo	1
Dodoma	Sub-total	3
	Dodoma Municipal	11
Total Sampled Processors		59

Like processors, traders of different categories engaged in trading processed fruits and vegetables were chosen from lists of the traders obtained from various sources such as TFDA, Tanzania Revenue Authority (TRA) and government officials. Table 3 shows the distribution of sample traders by region and district. While a combination of sampling techniques such as purposive, simple random and systematic were used to obtain sample traders in Dar es Salaam region, traders in the other three regions were purposively selected because the number of traders engaged in trading processed products in Dar es Salaam were higher than in the other three regions.

Table 3: Distribution of sample traders by region and district, 2003

Region	District	Traders Interviewed
Dar es Salaam	Kinondoni	17
	Ilala	15
	Temeke	10
Sub-total		42
Tanga	Tanga Municipal	8
	Lushoto	2
	Muheza	2
Sub-total		12
Iringa	Iringa Municipal	13
Dodoma	Dodoma Municipal	10
Total Sampled Traders		77

The following criteria were employed in the selection of traders in both Dar es Salaam region and other regions: (i) availability of both locally and imported processed fruits and vegetables in their shops and/or kiosks, (ii) amount of products handled at least half of the products marketed by traders should be processed fruits and vegetables, and (iii) willingness of the traders to be interviewed. The first two criteria were mainly met by supermarkets, mini-supermarkets, importers, wholesalers, big shops and kiosks. Like processors, Dar es Salaam region had relatively larger numbers of sample traders selected than the other three regions simply because few traders in the other regions were able to meet the second criterion.

The procedure of selecting consuming households in Dar es Salaam was different from other sample regions too. In Dar es Salaam region, the procedure started with differentiating locations into three categories, namely, high, medium and low-income earners locations. The main reason for differentiating locations in terms of income levels was to capture whether significant differences exist between income groups on the consumption of processed fruits and vegetables or not. Between seven and eight households were selected from each ward because the population and household sizes of the wards were not significantly different. Households were chosen from each

category using purposive and simple random sampling techniques. Table 4 shows the proportion of the sampled households by district and division in Dar es Salaam region.

Table 4: Proportion of sampled households by district and division in Dar es Salaam region (%), 2003

District	Division	Total Wards Available	Sampled Wards	Total Households in Sampled Wards	Sampled Households per Division	Percent of Households Sampled
Kinondoni	Kinondoni	9	5	45 442	35	0.08
	Magomeni	11	4	47 692	29	0.06
	Kawe	4	2	38 372	14	0.04
	Kibamba	3	1	7 290	7	0.10
	Sub-total	27	12	138 796	85	0.06
Ilala	Kariakoo	8	5	7 956	35	0.44
	Ilala	6	3	41 255	23	0.06
	Ukonga	8	2	32 882	15	0.05
	Sub-total	22	10	82 093	73	0.09
Temeke	Chang'ombe	9	4	30 679	28	0.09
	Mbagala	7	2	30 452	15	0.05
	Kigamboni	8	2	11 079	14	0.13
	Sub-total	24	8	72 210	57	0.08
Total		73	30	293 099	215	0.07

In the other sample regions, 35 households were purposely selected from each region without differentiating locations by economic status of the residents. Proportion-wise, the number of sampled households in Dar es Salaam region was higher than the other three regions for reasons explained in Chapter One section 1.8. The following criteria were considered on reaching the decision to interview an individual respondent in both Dar es Salaam and other sample regions: (i) asset possession, (ii) occupation of the household head and (iii) willingness of the respondents to be interviewed. In summary, Table 5 shows distribution of the sample sizes for different categories of sampled respondents by region.

Table 5: Distribution of the sample sizes for different categories of respondents by region

Region	Respondents					
	Processors		Traders		Households	
	Sample Size	Percent of Sampled Processors	Sample Size	Percent of Sampled Traders	Sample Size	Percent of Sampled Households
Dar es Salaam	33	56.0	42	54.5	215	67.0
Tanga	12	20.3	12	15.6	35	11.0
Iringa	03	05.1	13	16.9	35	11.0
Dodoma	11	18.6	10	13.0	35	11.0
Total	59	100.0	77	100.0	320	100.0

3.4 Data Collection Instruments

Structured questionnaires were used as tools for data collection from processors, traders and consumers (households). Three types of structured questionnaires were constructed to capture both qualitative and quantitative data. These questionnaires consisted of both open and closed ended questions. The first type of questionnaire (Appendix 1) was designed to capture information related to household consumption of processed fruits and vegetables. The questionnaire was made up of four main parts in which the first part was designed to obtain background information on characteristics of respondents, the second was intended to obtain consumption pattern data, the third aimed at gathering data related to availability, promotion and quality of processed fruits and vegetables, and the last part was designed to obtain information on sources of consumer income, economic status of households and expenditure behaviour of respondents on different kinds of processed products.

The second type of questionnaire (Appendix 2) was designed for traders of processed fruits and vegetables. It is also made up of four main parts. The first part was intended to obtain information on characteristics of traders, the second was designed to capture

information related to characteristics of the business, the third aimed at obtaining data on handling of processed fruits and vegetables, and the last part was designed to capture information related to marketing condition of processed fruits and vegetables.

The third type of questionnaire made up of four parts (Appendix 3) was designed for processors of fruits and vegetables. The first part was intended to collect data on characteristics of entrepreneurs, the second was designed to obtain data related to characteristics of the processing firms, and the third was designed to elicit data on production pattern of processed fruits and vegetables. Finally, part four was designed to obtain data related to marketing of processed fruits and vegetables.

Direct observations were also employed to evaluate the conditions of processing premises as well as to assess the type and condition of processing technology used. It was also used to evaluate the differences in product quality, product design and packaging between locally and imported processed fruits and vegetables. The information gathered using this technique was used to counter check information provided by respondents.

3.5 Preliminary Survey

Prior to operationalization of main fieldwork, a preliminary survey was conducted between 16 December, 2002 and 31 January, 2003. The objectives of the survey were to:- (i) solicit background information about the study areas, (ii) familiarize with the areas where the main survey was to be conducted, (iii) establish sampling frames and units, (iv) find out the most efficient way of carrying out the main survey and (v) pre-test the questionnaires in order to validate the relevance of the questions to the

intended respondents. The questionnaires were pre-tested using twenty households, twelve traders and eight processors in Dar es Salaam region, which was the main focus area of the study.

The following experiences were gained from the preliminary survey. (i) it was noted that the interviews lasted between 50 and 75 minutes per respondent. The questionnaire for households lasted for 75 minutes whereas those of traders and processors lasted for 50 minutes. This duration was quite satisfactory because a period longer than this often leads to impatience on the part of the respondent. (ii) It was discovered that the questionnaires needed slight amendments. Therefore, some questions had to be reframed and others deleted and added. Moreover, sensitive questions such as those seeking income-related data were better asked towards the end of the interview partly because by that time a good understanding and rapport between the interviewer and the interviewee had already been established. (iii) It was also noted that the most efficient way of carrying out the main survey was to allow respondents who had no time for face to face interview to fill the questionnaires at their own convenient time. This was the case in Dar es Salaam region where some of the respondents were reluctant to be interviewed and others could not easily be seen especially during working hours.

3.6 Recruitment and Training of Enumerators

Recruitment of the enumerators was guided by factors including:- (i) academic qualifications, (ii) willingness to work for long period of time in different environments, (iii) ability to speak fluently in English and Kiswahili as well as to interact with people of different ethnic groups and (iv) familiarity with places where

the fieldwork was conducted. The recruitment and training were done after the preliminary survey during the first and second weeks of February, 2003. During the training, the objectives of the research were explained to all enumerators. Furthermore, some of the experiences, such as difficulties in obtaining respondents and reluctance of some of the respondents to be interviewed gained during the preliminary survey and how to overcome them were discussed. Other aspects emphasized during the training were (i) to record clearly and explicitly units of measure used by respondents and (ii) to use notebooks for recording additional information that could not be recorded in the questionnaires. Lastly, the enumerators were informed that the overall quality of the data collected would entirely depend on how respondents were approached and how the questions were asked.

3.7 Operationalization of the Fieldwork

The fieldwork was conducted from 15 February to end of December 2003. The operationalization of the fieldwork involved questionnaires interviews and discussions with key informants and government officials in the study areas. The interviews and discussion were carried out by the researcher with the assistance of four well-trained enumerators. Prior to the day of starting interviews, the researcher and enumerators visited ward, district or municipal council offices to inform the relevant authorities about the purpose of the study.

Individual household heads and/or functional heads or managers were interviewed in their homes or business places, offices or selected places after an initial appointment. Appointments were made at least one day before the interview date. The objectives of the study were explained to each respondent prior to interviews in order to create good understanding between interviewer and interviewee. Respondents were

interviewed once and their responses were recorded immediately. However, it is important to note that although respondents were heads of households, conversations created interest among other household members who were listening and hence contributed to responses of the respondent in certain questions. This often occurred when discussing issues such as expenditure on processed fruits and vegetables, effects of product quality, advertisement and sales promotion and consumption habits.

To overcome language barrier, the interviews were conducted in both English and Kiswahili. English was used for respondents who knew the language, whereas Kiswahili was used for respondents who did not know English. The responses were recorded in Kiswahili and/or English. Besides questionnaires, informal discussions guided by checklists were held with government leaders and other stakeholders such as representatives from TAFOPA, SIDO, Tanzania Food and Nutrition Centre (TFNC), TFDA, TBS and UNIDO. These aimed at obtaining data related to prices, quality of processed products, supply pattern of processed products, marketing problems, interventions directed to agro-processing enterprises, policies addressing agro-processing firms, constraints facing agro-processing firms and capacity building needs in order to strengthen and promote consumption of locally processed products. The functional heads of different organizations were interviewed in their offices, but other staff contributed their opinions where the need arose. This happened with TFDA, TBS, SIDO, TFNC, MITC and MAFSC in Dar es Salaam region. Others include Tanga, Dodoma and Iringa Municipal Councils and Muheza and Lushoto district councils.

3.8 Data Processing and Analysis

3.8.1 Data processing

Data were coded and entered into the Statistical Package for Social Sciences (SPSS) for windows versions 9.0 and 11.5, cleaned by running frequencies of individual variables and later analyzed. Cleaned data were later exported to other software packages such as Micro Soft Excel and LIMDEP for windows (version 8) for further analysis.

3.8.2 Data analysis

A substantial part of the analysis was based on descriptive statistics such as frequencies, cross-tabulations, means, and correlation coefficients of some critical variables. These statistics were used to assess respondents' characteristics, determine consumption patterns of processed products, identify factors affecting performance of fruit and vegetable processing firms and evaluate marketing system of processed products. Analysis of Variance (ANOVA) was used to compare more than two means between regions. If the F-value was found to be statistically significant, a further test was performed to identify the means that were significant using Tukey Honestly Significant Difference (HSD) tests technique. To complement the descriptive analyses, some of the information was assessed qualitatively based on sound judgments and economic rationale. The Statistical Package for Social Sciences (SPSS-PC) software was used to analyze most of descriptive statistics while Microsoft Excel software was used to generate histograms.

Apart from the afore-mentioned descriptive statistics, multinomial logit model was used to determine the main factors affecting demand for processed mangoes and

tomatoes. The main motivation of focusing on mangoes and tomatoes was that a significantly large number of processors have been engaged in processing of these products as indicated in section 4.2.2 in Chapter Four. Indeed, processed mangoes and tomatoes were purposely chosen to represent fruits and vegetables respectively from which factors that significantly influence consumption of locally processed fruits and vegetables among households in the study areas were examined.

From foregoing discussion, this study assumed that households decide either to purchase or not to purchase processed mangoes or tomatoes. The observations were coded “1” for purchasers and “0” for non-purchasers and were used as qualitative dependent variables. The probability of individual household consuming processed mangoes or tomatoes is given as a well-defined set of socio-economic, demographic and institutional characteristics denoted as (X_i) and are written as follows:

$$P [m_2/X] = \exp^{(X\beta + \mu)} / [1 + \exp^{(X\beta + \mu)}] \dots\dots\dots (1)$$

Where,

“m” represents processed mangoes or tomatoes,

“X” represents set of explanatory variables,

“ β_i ” are coefficients to be estimated and

“ μ ” is disturbance term.

Likewise, the probability of individual household not consuming processed mangoes or tomatoes (m_2) is represented as follows:

$$P [m_1/X] = 1 - P [m_2 / X] = 1 - \{ \exp^{(X\beta + \mu)} / [1 + \exp^{(X\beta + \mu)}] \} = 1 / [1 + \exp^{-(X\beta + \mu)}] \dots\dots\dots (2)$$

Based on the above relationships, the relative odds of consuming versus not consuming processed mangoes are given by:

$$P [m_2/X] / P [m_1/X] = [\exp^{(X\beta + \mu)}] [1 + \exp^{(X\beta + \mu)}] / [1 + \exp^{(X\beta + \mu)}] = \exp^{(X\beta + \mu)} \dots\dots\dots (3)$$

In addition, the estimation of logit model was undertaken by transforming equation 3 into logarithm form as shown in the subsequent equation:

$$\ln P [m_2/X] / P [m_1/X] = C + X_i\beta_i + \mu \dots\dots\dots (4)$$

Where,

“m” is a vector of binary variables denoted as “1” if the household consume processed mangoes or tomatoes and “0” otherwise,
 “ X_i ” represents set of explanatory variables,
 “ β_i ” are coefficients to be estimated,
 “C” is the constant term and
 “ μ ” is the error term aimed at capturing all unmeasured variables that influence the likelihood of the household decision to consume processed mangoes. The error term is independently distributed and follows what is called an extreme value distribution (Johnson and Dinardo, 1997 cited by Senkondo *et al.*, 2005).

According to Powers and Xie (2000), for all possible values of X and β , the logistic transformation ensures that “p” remains in the [0, 1] interval. As “p” approaches 0, logit (p) tends to lean toward $-\infty$. Likewise, as “p” approaches 1, logit (p) tends to lean toward $+\infty$. In line with this, Tambi *et al.* (1999) argue that the expected probability $E(y_i)$, interpreted as the proportion of all consumers with characteristics (X_i) likely to use a given product or service is given as

$$0 < C_i + \beta_i \sum_{i=1}^t X_i < 1 \dots\dots\dots (5)$$

The information obtained from equation 5 partly suggest that the larger the proportion, the more likely the decision to purchase the processed mangoes or tomatoes and vice versa.

From the foregoing discussion, the general form of demand for processed mangoes was specified as follows:

$$\begin{aligned}
 D_m = & \beta_0 + \beta_1 PCLPM + \beta_2 PCFM + \beta_3 PCIPM + \beta_4 HINCM + \beta_5 AVALPM + \beta_6 PRMT \\
 & + \beta_7 QTYPM + \beta_8 NTAWS + \beta_9 D_1 PFNP + \beta_{10} EDUC + \beta_{11} HSIZE + \beta_{12} AGE \\
 & + \beta_{13} SEXR + \beta_{14} D_2 RG + \epsilon_m \dots\dots\dots (6)
 \end{aligned}$$

Related to this model, the explanatory variables included in the empirical models are summarized in Table 6. Selection of the explanatory variables included in the empirical model was based on the theory of consumer behaviour and empirical findings from previous research elsewhere.

Table 6: Specification of variables included in multinomial logit model for processed mangoes

Variable	Explanation	Measurability
D_m	Binary dependent variable that stands for “1” household consumed processed mangoes and “0” otherwise	Binary
PCLPM	Price of locally processed mangoes	TShs
PCFM	Price of fresh mangoes	TShs
PCIPM	Price of imported processed mangoes	TShs
HINCM	Household income	TShs
AVALPM	Availability of processed mangoes in the markets specified as “1” available and “0” otherwise	Dominance of the products on shelves of local shops, kiosks, supermarkets and stores
PRMT	Frequencies of promotion specified as “1” frequently promoted and “0” otherwise	Frequencies in getting information from mass media per month
QTYPM	Quality of processed mangoes specified as “1” good quality and “0” otherwise	Physical and chemical attributes as perceived by consumers. These include flavours, smells, texture, appearance, and ingredients
NTAWS	Awareness of vital nutritional role that mangoes play in human diet specified as “1” if aware and “0” otherwise	Knowledge of nutritional contents
D_1PFNP	Dummy variable intended to capture household preference of consuming particular type of product specified as “1” if household preferred locally processed mangoes and “0” otherwise	Habit or attitude of consuming the product measured using frequencies in purchasing
EDUC	Educational level attained by respondents	Years
HSIZE	Households size (number of household members)	Persons
AGE	Age of the respondents specified as “1” for below 36 years old and “0” otherwise	Years
SEXR	Sex of respondents intended to capture the effect of gender on consumption of processed mangoes specified as “1” for female and “0” otherwise	Dummy
D_2RG	Dummy for study regions intended to capture location differences in terms of consumption specified as “1” for Dar es Salaam region and “0” otherwise	Dummy
β_i	Vector of parameters to be estimated	
ϵ_{ij}	Random error terms or disturbance terms	
M	Stands for processed mangoes	

It should also be noted that factors hypothesized to influence the probability of consuming processed mangoes were verified using OLS regression model to see whether they had similar effects on the quantity of locally processed mangoes consumed by sample households. This stems from the fact that households face a two step decision process. The first decision is whether or not to consume processed fruits and vegetables. The second is how much processed fruits and vegetables to consume. Goetz (1995) argues that a given variable may increase the probability of consuming a particular product, but may reduce its amount in case the individual consumer has already decided to consume the product and vice versa. It is for this reason that, Ordinary Least Square Regression Model (OLSRM) was used as an error correction model aimed at verifying the effect of the explanatory variables included in the empirical model on quantity of processed products consumed. In response to this, a linear regression equation of the following form was estimated using quantity of processed mangoes consumed as a dependent variable (Q_m):

$$Q_m = \beta_0 + \beta_1 PCLPM + \beta_2 PCFM + \beta_3 PCIPM + \beta_4 HINCM + \beta_5 AVALPM + \beta_6 PRMT + \beta_7 QTYPM + \beta_8 NTAWS + \beta_9 D_1 PFNP + \beta_{10} EDUC + \beta_{11} HSIZE + \beta_{12} AGE + \beta_{13} SEXR + \beta_{14} D_2 RG + \epsilon_m \dots\dots\dots (7)$$

As with the case of processed mangoes, an empirical multinomial logit model for the case of processed tomatoes was specified as follows:

$$D_t = \beta_0 + \beta_1 PCLPT + \beta_2 PCFT + \beta_3 PCIPT + \beta_4 HINCM + \beta_5 AVLPT + \beta_6 PRMT + \beta_7 QTYPT + \beta_8 NAWs + \beta_9 D_1 PFNP + \beta_{10} EDUC + \beta_{11} HSIZE + \beta_{12} AGE + \beta_{13} SEXR + \beta_{14} D_2 RG + \epsilon_t \dots\dots\dots (8)$$

In response to the specified model, the explanatory variables included in the empirical models are summarized in Table 7. As in the case of processed mangoes, the selection of the explanatory variables included in this model was based on the theory of consumer behaviour and empirical findings from previous research.

Table 7: Specification of variables included in multinomial logit model for processed tomatoes

Variable	Explanation	Measurability
D_i	Binary dependent variable that stands for “1” household consumed processed tomatoes and “0” otherwise	Binary
PCLPT	Price of locally processed tomatoes	TShs
PCFT	Price of fresh tomatoes	TShs
PCIPT	Price of imported processed tomatoes	TShs
HINCM	Household income	TShs
AVLPT	Availability of processed tomatoes in the markets specified as “1” available and “0” otherwise	Dominance of the products on shelves of local shops, kiosks, supermarkets and stores
PRMT	Frequencies of promotion specified as “1” frequently promoted and “0” otherwise	Frequencies in getting information from mass media per month
QTYPT	Quality of processed tomatoes specified as “1” good quality and “0” otherwise	Physical and chemical attributes as perceived by consumers. These include flavours, smells, texture, appearance, and ingredients
NTAWS	Awareness of vital nutritional role that tomatoes play in human diet specified as “1” if aware and “0” otherwise	Knowledge of nutritional contents
D_1 PFNP	Dummy variable intended to capture household preference of consuming particular type of product specified as “1” if household preferred locally processed tomatoes and “0” otherwise	Habit or attitude of consuming the products measured using frequencies in purchasing
EDUC	Educational level attained by respondents	Years
HSIZE	Households size (number of household members)	Persons
AGE	Age of the respondents specified as “1” for below 36 years old and “0” otherwise	Years
SEXR	Sex of respondents intended to capture the effect of gender on consumption of processed tomatoes specified as “1” for female and “0” otherwise	Dummy
D_2 RG	Dummy for study regions intended to capture location differences in terms of consumption specified as “1” for Dar es Salaam region and “0” otherwise	Dummy
β_i	Vector of parameters to be estimated	
ϵ_{ij}	Random error terms or disturbance terms	
T	Stands for processed tomatoes	

Like the case of processed mangoes, the factors hypothesized to influence the probability of consuming processed tomatoes were verified using an error correction

model called OLS regression model to see whether they had similar effects on the quantity of locally processed tomatoes consumed by sample households. A linear regression equation 9 was estimated using quantity of processed tomatoes consumed by sample households as a dependent variable (Q_t):

$$Q_t = \beta_0 + \beta_1 PCLPT + \beta_2 PFT + \beta_3 PCIPT + \beta_4 HINCM + \beta_5 AVLPT + \beta_6 PRMT \\ + \beta_7 QTYPT + \beta_8 NTAWS + \beta_9 D_1 PFNP + \beta_{10} EDUC + \beta_{11} HSIZE + \beta_{12} AGE + \\ \beta_{13} SEXR + \beta_{14} D_2 RG + \epsilon_t \dots\dots\dots (9)$$

The following hypotheses were made between the variables described above and the demand for processed mangoes and tomatoes in the study areas. The prices of processed mangoes and tomatoes were regarded to be the most important factor that could explain the difference in consumption of each of these products among households. Thus, an inverse relationship between prices of processed mangoes or tomatoes and consumption of the mangoes or tomatoes was expected in the case of its own price. Differences in retail prices between fresh and processed mangoes or tomatoes may explain differences in their consumption patterns among households. A positive relationship is expected between prices of fresh mangoes or tomatoes and consumption of processed mangoes or tomatoes. Likewise, income determines the purchasing power of the households, such that as household income increases the ability of household to purchase processed mangoes or tomatoes also increases and vice-versa. Therefore, a positive relationship between household income and consumption of processed mangoes or tomatoes is expected.

The availability of processed mangoes or tomatoes in the markets at the right time and place was used as proxy for the effectiveness and efficiency of marketing systems

of processed mangoes or tomatoes in the study areas. A positive relationship is expected between consumption of the processed mangoes or tomatoes and availability of processed mangoes or tomatoes in the market at the right time and place, since increases in availability imply increased supply. High supply of processed mangoes and tomatoes in the market may reduce the price of products and then encourage many households to purchase the products. Frequency of promotion was used as a tool for creating awareness among potential consumers. A positive relationship is also expected between frequency of promotion and consumption of processed mangoes or tomatoes.

The quality of processed mangoes and tomatoes as perceived by consumers determines the household acceptance of consuming processed mangoes and tomatoes. Thus, a positive relationship between quality of processed mangoes and tomatoes and consumption of the processed mangoes or tomatoes is expected in case of good quality products. Awareness about the vital nutritional role that mangoes and tomatoes play in human diet may stimulate the consumption of processed mangoes and tomatoes. It is therefore hypothesized that a positive relationship between households with nutrition knowledge about processed mangoes and tomatoes and consumption of processed mangoes or tomatoes is also expected. The dummy for nature of processed mangoes and tomatoes preferred by households were used to capture household preference in terms of consuming particular type of processed mangoes and tomatoes. A positive relationship between dummy for nature of processed mangoes and tomatoes preferred by households and consumption of processed mangoes or tomatoes is expected if the households preferred locally processed mangoes or tomatoes. The education level attained by household head is

expected to increase customer awareness of the nutritional importance of processed mangoes and tomatoes. Therefore, a positive relationship between the education level of the household head and consumption of processed mangoes or tomatoes is also expected.

Household food expenditure patterns depend on, *inter alia*, the number of the household members and their ages. In general, a large household would spend more on food products than a small household, *ceteris paribus*. Thus, a positive relationship is expected between household size and consumption of processed mangoes or tomatoes. Similarly, age of the household head was used to capture the effects of different age groups on consumption of processed mangoes and tomatoes. Thus, an inverse relationship is expected between age of the household head and consumption of processed mangoes or tomatoes.

Moreover, sex of the respondent was used to capture the effect of gender on consumption of processed mangoes and tomatoes. It is therefore hypothesized that female-headed households are more likely to consume processed mangoes and tomatoes because in African culture women make the majority of households food purchase compared to men. Thus, a positive relationship between female-headed households and consumption of processed mangoes or tomatoes is expected. Finally, the dummy for study regions was used to capture the effect of location on consumption of processed mangoes and tomatoes. It is assumed that, households in Dar es Salaam region are more likely to increase the probability of consuming processed mangoes and tomatoes compared to their counterparts in the other three regions. This is mainly due to differences in purchasing power and main sources of

supply of food stuffs between Dar es Salaam and the other three regions. Thus, a positive relationship is expected between Dar es Salaam region and consumption of processed mangoes or tomatoes.

The specified empirical multinomial logit model was estimated using MLE method in LIMDEP for Microsoft windows (version 8) software. Maximum Likelihood (ML) is the most frequently used estimation technique for dichotomous logit model because use of Standard Ordinary Least Square (SOLS) estimation method gives biased and inconsistent parameter estimates because such a method does not take into account the non-zero mean of the disturbances. According to Koutsoyiannis (1977), estimates of a parameters obtained by using the ML estimation method maximizes the value of the probability density function $f(X, \beta)$, which gives a better fit of log-normal distribution. Therefore, the estimators of the ML method are described as sufficient, consistent and asymptotically normally distributed (Koutsoyiannis, 1977; Tambi *et al.*, 1999). The assumption of asymptotic normality of distribution and consistency is known to give more satisfactory results only when the sample size is large (Gujarati, 1988; Tambi *et al.*, 1999). The detailed steps that need to be followed when performing the ML method are clearly documented by Koutsoyiannis (1977).

In addition, the marginal probability concept was used to predict the effect of a change in an explanatory variable on the probability of a favourable attitude toward consumption of processed mangoes or tomatoes. For continuous variables, derivatives of the probability function were evaluated at the mean values of the independent variables. The marginal probability was calculated by multiplying the coefficient estimate β_i , by the standard probability density function, $n(X_i, \beta_i)$ of the multinomial

logit model evaluated at the mean values of the explanatory variables. For categorical explanatory variables with a value of zero or one, the marginal probability was calculated as the difference arising from $n(X_i, \beta_i)$ for $X_i = 0$ and $X_i = 1$ for the discrete variable (Tambi *et al.*, 1999; Mazuze, 2004). The marginal probability was used to explain the likelihood of households toward consuming or not consuming processed mangoes or tomatoes among households.

The common problems of autocorrelation, multicollinearity and heteroscedasticity were critically examined. Diagnostic tests to detect the presence of the afore-said problems were performed by using Variance Inflation Factor (VIF), Durbin-Watson statistic test and the MLE method and in most cases indicated the absence of serious autocorrelation, multicollinearity and heteroscedasticity problems. The goodness-of-fit of the multinomial logit model was measured by the McFadden with likelihood ratio statistics as the basis of inference (Saleth, 1991; Tambi *et al.*, 1999; Kuperis *et al.*, 1999; Senkondo *et al.*, 2005) with a chosen significance level of 10% probability level. Similarly, the goodness-of-fit of the OLS regression model was measured by the adjusted R^2 (Koutsoyiannis, 1977; Maddala, 1988; Gujarati, 1988) with a chosen significance level of 5% confidence level.

Moreover, the following criteria were also employed to verify the goodness-of-fit of the model: (i) statistical tests of significance (z-tests or t-tests for individual parameters), (ii) inspection of the signs of the estimated parameters to verify whether they agreed with expectations, (iii) values of the standard errors of the variables included in the model and (iv) whether the empirical model was correctly predicted. On the basis of these criteria, the empirical models used in this study were found to

be appropriate in determining the main factors that significantly influence demand for processed mangoes or tomatoes. This is partly because the standard errors of all variables included in the models were found to be small and the estimated coefficients of all hypothesized variables had the expected logical signs (Tambi *et al.*, 1999).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Overview

This chapter presents and discusses the results of the analysis of processing, marketing and demand for processed fruits and vegetables in the study areas. Specifically, the results presented rely heavily on the information obtained from sample processors, traders and households and examined by using descriptive statistics analysis and econometric models. The remainder of the chapter is divided into five main sections. The second section discusses the results of the fruits and vegetables processing. This is followed by analysis of the marketing system of processed fruits and vegetables in the study areas in section three. While section four describes consumption pattern of processed products, the corresponding section examines factors influencing demand for processed mangoes. Finally, the chapter winds-up with a discussion of factors influencing demand for processed tomatoes.

4.2 Fruits and vegetables processing

4.2.1 Characteristics of sample processors and their processing firms

Tables 8 and 9 present characteristics of sample processors and their processing firms by region. The results in Table 8 show that most of the processors were females. Dar es Salaam region had the highest proportion of female processors followed by Tanga region. This result supports the findings by Nyagori (2001) that over 65% of small-scale food processing units in Dar es Salaam region were owned and operated by females. This may be due to promotion of small-scale food processing by SIDO/UNIDO which largely targets women entrepreneurs. However, in Iringa and

Dodoma regions, the number of male processors was higher than females. In almost all the sample regions, most of the processors were married, which may reflect that fruit and vegetable processing activities were an important source of households' income.

The overall average age of the sample processors was 44 years of age with sample processors in Iringa region being relatively more aged than those in the other three regions. Proportion-wise, most of the sample processors were below 50 years of age. This finding suggests that the majority of sample processors in the study areas were economically productive age group and therefore supporting findings by Minga (1998), Mungai *et al.* (2000) and Nyagori (2001) that most of small-scale entrepreneur's workforce is constituted of economically active age group.

The overall results from Table 8 also indicate that most of the sample processors had attained ordinary level secondary education with the largest number being in Dar es Salaam region followed by Tanga and Iringa regions. However, the number of sample processors who attained primary school education in Dodoma region was slightly higher than their counterparts who attained other levels of education. The fact that all processors had attended school implies that sample processors were not constrained by education and therefore, they could operate their businesses successfully, *Ceteris paribus*. The average number of years of experience in processing fruits and vegetables for the whole sample was six years. However, experience varied region-wise with processors in Iringa region having significantly longer experience than processors in the other three regions. Over 50% of the sample processors had experience of between 1 and 5 years. Very few sample processors had experience of

above 15 years. These findings suggest that most processors in the study areas had little experience in processing fruits and vegetables complementing findings by Nyagori (2001) that over 70% of processors in Dar es Salaam region had little experience in food processing ranging between 1 and 7 years. In this case, the processors having little experience were not able to compete with long experienced processors in terms of processing good quality products capable of competing with products processed by experienced firms including imported processed products.

Table 8: Characteristics of sample processors by region

Variable	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Respondents' Sex (%):					
Male	18.2 (06)	41.7 (5)	66.7 (2)	72.7 (8)	35.6 (21)
Female	81.8 (27)	58.3 (7)	33.3 (1)	27.3 (3)	64.4 (38)
Sub Total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Marital Status (%):					
Married	90.9 (30)	58.3 (7)	100.0 (3)	72.7 (8)	81.4 (48)
Single	03.0 (01)	16.7 (2)	Nil	18.2 (2)	08.5 (05)
Separated	Nil	08.3 (1)	Nil	09.1 (1)	03.4 (02)
Widow	06.1 (02)	16.7 (2)	Nil	Nil	06.8 (04)
Sub Total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Mean Age of Sample Processor (Years):	43.0 (33)	43.0 (12)	49.0 (3)	47.0 (11)	44.0 (59)
Distribution of Age (%)					
Below 50 Years	70.0 (23)	75.0 (09)	67.7 (2)	55.0 (06)	68.0 (40)
50 Years and Above	30.0 (10)	25.0 (03)	33.3 (1)	45.0 (05)	32.0 (19)
Sub Total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Education Level (%):					
Primary Education	15.2 (05)	25.0 (03)	Nil	36.4 (4)	20.3 (12)
Ordinary Secondary Education	45.5 (15)	50.0 (06)	66.7 (2)	09.1 (1)	40.7 (24)
Advanced Secondary Education	03.0 (01)	08.3 (01)	Nil	Nil	03.4 (02)
Diploma Level	12.1 (04)	Nil	Nil	27.3 (3)	11.9 (07)
Degree Level	24.2 (08)	16.7 (02)	33.3 (1)	27.3 (3)	23.7 (14)
Sub Total	100.0 (33)	100.0(12)	100.0 (3)	100.0 (11)	100.0 (59)
Average Experience in Processing Activity (Years):	05.0 (33)	05.0 (12)	11.0 (3)	7.0 (11)	6.0 (59)
Distribution by Years in Experience of Processing Activity (%):					
Between 1 and 5 Years	75.9 (25)	66.7 (8)	66.7 (2)	54.5 (6)	69.5 (41)
Between 6 and 15 Years	21.2 (07)	25.0 (3)	Nil	27.3 (3)	22.0 (13)
Above 16 years	03.0 (01)	08.3 (1)	33.3 (1)	18.2 (2)	08.5 (05)
Sub Total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)

Figures in parentheses are the number of firms

Table 9 summarizes characteristics of sampled processing firms by region. It is clear from the table that the geographical distribution of sample processing firms is biased against rural areas where most of the fresh fruits and vegetables are grown. This is mainly due to the need to be close to market and availability of important facilities such as electricity and water. Similar findings were reported by Mungai *et al.* (2000) who found that most of fruit and vegetable processing factories in Kenya are located in areas with high-income consumers. This is contrary to Nyanteng (2001) who argues that locating processing firms in the rural areas reduces poverty by adding value to products produced by smallholder farmers, creating employment opportunities especially during off season and reducing rural-urban migration.

Irrespective of geographical distribution, the findings in the same table show that most of the processing firms were operating on full time basis except in Tanga region. This suggests that processing activities in the study areas provide employment opportunities almost throughout the year. With the exception of Iringa region, the majority of processing firms were not registered and therefore some of their products lack Tanzania Bureau of Standard (TBS) certification mark “*tbs*”. This is partly attributed by failure to meet conditions (such as regulations relating to quality standards and processing premises) stipulated by TBS and TFDA. The implication of these findings is that the products which lack “*tbs*” certification mark might not be able to meet the required quality standards. Therefore, they can hardly compete with similar products from either abroad or within the country that have good quality and well reputable certification marks. This could partly be the reason why micro and small scale processing enterprises in the country have not grown as expected.

Table 9: Characteristics of sample processing firms by region (%)

Variable	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Location of the Firm:					
Urban area	66.7 (22)	50.0 (6)	66.7 (2)	72.7 (8)	64.4 (38)
Peri-urban area	27.3 (09)	08.3 (1)	Nil	27.3 (3)	22.0 (13)
Rural area	06.0 (02)	41.7 (5)	33.3 (1)	Nil	13.6 (08)
Sub-total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Nature of the business:					
Full time	57.6 (19)	41.7 (5)	66.7 (2)	54.5 (6)	54.2 (32)
Part time	27.3 (09)	58.3 (7)	33.3 (1)	45.5 (5)	37.3 (22)
Infrequent	15.1 (05)	Nil	Nil	Nil	08.5 (05)
Sub-total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Registration of the Business:					
Registered	27.3 (09)	33.3 (4)	66.7 (2)	27.3 (3)	30.5 (18)
Not registered	72.7 (24)	66.7 (8)	33.3 (1)	72.7 (8)	69.5 (41)
Sub-total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Ownership of the Premises:					
Rented	15.2 (05)	Nil	Nil	Nil	08.5 (05)
Owned	84.8 (28)	100.0 (12)	100.0 (3)	100.0 (11)	91.5 (54)
Sub-total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Ownership of the Firm:					
Individual	81.8 (27)	33.3 (04)	66.7 (2)	45.5 (5)	64.4 (38)
Partnership	12.1 (04)	25.0 (03)	33.3 (1)	09.1 (1)	15.3 (09)
Cooperative (Group of People)	06.1 (02)	16.7 (02)	Nil	09.1 (1)	08.5 (05)
NGOs	Nil	25.0 (03)	Nil	36.4 (4)	11.9 (07)
Sub Total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Distribution by Start-up Capital in Tanzania shillings:					
Below 1.0 Million	79.0 (26)	75.0 (9)	33.3 (1)	45.0 (5)	69.0 (41)
Above 1.0 Million	21.0 (07)	25.0 (3)	66.7 (2)	55.0 (6)	31.0 (18)
Sub Total	100.0 (33)	100.0 (12)	100.0 (3)	100.0 (11)	100.0 (59)
Distribution by Labour/employees:					
Below 5	90.5 (30)	83.3 (10)	33.3 (01)	81.8 (09)	84.7 (50)
Between 5 and 19	06.1 (02)	16.7 (02)	33.3 (01)	18.2 (02)	11.9 (07)
Between 20 and 99	03.0 (01)	Nil	33.3 (01)	Nil	03.4 (02)
Sub Total	100.0 (33)	100.0 (12)	100.0 (03)	100.0 (11)	100.0 (59)

Figures in parentheses are the number of firms

Apart from registration of the business, majority of sample processors were operating in their processing premises. Very few processors in Dar es Salaam region rented processing premises (Table 9). This could be due to legal regulation related to registration of premises, which states that no person shall manufacture for sale,

supply or store food products except in registered premises (Tanganyika, 1956). With regard to ownership of the firms, a significant number of processing firms were owned by individuals. The same has been observed by Nyagori (2001) who found that, many small-scale food processing enterprises in Dar es Salaam region were operated as individual business units implying that the private sector plays a crucial role in stimulating and promoting growth and development of fruit and vegetables processing in the country.

Access to finance remained a major constraint limiting the expansion of processing activities in the study areas. As can be seen from Table 9, majority of the sample processors had start-up capital of below 1.0 million TShs. However, variations across the study regions were apparent. For instance, in Iringa and Dodoma regions, the number of processors with start-up capital of above 1.0 million TShs was higher than their counterparts in the other two regions. The results in the table also suggest that fruit and vegetable processing activities were mainly done by operators who belong to micro-enterprise category. This is partly because a significant proportion of processing firms in almost all four regions had hired labour of below 5 persons, followed by processing firms with hired labour of between 5 and 19 persons. Only two processing firms, one each from Dar es Salaam and Iringa regions employed between 20 and 99 persons. The sizes of processing firms in the study areas lies within the definition of different categories of enterprises suggested by UNIDO and Indonesia's Central Bureau of Statistics (ICBS) cited by Elaian (1996) and Damardjati (1995). According to these categories, micro-enterprises are those employing less than 5 employees, small-enterprises are those employing 5 and 19

employees, medium-enterprises are those employing 20 and 99 employees and large-enterprises as those employing 100 and above employees.

4.2.2 Types of processed products

Table 10 summarizes different types of processed products reported by the sample processors while Figure 5 shows some of the products processed by Dabaga Fruit and Vegetables Canning Company Limited in Iringa region. The results in Table 10 show that tomato sauce, tomato paste, mango pickles, marmalades and jam were processed in all four regions. However, there were regional variations in the proportion of processors in terms of types of products processed.

Table 10: Proportions of sample processors by type of products (%)

Product Type	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Tomato Products:					
Tomato Sauce	09.33 (07)	18.60 (08)	06.25 (01)	11.11 (02)	11.84 (18)
Tomato Paste	01.33 (01)	09.30 (04)	06.25 (01)	05.56 (01)	04.60 (07)
Garlic Paste	06.67 (05)	Nil	06.25 (01)	05.56 (01)	04.60 (07)
Chilli Sauce	05.33 (04)	07.00 (03)	06.25 (01)	Nil	05.26 (08)
Pickle Products:					
Mango Pickles	29.34 (22)	14.00 (06)	06.25 (01)	11.11 (02)	20.30 (31)
Lemon Pickles	02.67 (02)	07.00 (03)	06.25 (01)	Nil	04.00 (06)
“Mbilibi”	05.33 (04)	02.30 (01)	Nil	11.11 (02)	04.60 (07)
Marmalades	02.67 (02)	04.65 (02)	06.25 (01)	05.56 (01)	04.00 (06)
Jam	12.00 (09)	18.60 (08)	18.75 (03)	11.11 (02)	14.47 (22)
Wines	08.00 (06)	04.65 (02)	Nil	38.88 (07)	09.87 (15)
Juice Products:					
Orange Juice	05.33 (04)	11.60 (05)	18.75 (03)	Nil	07.90 (12)
Passion Juice	05.33 (04)	02.30 (01)	06.25 (01)	Nil	04.00 (06)
Mixed Fruits Juices	06.67 (05)	Nil	12.50 (02)	Nil	04.60 (07)

Figures in parentheses are the number of firms involved and the sample sizes for Dar es Salaam (33); Tanga (12); Iringa (3) and Dodoma (11).

While Dar es Salaam region appears to process all the thirteen products shown in Table 10, Tanga, Iringa and Dodoma regions processed 11, 11 and 8 of the 13

products respectively. Processing of several products in Dar es Salaam region may reflect a relatively high demand for a variety of processed fruits and vegetables compared to the other three regions. Notable differences in the proportion of respondents who reported processing of different products in each region were also apparent. In Dar es Salaam region, for example, a significant larger number of respondents reported processing of mango pickles compared to other products and therefore supporting the findings of Nyagori (2001) that most of the sample processors in Dar es Salaam region processed mangoes into mango pickles. This may also reflect the high demand for mango pickles in Dar es Salaam region compared to other types of products. Results also show that in Dodoma region processing wines featured highly than any other type of fruits and in Tanga region tomato sauce and jam processing was prominent. A similar picture was observed in Iringa region for the case of jam and orange juice. The major reason for this variation may be due to availability of raw materials (type of raw fruits and vegetables) required to process these products.

Source: Dabaga Fruit and Vegetables Canning Company Ltd, 2003

Processors were asked to indicate the main reasons for their engagement in fruit and vegetable processing activities. The responses are summarized in Table 11. Out of the five reasons mentioned by the respondents, source of additional income remain by far the major reason, followed by employment opportunity. Very few processors

indicated access to market as a reason. These results complement findings by Kejriwal (1998), Damardjati (1995), Hicks (2001), Nyagori (2001) and Tiisekwa *et al.* (2005) who reported that agro-processing provides additional income and generates employment opportunities.

Table 11: Reasons for engaging in processing fruit and vegetable activities (%)

Reason	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Source of Additional Income	47.8 (33)	35.3 (12)	33.3 (3)	40.7 (11)	42.5 (59)
Employment Opportunity	30.4 (21)	35.3 (12)	33.3 (3)	37.0 (10)	33.1 (46)
Availability of Raw Fruits and Vegetables	11.6 (08)	14.7 (05)	11.1 (1)	11.1 (03)	12.2 (17)
Processing Skills and Knowledge Acquired	05.8 (04)	08.8 (03)	11.1 (1)	07.4 (02)	07.2 (10)
Access to Market	04.4 (03)	05.9 (02)	11.1 (1)	03.7 (01)	05.0 (07)

Figures in brackets indicate the number of firms and the total number of responses for Dar es Salaam (69); Tanga (34); Iringa (09) and Dodoma (27)

4.2.3 Main sources of raw fruits and vegetables

Figure 6 shows that there were four main sources of raw fruits and vegetables in the study areas. These included own farm, nearby farmers, nearby local markets and farmers outside the region. Out of these sources, nearby local markets remains by far to be the major source for processors in Dar es Salaam. However, there were variations in the number of respondents who reported main sources of raw fruits and vegetables in the other three regions. In Tanga region, for example, majority of sample processors indicated nearby farmers as the main source of raw materials. This could be due to the region's potential for producing different fruit and vegetable products. A similar picture was observed in Dodoma region, which has a comparative advantage in production of grape fruits. However, both nearby farmers and farmers

from outside the region appeared to be the major sources of raw fruits and vegetables in Iringa region, probably due to existence of Dabaga Fruit and Vegetables Canning Company which is the largest plant in the country, with the ability to collect raw materials from distances places in Tanzania.

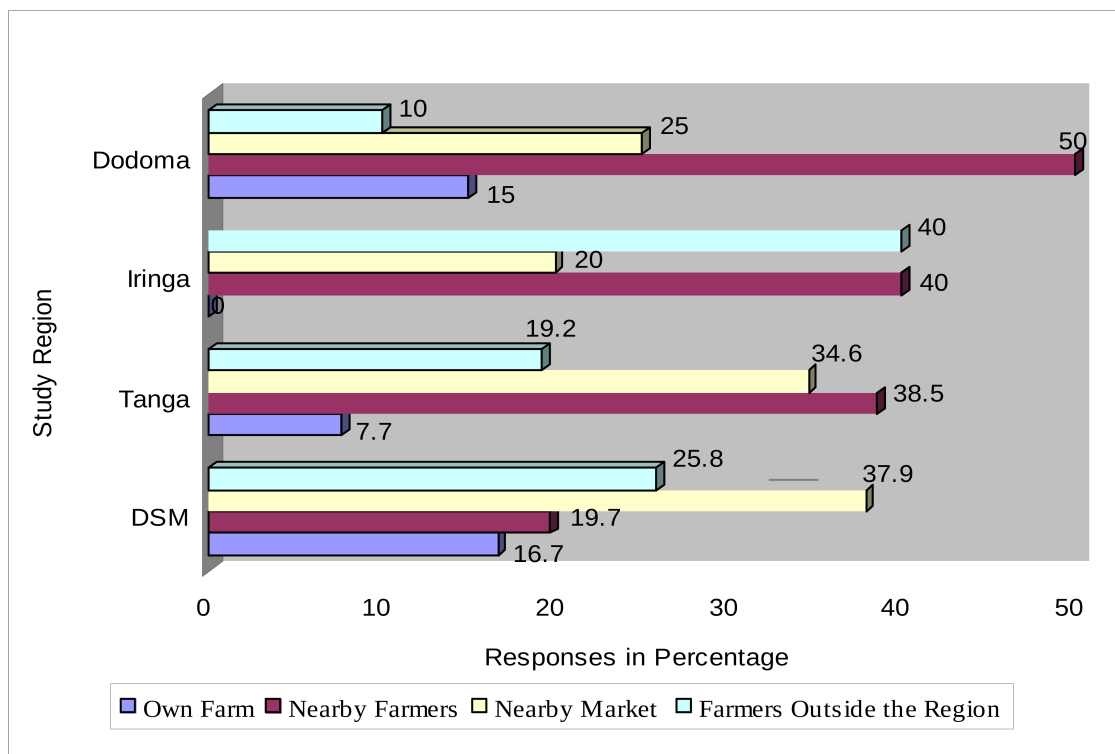


Figure 6: Main sources of fresh fruits and vegetables by region (%)

Apart from main sources of fresh fruits and vegetables, processors were asked to indicate whether they had contracts with suppliers of fruits and vegetables. The responses are presented in Figure 7. With the exception of Iringa region, most of the sample processors had no contracts with suppliers of fruits and vegetables. This, therefore, supports the findings by Mungai *et al.* (2000) who observed that most of the small processors in Kenya have no direct links with the suppliers of fruits and vegetables and depend on purchases from the markets.

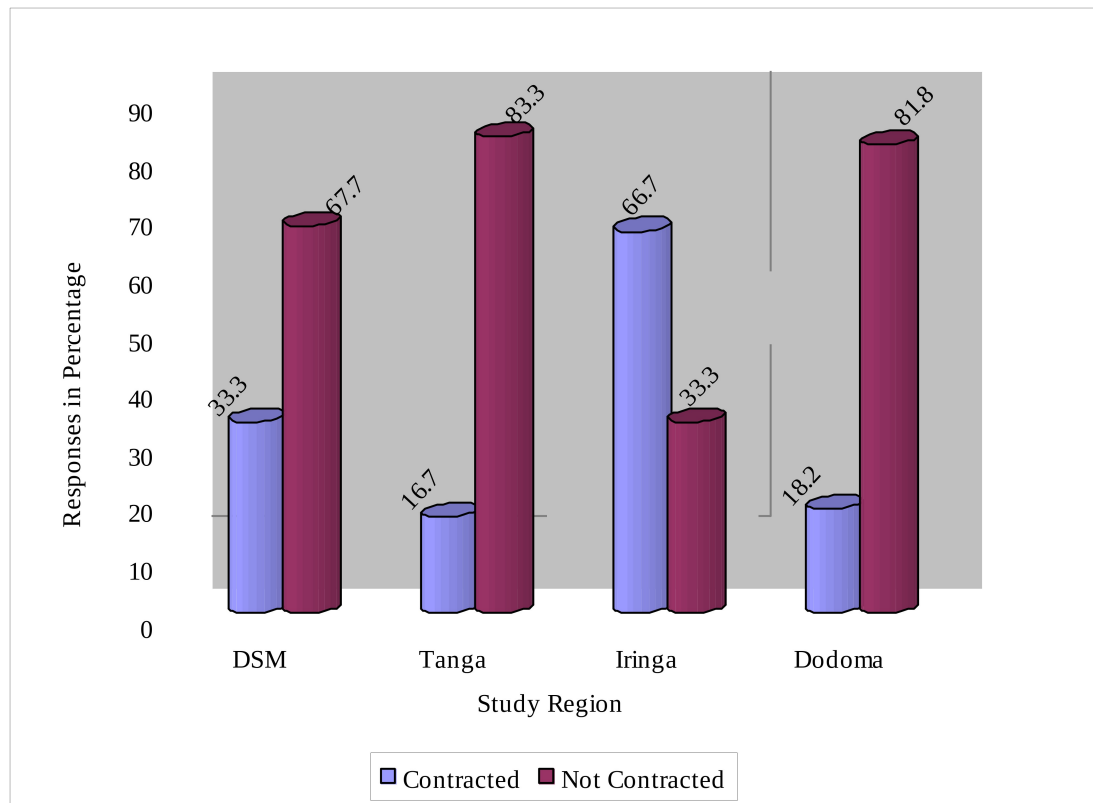


Figure 7: Sample processors contracted with suppliers of fresh fruits and vegetables by region (%)

Two interesting implications can be derived from the findings presented in Figure 7 that is, (i) there is no room for processors to control the quality of fruits and vegetables, and (ii) fruit and vegetable processing firms lack strong link with suppliers to ensure constant availability of fruits and vegetables, the most important inputs for processing. This situation might have a negative impact on sustainability of fruit and vegetable processing firms because the fresh raw materials for these enterprises depend largely on the supply situation.

4.2.4 Production of processed fruits and vegetables

Tables 12 to 15 present actual quantities of different processed fruits and vegetables in Dar es Salaam, Tanga, Iringa and Dodoma regions respectively from 1999 to 2003. The following can be observed from the results in Table 12. First, with the exception of few cases, significantly large quantities of almost all processed products were produced during harvest season compared to during off season. This may partly be due to high availability of raw fruits and vegetables during the harvest period. Second, on average, tomato sauce, tomato paste, chilli sauce and mixed fruit juices production were higher than production of other products processed in the region. This may partly be due to high demand for the products. Third, with the exception of tomato paste, the average quantities of the rest of the products have been fluctuating during the five year period. The fluctuation pattern in production of many products in Dar es Salaam region could have been caused by stiff competition from similar products processed from abroad and unavailability of fresh raw materials.

Table 12: Dar es Salaam region: Average quantity of fruits and vegetables processed between 1999 and 2003 production period (in Tons)

Product	Year/Season									
	1999		2000		2001		2002		2003	
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Tomato Sauce	21.3 (3)	20.7 (3)	17.0 (4)	16.6 (4)	13.6 (7)	12.7 (7)	14.0 (7)	13.3 (7)	15.3 (7)	14.1 (7)
Tomato Paste	Nil	Nil	36.0 (1)	36.0 (1)	36.0 (1)	36.0 (1)	36.0 (1)	36.0 (1)	36.0 (1)	36.0 (1)
Garlic Paste	0.6 (1)	0.6 (1)	1.0 (1)	1.0 (1)	1.5 (1)	1.5 (1)	1.2 (4)	1.1(4)	1.2 (2)	1.1 (5)
Chilli Sauce	15.5 (2)	15.3 (2)	15.8 (2)	15.5 (2)	11.9 (3)	11.7 (3)	9.2 (4)	8.9 (4)	9.5 (4)	9.2 (4)
Mango Pickles	2.1(4)	1.9 (3)	2.0 (8)	2.0 (6)	1.9 (14)	1.8 (11)	2.2 (19)	2.0 (15)	2.8 (22)	2.4 (19)
Lemon Pickles	0.5 (1)	Nil	0.5 (1)	Nil	0.5 (1)	Nil	0.3 (2)	0.2 (1)	0.4 (2)	0.3 (1)
Marmalades	0.9 (1)	0.5 (1)	0.7 (1)	0.4 (1)	1.0 (1)	0.3 (1)	1.2 (1)	0.6 (1)	1.2 (1)	0.6 (1)
“Mbilibi”	0.4 (1)	0.4 (1)	0.5 (1)	0.5 (1)	5.0 (1)	1.0 (1)	0.7 (2)	0.5 (2)	2.5 (4)	2.0 (4)
Jam	0.9 (1)	0.9 (1)	1.1 (2)	0.9 (2)	8.3 (5)	7.9 (5)	8.1 (6)	7.1(5)	6.3 (10)	5.1(10)
Wines	0.7 (3)	0.6 (3)	0.9 (3)	0.9 (3)	1.4 (4)	1.0 (4)	1.5 (6)	1.2 (5)	2.2 (6)	1.8 (6)
Orange Juice	1.0 (1)	0.4 (1)	1.5 (1)	0.5 (1)	13.6 (2)	13.1 (2)	8.6 (4)	7.4 (4)	5.7 (7)	4.9 (7)
Passion Juice	1.0 (1)	0.3 (1)	2.0 (1)	0.5 (1)	3.0 (1)	1.0 (1)	3.5 (1)	1.5 (1)	2.2 (2)	1.1 (2)
Mixed Fruit Juices	1.2 (1)	Nil	1.2 (1)	Nil	630.8 (2)	630.0 (1)	420.6 (3)	315.1(3)	421.5 (3)	315.2 (3)

Figures in brackets indicate the number of firms

Like Dar es Salaam region, Table 13 indicates that sample processors in Tanga region produced larger quantities for almost all processed fruits and vegetables during harvest season than during off season. The quantities of tomato sauce produced decreased from 9.2 and 9.1 tons in 1999 to 3.3 and 3.2 tons in 2002 and thereafter increased suddenly to 28.2 and 26.1 tons in 2003 during harvest and off seasons, respectively. A similar trend was observed for chilli sauce and mixed fruit juices whereby the highest production in both seasons was recorded in 2003. The highest production of tomato sauce and chilli sauce in 2003 might have been due to the revival of Soni Fruit Canning Company Limited. Similar to the case of Dar es Salaam region, on average, tomato sauce and chilli sauce production were higher than production of other products processed in the region. A similar trend was noted for orange and passion juices during harvest season reflecting partly the high availability of raw materials.

Table 13: Tanga region: Average amount of fruits and vegetables processed between 1999 and 2003 production period (in Tons)

Product	Year/Season									
	1999		2000		2001		2002		2003	
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Tomato Sauce	9.2 (2)	9.1 (2)	9.2 (2)	9.1 (2)	4.9 (4)	4.8 (4)	3.3 (6)	3.2 (6)	28.2 (8)	26.1 (8)
Tomato Paste	1.1 (1)	0.3 (1)	1.1 (1)	0.3 (1)	1.3 (1)	0.6 (1)	0.8 (3)	0.4 (3)	0.7 (4)	0.4 (4)
Chilli Sauce	9.2 (2)	9.1 (2)	9.2 (2)	9.1 (2)	9.2 (2)	9.1 (2)	9.2 (2)	9.1 (2)	16.1 (3)	11.1 (3)
Mango Pickles	0.7 (2)	0.4 (2)	0.9 (2)	0.5 (2)	0.9 (2)	0.5 (2)	0.7 (4)	0.4 (4)	2.3 (6)	1.2 (6)
Marmalades	0.6 (2)	0.4 (2)	0.5 (2)	0.3 (2)	0.5 (2)	0.3 (2)	0.4 (2)	0.2 (2)	0.4 (2)	0.2 (2)
“Mbilibi”	0.4 (1)	0.2 (1)	0.4 (1)	0.2 (1)	0.5 (1)	0.3 (1)	0.7 (1)	0.4 (1)	0.9 (1)	0.6 (1)
Jam	0.5 (2)	0.3 (2)	0.6 (2)	0.4 (2)	1.6 (4)	0.8 (4)	1.3 (6)	0.7 (6)	1.4 (6)	0.7 (6)
Wines	1.6 (2)	0.3 (2)	1.7 (2)	0.3 (2)	1.7 (2)	0.3 (2)	1.9 (2)	0.3 (2)	1.9 (2)	0.3 (2)
Orange Juice	5.0 (1)	0.4 (1)	5.0 (1)	0.4 (1)	5.0 (1)	1.6 (3)	3.7 (5)	1.2 (5)	3.7 (5)	1.2 (5)
Passion Juice	5.0 (1)	0.4 (1)	5.0 (1)	0.4 (1)	5.0 (1)	0.4 (1)	5.0 (1)	0.4 (1)	5.0 (1)	0.4 (1)
Mixed Fruits Juices	Nil	Nil	0.5 (1)	0.1 (1)	0.5 (1)	0.1 (1)	0.4 (1)	0.2 (1)	4.0 (1)	2.0 (1)

Figures in brackets indicate the number of firms

Table 14 shows the actual quantities of processed fruits and vegetables produced by sample processors in Iringa region between 1999 and 2003 production period. From Table 14, the following can be observed: (i) unlike Dar es Salaam and Tanga regions, the quantities of most of the products processed during harvest season were almost the same as those processed during off season except for jam and mixed fruit juice (ii) The average quantities of tomato sauce processed between 1999 and 2003 during both harvest and off seasons were significantly larger than the other products processed in this region and similar product processed in other three regions. This was followed by chilli sauce, mango pickles and passion juices. The major reasons for this may be due to the availability of fresh raw materials, high demand of the products and longer experience in processing different fruits and vegetables.

Table 14: Iringa region: Average amount of fruits and vegetables processed between 1999 and 2003 production period (in Tons)

Product	Year/Season									
	1999		2000		2001		2002		2003	
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Tomato Sauce	288.0 (1)	288.0 (1)	288.0 (1)	288.0 (1)	288.0 (1)	288.0 (1)	288.0 (1)	288.0 (1)	375.0 (1)	375.0 (1)
Tomato Paste	5.1 (1)	5.1 (1)	7.1 (1)	7.1 (1)	5.5 (1)	5.5 (1)	4.0 (1)	4.0 (1)	3.0 (1)	3.0 (1)
Garlic Paste	3.1 (1)	3.1 (1)	2.3 (1)	2.3 (1)	3.0 (1)	3.0 (1)	3.2 (1)	3.2 (1)	3.0 (1)	3.0 (1)
Chilli Sauce	144.0 (1)	144.0 (1)	144.0 (1)	144.0 (1)	144.0 (1)	144.0 (1)	144.0 (1)	144.0 (1)	204.0 (1)	204.0 (1)
Mango Pickles	13.1 (1)	13.1 (1)	16.4 (1)	16.4 (1)	7.5 (1)	7.5 (1)	13.1 (1)	13.1 (1)	13.1 (1)	13.1 (1)
Lemon Pickles	0.4 (1)	0.4 (1)	0.2 (1)	0.2 (1)	0.2 (1)	0.2 (1)	0.4 (1)	0.4 (1)	1.5 (1)	1.5 (1)
Marmalades	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	2.0 (2)	2.0 (2)
Jam	1.7 (3)	1.4 (3)	2.2 (3)	1.2 (3)	2.3 (3)	1.2 (3)	2.7 (3)	1.3 (3)	3.1 (3)	1.9 (3)
Orange Juice	2.9 (2)	2.9 (2)	4.4 (2)	4.4 (2)	4.4 (2)	4.4 (2)	3.0 (2)	3.0 (2)	3.2 (2)	3.2 (2)
Passion Juice	12.4 (1)	12.4 (1)	11.6 (1)	11.6 (1)	11.6 (1)	11.6 (1)	12.4 (1)	12.4 (1)	6.6 (1)	6.6 (1)
Mixed Fruits Juices	3.5 (2)	3.5 (2)	3.8 (2)	3.3 (2)	3.8 (2)	3.3 (2)	2.9 (2)	1.5 (2)	2.3 (2)	1.3 (2)

Figures in brackets indicate the number of firms

Lastly, the production of processed fruits and vegetables in Dodoma region between 1999 and 2003 shows a declining trend except for wine production (Table 15). This is partly due to the unreliable and unavailability of fresh raw materials. As it was the case of the processors in Dar es Salaam and Tanga regions, it can as well be argued that the sample processors in Dodoma region produced higher outputs during harvest season than off season for almost all products, reflecting high availability of raw fresh fruits and vegetables during peak period. On average, wines production was higher than production of other products processed in this region and similar product in Dar es Salaam and Tanga regions. The major reason for this may be due to the fact that grape fruit is more readily available than any other type of fruit in the region.

Table 15: Dodoma region: Mean quantity of fruits and vegetables processed between 1999 and 2003 production period (in Tons)

Product	Year/Season									
	1999		2000		2001		2002		2003	
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Tomato Sauce	0.46 (1)	0.12 (1)	0.45 (1)	0.15 (1)	0.25 (1)	0.15 (1)	0.03 (1)	0.01 (1)	0.06 (2)	0.02 (1)
Tomato Paste	1.00 (1)	0.45 (1)	0.90 (1)	0.40 (1)	0.02 (1)	0.01 (1)	0.03 (1)	0.02 (1)	0.04 (1)	0.02 (1)
Garlic Paste	0.72 (1)	Nil	0.68 (1)	0.30 (1)	0.50 (1)	0.25 (1)	0.40 (1)	0.15 (1)	0.14 (1)	0.04 (1)
Mango Pickles	0.40 (2)	0.20 (2)	0.40 (2)	0.10 (2)	0.20 (2)	0.09 (2)	0.10 (2)	0.03 (2)	0.09 (1)	0.05 (1)
Marmalades	0.06 (1)	0.03 (1)	0.04 (1)	0.02 (1)	0.02 (1)	0.01 (1)	0.03 (1)	0.02 (1)	0.03 (1)	0.02 (1)
“Mbilibi”	0.66 (2)	0.43 (2)	0.50 (2)	0.15 (2)	0.45 (2)	0.10 (2)	0.30 (2)	0.09 (2)	0.06 (1)	0.03 (1)
Jam	0.25 (1)	0.14 (1)	0.23 (1)	0.12 (1)	0.75 (1)	0.02 (1)	0.06 (1)	0.03 (1)	0.07 (2)	0.02 (2)
Wines	3.80 (4)	2.80 (2)	7.10 (6)	7.0 (4)	8.20 (6)	6.90 (5)	6.60 (6)	3.0 (5)	10.7 (7)	5.80 (7)

Figures in brackets indicate the number of firms

Data in Tables 12 to 15 suggest that processors in Dar es Salaam region had high potential in terms of processing tomato paste and mixed fruit juices compared to the other three regions. A similar picture was observed in Tanga region for tomato sauce, tomato pastes, mango pickles and jam compared to processors in Dodoma region. Likewise, processors in Iringa region had high potential for processing almost all products except wines, mixed fruit juices and orange juice compared to the other three regions, partly due to long experience in processing fruits and vegetables. On the other hand, processors in Dodoma region had high potential for processing wines compared to their counterparts in Tanga and Dar es Salaam regions. The fact that processors in all four regions produced higher outputs during harvest season than off season for almost all products is an indication that the processing firms in the study areas were not able to utilize their capacities throughout the year. However, tomato sauce, chilli sauce and mixed fruit juices appeared to dominate the market compared to other types of processed products.

4.2.5 Plan to expand processing of fruits and vegetables

Apart from the actual quantities processed during the harvest and off seasons, respondents were also asked to indicate whether they intend to expand production in the future. The responses are summarized and presented in Figure 8. It is apparent from the figure that the majority of sample processing firms would like to expand processing, partly due to profit emanating from fruits and vegetables processing activities and marketability of the products.

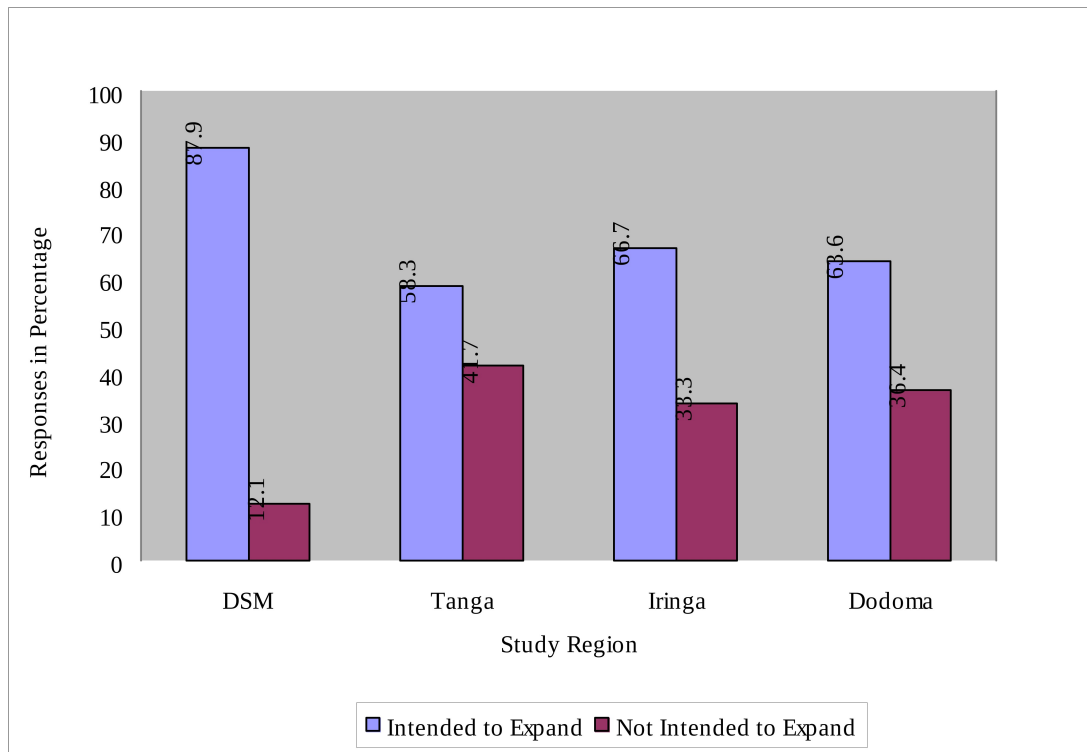


Figure 8: Responses on intention to expand the production in future by region (%)

In order to capture processors' preference with respect to intention to expand production, the respondents were requested to indicate specific type of products intended to be increased in future. The responses are summarized in Table 16. The overall results from the table indicate that most of respondents would like to expand production of mango pickles followed by jam. Few respondents reported intention to expand the production of lemon pickles and marmalades. Availability of fresh raw materials, high demand and profits emanating from products were the main motivators for the intention to expand their production. However, there were variations in the number of respondents' intention to expand production of specific products across the sample regions. For example, majority of those who intended to expand production of different products are in Dar es Salaam region compared to the other three regions, probably due to high demand for different processed products in

the region. A similar trend was observed in Dodoma region for wines and Tanga region for mango pickles, jam and orange juices, probably due to availability of raw materials.

Table 16: Plan to expand processing of fruits and vegetables in future by product by region (%)

Product	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Tomato Sauce	10.2 (06)	10.0 (2)	10.0 (1)	14.3 (1)	10.4 (10)
Tomato Paste	03.4 (02)	10.0 (2)	10.0 (1)	Nil	05.2 (05)
Garlic Paste	08.5 (05)	Nil	Nil	14.3 (1)	06.2 (06)
Chilli Sauce	03.4 (02)	05.0 (1)	10.0 (1)	Nil	04.2 (04)
Mango Pickles	27.1 (16)	15.0 (3)	10.0 (1)	Nil	20.8 (20)
Lemon Pickles	01.7 (01)	Nil	10.0 (1)	Nil	02.1 (02)
Marmalades	03.4 (02)	Nil	10.0 (1)	Nil	03.1 (03)
“Mbilimbi”	06.8 (04)	10.0 (2)	Nil	Nil	06.2 (06)
Jam	12.0 (07)	15.0 (3)	10.0 (1)	14.3 (1)	12.5 (12)
Wines	08.5 (05)	05.0 (1)	Nil	57.1 (4)	10.4 (10)
Orange Juice	06.4 (04)	15.0 (3)	20.0 (2)	Nil	09.5 (09)
Passion Juice	03.4 (02)	10.0 (2)	10.0 (1)	Nil	05.2 (05)
Mixed Fruits Juice	05.2 (03)	05.0 (1)	Nil	Nil	04.2 (04)

Figures in the brackets indicate the Number of respective respondents Involved and the total number of responses for Dar es Salaam (59); Tanga (20); Iringa (10); and Dodoma (07)

While respondents in Dar es Salaam region would like to expand the production of all the thirteen products shown in Table 16, none of the sample processors in Tanga would like to expand production of garlic paste, lemon pickle and marmalades. A similar picture was observed in Iringa region for garlic paste, “mbilimbi”, wines and mixed fruit juices, and in Dodoma region for tomato paste, chilli sauce, mango pickles, lemon pickles, marmalades, “mbilimbi”, orange juice, passion juice and mixed fruit juices. Lack of markets and unavailability of raw materials may be the major reasons that limit the processors to expand the processing of these products.

4.2.6 Factors affecting performance of fruit and vegetable processing firms

Processors were also asked to indicate the problems affecting their performance in fruit and vegetable processing. The responses are summarized in Table 17. Nine

problems were given by the respondents that affect the performance of fruit and vegetable processing firms in the study areas. Overall results in the table indicate that lack of market was the main problem limiting the performance of the fruit and vegetable processing, followed by lack of working capital and competition from imported processed products. These findings are similar to those reported by Nyagori (2001) who found that small-scale food processors in Dar es Salaam region were greatly constrained by lack of finance and markets.

However, variations in the proportions of sample respondents who reported problems affecting their processing firms between the study regions were apparent. In Dar es Salaam, for example, both lack of market and working capital were the main problems hindering the performance of fruit and vegetable processing firms. Competition from imported processed products by far appeared to be the main problem in Tanga region. Likewise, 6 and 4 problems constrained the performance of fruit and vegetable processing firms in Iringa and Dodoma regions respectively. These findings suggest that the problems affecting performance of fruit and vegetable processing firms in the study areas were location specific.

Table 17: Problems affecting performance of fruits and vegetables processing firms (%)

Specific Problem	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Very High Tax Rate	12.0 (22)	03.5 (02)	13.3 (02)	05.8 (04)	09.2 (30)
Failure to Protect Local Processing Firms	13.1 (24)	06.9 (04)	13.3 (02)	08.8 (06)	11.1 (36)

Unnecessary Procedure of Obtaining Registration and “tbs” Certification	13.1 (24)	13.8 (08)	13.3 (02)	13.0 (09)	13.2 (43)
Competition From Imported Processed Products	12.0 (22)	20.7 (12)	13.3 (02)	13.0 (09)	13.8 (45)
Lack of Working Capital	15.3 (28)	17.2 (10)	13.3 (02)	11.6 (08)	14.8 (48)
Lack of Market	15.3 (28)	17.2 (10)	13.3 (02)	13.0 (09)	15.1 (49)
Lack of Packaging Materials	07.1 (13)	05.2 (03)	06.7 (01)	11.6 (08)	07.7 (25)
Seasonality of Fresh Raw Materials	05.5 (10)	10.3 (06)	06.7 (01)	13.0 (09)	08.0 (26)
Lack of Appropriate Processing Technologies	06.6 (12)	05.2 (03)	06.7 (01)	10.2 (07)	07.1 (23)

Figures in brackets indicate the Number of Firms and the total number of responses for Dar es Salaam (183); Tanga (58); Iringa (15) and Dodoma (69)

The problems reported by sample processors were verified with information from key informants and providers of services related to certification of products such as TBS and TFDA officials. The majority reported that high cost of certification of products was one of the main problems affecting performance of fruit and vegetable processing firms (Table 18). As can be noted from the table, the certification cost per product in Dar es Salaam region ranged between 1.00 and 1.74 million TShs and outside Dar es Salaam region between 1.10 and 1.99 million TShs. It should also be kept in mind that TFDA is another agency which has its own procedures and costs. Thus, the total cost for certification will be the summation of the TBS and TFDA costs.

However, the fees for small scale processors particularly those which belong to TAFOPA as per requirement of TBS ranged from 10 000.00 to 300 000.00 TShs (Table 18). This includes the application and initial assessment inspection fees only. Definitely, the higher cost of certifying products is partly a reflection that most of the micro and small scale processors could not afford to certify their products. As a result, most of them devoted their resources in processing and selling their products without

having “tbs” certification marks. These results support findings by Tiisekwa *et al.* (2005) who observed that high and many levies at various stages of the chain and unfair taxation system leads to unfair competition. These, in turn, become important constraints affecting performances of agro-processing firms in Tanzania.

Table 18: TBS certification procedures and necessary costs per product

Procedures	Costs per procedure	
	DSM	Outside DSM
Filling Application Form(s): One form per product	Application fee 10 000.00 TShs @ form	Application fee 10 000.00 TShs@ form
Initial factor assessment needed: That is Pre-license Inspection	Inspection fee 50 000.00 TShs	Inspection fee From 150 000.00 to 300 000.00 TShs
Sample should be Tested Against the Relevant Standard	Testing fee From 100 000.00 to 180 000.00 TShs	Testing fee From 100 000.00 to 180 000.00 TShs
In case the Sample Meet the Requirements of the standard, TBS offers TBS License	Annual Certification Fees per Product cost: 840 000.00 and 1.5 million TShs	Annual Certification Fees per Product cost: 840 000.00 and 1. 5 million TShs
Overall	Varies From 1.0 to 1.74 million TShs per Product	Varies From 1. 1 to 1. 99 million TShs per Product

Source: Masaga, 2003

Apart from cost of certification procedures, other problems mentioned by key informants and government officials were inadequate capital and lack of technical know- how to produce good quality products. This is partly due to the fact that most of the processors were producing their products without advice from food technologists and/or they do not have food technologists who can ensure quality of their products and therefore they cannot improve and maintain product quality. Moreover, it was reported that poor infrastructure, low capability of producing enough products to cater for domestic demand and poor packaging materials makes locally processed products fail to compete with similar products from abroad. These

findings are not different from those reported by Commonwealth Secretariat (1997) and Tiisekwa *et al.* (2005) who found that lack of appropriate and adequate working premises, poor management skills, irregular and expensive power supply, lack of working capital, lack of up-to-date machinery and equipment, lack of technical skills and poor infrastructure are the main constraints affecting performances of agro-processing firms in Tanzania.

4.3 Marketing of Processed Fruits and Vegetables

4.3.1 Characteristics of sample traders and their business activities

Tables 19 and 20 present characteristics of sample traders and their business activities respectively. The results in Table 19 show that trading of processed fruits and vegetables in all sample regions were mostly operated by males. Variations in proportions of sample traders with respect to marital status across the study regions were apparent. Nevertheless, it appears that trading of processed fruits and vegetables was mostly performed by married traders. The overall average age of sample traders was 35 years. However, the average age of sample traders in Iringa and Dodoma regions were slightly higher than the overall sample mean. The converse holds true in Dar es Salaam and Tanga regions.

Table 19: Characteristics of sample traders by region

Variable	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Respondents' Sex (%):					
Male	92.9 (39)	91.7 (11)	84.6 (11)	70.0 (7)	88.3 (68)
Female	07.1 (03)	08.3 (01)	08.3 (01)	30.0 (3)	11.7 (09)
Sub Total	100.0 (42)	100 (12)	100.0 (12)	100.0 (10)	100.0 (77)

Marital Status (%):					
Married	78.6 (33)	58.3 (70)	92.3 (12)	70.0 (7)	76.6 (59)
Single	21.4 (09)	41.7 (05)	07.7 (01)	10.0 (1)	20.8 (16)
Separated	Nil	Nil	Nil	20.0 (2)	02.6 (02)
Sub Total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Mean Age of Sample Traders (Years):					
	33.0 (42)	32.0 (12)	41.0 (13)	44.0 (10)	35.0 (77)
Distribution by Age Group (%):					
Between 20 and 35 Years	66.7 (28)	66.7 (8)	23.1 (3)	30.0 (3)	54.5 (42)
Between 36 and 50 Years	33.3 (14)	33.3 (4)	69.2 (9)	40.0 (4)	40.3 (31)
Above 50 Years of Age	Nil	Nil	07.7 (1)	30.0 (3)	05.2 (04)
Sub Total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Education Level (%):					
Primary Education	21.4 (09)	58.4 (7)	76.9 (10)	10.0 (1)	35.1 (27)
Ordinary Secondary Education	50.0 (21)	33.3 (4)	23.1 (03)	90.0 (9)	48.1 (37)
Advanced Secondary Education	14.3 (06)	08.3 (1)	Nil	Nil	09.0 (07)
Diploma Level	04.8 (02)	Nil	Nil	Nil	02.6 (02)
Degree Level	09.5 (04)	Nil	Nil	Nil	05.2 (04)
Sub Total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Average Experience in Trading Activity (Years):					
	4.0 (42)	8.0 (12)	9.0 (13)	8.0 (10)	6.0 (77)
Experience of Trading Activity by Age Group (%):					
Between 1 and 5 Years	73.8 (31)	33.4 (4)	53.8 (7)	60.0 (6)	62.3 (48)
Between 6 and 15 Years	26.2 (11)	58.3 (7)	38.5 (5)	40.0 (4)	35.1 (27)
Above 15 Years of Age	Nil	08.3 (1)	07.7 (1)	Nil	02.6 (02)
Sub Total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)

Figures in parentheses are the number of entrepreneurs

Despite the fact that the results in Table 19 show that over 50% of the overall sample traders were between 20 and 36 years of age, which is the most economical active group, notable differences exist across the study regions. For example, while significantly larger proportions of sample traders in Dar es Salaam and Tanga regions fall between 20 and 35 years of age, a different pattern was observed in Iringa and Dodoma regions whereby the majority of sample traders were between 36 and 50 years of age. However, none of the sample traders in Dar es Salaam and Tanga regions was above 50 years of age. Under *ceteris paribus* conditions, these results suggest that sample traders in the study areas were in a better position to utilize their energy to operate their businesses more profitably.

According to Table 19, notable differences were also found in the education level attained by the respondents. As can be seen from the table, majority of the respondents in Dar es Salaam and Dodoma regions had ordinary level secondary education. A similar picture was observed in Tanga and Iringa regions for primary level education. With the exception of Dar es Salaam region, none of the respondents in the other three regions had diploma and degree level education. Similar picture was noted in Iringa and Dodoma regions for advanced level secondary education. The fact that the trading of fruit and vegetable is predominantly owned and operated by low educated entrepreneurs indicates that traders are not equipped educationally to face the challenges related to trading of processed fruits and vegetables.

The average years of experience in trading the processed fruits and vegetables for sample traders in Dar es Salaam region were slightly lower than the overall sample mean. The converse holds true in the other three regions. Indeed, with the exception of Tanga region, the majority of sample traders' experience was between 1 and 5 years. Very few sample traders in Tanga and Iringa regions had experience of above 15 years in processed fruit and vegetable trading. Similarly, none of the respondents in Dar es Salaam and Dodoma regions had trading experience above 15 years. These results suggest that sample traders for almost all four regions had little experience in trading processed fruits and vegetables indicating again that traders were not in a better position to face the challenges related to the trading of these products. This is mainly due to the fact that the market for processed fruit and vegetable products is increasingly becoming competitive following the trade liberalization policy implemented in Tanzania since 1985.

Irrespective of traders' characteristics, Table 20 summarizes the characteristics of sampled business activities by region. Noteworthy in the table is that the trading activities in almost all four regions were conducted in urban areas. The large number of trading activities in urban areas reflects that there is effective demand for processed fruit and vegetable products. Other reasons for this may be due to availability of infrastructure such as electricity, storage facilities, and information and communication network.

Although there were four main types of middlemen involved in the trading of processed fruits and vegetables, retailers appear to be the dominant group. The large number of retailers in the business activities is partly an indication that the market for processed fruits and vegetables was not monopolized by few individuals. However, findings from Commonwealth Secretariat (1997) pointed out that the Tanzanian food retailers are supply driven rather than demand led. The results in the table also indicate that all sampled business activities were licensed and a large proportion of sample traders were operating in rented business premises. This could be due to legal requirement during registration of business premises and/or permit to sell food products which states that no person shall manufacture for sale, sell and supply or store food products except in registered premises (Tanganyika, 1956).

Table 20: Characteristics of sampled business activities (%)

Variable	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Location of the Business:					
Urban area	100.0 (42)	66.7 (8)	100.0 (13)	90.0 (9)	93.5 (72)
Peri-urban area	Nil	33.3 (4)	Nil	10.0 (1)	06.5 (05)

Rural area	Nil	Nil	Nil	Nil	Nil
Sub-total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Nature of the business:					
Retail	81.0 (34)	58.3 (7)	84.6 (11)	90.0 (9)	79.2 (61)
Whole sale	02.4 (01)	16.7 (2)	Nil	10.0 (1)	05.2 (04)
Both	16.7 (07)	25.0 (3)	15.4 (2)	Nil	15.6 (12)
Sub-total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Licensed Business:	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Ownership of the premises:					
Rented	83.3 (35)	66.7 (8)	61.5 (8)	70.0 (7)	75.3 (58)
Owned	16.7 (07)	33.3 (4)	38.5 (5)	30.0 (3)	24.7 (19)
Sub-total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Ownership of the Business:					
Individual	88.1 (37)	91.7 (11)	92.3 (12)	100.0 (10)	90.9 (70)
Partnership	07.1 (03)	08.3 (01)	07.7 (01)	Nil	06.5 (05)
Cooperative (Group of People)	02.4 (01)	Nil	Nil	Nil	01.3 (01)
Public Company	02.4 (01)	Nil	Nil	Nil	01.3 (01)
Sub Total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Status of the Business:					
Full Time	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)
Distribution by start-up Capital In TShs:					
Below 100,000	02.4 (01)	08.3 (1)	07.7 (01)	10.0 (1)	05.2 (04)
Between 100 000 and 1000 000	54.8 (23)	58.4 (7)	84.6 (11)	80.0 (8)	63.6 (49)
Above 1000 000	42.8 (18)	33.3 (4)	07.7 (01)	10.0 (1)	31.2 (24)
Sub Total	100.0 (42)	100.0 (12)	100.0 (13)	100.0 (10)	100.0 (77)

Figures in parentheses are the number of enterprises

As can be seen from Table 20, all sample traders were operating their trading activities on full time basis, partly a reflection of the importance of the activity in the provision of employment opportunities. It appears that most of the business activities related to processed fruits and vegetables were owned by individuals. Only 7 business entities were operated in the form of partnership, cooperative and public company. These results support findings by Minga (1998) who reported that most of the business activities in Dar es Salaam region were owned and operated by individuals. According to NBS (2002), both private and self employments are becoming the main activities for 40% of adults in Dar es Salaam and 31% in other urban areas. This is an

indication that, the private sector has significant contribution to promoting trading of processed fruits and vegetables following the trade liberalization policy.

As it was the case of processors, access to finance remained a dominant constraint to the majority of sample traders. This stems from the fact that significantly large proportion of the sample traders had start-up capital of between 100 000.00 and 1000 000.00 TShs. With the exception of Dar es Salaam region, very few traders in the other three regions had start-up capital above 1.0 million.

4.3.2 Marketed quantities of processed fruits and vegetables

Tables 21 and 22 summarize the average quantities of locally processed fruits and vegetables marketed by sample processors during harvest and off seasons in 2003 respectively. Noteworthy in Table 21 is the fact that, generally not all quantities of processed fruits and vegetables produced by the sample processors were sold during harvest season for almost all products. However, there were marked variations in the number of products sold in the study regions. In Dar es Salaam, for instance, the number of products of which not all quantities produced were marketed during harvest season in 2003 was larger than in the other three regions. In descending order, Dodoma was followed by Iringa and Tanga regions, which accounted for 8, 7 and 6 out of 13 products respectively.

Table 21: Harvest season: Mean quantity of locally processed fruits and vegetables offered in the market by processors, 2003 (in Tons)

Product	Region							
	Dar es Salaam		Tanga		Iringa		Dodoma	
	Quantity Processed	Quantity Marketed	Quantity Processed	Quantity Marketed	Quantity Processed	Quantity Marketed	Quantity Processed	Quantity Marketed
Tomato Sauce	15.30 (07)	14.97 (07) ^{LP}	28.20 (8)	28.20 (8)	375.0 (1)	288.0 (1) ^{LP}	0.06 (2)	0.02 (2) ^{LP}
Tomato Paste	36.00 (01)	8.40 (01) ^{LP}	0.60 (5)	0.60 (5)	3.0 (1)	3.0 (1)	0.04 (1)	0.01 (1) ^{LP}
Garlic Paste	1.20 (02)	1.07 (05) ^{LP}	Nil	Nil	3.0 (1)	2.5 (1)	0.14 (1)	0.10 (1) ^{LP}
Chilli Sauce	9.50 (04)	7.59 (05) ^{LP}	16.10 (3)	15.19 (3) ^{LP}	204.0 (1)	144.0 (1) ^{LP}	Nil	Nil
Mango Pickles	2.80 (22)	2.67 (22) ^{LP}	2.30 (6)	2.30 (6)	13.1 (1)	13.1 (1)	0.09 (1)	0.05 (1) ^{LP}
Lemon Pickles	0.40 (02)	0.40 (02)	Nil	Nil	1.5 (1)	1.5 (1)	Nil	Nil
Marmalades	1.20 (01)	0.90 (01) ^{LP}	0.40 (2)	0.35 (2) ^{LP}	2.0 (2)	2.0 (1)	0.03 (1)	0.01 (1) ^{LP}
“Mbilimbi”	2.50 (04)	2.48 (04) ^{LP}	0.90 (1)	0.90 (1)	Nil	Nil	0.06 (1)	0.04 (1) ^{LP}
Jam	6.30 (10)	4.64 (10) ^{LP}	1.40 (6)	1.40 (6)	3.1 (3)	1.7 (3) ^{LP}	0.07 (2)	0.04 (2) ^{LP}
Wines	2.24 (06)	2.20 (06) ^{LP}	1.90 (2)	1.72 (2) ^{LP}	Nil	Nil	10.7 (7)	5.40 (7) ^{LP}
Orange Juice	5.70 (07)	5.60 (06) ^{LP}	3.70 (5)	3.62 (5) ^{LP}	3.3 (2)	3.2 (2) ^{LP}	Nil	Nil
Passion Juice	2.20 (02)	2.20 (02)	5.00 (1)	4.54 (1) ^{LP}	6.6 (1)	1.5 (1) ^{LP}	Nil	Nil
Mixed Fruit Juices	421.50 (03)	29.63 (04) ^{LP}	4.00 (1)	3.00 (1) ^{LP}	2.3 (2)	1.2 (1) ^{LP}	Nil	Nil

Figures in brackets indicate the number of firms and LP indicates the products where by not all quantities were sold in the market

Specifically, larger quantities of tomato paste and mixed fruit juices in Dar es Salaam region were not marketed compared to other products processed in this region (Table 21). A similar trend was noted in Iringa region for tomato sauce and chilli sauce. The major reason for this may be due to availability of unprocessed fruits and vegetables, and stiff competition from similar products processed abroad.

Furthermore, Table 22 shows the actual quantities of locally processed fruits and vegetables offered for sale by sample processors during off season in 2003. As it was the case during harvest season, not all quantities of processed fruits and vegetables processed by sample processors were marketed during off season in 2003 for many products. However, there were regional variations in the number of products. In Dar es Salaam region, for instance, the number of products of which not all quantities produced were sold during off season in 2003 was seven. This was followed by Dodoma region, which accounted for 6 from the list of 13 products processed in the study areas.

As observed in the harvest season, larger quantities of tomato paste and mixed fruit juices in Dar es Salaam region were not marketed compared to other products processed in this region. A similar trend was also noted in Iringa region in the case of tomato sauce and chilli sauce. The major reason for this may again be due to stiff competition from similar products processed abroad in terms of quality and prices, which leads to low marketability of locally processed products.

Table 22: Off season: Mean quantity of locally processed fruits and vegetables offered in the market by sample processors, 2003 (in Tons)

Product	Region							
	Dar es Salaam		Tanga		Iringa		Dodoma	
	Quantity Processed	Quantity Marketed	Quantity Processed	Quantity Marketed	Quantity Processed	Quantity Marketed	Quantity Processed	Quantity Marketed
Tomato Sauce	14.10 (07)	13.79 (07) ^{LP}	26.10 (8)	26.10 (8)	375.0 (1)	288.00 (1) ^{LP}	0.02 (1)	0.01(2) ^{LP}
Tomato Paste	36.00 (01)	8.40 (01) ^{LP}	0.40 (5)	0.32 (5) ^{LP}	3.0 (1)	3.00 (1)	0.02 (1)	0.01 (1) ^{LP}
Garlic Paste	1.10 (05)	1.00 (05) ^{LP}	Nil	Nil	3.00 (1)	2.50 (1) ^{LP}	0.04 (1)	0.03 (1) ^{LP}
Chilli Sauce	9.20 (04)	7.35 (05) ^{LP}	11.10 (2)	7.59 (2) ^{LP}	204.0 (1)	144.00 (1) ^{LP}	Nil	Nil
Mango Pickles	2.40 (19)	2.50 (19)	1.20 (6)	1.22 (6)	13.1 (1)	13.06 (1) ^{LP}	0.05 (1)	0.10 (1) ^{LP}
Lemon Pickles	0.30 (01)	0.30 (01)	Nil	Nil	1.50 (1)	1.50 (1)	Nil	Nil
Marmalades	0.60 (01)	0.60 (01)	0.2 (2)	0.2 (2)	2.00 (2)	2.00 (1)	0.02 (1)	0.03 (1)
“Mbilibi”	2.00 (04)	2.00 (01)	0.60 (1)	0.60 (1)	Nil	Nil	0.03 (1)	0.04 (1)
Jam	5.10 (10)	4.15 (10) ^{LP}	0.70 (6)	0.70 (6)	1.90 (3)	3.40 (3)	0.02 (2)	0.01 (2) ^{LP}
Wines	1.80 (06)	2.16 (05)	0.30 (2)	0.30 (2)	Nil	Nil	5.80 (7)	4.60 (7) ^{LP}
Orange Juice	4.90 (07)	5.25 (06)	1.20 (5)	1.19 (5) ^{LP}	3.20 (2)	3.24 (2)	Nil	Nil
Passion Juice	1.10 (02)	1.06 (02) ^{LP}	0.40 (1)	0.40 (1)	6.6 (1)	1.50 (1) ^{LP}	Nil	Nil
Mixed Fruit Juices	315.20 (03)	19.14 (03) ^{LP}	2.00 (1)	2.00 (1)	1.3 (2)	2.38 (1)	Nil	Nil

Figures in brackets indicate the number of firms and LP indicates the products where by not all quantities were sold in the market

As can be seen from Table 22 that processors in Dar es Salaam region sold larger quantities of mango pickles, wines and orange juice compared to the amount processed during off season. A similar picture was observed in Iringa region for jam, orange juice and mixed fruit juices, and in Dodoma region for marmalades and “mbilimbi”. This could be attributed by unsold quantities of these products carried forward from the previous production season.

Apart from the amount of locally processed fruits and vegetables offered for sale by sample processors, further analysis was carried out to examine the average quantities of major types of processed fruits and vegetables marketed by sample traders. The results are presented in Table 23 to Table 26. Table 23 presents quantities of processed fruits and vegetables marketed by sample traders in Dar es Salaam region. The following can be observed from the results presented in the table: (i) trend-wise, the quantities of imported processed products seem to have been fluctuating during the five years period. However, the average quantities of almost all locally processed products show a general declining trend over time, (ii) on average, the sample traders marketed significantly larger quantities of imported processed products than similar products of Tanzania origin. The major reasons for marketing low quantities of locally processed products by sample traders in this region may probably be stiff competition from similar products processed abroad in terms of quality and prices.

Table 23: Dar es Salaam region: Mean quantities of locally and imported processed products marketed by sample traders (in Tons)

Product	Year				
	1999	2000	2001	2002	2003
Local Mango Pickles	2.09 (06)	01.84 (07)	1.00 (17)	01.16 (21)	01.10 (27)
Imported Mango Pickles	2.84 (06)	11.00 (08)	1.82 (16)	05.15 (20)	05.11 (25)
Local Mango Juice	3.93 (05)	03.37 (06)	1.56 (15)	02.27 (19)	02.51 (22)
Imported Mango Juice	8.79 (05)	27.75 (08)	3.75 (16)	11.69 (22)	09.21 (29)
Local Tomato Sauce	5.74 (07)	05.55 (08)	3.02 (19)	04.07 (26)	03.88 (11)
Imported Tomato Sauce	4.48 (09)	21.13 (12)	2.33 (22)	09.44 (30)	08.18 (36)
Local Jam	1.81 (05)	01.57 (06)	1.09 (16)	01.17 (21)	01.16 (25)
Imported Jam	2.87 (07)	12.71 (10)	1.44 (19)	06.54 (21)	05.50 (26)
Local Orange Juice	1.36 (07)	01.28 (08)	1.40 (19)	01.45 (23)	01.36 (27)
Imported Orange Juice	7.57 (10)	22.40 (13)	5.00 (22)	11.93 (28)	09.90 (35)
Local Pineapple Juice	1.45 (04)	01.23 (05)	1.13 (14)	01.45 (17)	01.30 (21)
Imported Pineapple Juice	9.25 (07)	27.91 (10)	4.38 (18)	14.78 (21)	11.79 (27)
Local Passion Juice	1.54 (04)	01.91 (05)	1.58 (12)	01.69 (17)	01.56 (21)
Imported Passion Juice	8.78 (07)	27.52 (10)	4.22 (19)	14.16 (22)	10.74 (30)

Figures in brackets indicate the number of traders

Table 24 indicates the quantity of processed fruits and vegetables marketed by sample traders in Tanga region for a period of five years. The following can also be observed from the results in the table: (i) slightly larger amounts of mango pickles, tomato sauce and jam marketed by sample traders originated from the country. The opposite was true for mango juice, orange juice, pineapple juice and passion juice mainly due to high availability of the products in the markets at right time and place, (ii) the quantities of both locally and imported processed products marketed by sample traders show a general increasing trend over time, an indication of high demand for processed fruits and vegetables.

Table 24: Tanga region: Mean quantities of local and imported processed products marketed by sample traders (in Tons)

Product	Year				
	1999	2000	2001	2002	2003
Local Mango Pickles	0.27 (10)	0.55 (10)	0.74 (11)	0.84 (12)	0.97 (12)
Imported Mango Pickles	0.23 (09)	0.33 (09)	0.45 (10)	0.52 (11)	0.62 (11)

Local Mango Juice	0.20 (09)	0.30 (09)	0.48 (10)	0.53 (11)	0.65 (11)
Imported Mango Juice	0.34 (09)	0.50 (09)	0.54 (10)	0.61 (11)	0.84 (11)
Local Tomato Sauce	0.85 (10)	1.29 (10)	1.62 (11)	1.64 (12)	1.94 (12)
Imported Tomato Sauce	0.44 (10)	0.72 (10)	1.26 (11)	1.38 (12)	1.45 (12)
Local Jam	0.24 (10)	0.34 (10)	0.77 (11)	0.83 (12)	1.01 (12)
Imported Jam	0.20 (10)	0.23 (10)	0.39 (11)	0.49 (12)	0.69 (12)
Local Orange Juice	0.26 (08)	0.38 (08)	0.63 (09)	0.58 (10)	0.75 (10)
Imported Orange Juice	0.59 (09)	0.77 (09)	0.90 (10)	0.89 (11)	1.12 (11)
Local Pineapple Juice	0.20 (05)	0.44 (05)	0.63 (05)	0.67 (06)	0.89 (06)
Imported Pineapple Juice	0.31 (07)	0.51 (07)	0.77 (07)	1.03 (08)	1.37 (08)
Local Passion Juice	0.21 (04)	0.29 (04)	0.49 (04)	0.61 (05)	0.81 (05)
Imported Passion Juice	0.70 (05)	0.33 (05)	0.56 (05)	0.80 (06)	1.19 (06)

Figures in brackets indicate the number of traders

Table 25 gives the amounts of processed fruits and vegetables marketed by sample traders in Iringa region between 1999 and 2003 trading years. Similar to the observations for Tanga region, results in Table 25 indicate that the largest amount of mango pickles, tomato sauce and jam marketed by traders originated from Tanzania except in 1999 and 2003 for jam and mango pickles, respectively. The opposite also holds true for the rest of the processed products partly due to high availability of these products in the markets. However, it becomes apparent that the quantities of both locally and imported processed products marketed by sample traders show a general increasing trend over time, partly due to high demand for processed fruits and vegetables.

Table 25: Iringa region: Mean quantities of local and imported processed products marketed by sample traders (in Tons)

Product	Year				
	1999	2000	2001	2002	2003
Local Mango Pickles	0.24 (09)	0.38 (13)	0.58 (13)	0.59 (13)	0.69 (13)
Imported Mango Pickles	0.20 (09)	0.31 (13)	0.46 (13)	0.56 (13)	0.70 (13)
Local Mango Juice	0.28 (09)	0.55 (13)	0.67 (13)	0.69 (13)	0.86 (13)
Imported Mango Juice	0.42 (09)	0.80 (13)	0.95 (13)	1.03 (13)	1.31 (13)
Local Tomato Sauce	1.04 (09)	1.51 (13)	1.69 (13)	1.76 (13)	2.18 (13)
Imported Tomato Sauce	0.34 (09)	0.52 (13)	0.66 (13)	0.74 (13)	1.07 (13)
Local Jam	0.25 (09)	0.45 (13)	0.71 (13)	0.79 (13)	0.93 (13)
Imported Jam	0.30 (09)	0.34 (13)	0.49 (13)	0.62 (13)	0.88 (13)
Local Orange Juice	0.34 (09)	0.44 (13)	0.83 (13)	0.85 (13)	1.16 (13)

Imported Orange Juice	0.68 (09)	0.88 (13)	1.27 (13)	1.30 (13)	1.62 (13)
Local Pineapple Juice	0.27 (08)	0.47 (11)	0.57 (11)	0.64 (11)	0.87 (11)
Imported Pineapple Juice	0.37 (08)	0.67 (11)	0.90 (11)	1.06 (11)	1.42 (11)
Local Passion Juice	0.21 (09)	0.32 (12)	0.50 (12)	0.60 (12)	0.84 (12)
Imported Passion Juice	0.42 (09)	0.62 (12)	0.86 (12)	1.02 (12)	1.34 (12)

Figures in brackets indicate the number of traders

The average quantities of processed fruit and vegetable products marketed by sample traders in Dodoma region between 1999 and 2003 trading period are shown in Table 26. Similar to the results from Tanga and Iringa regions, it is clear from Table 26 that sample traders in Dodoma region marketed significantly larger quantity of locally processed tomato sauce compared to imported tomato sauce. The converse was true for the rest of locally processed products mainly due to unavailability of the products in the market at the right time and place. However, it appears that the quantities of both locally and imported processed products show a general increasing trend over time.

Table 26: Dodoma region: Mean quantities of local and imported processed products marketed by sample traders (in Tons)

Product	Year				
	1999	2000	2001	2002	2003
Local Mango Pickles	0.05 (06)	0.06 (07)	0.08 (07)	0.11 (07)	0.16 (07)
Imported Mango Pickles	0.13 (05)	0.14 (06)	0.15 (06)	0.16 (06)	0.18 (06)
Local Mango Juice	0.06 (06)	0.07 (09)	0.09 (09)	0.13 (09)	0.25 (09)
Imported Mango Juice	0.08 (06)	0.10 (09)	0.12 (09)	0.16 (09)	0.35 (09)
Local Tomato Sauce	0.11 (11)	0.13 (10)	0.19 (10)	0.26 (10)	0.37 (10)
Imported Tomato Sauce	0.07 (07)	0.09 (10)	0.11 (10)	0.13 (10)	0.21 (10)
Local Jam	0.08 (07)	0.09 (10)	0.11 (10)	0.12 (10)	0.19 (10)
Imported Jam	0.08 (07)	0.10 (10)	0.12 (10)	0.14 (10)	0.20 (10)
Local Orange Juice	0.05 (07)	0.07 (10)	0.09 (10)	0.15 (10)	0.22 (10)
Imported Orange Juice	0.07 (07)	0.09 (10)	0.11 (10)	0.14 (10)	0.26 (10)
Local Pineapple Juice	0.03 (05)	0.05 (07)	0.07 (07)	0.08 (07)	0.12 (07)
Imported Pineapple Juice	0.05 (06)	0.07 (08)	0.09 (08)	0.11 (08)	0.19 (08)
Local Passion Juice	0.04 (04)	0.05 (06)	0.07 (06)	0.10 (06)	0.15 (06)
Imported Passion Juice	0.06 (06)	0.08 (08)	0.09 (08)	0.13 (08)	0.18 (08)

Figures in brackets indicate the number of traders

From the foregoing discussions, with the exception of locally processed tomato sauce, it is evident that imported processed products particularly mango juice, pineapples juice, orange juice and passion juice accounted for a significant share in terms of the quantities of processed fruit and vegetable products marketed by sample traders in the study areas. Nonetheless, empirical evidence shows a high demand for both locally and imported processed fruits and vegetables whereas local processors have not been able to exploit fully the potential.

4.3.3 Major customers of processed fruits and vegetables

Successful marketing of any product depends upon understanding customers and their consumption behaviour. In view of this, processors and traders were asked to mention the major customers of their products. The responses are summarized in Table 27 and Figure 9 respectively. With the exception of Iringa region, the findings in Table 27 suggest that household consumers formed the largest proportion of all customers of processed fruits and vegetables, followed by retailers. With regard to Iringa region, significantly large number of sample processors indicated households, retailers and wholesalers to be major customers mainly due to the efforts made by Dabaga Fruit and Vegetables Canning Company to promote the consumption of processed fruits and vegetables in the country. These results complement findings by Nyagori (2001) who observed that individuals are the main customers for most small-scale food processing enterprises in Dar es Salaam region.

Table 27: Processors' side: Major customers of processed fruits and vegetables by region (%)

Type of Customer	Region
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	DSM	Tanga	Iringa	Dodoma	Total Sample
Households	32.0 (33)	35.3 (12)	20.0 (03)	45.8 (11)	33.5 (59)
Retailers	21.4 (22)	26.5 (09)	20.0 (03)	16.8 (04)	21.6 (38)
Wholesalers	01.9 (02)	02.9 (01)	20.0 (03)	08.3 (02)	04.5 (08)
Hotels and Restaurants	19.4 (20)	23.5 (08)	13.3 (02)	12.5 (03)	18.8 (33)
Supermarkets	17.5 (18)	05.9 (02)	13.3 (02)	08.3 (02)	13.6 (24)
Government Institutions and Other Organizations	07.8 (08)	05.9 (02)	13.3 (02)	08.3 (02)	08.0 (14)

Figures in brackets indicate the number of firms and the total number of responses for Dar es Salaam (103); Tanga (34); Iringa (15) and Dodoma (24)

Furthermore, Figure 9 shows the proportion of sample traders who reported customers of processed fruits and vegetables by region. Like processors, households seemed to be the major customers of processed fruits and vegetables. These were followed by hotels and restaurants, and government institutions and other organizations. These results support the findings by Mungai *et al.* (2000) that the major market outlets for most of the products processed by micro and small-scale processors in Kenya are local hotels, retailers in town and surrounding urban centres and individuals in offices and homes.

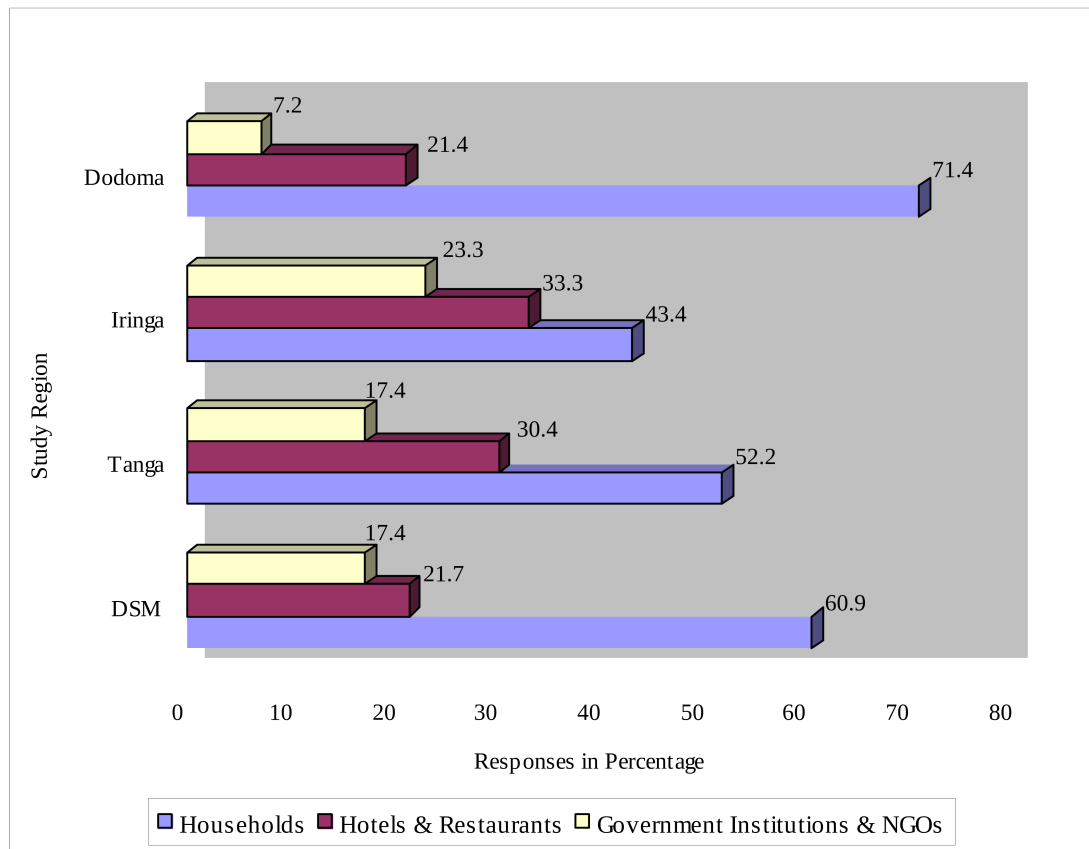


Figure 9: Traders' side: Major customers of processed fruits and vegetables by region (%)

From the foregoing discussions, it can be concluded that selling directly to local communities was the only alternative for both processors and traders to ensure existence of their business. This is mainly due to failure of the local products to meet quality standards stipulated by International Standard Organization (ISO), and lack of business and marketing skills among main actors within the value-added commodity chain.

4.3.4 Marketing channels for processed fruits and vegetables

Figure 10 shows the marketing channels for processed fruits and vegetables in the study areas. As can be seen from the figure, four marketing channels for locally processed products were identified. The first channel was sale of processed products

directly to ultimate consumers. About 46% of the sample processors sold their products directly to ultimate consumers. The main products passing through this channel were mango pickles; juice from different fruits (like mangoes, oranges, pineapples and passion); sauce from different products (such as tomatoes sauce, garlic sauce, chill sauce); jam from different products (such as mixed fruits jam, grape jam, plum jam, pineapple jam, mulberry jam); paste products (like tomato paste, garlic paste); pickles (such as lemon and mango); “mbilimbi” and marmalades.

The second channel was sale of processed products through retailers to ultimate consumers. About 37% of the sample processors sold their products through this channel. Most of the products sold directly to ultimate consumers were also passed through this channel. The third channel was sale of processed products through wholesalers to ultimate consumers. Most of the products sold directly to retailers were also sold through this channel. However, tomato sauce, mango pickles, “mbilimbi”, garlic paste, chilli sauce, jam and wines were the dominant products for this channel.

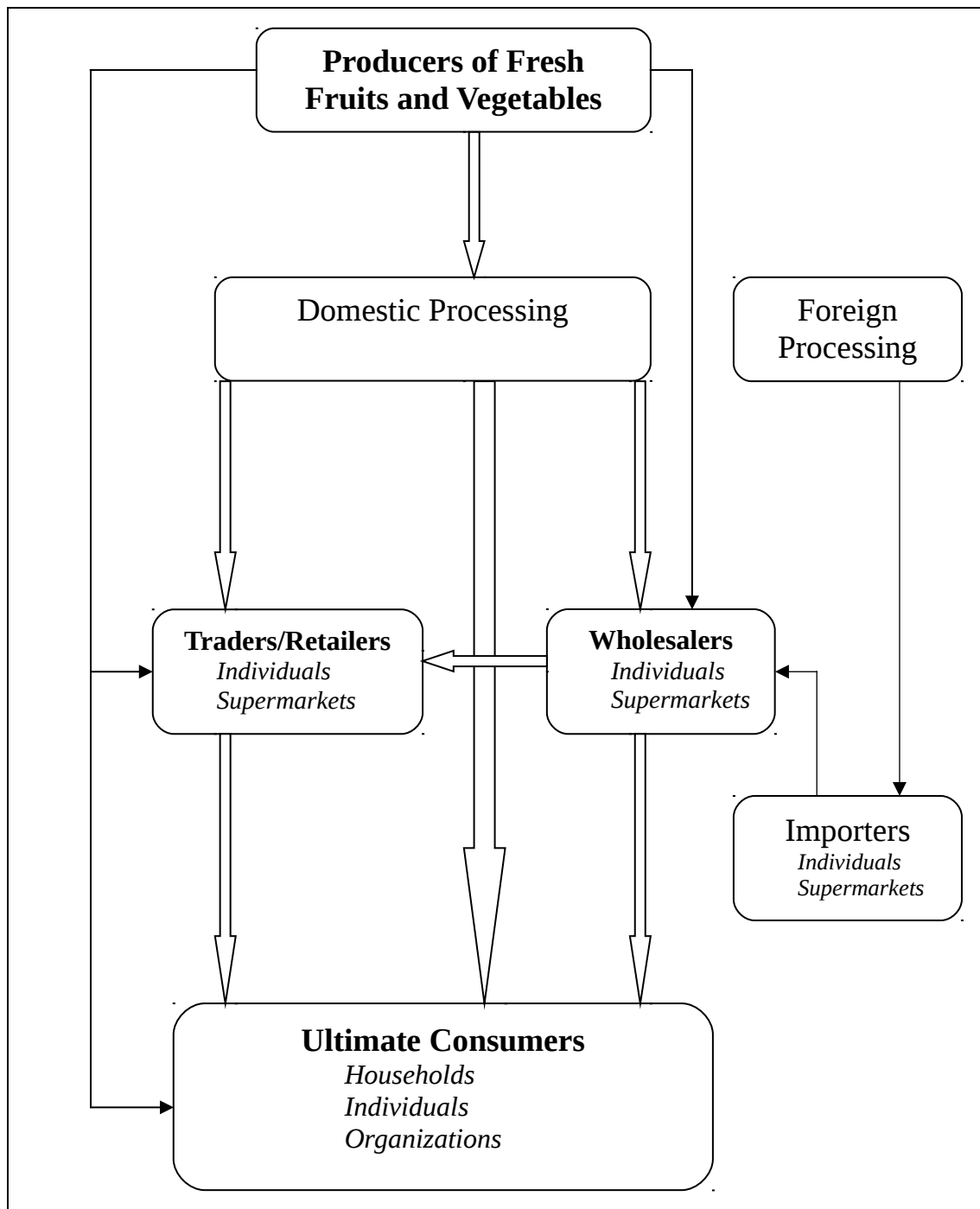


Figure 10: Marketing channels for processed fruits and vegetables in the study areas

The fourth channel was sale of processed products through wholesalers to retailers and thereafter to ultimate consumers (Figure 10). Data shows that about 17% of the sample processors sold their products to wholesalers. The main products sold through

this channel included tomato sauce, wines, chill sauce, jam and mango pickles to mention a few. One observed pattern of the selling behaviour of processors in the study areas was that a significant proportion of them sold their products directly to ultimate consumers compared with wholesalers and retailers. The major reasons for this may be lack of “*tbs*” certification marks on most of products processed (Table 9) and the low capacity of the processors to produce enough products to meet the needs of big traders. Therefore, direct selling to the ultimate consumers was the only means of ensuring existence of their business.

Furthermore, Figure 10 shows two marketing channels for imported processed fruits and vegetables in the study areas. These included: the channel for products passing through importers, wholesalers and ultimate consumers, whereby importers sold the products to wholesalers and thereafter the wholesalers sold the products directly to ultimate consumers, and the channel for products passing through importers, wholesalers, retailers and ultimate consumers whereby importers sold the products to wholesalers and the products reached ultimate consumers through retailers. The types of products sold by importers included tomato products (like tomato ketchup, tomato sauce, tomato paste, sliced tomatoes, sun dried tomato sauce, canned peeled tomato, tomato puree, tomato juice); chilli sauce; mango products (such as mango juice, mango pickles, mango chutney); different jams (like grape jam, plum jam, pineapple jam, mixed fruits jam, strawberry jam); different juices (such as orange juice, lemon juice, pineapple juice, tangerine juice, lime juice, guava juice, passion juice and mixed fruits juices); mixed vegetables; garlic sauce; pizza sauce; hot pepper sauce and canned mushrooms.

4.3.5 Traders' preferences for processed products

Sample traders were asked to express their views with regard to preferences for particular kinds of fruits and vegetables. The responses are presented in Figure 11.

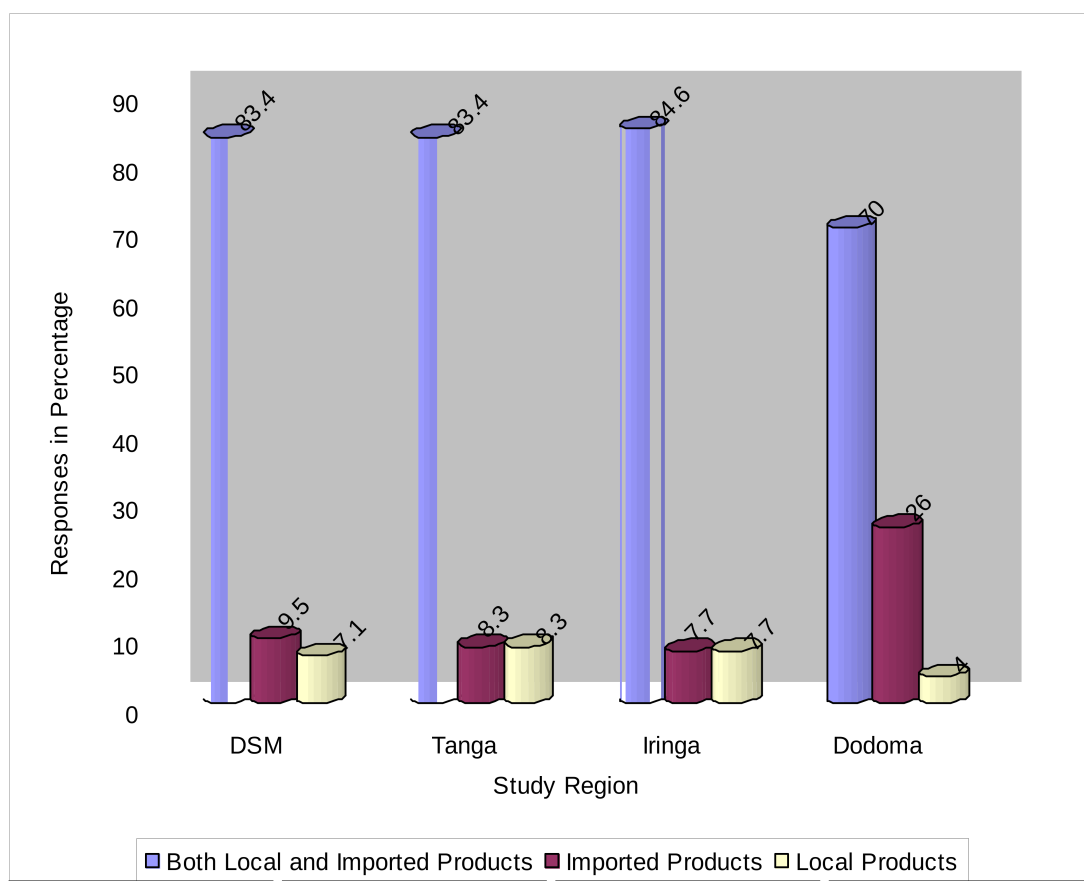


Figure 11: Traders preferences for processed fruits and vegetables by region (%)

The results in Figure 11 indicate that in almost all regions most of the sample traders preferred to sell both locally and imported processed products. Very few traders preferred only local or imported processed products. These findings suggest that there is demand for both locally and imported processed fruits and vegetables. However, the local processors have not been able to exploit fully the potential demand. Apart from preferences, traders were asked to give reasons for their preferences. The responses are presented in Table 28.

Table 28: Reasons for traders' preference for selling a particular type of processed fruits and vegetables (%)

Reason	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Available at right time and place	09.0 (06)	39.3 (11)	26.0 (07)	33.3 (6)	21.4 (30)
Frequently consumed by customers	43.2 (29)	28.6 (08)	37.0 (10)	27.8 (5)	37.2 (52)
Based on product quality	22.4 (15)	17.9 (05)	33.3 (09)	33.3 (6)	25.0 (35)
Obtained on credit basis	03.0 (02)	Nil	Nil	05.6 (1)	02.2 (03)
Affordable products	09.0 (06)	10.7 (03)	03.7 (01)	Nil	07.1 (10)
Personal interests	13.4 (09)	03.5 (01)	Nil	Nil	07.1 (10)

Figures in brackets indicate the number of traders and the total number of responses for Dar es Salaam (67); Tanga (28); Iringa (27) and Dodoma (18)

The overall results in Table 28 show that frequency of consuming products was the major reason for the traders' preferences for a particular type of processed fruits and vegetables, followed by product quality and availability of the products in the market at the right time and place. However, variations across the study regions were apparent. For example, while frequency of consuming products by far remain to be the most important reason for traders' preferences in Dar es Salaam and Iringa regions, a similar picture was observed in Tanga and Dodoma regions in the case of availability of the products in the markets at the right time and place. It can be concluded from these results, therefore, that both frequency in consuming products and availability of the products in the markets at right time and place influenced traders' decision to sell a particular type of processed fruit and vegetable.

4.3.6 Performance of the marketing system for processed fruits and vegetables

Average prices of processed fruits and vegetables received by processors were used as an indicator of comparing the relative performance of the marketing system between regions. The results are presented in Table 29. The following can be observed from the findings in the table. First, notable variations in prices of some products between

seasons in specific study region were apparent. For example, the sample processors in Dar es Salaam region received higher prices during off season than harvest season for tomato sauce, chilli sauce, mango pickles, wines, orange juice and passion juice. A similar picture was also observed in Tanga region for tomato sauce and marmalades; jam in Iringa region; and mango pickles, marmalades, jam and wines in Dodoma region. The reasons for this may be due to (i) unavailability of fresh fruits and vegetables in the markets which resulted into an increase in demand for the processed products and (ii) differences in the cost of production between seasons whereby processors may decide to offer their products at relatively high prices.

Second, differences in prices received by processors for some of the products exist between study regions. As can be seen from the table, with the exception of mango pickles, lemon pickles, “mbilimbi”, jam and mixed fruits juice, sample processors in Dar es Salaam region received higher prices for almost all types of the processed products than their counterparts in the other three regions. A similar picture was observed in Tanga region for “mbilimbi” and jam as well as in Iringa region for the case of mango pickles (during harvest season) and mixed fruit juices. This partly reflects high demand for these products. However, sample processors in Dodoma region received lowest prices for almost all products except mango pickles during off season, partly due to stiff competition from similar products processed domestically and abroad, and low effective demand among households.

Table 29: Mean prices of locally processed fruits and vegetables received by sample processors by region, 2003 (in TShs per kg or Litre)

Product	Region							
	Dar es Salaam		Tanga		Iringa		Dodoma	
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Tomato Sauce	920.00 (07)	950.00 (07)	912.50 (8)	937.50 (8)	700.00 (1)	700.00 (1)	700.00 (2)	700.00 (2)
Tomato Paste	2800.00 (01)	2800.00 (01)	2680.00 (5)	2680.00 (5)	2000.00 (1)	2000.00 (1)	2000.00 (1)	2000.00 (1)
Garlic Paste	3800.00 (01)	3800.00 (01)	Nil	Nil	2600.00 (1)	2600.00 (1)	2500.00 (1)	2500.00 (1)
Chilli Sauce	995.00 (05)	1100.00 (05)	700.00 (2)	700.00 (2)	700.00 (1)	700.00 (1)	Nil	Nil
Mango Pickles	1445.45 (22)	1545.45 (22)	1583.30 (6)	1583.30 (6)	1600.00 (1)	1600.00 (1)	1450.00 (1)	1600.00 (1)
Lemon Pickles	1600.00 (02)	1600.00 (02)	Nil	Nil	1750.00 (1)	1750.00 (1)	Nil	Nil
Marmalades	1850.00 (01)	1850.00 (01)	1600.00 (1)	1650.00 (1)	1800.00 (1)	1800.00 (1)	1700.00 (1)	1800.00 (1)
“Mbilimbi”	2200.00 (03)	2200.00 (03)	2700.00 (1)	2700.00 (1)	Nil	Nil	Nil	Nil
Jam	1810.00 (10)	1810.00 (10)	2112.50 (8)	2112.50 (8)	1700.00 (3)	1800.00 (3)	1700.00 (2)	1800.00 (2)
Wines	2980.00 (05)	3020.00 (05)	2900.00 (3)	2900.00 (3)	Nil	Nil	1257.15 (7)	1500.00 (7)
Orange Juice	1400.00 (06)	1500.00 (06)	1150.00 (5)	1150.00 (5)	1100.00 (2)	1100.00 (2)	Nil	Nil
Passion Juice	1100.00 (02)	1150.00 (02)	1100.00 (1)	1100.00 (1)	950.00 (1)	950.00 (1)	Nil	Nil
Mixed Fruit Juices	725.00 (04)	725.00 (04)	Nil	Nil	975.00 (2)	975.00 (2)	Nil	Nil

Figures in brackets indicate the number of firms

As it was the case of Dodoma region, processors in Iringa region received the lowest prices for tomato sauce, tomato paste, chilli sauce and jam (Table 29). A similar picture was also observed in Tanga region for chilli sauce and marmalades and in Dar es Salaam region for mango pickles, lemon pickles, “mbilimbi” and mixed fruits juice. This is probably due to stiff competition with similar products processed domestically and outside the country.

It should be, however, kept in mind that processors were concerned with high and stable prices for their products. Considering the level of prices and their stability, marketing systems for processed fruits and vegetables in the study areas seem to be more effective in terms of their ability to provide incentives to processors by offering stable prices throughout the production year. However, notable differences in the level of products prices across study regions were apparent.

Apart from average prices, processors were asked to give their opinions about the prevailing situation of market prices for their products. The responses are summarized in Figure 12. The results in the figure seem to suggest that the processors in all four regions were experiencing a similar problem of selling their products at relatively lower prices. This could be due to high availability of unprocessed fruits and vegetables in the market and stiff competition from similar products processed domestically and abroad.

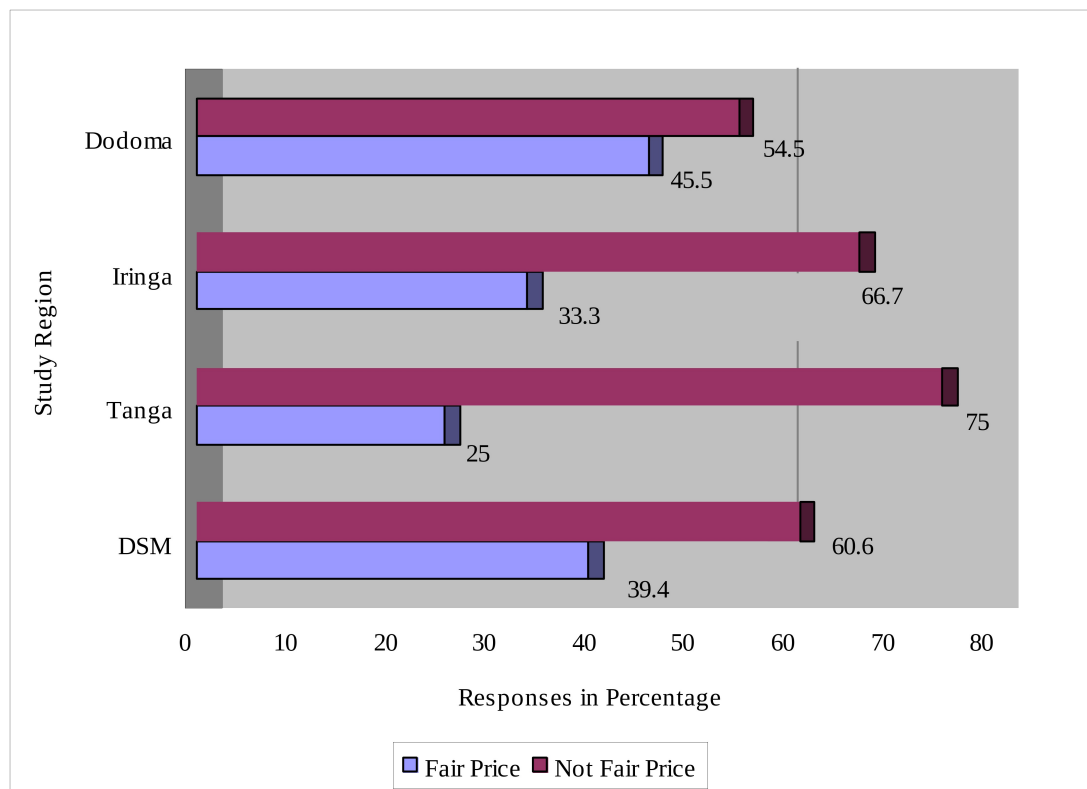


Figure 12: Situation of market prices of locally processed fruits and vegetables (%)

Likewise, processors were asked to indicate their major sources of price information. The responses are given in Figure 13. From the figure, direct visit to market appeared to be the major source of price information for most of the processors in all four regions, followed by hearing from friends and neighbours. Very few sample processors in Dar es Salaam region indicated mass media as an important source of information. This is probably due to failure of processors to exploit fully the potential of modern information technology available in the country such as internet, television and radio. This is contrary to Mungai *et al.* (2000) who observed that internet is commonly used by processors in Kenya to search for customers in the European markets.

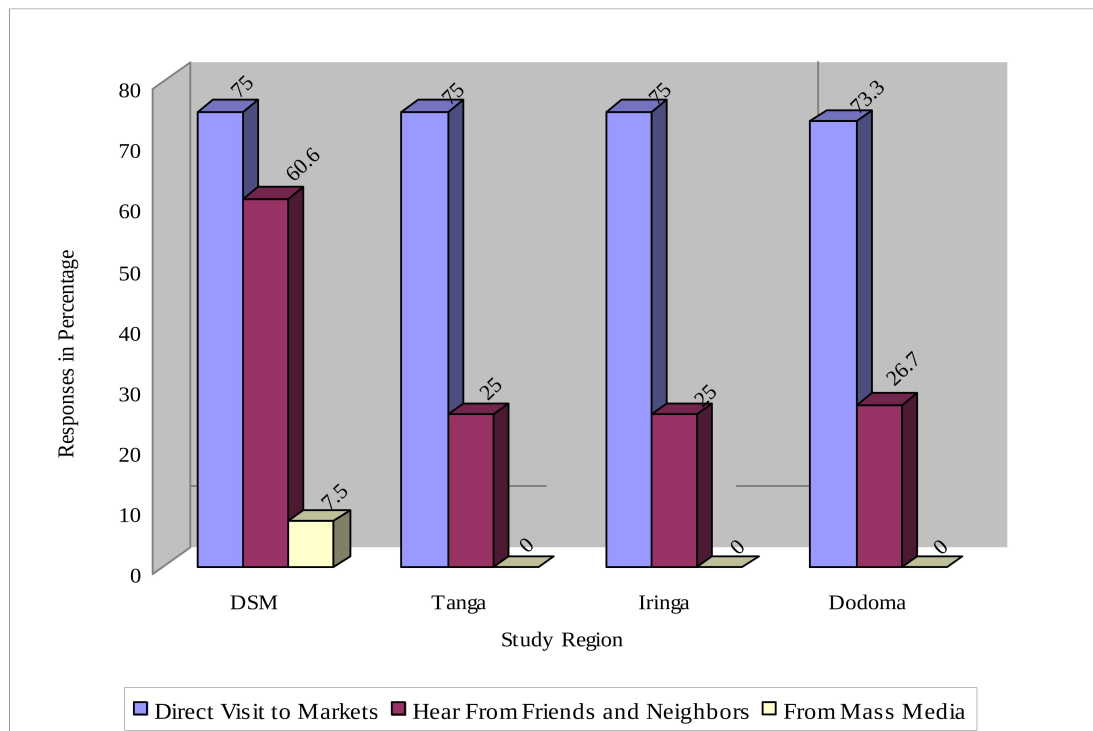


Figure 13: Sources of price information for processors by region (%)

Moreover, the findings presented in Figure 13 suggest that market information system for locally processed fruits and vegetables in the study areas was not well developed. The study by Mungai *et al.* (2000) reported that lack of information on domestic and export markets is major barrier to entry into processing activities in Kenya. Other barriers include: institutional rigidities, legal barriers, quality standards and technological factors. As pointed out by FAO (1997c) information network, particularly, communication serves five key objectives. These include: (i) the provision of basic information aimed at creating awareness amongst people, (ii) stimulation of demand for commodity in question, (iii) differentiating the product or service, (iv) under-lining the products value and (v) regulating sales. Thus, without effective communication networks it is almost impossible to develop effective and efficient marketing system of locally processed fruits and vegetables in the study areas in particular and the country as a whole.

4.3.7 Factors affecting marketing of locally processed fruits and vegetables

Both sample traders and processors were asked to give the problems affecting marketing of locally processed fruits and vegetables. The responses for sample traders and processors are presented in Table 30 and Table 31 respectively. The overall results in Table 30 seem to suggest that inadequate promotion and advertisement was the major problem affecting marketing of locally processed products and it appears to be a common problem for traders in Dar es Salaam, Tanga and Iringa regions. This was followed by lack of adequate infrastructure and poor product quality. However, differences in responses regarding problems facing sample traders were observed between study regions. For instance, while inadequate promotion and advertisement and lack of market were mentioned by the largest proportion of sample traders in Dar es Salaam and Dodoma regions respectively, three problems (that is lack of promotion and advertisement, lack of market and affordability) appeared to be the major ones in Tanga region. Correspondingly, both lack of adequate infrastructure, and inadequate promotion and advertisement seemed to be the most important problems affecting marketing of locally processed products in Iringa region. These findings suggest that problems affecting marketing of locally processed fruits and vegetables are location specific.

Table 30: Traders' side: Problems influencing marketing of locally processed products (%)

Specific Problem	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Lack of Adequate Infrastructure	23.9 (26)	13.3 (10)	18.6 (13)	10.0 (3)	18.3 (52)
Inadequate Promotion and Advertisement	24.8 (27)	14.7 (11)	18.6 (13)	13.3 (4)	19.4 (55)
Lack of Market	00.9 (01)	14.7 (11)	07.1 (05)	20.0 (6)	08.1 (23)
Poor Product Quality	18.3 (20)	10.6 (08)	14.3 (10)	13.3 (4)	14.8 (42)
Not easily Available at Right Time and Place	08.3 (09)	13.3 (10)	01.4 (01)	10.0 (3)	08.1 (23)
Not affordable	03.7 (04)	14.7 (11)	17.1 (12)	16.7 (5)	11.2 (32)
Lack of Credit Facilities	11.0 (12)	12.0 (09)	17.1 (12)	10.0 (3)	12.7 (36)
Lack of Appropriate Processing Technology	09.2 (10)	06.7 (05)	05.7 (04)	06.7 (2)	07.4 (21)

Figures in brackets indicate the number of traders and the total number of responses for Dar es Salaam (109); Tanga (75); Iringa (70) and Dodoma (30)

Table 31 also summarizes proportion of the sample processors who reported problems affecting marketing of locally processed fruits and vegetables. Nine problems were mentioned by the sample processors. Out of all these, stiff competition from similar products processed abroad seemed to be a major problem across all the study regions. While Tanzanian processors face stiff competition with similar products from abroad in the domestic market, Kenyan processors face stiff competition in the export markets from exports of other countries such as Brazil, Italy and Morocco (Mungai *et al.*, 2000). The major reasons for Tanzanian agro-processors' inability to compete in the domestic market and/or penetrate export market as clearly reported by Commonwealth Secretariat (1997) are low market image of products, low quality content, absence of innovation and uncompetitive pricing which reflects the general absence of marketing and management skills.

Table 31: Processors' side: Problems influencing marketing of processed products (%)

Specific Problem	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Lack of Adequate Infrastructure	08.2 (10)	08.6 (05)	12.5 (02)	10.0 (05)	08.9 (22)
High Cost of Advertisement	19.7 (24)	12.0 (07)	12.5 (02)	08.0 (04)	15.1 (37)
Unattractive Image of Packaging Materials	09.0 (11)	06.8 (04)	06.3 (01)	08.0 (04)	08.1 (20)
Lack of Credit Facilities	06.5 (08)	12.0 (07)	06.3 (01)	12.0 (06)	08.9 (22)
Tendency of Customers to Value Imported Products	07.4 (09)	08.6 (05)	18.7 (03)	10.0 (05)	08.9 (22)
Unavailability of Attractive Packaging Materials	02.5 (03)	10.3 (06)	12.5 (02)	14.0 (07)	07.3 (18)
Stiff Competition from Imported Processed Products	21.3 (26)	17.2 (10)	18.7 (03)	20.0 (10)	19.9 (49)
Low Market Prices	12.3 (15)	16.5 (09)	06.3 (01)	12.0 (06)	12.6 (31)
Lack of Consumers Awareness	13.1 (16)	08.6 (05)	06.3 (01)	06.0 (03)	10.2 (25)

Figures in brackets indicate the number of firms and the total number of responses for Dar es Salaam (122); Tanga (58); Iringa (16) and Dodoma (50)

Irrespective of stiff competition, there were wide variations in the other problems mentioned by sample processors across the study regions. For example, with the exception of processors in Dar es Salaam region, a large number of sample processors in the other three regions reported unavailability of attractive packaging materials as a major problem affecting marketing of locally processed fruits and vegetables, implying that the marketing system was not efficient enough to provide attractive packaging materials for processed fruits and vegetables as per processors' utility in terms of form, time and place.

4.4 Analysis of Consumption Pattern of Processed Products

4.4.1 Characteristics of sample households

The characteristics of the sample households are categorized into demographic, economic and social as summarized in Tables 32; 33 and 34 respectively. The overall results in Table 32 show that the average age of the household heads was 38 years old. However, the average age of the household heads in Dar es Salaam region was

slightly below the overall sample mean. The largest average age was reported by sample households in Tanga region. Proportion-wise, the majority of household heads in Dar es Salaam region had ages falling between 18 and 39 years while ages of most household heads in the other three regions ranged between 40 and 55 years old.

Table 32: Demographic characteristics of sample households by region

Variables	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Mean Age of Households Heads in Years:	37 (215)	41 (35)	39 (35)	39 (35)	38 (320)
Minimum Households Age	20	27	26	24	20
Maximum Households Age	62	59	56	62	62
Households Distribution by Age (%):					
Between 18 and 39	62.8 (135)	37.1 (13)	45.7 (16)	45.7 (16)	56.3 (180)
Between 40 and 55	35.3 (076)	57.1 (20)	51.4 (18)	51.4 (18)	41.3 (132)
Over 55	01.9 (004)	05.7 (02)	02.9 (01)	02.9 (01)	02.5 (008)
Mean Households Size (Person):	6 (215)	6 (35)	6 (35)	6 (35)	6 (320)
Minimum Households Size	1	2	2	1	1
Maximum Households Size	17	10	12	11	17
Households Distribution by Size (%):					
Between 1 and 4	26.0 (056)	25.7 (09)	14.3 (05)	34.3 (12)	25.6 (082)
Between 5 and 17	74.0 (159)	74.3 (26)	85.7 (30)	65.7 (23)	74.4 (238)

Figures in parentheses represent number of sample households' heads

The household size has a great bearing on the amount of processed fruits and vegetables purchased. In general, a larger household would spend more on processed fruits and vegetables than a small household, *ceteris paribus*. As can be seen from Table 32, the average household size of 6 persons for the sample regions was larger than the national average household size of 4.9 (URT, 2003e). With regard to household distribution by size, the majority of sample households in all four regions had household sizes which lie between 5 and 17 persons indicating that they are potential consumers of locally processed fruits and vegetables.

Apart from household age and size, household income determines the purchasing power such that the higher the purchasing power the higher the purchase. Variations were observed in income levels among the sample households in the study areas with households in Dar es Salaam region having significantly higher incomes than their counterparts in the other three regions (Table 33). This may partly be due to differences in the amount of disposable income received by the households from the main sources of households' income.

Diversification seems to be an important means for households to raise income in all four sample regions. This is seen clearly from the results in Table 33, which show that households derived their income from four major sources, namely formal employment, business, farming and remittances. Out of these sources, formal employment appeared to be the main source of households' income in all four regions, followed by business and farming activities. Households were differentiated into three main income categories, namely, low, medium and high income on the basis of their average monthly income. Households which earned an average income of below 100 000.00 TShs per month were placed in the low income category. Households earning an average income of between 100 000.00 and 500 000.00 TShs per month were placed in medium income category and those earning an average monthly income of above 500 000.00 TShs per month were placed in the high income category. The majority of the sample households fell in the medium income category followed by low income category. Very few sample households in all four regions fell in the high income category. The predominance of the sample households with an average income of between 100 000.00 and 500 000.00 TShs partly indicates that households have ability to purchase locally processed fruits and vegetables.

Table 33: Economic characteristics of sample households by region

Variables	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Average Households Income per Month in TShs:	235 793 (215)	199 657 (35)	187 857 (35)	187 257 (35)	221 289 (320)
Minimum Average Income	15 000	78 000	48 000	45 000	15 000
Maximum Average Income	850 000	600 000	850 000	650 000	850 000
Distribution of Households by Major Income Sources (%):					
Formal Employment	45.3 (166)	35.4 (29)	34.7 (25)	34.6 (28)	41.3 (248)
Business	32.5 (119)	29.3 (24)	31.9 (23)	28.4 (23)	31.5 (189)
Farming	12.5 (046)	20.7 (17)	16.7 (12)	23.5 (19)	15.6 (094)
Remittances	09.7 (035)	14.6 (12)	16.7 (12)	13.6 (11)	11.6 (070)
Distribution of Sample Households by Income Categories (%):					
Low Income Earners	27.9 (060)	20.0 (07)	34.2 (12)	22.9 (08)	27.2 (087)
Medium Income Earners	62.8 (135)	74.3 (26)	62.9 (22)	74.2 (26)	65.3 (209)
High Income Earners	09.3 (020)	05.7 (02)	02.9 (01)	02.9 (01)	07.5 (024)

Figures in parentheses represent number of sample households' heads

In addition to household distribution by income, households' decision to purchase processed fruits and vegetables is a consequence of a compromise between male and female. The overall results in Table 34 show that female-headed households formed the largest percent compared to male-headed households. These results support the findings by NBS (2002) that reported the presence of a large rise in the proportion of households headed by women from 18% in 1991/92 to 23% in 2000/01. However, in Iringa and Dodoma regions, a relatively large proportion of households were male. Irrespective of region, the results in the table indicate that over 80% of the sample household heads were married and with the exception of Tanga region, very few sample household heads in Dar es Salaam, Iringa and Dodoma regions were widowed.

Table 34: Social characteristics of sample households by region (%)

Variables	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Sex of the Household Heads:					
Male	46.5 (100)	31.4 (11)	57.1 (20)	51.4 (18)	46.6 (149)
Female	53.5 (115)	68.6 (24)	42.9 (15)	48.6 (17)	53.4 (171)
Marital Status of Household Heads:					
Married	80.5 (173)	91.4 (32)	80.0 (28)	82.9 (29)	81.9 (262)
Single	17.7 (038)	05.7 (02)	14.2 (05)	14.2 (05)	15.6 (050)
Separated	01.3 (003)	02.9 (01)	02.9 (01)	Nil	01.6 (005)
Widow	00.5 (001)	Nil	02.9 (01)	02.9 (01)	00.9 (003)
Education Level Attained by Households:					
Primary Level Education	17.7 (38)	22.9 (07)	45.7 (16)	17.1 (06)	21.2 (67)
Ordinary Level Secondary Education	27.0 (58)	40.0 (14)	34.3 (12)	14.3 (05)	27.8 (89)
Advanced Level Secondary Education	07.0 (15)	02.9 (01)	05.7 (02)	08.6 (03)	06.6 (21)
Diploma Level Education	22.8 (49)	34.2 (12)	08.6 (03)	31.4 (11)	23.4 (75)
University Level Education	25.5 (55)	Nil	05.7 (02)	28.6 (10)	21.0 (67)

Figures in parentheses represent number of sample households' heads

In terms of education level attained by the respondents, the results in Table 34 indicate that most of the sample household heads in Dar es Salaam and Tanga regions had attended ordinary secondary school education while a relatively larger proportion of the sample household heads in Iringa and Dodoma regions had attained primary and diploma education levels respectively. The fact that the majority of sample households had attended formal school partly implies that they had adequate knowledge for making rational purchasing decisions to a particular brand of processed products.

4.4.2 Household consumption of processed fruits and vegetables

4.4.2.1 Consumption of processed products by region

Figure 14 presents the proportion of households who consumed processed fruits and vegetables in the study areas. From the figure a significant proportion of households consumed processed fruits and vegetables but households in Iringa region accounted for largest percent. The fact that the majority of households consumed processed

fruits and vegetables partly reflect that there is high demand for processed fruits and vegetables in the study areas.

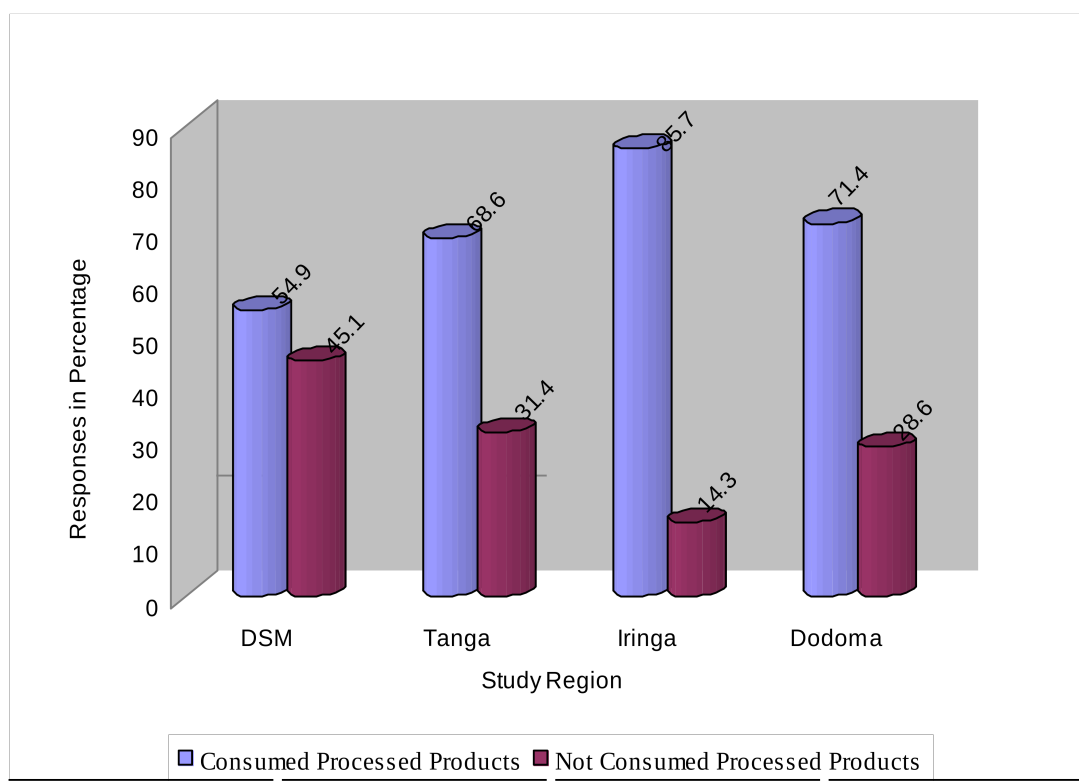


Figure 14: Proportion of households consuming processed fruits and vegetables by region (%), 2003

4.4.2.2 Consumption of processed products by income group

Further analysis of household consumed processed products against income group was carried out (Figure 15).

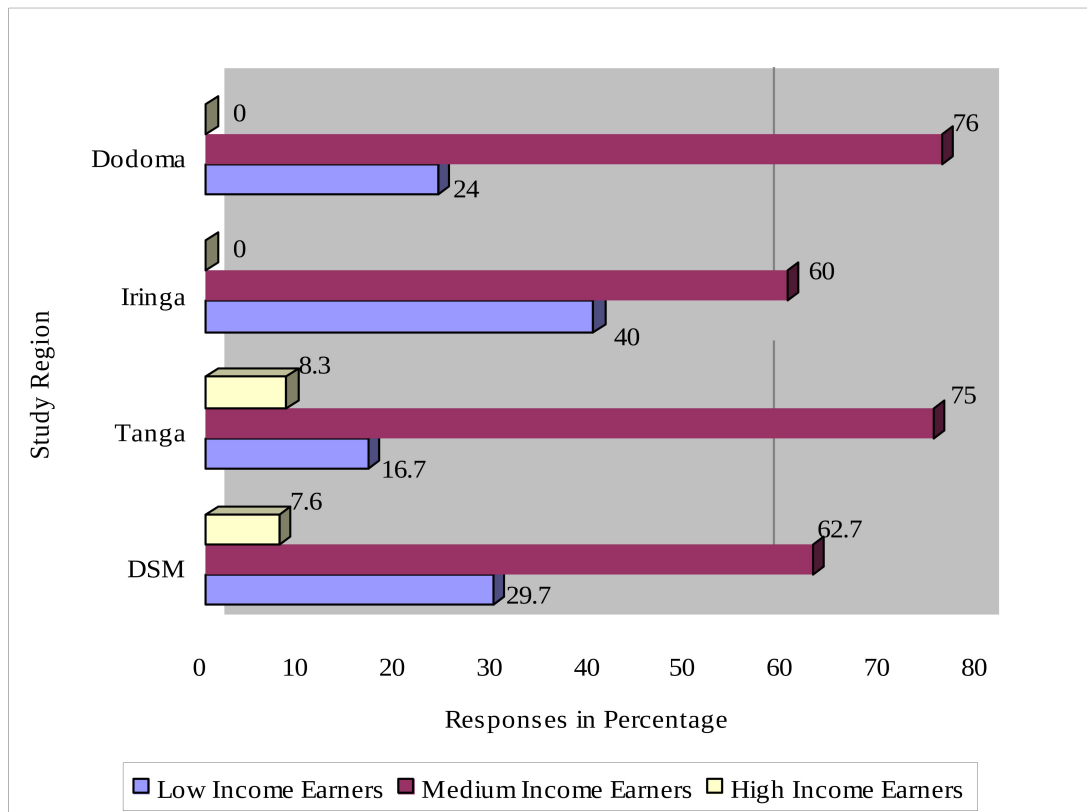


Figure 15: Proportion of household consuming processed fruits and vegetables by income (%)

According to Figure 15, it appears that a significant proportion of the sample households which consumed processed fruits and vegetables were in the medium income group, followed by households in the low income group. Very few households which consumed processed fruit and vegetables products in Dar es Salaam and Tanga regions were in the high income group. Similar findings were reported by NBS (2002) that households with the higher income group spending the lowest proportion on food (54%) compared to lower income (67%).

4.4.2.3 Variation in consumption of processed products by household size

Apart from household's income groups, notable differences were also found in consumption of processed fruits and vegetables between households of different sizes as shown in Figure 16.

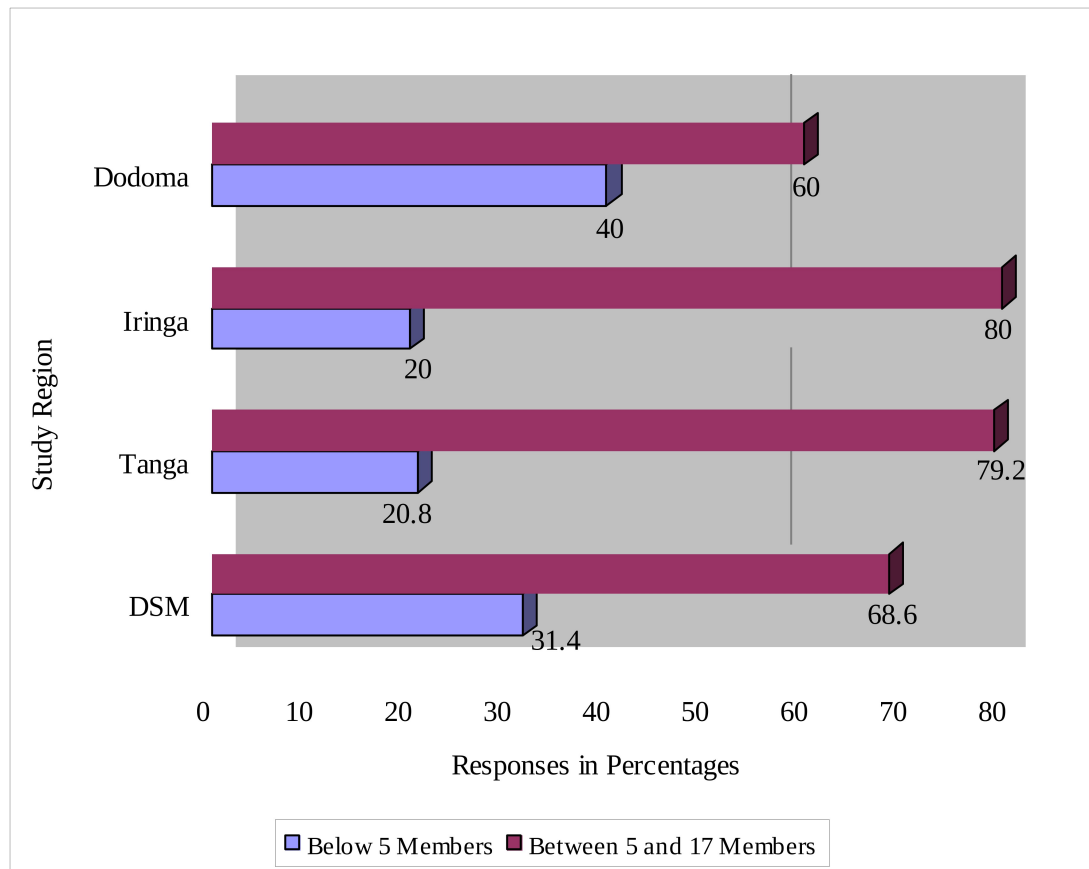


Figure 16: Proportion of household consuming processed fruits and vegetables by household Size (%)

As can be seen from Figure 16, a large proportion of the sample households with many people consumed more processed fruits and vegetables in 2003 compared to households with few people. The reason for this may be due to the fact that households' consumption decisions are partly determined by preferences among household members. In practice, the higher the preferences among household members to a particular food product, the larger the consumption assuming other factors remains constant.

4.4.2.4 Consumption of processed products by age group

Households were asked to indicate the major consumers of processed fruits and vegetables with respect to specific type of age groups. The aim was to assess the effect of age group composition on consumption of processed products. The households' responses are summarized in Table 35. It is clear from the table that both children and adults consume processed fruits and vegetables. However, there were significant differences in consumption between children and adults. Chi-square test confirms the existence of statistical significant differences in consumption of specific type of processed products by age group compositions between sample regions at (prob=0.01). For instance, with the exception of Dar es Salaam region, a slightly large proportion of the sample households in the other three regions indicated that children below 18 years old were the main users of locally processed oranges and mangoes, and imported processed oranges. While large proportion of sample households indicated that processed tomatoes were consumed by both children and adults, children below 18 years of age, on the other hand, were main users of processed oranges across all four regions. This may be due to the fact that processed tomatoes are normally used for cooking as opposed to processed fruits like mangoes.

Table 35: Proportion of households reported specific type of age group consuming processed fruits and vegetables (%)

Products/Age Composition	Region
--------------------------	--------

	DSM	Tanga	Iringa	Dodoma	Total Sample
Locally Processed Tomatoes:					
Below 18 Years Old	07.9 (17)	37.1 (13)	11.4 (04)	20.0 (07)	12.8 (041)
Above 18 Years Old	05.1 (11)	08.6 (03)	22.9 (08)	17.1 (06)	08.8 (028)
Both	87.0 (187)	54.3 (19)	65.7 (23)	62.9 (22)	78.4 (251)
	Chi-square (χ^2)	42.103	df 6	p-value 0.000	
Locally Processed Oranges:					
Below 18 Years Old	44.2 (95)	60.0 (21)	42.9 (15)	57.1 (20)	47.2 (151)
Above 18 Years Old	03.3 (07)	05.7 (02)	17.1 (06)	20.0 (07)	06.9 (022)
Both	52.6 (113)	34.3 (12)	40.0 (14)	22.9 (08)	45.9 (147)
	Chi-square (χ^2)	25.716	df 6	p-value 0.000	
Locally Processed Mangoes:					
Below 18 Years Old	21.4 (46)	60.0 (21)	45.7 (16)	40.0 (14)	30.3 (097)
Above 18 Years Old	04.2 (09)	08.6 (03)	14.3 (05)	25.7 (09)	08.1 (026)
Both	74.4 (160)	31.4 (11)	40.0 (14)	34.3 (12)	61.6 (197)
	Chi-square (χ^2)	38.075	df 6	p-value 0.000	
Imported Processed Tomatoes:					
Below 18 Years Old	08.8 (19)	22.9 (08)	5.7 (02)	02.9 (01)	09.4 (030)
Above 18 Years Old	05.6 (12)	14.3 (05)	20.0 (07)	31.4 (11)	10.9 (035)
Both	85.6 (184)	62.9 (22)	74.3 (26)	65.7 (23)	79.7 (255)
	Chi-square (χ^2)	34.168	df 6	p-value 0.000	
Imported Processed Oranges:					
Below 18 Years Old	46.5 (100)	54.3 (19)	42.9 (15)	48.6 (17)	47.2 (151)
Above 18 Years Old	04.7 (010)	08.6 (03)	17.1 (06)	28.6 (10)	09.0 (029)
Both	48.8 (105)	37.1 (13)	40.0 (14)	22.8 (08)	43.8 (140)
	Chi-square (χ^2)	26.056	df 6	p-value 0.000	
Imported Processed Mangoes:					
Below 18 Years Old	27.9 (060)	42.8 (15)	37.1 (13)	11.4 (04)	28.7 (092)
Above 18 Years Old	06.5 (014)	08.6 (03)	17.1 (06)	40.0 (14)	11.6 (037)
Both	65.6 (141)	48.6 (17)	45.7 (16)	48.6 (17)	59.7 (191)
	Chi-square (χ^2)	42.689	df 6	p-value 0.000	

Figures in parentheses represent number of sample households' heads

4.4.2.5 Frequency in consuming different types of fruits and vegetables

Households were asked to indicate how often they consumed different types of fruits and vegetables. The aim was to assess differences between consumption of different processed products and between processed and unprocessed products. The responses are summarized in Table 36 and Table 37.

The results in Table 36 show that all locally unprocessed products were often consumed compared to almost all processed products, mainly due to high availability

of raw fresh products during the harvest season. However, variation in the frequency of consuming processed products across the study regions was apparent. For example, irrespective of households that did not consume processed products, large proportions of sample households in Dar es Salaam, Tanga and Iringa regions often consumed locally processed tomatoes than their counterparts in Dodoma region. A similar picture was observed in Iringa region for imported processed oranges and in Dar es Salaam region for both locally and imported processed mangoes. Whereas the remaining processed fruits and vegetables were rarely consumed for almost all four study regions, probably due to differences in market prices between processed and unprocessed fruits and vegetables whereby households may choose to go for cheaper products.

Table 36: Frequency in consuming fruits and vegetables during harvest season by region (%)

Products	Region/Frequency of Consumption												Total Sample		
	DSM			Tanga			Iringa			Dodoma			Often	Rarely	Not Consumed
	Often	Rarely	Not Consumed	Often	Rarely	Not Consumed	Often	Rarely	Not Consumed	Often	Rarely	Not Consumed			
Fresh Tomatoes	99.5 (214)	00.5 (01)	Nil	100.0 (35)	Nil	Nil	100.0 (35)	Nil	Nil	100.0 (35)	Nil	Nil	99.7 (319)	0.3 (1)	Nil
Fresh Orange	97.7 (210)	02.3 (05)	Nil	94.3 (33)	05.7 (02)	Nil	100.0 (35)	Nil	Nil	94.3 (33)	05.7 (02)	Nil	97.2 (311)	2.8 (9)	Nil
Fresh Mangoes	98.6 (212)	01.4 (03)	Nil	91.4 (32)	08.6 (03)	Nil	97.1 (34)	02.9 (01)	Nil	94.3 (33)	05.7 (02)	Nil	97.2 (311)	2.8 (9)	Nil
Locally Processed Tomatoes	28.4 (61)	20.5 (44)	51.1 (110)	37.1 (13)	28.6 (10)	34.3 (12)	74.3 (26)	08.6 (03)	17.1 (06)	14.3 (05)	57.1 (20)	28.6 (10)	32.8 (105)	24.1 (77)	43.1 (138)
Imported Processed Tomatoes	07.9 (17)	33.5 (72)	58.6 (126)	14.3 (05)	34.3 (12)	51.4 (18)	17.1 (06)	57.1 (20)	25.7 (09)	08.6 (03)	54.3 (19)	37.1 (13)	09.7 (31)	38.4 (123)	51.9 (166)
Locally Processed Oranges	11.2 (24)	33.5 (72)	55.3 (119)	17.1 (06)	34.3 (12)	48.6 (17)	28.6 (10)	45.7 (16)	25.7 (09)	28.6 (10)	37.1 (13)	34.3 (12)	15.6 (50)	35.3 (113)	49.1 (157)
Imported Processed Oranges	20.0 (43)	27.0 (58)	53.0 (114)	14.3 (05)	40.0 (14)	45.7 (16)	48.6 (17)	22.9 (08)	28.5 (10)	05.7 (02)	57.2 (20)	37.1 (13)	20.9 (67)	31.3 (100)	47.8 (153)
Locally Processed Mangoes	35.3 (76)	14.9 (32)	49.8 (107)	20.0 (07)	31.4 (11)	48.6 (17)	34.3 (12)	45.7 (16)	20.0 (07)	25.7 (09)	40.0 (14)	34.3 (12)	32.5 (104)	22.8 (73)	44.7 (143)
Imported Processed Mangoes	19.5 (42)	09.8 (21)	70.7 (152)	20.0 (07)	31.4 (11)	48.6 (17)	28.6 (10)	42.8 (15)	28.6 (10)	05.7 (02)	54.3 (19)	40.0 (14)	19.1 (61)	20.6 (66)	60.3 (195)

Figures in Parentheses Represent Number of Sample Households' Heads

Unlike in the harvest season, the results in Table 37 indicate that a large proportion of households rarely consumed unprocessed fruits or vegetables except tomatoes. This could most likely be due to unavailability of unprocessed fresh products during off season. Apart from households that did not consume processed products, there was large proportion of sample households in Dar es Salaam region who often consumed processed products except processed oranges. Similar pattern was observed in Tanga region for processed tomatoes (both locally and imported processed tomatoes) and imported processed mangoes as well as in Iringa region for locally processed tomatoes and all imported processed products partly due to availability of products in the markets at right time and place. In particular, processed products such as tomato pastes are commonly used by households as substitute to fresh tomatoes when there is scarcity of fresh tomatoes in the market. However, the frequency of consuming processed fruits and vegetables in Dodoma region was low for almost all processed fruits and vegetables. A similar pattern was observed for both locally and imported processed oranges in all four regions. This is probably due to high market prices of processed products and therefore, households could not afford to purchase them frequently although these products were available in the market.

Table 37: Frequency in consuming fruits and vegetables during off season by region (%)

Products	Region/Frequency of Consumption												Total Sample		
	DSM			Tanga			Iringa			Dodoma			Often	Rarely	Not Consumed
	Often	Rarely	Not Consumed	Often	Rarely	Not Consumed	Often	Rarely	Not Consumed	Often	Rarely	Not Consumed			
Fresh Tomatoes	81.4 (175)	18.6 (40)	Nil	77.1 (27)	17.1 (06)	05.7 (02)	97.1 (34)	02.9 (01)	Nil	62.9 (22)	37.1 (13)	Nil	80.6 (258)	18.8 (60)	0.6 (02)
Fresh Orange	41.4 (89)	56.7 (122)	01.9 (04)	28.6 (10)	65.7 (23)	05.7 (02)	31.4 (11)	68.6 (24)	Nil	34.3 (12)	65.7 (23)	Nil	38.1 (122)	60.0 (192)	01.9 (06)
Fresh Mangoes	34.9 (75)	63.3 (136)	01.9 (04)	17.1 (06)	80.0 (28)	02.9 (01)	42.9 (15)	51.4 (18)	05.7 (02)	28.6 (10)	71.4 (25)	Nil	33.1 (106)	64.7 (207)	02.2 (07)
Locally Processed Tomatoes	31.6 (68)	21.4 (46)	47.0 (101)	48.6 (17)	20.0 (07)	31.4 (11)	80.0 (28)	05.7 (02)	14.3 (05)	28.6 (10)	42.8 (15)	28.6 (10)	38.4 (123)	21.9 (70)	39.7 (127)
Imported Processed Tomatoes	25.1 (54)	22.3 (48)	52.6 (113)	28.6 (10)	20.0 (07)	51.4 (18)	40.0 (14)	34.3 (12)	25.7 (09)	28.6 (10)	40.0 (14)	31.4 (11)	27.5 (88)	25.3 (81)	47.2 (151)
Locally Processed Oranges	12.1 (26)	34.0 (73)	54.0 (116)	17.1 (06)	34.3 (12)	48.6 (17)	22.9 (08)	51.4 (18)	25.7 (09)	08.6 (03)	62.9 (22)	28.6 (10)	13.4 (43)	39.1 (125)	47.5 (152)
Imported Processed Oranges	23.7 (51)	26.0 (56)	50.2 (108)	22.9 (08)	31.4 (11)	45.7 (16)	51.4 (18)	22.9 (08)	25.7 (09)	11.4 (04)	54.3 (19)	34.3 (12)	25.3 (81)	29.4 (94)	45.3 (145)
Locally Processed Mangoes	27.0 (58)	25.6 (55)	47.4 (102)	20.0 (07)	37.1 (13)	42.9 (15)	37.1 (13)	42.9 (15)	20.0 (07)	11.4 (04)	60.0 (21)	28.6 (10)	25.6 (82)	32.5 (104)	41.9 (134)
Imported Processed Mangoes	39.5 (85)	14.0 (30)	46.5 (100)	31.4 (11)	28.6 (10)	40.0 (14)	37.2 (13)	31.4 (11)	31.4 (11)	22.9 (08)	42.9 (15)	34.2 (12)	36.6 (117)	20.6 (66)	42.8 (137)

Figures in Parentheses Represent Number of Sample Households' Heads

4.4.3 Households' preference for processed products

Figure 17 presents the household consumers' preferences for different processed fruits and vegetable as perceived by the sample households in 2003.

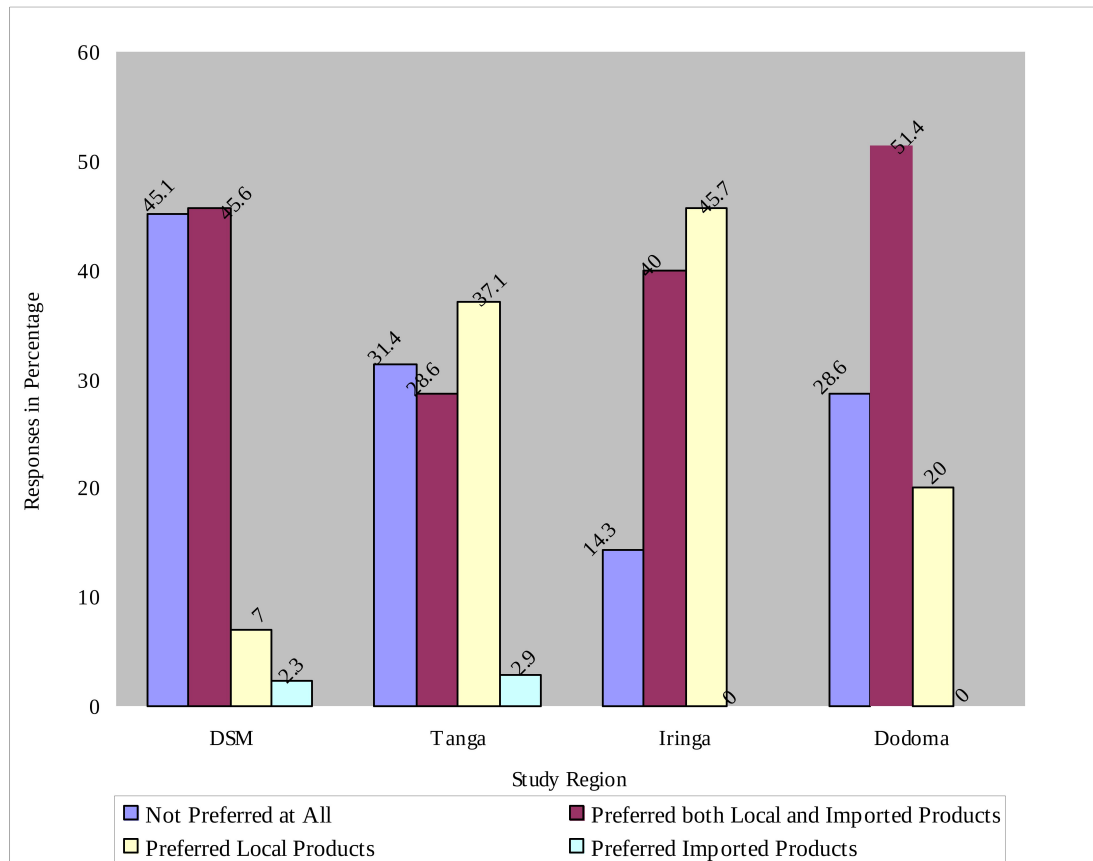


Figure 17: Preferences of consuming processed fruits and vegetables by region (%)

It is apparent from Figure 17 that a relatively large proportion of households in Tanga and Iringa regions preferred locally processed products, suggesting that there is potential demand for these products. A similar picture was observed in Dar es Salaam and Dodoma regions for both locally and imported processed products. However, none of the households in Iringa and Dodoma regions preferred imported processed products probably due to the high availability of locally processed products in the markets. Households were also asked to rate their preferences with respect to specific

type of brand of processed products. Notable differences were found in the proportion of households which reported preferences between locally and imported processed products as shown in Table 38.

Table 38: Households' preferences for specific type of processed fruits and vegetables by region (%)

Preference	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Locally Processed Oranges:					
Preferred	47.4 (102)	65.7 (23)	80.0 (28)	71.4 (25)	55.6 (178)
Less preferred	27.9 (060)	22.9 (08)	08.6 (03)	17.2 (06)	24.1 (077)
Not Preferred at all	24.7 (053)	11.4 (04)	11.4 (04)	11.4 (04)	20.3 (065)
Locally Processed Mangoes:					
Preferred	45.6 (098)	60.0 (21)	80.0 (28)	60.0 (21)	52.5 (168)
Less preferred	29.8 (064)	22.9 (08)	08.6 (03)	22.9 (08)	25.9 (083)
Not Preferred at all	24.6 (053)	17.1 (06)	11.4 (04)	17.1 (06)	21.6 (069)
Locally Processed Pineapples:					
Preferred	46.5 (100)	60.0 (21)	80.0 (28)	60.0 (21)	53.1 (170)
Less preferred	28.8 (062)	25.7 (09)	08.6 (03)	25.7 (09)	25.9 (083)
Not Preferred at all	24.7 (053)	14.3 (05)	11.4 (04)	14.3 (05)	21.0 (067)
Locally Processed Passion:					
Preferred	48.9 (105)	65.7 (23)	85.7 (30)	65.7 (23)	56.6 (181)
Less preferred	27.4 (059)	20.0 (07)	02.9 (01)	22.9 (08)	23.4 (075)
Not Preferred at all	23.7 (051)	14.3 (05)	11.4 (04)	11.4 (04)	20.0 (064)
Locally Processed Tomatoes:					
Preferred	69.3 (149)	85.7 (30)	88.6 (31)	77.1 (27)	74.0 (237)
Less preferred	30.7 (066)	14.3 (05)	11.4 (04)	22.9 (08)	26.0 (083)
Not Preferred at all	Nil	Nil	Nil	Nil	Nil
Imported Processed Oranges:					
Preferred	36.7 (79)	54.3 (19)	51.4 (18)	17.1 (06)	38.1 (122)
Less preferred	30.7 (66)	25.7 (09)	37.1 (13)	54.3 (19)	33.5 (107)
Not Preferred at all	32.6 (70)	20.0 (07)	11.5 (04)	28.6 (10)	28.4 (091)
Imported Processed Mangoes:					
Preferred	34.9 (75)	48.6 (17)	48.6 (17)	22.9 (08)	36.6 (117)
Less preferred	30.7 (66)	31.4 (11)	28.5 (10)	48.6 (17)	32.5 (104)
Not Preferred at all	34.4 (74)	20.0 (07)	22.9 (08)	28.5 (10)	30.9 (099)
Imported Processed Pineapples:					
Preferred	35.4 (76)	48.6 (17)	40.0 (14)	14.3 (05)	35.0 (112)
Less preferred	30.7 (66)	25.7 (09)	37.1 (13)	57.1 (20)	33.8 (108)
Not Preferred at all	34.9 (73)	25.7 (09)	22.9 (08)	28.6 (10)	31.2 (100)
Imported Processed Passion:					
Preferred	36.2 (78)	45.7 (16)	42.9 (15)	22.9 (08)	36.6 (117)
Less preferred	29.8 (64)	28.6 (10)	42.9 (15)	45.7 (16)	32.8 (105)
Not Preferred at all	34.0 (73)	25.7 (09)	14.2 (05)	31.4 (11)	30.6 (098)
Imported Processed Tomatoes:					
Preferred	38.1 (82)	62.8 (22)	54.3 (19)	31.4 (11)	41.9 (134)
Less preferred	28.9 (62)	22.9 (08)	31.4 (11)	45.7 (16)	30.3 (097)
Not Preferred at all	33.0 (71)	14.3 (05)	14.3 (05)	22.9 (08)	27.8 (089)

Figures in parentheses represent number of sample households' heads

It is worth pointing out that, households in all four regions reported that locally processed products were preferred to similar products imported from abroad (Table 38). Interestingly, while none of the respondents indicated preference for locally processed tomatoes, the opposite holds true for imported processed tomatoes. High preference for locally processed products is an indication that there is potential demand for locally processed fruits and vegetables but local processors have not been able to fully exploit the potential.

Apart from households' preferences, respondents were also asked to give reasons for their preferences. The households' responses are presented in Figure 18.

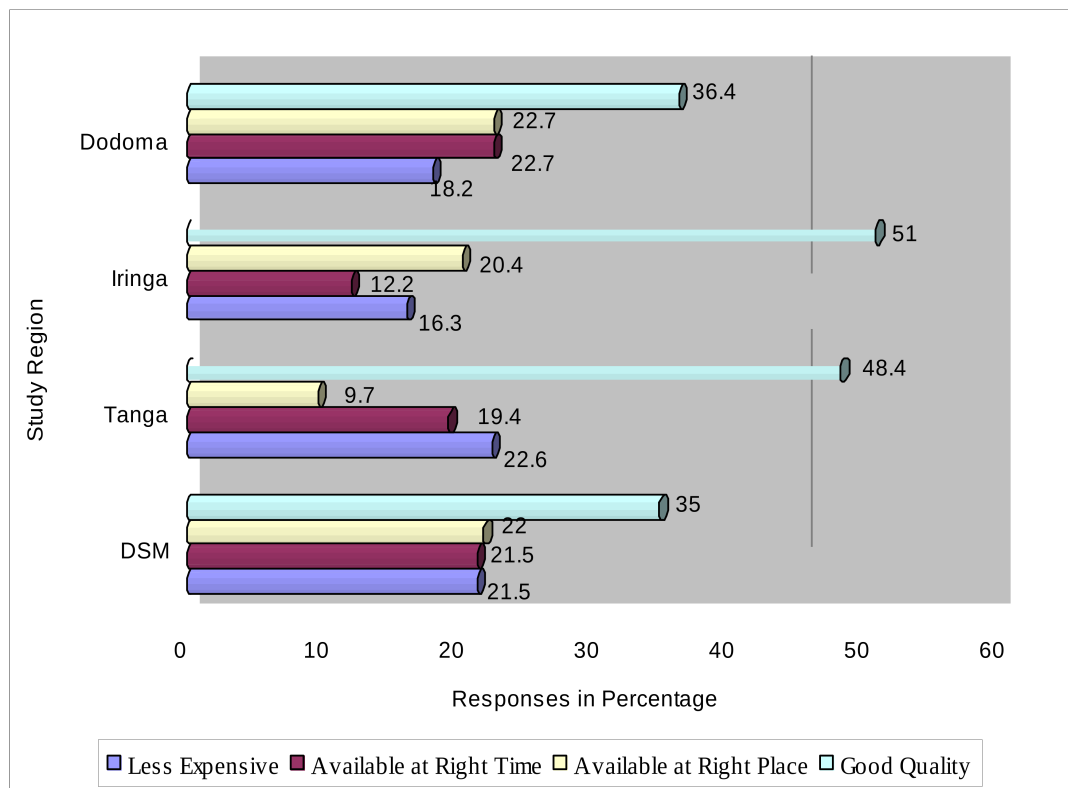


Figure 18: Reasons for households' preferences for processed fruits and vegetables by region (%)

Four main reasons were given for their preferences (Figure 18). These included quality of the products, availability of the products at the right time, availability of the products at right place and affordability. Out of these reasons, good product quality by far seems to be the most important reason that determined households' preferences for a particular type of processed fruit or vegetable. This finding partly suggests that households in all four regions were more conscious of product quality. Therefore, promotion of the Total Quality Control (TQC) is important in order to stimulate and promote the consumption of locally processed fruits and vegetables in the country. However, Kurwijila (1999) argues that quality assurance is among the elements which have not been given much attention by various agro-processors in Tanzania, particularly for small and medium scale processors. He further argues that most of the processors in the country view requirements to meet quality specification as a burden to their operations instead of a catalyst to their sales volumes.

4.4.4 The Effects of households' characteristics on consumption

Pearson correlation analysis was carried out to determine the effect of individual household characteristic on consumption of processed fruits and vegetables. The results of correlation analysis are summarized in Table 39. It is evident from the table that correlation between sex of household head and consumption of processed fruits and vegetables in Iringa and Dodoma regions were negative and statistically significant at 1% and 5% probability levels respectively. This implies that female-headed households consumed more processed fruits and vegetables than male-headed households. This finding concurs with that of Ruel *et al.* (2005) who reported that female-headed households allocated a significantly larger share of their budget to fruits and vegetables than male-headed households in most sub-Saharan countries. In

addition, the correlation coefficient between age of household head and consumption of processed fruits and vegetables in Iringa region was positive and statistically significant at 5% probability level implying that the consumption of processed fruits and vegetables increases with age of household head. The results in the table also show negative and significant correlation coefficient ($p=0.01$) between consumption and household size in Dodoma region implying that small-sized households consumed more processed fruits and vegetables than large-sized households. This finding complements the study done by Ruel *et al.* (2005) who found that large-sized households allocated smaller share of their budget to fruit and vegetables products purchase than those with fewer household members. This may partly be due to economies of scale in larger households. However, in Dar es Salaam and Iringa regions, the consumption of processed fruits and vegetables increases with an increase in household size partly due to availability and affordability of products.

Table 39: Correlation coefficients of household consumption of processed fruits and vegetables contrasted with households characteristics

Characteristics	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Sex of Household Head	0.058	-0.072	-0.354*	-0.398**	-0.055
Marital Status	-0.024	-0.194	-0.177	-0.184	-0.032
Age of households' Heads	0.083	-0.194	0.475**	0.254	0.080
Household Size	0.141*	-0.084	0.257**	-0.285*	0.137**
Education Level	0.121*	0.300*	-0.369*	0.397**	0.030
Income Level	0.099	0.156	0.489**	0.273	0.079
Household's Preference	0.788**	0.775**	0.616**	0.680**	0.739**
Consumption Habits:					
Processed Tomatoes	0.196**	0.185	0.042	0.344*	0.233**
Processed Oranges	0.138*	0.207	0.042	0.227	0.175**
Processed Mangoes	0.204**	0.207	0.070	0.156	0.211**

* Significant at prob = 0.01 level and ** Significant at prob = 0.05 level

Similarly, the results in Table 39 show that the correlation coefficients between education level attained by household head and consumption of processed fruits and

vegetables were positive in Dar es Salaam, Tanga and Dodoma regions and statistically significant at 1% probability level in Dar es Salaam and Tanga regions and 5% confidence level in Dodoma region. This implies that the consumption of processed fruits and vegetables increases with an increase in education level. This is mainly due to the fact that education enables customers to effectively assess and understand the vital role that fruits and vegetables play for human health and nutrition. However, in Iringa region, the consumption of processed fruits and vegetables decreases with an increase in education level. Similar findings have also been reported by Ruel *et al.* (2005) who found that households with a highly educated member tended to spend a lower percentage of their income on fruits and vegetables compared with those with lower levels of education. This may be due to differences in food preferences across education levels.

As can be seen from Table 39, the correlation coefficient between income level and consumption of processed fruits and vegetables was positive and statistically significant at 5% confidence level in Iringa region but not in the other three regions. This implies that the consumption of processed fruits and vegetables increases with an increase in the level of household income. This finding concurs with that of Ruel *et al.* (2005) who reported that higher income is associated not only with an increase in the volume of fruits and vegetables consumed, but also with an increase in the diversity of fruit and vegetable products. This is probably due to the fact that people with high income have adequate financial resources to meet costs of living and hence can also afford to purchase processed fruits and vegetables. Likewise, the correlation coefficients between household's preference and consumption of processed fruits and vegetables were positive and statistically significant at 5% probability level in all four

regions. This implies that consumption of processed fruits and vegetables increases with an increase of household's preferences due to the fact that households which do not prefer processed fruits and vegetables will not develop any interest in consuming these products.

Apart from preference, the overall results in the same table show that the correlation coefficients between consumption habits and consumption of processed tomatoes, oranges and mangoes were positive and statistically significant at 5% probability level. Similar results have also been seen in Dar es Salaam region for all processed products and in Dodoma region for processed tomatoes at 1% probability level. This partly reflects that consumption of the processed products increases with an increase in the households' habit of consuming these products. These results support findings by Price and Gislason (2001) who concluded that consumption habit was among the most important factors that significantly explain the consumption of food among households in Japan.

4.4.5 Government intervention and consumption of locally processed products

Apart from characteristics of households, government has a great influence on consumption of locally processed fruits and vegetables by creating conducive environment to main actors of processed fruits and vegetables within value-added commodity chains. However, following trade liberalization policy adopted by Tanzania government, a number of similar products that compete with locally processed products are imported. Figure 19 shows the households responses in terms of the effect of trade liberalization policy on consumption of locally processed fruits

and vegetables. Special attention was devoted to examine the effect of importation of similar processed products on consumption of locally processed fruits and vegetables.

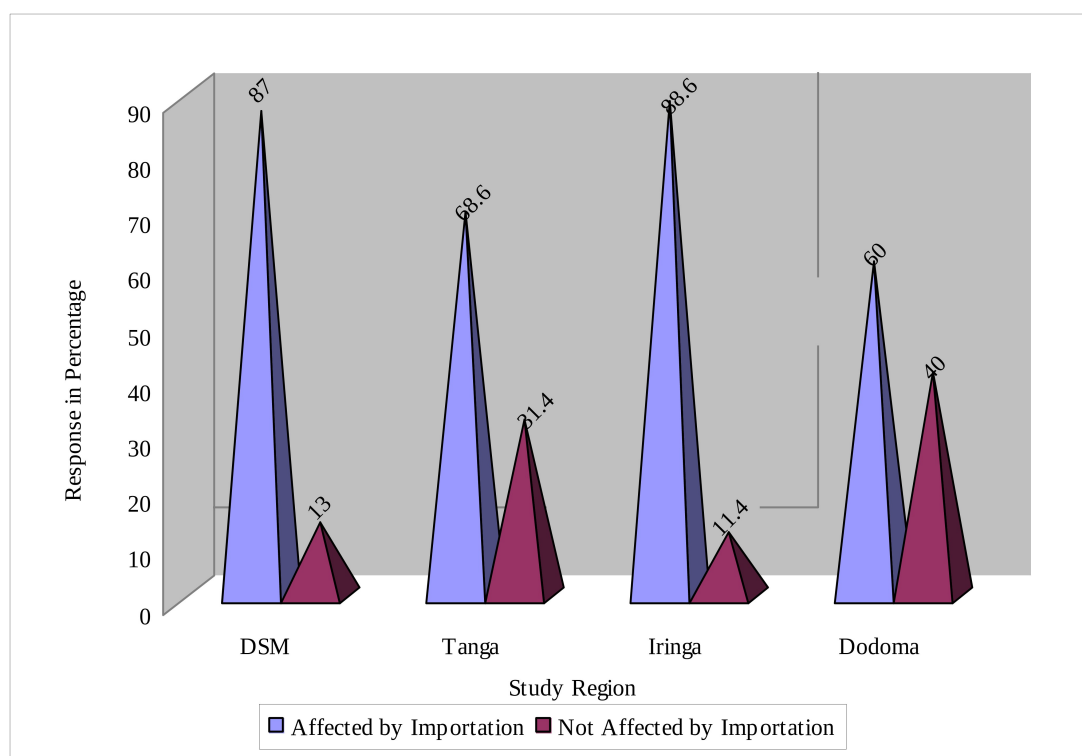


Figure 19: Proportion of households reporting the effect of importation on consumption of locally processed fruits and vegetables (%)

It can be seen from Figure 19 that the majority of households in all four regions were of the opinion that consumption of locally processed fruits and vegetables was affected by importation of similar products processed abroad. Furthermore, households were asked to indicate the effects of importation policy on specific products. The responses are summarized in Table 40. The results in the table show that a significant proportion of the sample households felt that the consumption of locally processed fruits and vegetables had been decreasing for the past five years except in Iringa and Dodoma regions in the case of locally processed tomatoes. The converse holds true for all brands of imported processed fruits and vegetables. Chi-

square test confirms the existence of statistical significant differences with regard to the effects of importation policy on consumption of processed products between products in all the study regions at (prob=0.01).

Table 40: Households reported effects of importation on consumption of processed fruits and vegetables (%)

Products/Type of Effects	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Locally Processed Tomatoes:					
Consumption Increased	40.5 (87)	34.3 (12)	65.9 (22)	45.7 (16)	42.8 (137)
Consumption Remain the Same	15.3 (33)	14.3 (05)	17.1 (06)	17.2 (06)	15.6 (050)
Consumption Decreased	44.2 (95)	51.4 (18)	20.0 (07)	37.1 (13)	41.6 (133)
	Chi-square (χ^2) 42.512 df 6 p-value 0.000				
Locally Processed Oranges:					
Consumption Increased	19.1 (041)	20.0 (07)	14.3 (05)	28.6 (10)	19.7 (063)
Consumption Remain the Same	25.6 (055)	14.3 (05)	14.3 (05)	17.1 (06)	22.2 (071)
Consumption Decreased	55.3 (119)	65.7 (23)	71.4 (25)	54.3 (19)	58.1 (186)
	Chi-square (χ^2) 21.637 df 6 p-value 0.001				
Locally Processed Mangoes:					
Consumption Increased	28.4 (061)	28.6 (10)	17.2 (06)	28.6 (10)	27.2 (087)
Consumption Remain the Same	07.0 (015)	11.4 (04)	11.4 (04)	20.0 (07)	09.4 (030)
Consumption Decreased	64.6 (139)	60.0 (21)	71.4 (25)	51.4 (18)	63.4 (203)
	Chi-square (χ^2) 15.052 df 6 p-value 0.010				
Imported Processed Tomatoes:					
Consumption Increased	70.7 (152)	42.9 (15)	48.6 (17)	57.1 (20)	63.8 (204)
Consumption Remain the Same	18.1 (039)	17.1 (06)	14.3 (05)	17.2 (06)	17.5 (056)
Consumption Decreased	11.2 (024)	40.0 (14)	37.1 (13)	25.7 (09)	18.7 (060)
	Chi-square (χ^2) 25.266 df 6 p-value 0.000				
Imported Processed Oranges:					
Consumption Increased	67.9 (146)	68.6 (24)	82.9 (29)	54.3 (19)	74.0 (218)
Consumption Remain the Same	20.5 (044)	14.3 (05)	11.4 (04)	20.0 (07)	16.8 (060)
Consumption Decreased	11.6 (025)	17.1 (06)	05.7 (02)	25.7 (09)	09.2 (042)
	Chi-square (χ^2) 28.665 df 6 p-value 0.000				
Imported Processed Mangoes:					
Consumption Increased	83.2 (179)	65.7 (23)	82.8 (29)	62.9 (22)	79.0 (253)
Consumption Remain the Same	09.8 (021)	14.3 (05)	08.6 (03)	20.0 (07)	11.3 (036)
Consumption Decreased	07.0 (015)	20.0 (07)	08.6 (03)	17.1 (06)	09.7 (031)
	Chi-square (χ^2) 30.797 df 6 p-value 0.000				

Figures in parentheses represent number of sample households' heads

4.4.6 Main sources of supply of processed products

Four main sources of supply of processed products were mentioned by sample households (Table 41). These included processors, wholesalers, retailers and supermarkets. Out of these sources, retailers by far seemed to be the major and reliable source of supply of all processed products in all four regions. Next to

retailers, processors ranked second in Iringa region. A similar observation was also noted in Dar es Salaam region for oranges, in Tanga region for all locally processed products, and in Dodoma region for tomatoes.

Table 41: Proportion of households that reported main sources of supply (%)

Product	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Locally Processed Tomatoes:					
Processors	07.9 (017)	22.9 (08)	42.9 (15)	08.5 (03)	13.4 (043)
Whole sellers	06.0 (013)	05.7 (02)	05.7 (02)	02.9 (01)	05.6 (018)
Retailers	77.7 (167)	65.7 (23)	51.4 (18)	82.9 (29)	74.1 (237)
Supermarkets	08.4 (018)	05.7 (02)	Nil	05.7 (02)	06.9 (022)
Imported Processed Tomatoes:					
Whole sellers	11.6 (025)	22.9 (08)	37.1 (13)	14.3 (05)	15.9 (051)
Retailers	79.6 (171)	71.4 (25)	62.9 (22)	80.0 (28)	76.9 (246)
Supermarkets	08.8 (019)	05.7 (02)	Nil	05.7 (02)	07.2 (023)
Locally Processed Oranges:					
Processors	09.3 (020)	25.7 (09)	42.9 (15)	02.9 (01)	14.0 (045)
Whole sellers	07.0 (015)	05.7 (02)	08.5 (03)	08.5 (03)	07.2 (023)
Retailers	76.3 (164)	62.9 (22)	48.6 (17)	82.9 (29)	72.5 (232)
Supermarkets	07.4 (016)	05.7 (02)	Nil	05.7 (02)	06.3 (020)
Imported Processed Oranges:					
Whole sellers	14.9 (032)	22.9 (08)	40.0 (14)	14.3 (05)	18.5 (059)
Retailers	78.1 (168)	71.4 (25)	60.0 (21)	80.0 (28)	75.6 (242)
Supermarkets	07.0 (015)	05.7 (02)	Nil	05.7 (02)	05.9 (019)
Locally Processed Mangoes:					
Processors	08.8 (019)	25.7 (09)	40.0 (14)	05.7 (02)	13.8 (044)
Whole sellers	04.7 (010)	02.9 (01)	05.7 (02)	08.6 (03)	05.0 (016)
Retailers	54.4 (117)	48.6 (17)	40.0 (14)	60.0 (21)	52.8 (169)
Supermarkets	32.1 (069)	22.8 (08)	14.3 (05)	25.7 (09)	28.4 (091)
Imported Processed Mangoes:					
Whole sellers	04.2 (009)	20.0 (07)	28.6 (10)	14.2 (05)	09.7 (031)
Retailers	83.7 (180)	74.3 (26)	68.6 (24)	82.9 (29)	80.9 (259)
Supermarkets	12.1 (026)	05.7 (02)	02.8 (01)	02.9 (01)	09.4 (030)

Figures in parentheses represent number of sample households' heads

Proportion-wise, households in Dar es Salaam region which reported supermarkets as a main source of supply of processed products were larger than in the other three regions (Table 41). The fact that retailers were the major source of supply for processed fruits and vegetables in all four regions suggests that the distribution system of processed fruits and vegetables was not in the hands of few suppliers.

Three reasons were advanced by households for mentioning retailers as the most important and reliable source of supply of processed products (Table 42). These included affordability of the products, available at right time and place as well as good hygienic environment. Of all these reasons, availability of the products at right time and place by far appears to be the most important reason across the products and study regions.

Table 42: Reasons for putting most important source of supply by product by region (%)

Product/Reason	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Locally Processed Tomatoes:					
Affordable	16.3 (035)	25.7 (09)	25.7 (09)	37.1 (13)	20.6 (066)
Easily available at right time & place	83.7 (180)	62.9 (22)	74.3 (26)	62.9 (23)	78.1 (250)
Good Hygienic Environment	Nil	11.4 (04)	Nil	Nil	01.3 (004)
Locally Processed Oranges:					
Affordable	22.3 (048)	20.0 (07)	20.0 (07)	37.1 (13)	23.4 (075)
Easily available at right time & place	77.7 (167)	68.8 (24)	77.1 (27)	62.9 (22)	75.0 (240)
Good Hygienic Environment	Nil	11.4 (04)	02.9 (01)	Nil	01.6 (005)
Locally Processed Mangoes:					
Affordable	14.0 (030)	34.3 (12)	20.0 (07)	37.1 (13)	19.4 (062)
Easily available at right time & place	80.0 (172)	62.9 (22)	77.1 (27)	60.0 (21)	75.6 (242)
Good Hygienic Environment	06.0 (013)	02.9 (01)	02.9 (01)	02.9 (01)	05.0 (016)
Imported Processed Tomatoes:					
Affordable	16.3 (035)	08.6 (03)	17.1 (06)	37.1 (13)	17.8 (057)
Easily available at right time & place	82.3 (177)	88.6 (31)	82.9 (29)	62.9 (22)	80.9 (259)
Good Hygienic Environment	01.4 (003)	02.9 (01)	Nil	Nil	01.3 (004)
Imported Processed Oranges:					
Affordable	15.9 (034)	22.9 (08)	17.1 (06)	34.3 (12)	18.8 (060)
Easily available at right time & place	83.7 (180)	68.6 (24)	82.9 (29)	65.7 (23)	80.0 (256)
Good Hygienic Environment	00.5 (001)	08.6 (03)	Nil	Nil	01.3 (004)
Imported Processed Mangoes:					
Affordable	30.7 (066)	31.4 (11)	14.3 (05)	42.9 (15)	30.3 (097)
Easily available at right time & place	67.4 (145)	68.6 (24)	82.9 (29)	57.1 (20)	68.1 (218)
Good Hygienic Environment	01.9 (004)	Nil	02.9 (01)	Nil	01.6 (005)

Figures in parentheses represent number of sample households' heads

4.4.7 Quantity of processed fruits and vegetables consumed

Ideally, the proportion of households consuming processed fruits and vegetables is indicative of the popularity and probably the relative importance of the specific products to consumers; it does not tell us the actual quantity of the products consumed by the households. Table 43 presents the average quantities of processed fruits and vegetables consumed by the sample households during harvest and off seasons.

Table 43: Average quantities of processed fruits and vegetables consumed by household by region in 2003 (in kg or litre per month)

Processed Products	Region/Season								Total Sample	
	DSM		Tanga		Iringa		Dodoma		Harvest	Off
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off		
Local Processed Tomatoes (kg)	03.55 (100)	03.71 (112)	08.33 (22)	08.40 (24)	10.70 (29)	11.03 (30)	02.69 (23)	03.00 (24)	05.26 (174)	05.27 (190)
Imported Processed Tomatoes (kg)	01.85 (37)	03.10 (100)	01.93 (07)	02.47 (18)	02.10 (10)	03.29 (21)	02.02 (16)	02.84 (20)	01.93 (70)	03.02 (159)
Local Processed Oranges (litre)	02.82 (81)	02.90 (103)	02.83 (17)	02.95 (17)	07.98 (19)	07.98 (19)	03.47 (20)	04.91 (22)	04.66 (137)	04.70 (161)
Imported Processed Oranges (litre)	03.92 (87)	16.31 (103)	06.50 (16)	07.03 (16)	11.50 (20)	12.18 (21)	04.84 (17)	05.38 (17)	05.12 (140)	12.63 (157)
Local Processed Mangoes (kg)	05.02 (85)	5.63 (99)	03.82 (11)	04.77 (11)	04.54 (10)	05.24 (10)	02.97 (18)	03.32 (19)	04.58 (124)	05.22 (139)
Imported Processed Mangoes (kg)	09.72 (99)	10.93 (110)	04.40 (15)	04.81 (15)	14.73 (12)	15.00 (14)	04.42 (19)	05.32 (19)	08.89 (145)	10.06 (158)

Figures in parentheses represent number of sample households' heads

Worth noting from the results in Table 43 is that irrespective of region and season, households consumed relatively larger quantities of locally processed tomatoes than imported processed tomatoes. However, there were wide variations in the amount of product consumed between the study regions. The largest quantities of locally processed tomatoes were recorded in Iringa region followed by Tanga region. The

difference may be due to the high availability of this product in the market at the right time and place and differences in market prices. It is also apparent from the table that households in all four regions consumed significantly large quantities of imported processed oranges and mangoes compared to locally processed oranges and mangoes. A number of factors contributed to this but consciousness of consumers in terms of quality and prices of products may be one of them. Other reasons would be high availability of the imported products in the market at right time and place. Interestingly, households in all four regions consumed significantly larger quantities of all processed products (both locally and imported products) during off season than during harvest season. This may partly be due to unavailability of fresh fruits and vegetables during off season whereby consumers may choose to go for processed products rather than raw fresh fruits and vegetables.

Based on the findings presented in Table 43, one-way ANOVA was carried out in order to establish whether the average quantities of processed fruits and vegetables consumed by households were significantly different between the study regions. The results are summarized in Table 44 with details given in Appendix 4a. From the table the following can be observed: With the exception of imported processed tomatoes (both seasons), imported processed oranges during off season and locally processed mangoes (both seasons), the F-values of the rest of processed products were significantly different from zero. For example, the F-values for locally processed tomatoes during harvest and off seasons were statistically significant at (prob \leq 0.05).

Thereafter, *Post Hoc Test* preferably Tukey HSD was run to show the variation between the study regions. It was noted that the average quantities of locally processed tomatoes consumed by households during harvest and off seasons in Dar es Salaam region were significantly different from zero at 5% probability level with households in Iringa region. A similar picture was seen in Dodoma viz-a-viz Iringa regions for the same product. No significant variation was observed for imported processed tomatoes during harvest and off seasons.

Table 44: ANOVA and Tukey HSD summarized results for average quantities of processed fruits and vegetables (kg or litre per month)

Variable		F-values from ANOVA	Multiple Comparisons Using Tukey HSD			
			(I) Region	(J) Region	Mean Differences	Significance Level
Locally Processed Tomatoes (Harvest)		4.405*	DSM	Iringa	-7.485*	0.01
			Dodoma	Iringa	-8.349*	0.03
Locally Processed Tomatoes (Off)		4.184*	DSM	Iringa	-6.994*	0.01
			Dodoma	Iringa	-7.719*	0.04
Locally Processed Oranges (Harvest)		2.854*	DSM	Iringa	-9.367*	0.03
Locally Processed Oranges (Off)		2.943*	DSM	Iringa	-8.605*	0.03
Imported Processed Oranges (Harvest)		3.779*	DSM	Iringa	-8.028*	0.01
			Tanga	Iringa	-9.121*	0.04
Imported Processed Mangoes (Harvest)		5.313*	Tanga	Iringa	-10.333*	0.01
			Dodoma	Iringa	-10.312*	0.01
Imported Processed Mangoes (Off)		5.175*	Tanga	Iringa	-10.186*	0.02
			Dodoma	Iringa	-9.609*	0.01

* Significant at prob. ≤ 0.05

It is also apparent from Table 44 and Appendix 4a that the F-values for the locally processed oranges during harvest and off seasons were statistically significant at (prob. ≤ 0.05). It also appears that the average quantities of locally processed oranges consumed by households in Dar es Salaam region during harvest and off seasons

were statistically different from zero at 5% probability level with those of households in Iringa region. Likewise, the F-value for the imported processed oranges during harvest season was statistically significant at (prob. ≤ 0.05). Tukey HSD analysis indicates that average quantities of imported processed oranges consumed by households in Dar es Salaam region was statistically different from zero at 5% probability level with households in Iringa region. A similar picture was observed in Tanga viz-a-viz Iringa regions for the same product. Nonetheless, ANOVA results do not show significant variations for imported processed oranges consumed by households during off season. Apart from processed oranges, the F-values for the imported processed mangoes during harvest and off seasons were statistically significant at (prob. ≤ 0.05). The analysis of Tukey HSD test shows that the average quantities of imported processed mangoes consumed by households in Tanga region during harvest and off seasons were statistically different from zero at 5% probability level with those consumed by their counterparts in Iringa region. Similar results have also been observed in Dodoma viz-a-viz Iringa regions. Nevertheless, the ANOVA results do not show a significant variation for locally processed mangoes during harvest and off season.

Irrespective of quantity of processed products, per capita consumption of processed products was calculated using total consumption per household divided by household size. The findings are shown in Table 45. The following can be observed from the results presented in the table: (i) households with smaller size had relatively larger per capita consumption for all products than households with larger size members. This is partly a reflection of economies of scale in larger households. (ii) While the per capita consumption of locally processed tomatoes was higher than imported processed

tomatoes for both large and small households, the converse holds true for oranges and mangoes, probably due to high availability of products in the market at the right time and place, and stiff competition in terms of prices and quality. (iii) The per capita consumption of processed fruits and vegetables in the study areas was very far below the World Health Organization (WHO) and Food Agriculture Organization (FAO) recommended minimum level of 400g per capita per day or 146 kg per capita per year. Similar findings have been reported by Ruel *et al.* (2005) who found that the consumption of fruits and vegetables in the 10 sub-Saharan African countries ranges from 27kg to 114kg per capita per year, which is far below the WHO/FAO recommended minimum intakes of 146 kg per capita per year.

Table 45: Quantities of processed fruits and vegetables consumed per capita in 2003 (in kg or litre per month)

Products/Household Distribution	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Locally Processed Tomatoes (kg):					
Between 1 and 4	2.465	2.517	3.325	0.842	2.309
Between 5 and 17	1.084	0.944	1.045	0.412	0.898
Imported Processed Tomatoes (kg):					
Between 1 and 4	1.888	1.250	1.058	0.724	1.692
Between 5 and 17	0.623	0.917	0.528	0.405	0.668
Locally Processed Oranges (Lts):					
Between 1 and 4	1.801	1.854	1.361	1.806	1.740
Between 5 and 17	0.978	0.991	0.986	0.572	0.976
Imported Processed Oranges (Lts):					
Between 1 and 4	5.623	1.638	2.813	2.283	4.526
Between 5 and 17	1.166	0.698	1.778	0.974	1.301
Locally Processed Mangoes (kg):					
Between 1 and 4	3.783	1.917	2.194	2.012	3.233
Between 5 and 17	1.292	0.803	1.305	0.780	1.243
Imported Processed Mangoes (kg):					
Between 1 and 4	5.163	2.833	5.000	2.786	4.581
Between 5 and 17	2.175	2.379	1.852	0.891	2.067

Households were asked to give their opinions on future prospects of the consumption pattern of both locally and imported processed products per season. The households' responses are summarized in Table 46. From the table, the majority of the sample households in all four regions felt that the consumption of locally processed products would increase in future during harvest season. The converse holds true for all imported processed products except mangoes in Dar es Salaam region. This may be due to high availability of unprocessed fruits and vegetables during harvest season.

However, during off season, notable differences were observed in the expected consumption pattern between products across the study regions (Table 46). For instance, despite the fact that the majority of the sample households felt that the consumption of imported processed products would decrease in future during harvest season, the converse holds true during off season whereby households in all four regions felt that the consumption of both locally and imported processed products would increase except in Tanga and Iringa regions for imported processed tomatoes. The reason for this may be unavailability of fresh raw fruits and vegetables whereby households are forced to go for processed fruits and vegetables.

Table 46: Proportion of households reported expected consumption pattern of processed fruits and vegetables by season (%)

Product/pattern	Region								Total Sample	
	DSM		Tanga		Iringa		Dodoma			
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Locally Processed Tomatoes:										
Will Increase	45.6 (98)	57.7 (124)	42.9 (15)	57.1 (20)	45.7 (16)	51.4 (18)	48.6 (17)	57.2 (20)	45.6 (146)	56.9 (182)
Will Remain the Same	18.6 (40)	19.0 (041)	17.1 (06)	20.0 (07)	17.2 (06)	34.3 (12)	22.9 (08)	17.1 (06)	18.8 (060)	20.6 (066)
Will Decrease	35.8 (77)	23.3 (050)	40.0 (14)	22.9 (08)	37.1 (13)	14.3 (05)	28.6 (10)	25.7 (09)	35.6 (114)	22.5 (072)
Imported Processed Tomatoes:										
Will Increase	27.9 (060)	60.0 (129)	25.7 (09)	37.1 (13)	28.6 (10)	34.3 (12)	14.3 (05)	51.4 (18)	26.2 (084)	53.8 (172)
Will Remain the Same	20.9 (045)	16.3 (035)	20.0 (07)	20.0 (07)	20.0 (07)	28.6 (10)	34.3 (12)	20.0 (07)	22.2 (071)	18.4 (059)
Will Decrease	51.2 (110)	23.7 (051)	54.3 (19)	42.9 (15)	51.4 (18)	37.1 (13)	51.4 (18)	28.6 (10)	51.6 (165)	27.8 (089)
Locally Processed Oranges:										
Will Increase	39.1 (84)	56.3 (121)	40.0 (14)	48.5 (17)	45.7 (16)	51.4 (18)	51.4 (18)	57.1 (20)	41.3 (132)	55.0 (176)
Will Remain the Same	24.7 (53)	20.0 (043)	22.9 (08)	22.9 (08)	34.3 (12)	34.3 (12)	25.7 (09)	20.0 (07)	25.6 (082)	22.0 (070)
Will Decrease	36.3 (78)	23.7 (051)	37.1 (13)	28.6 (10)	20.0 (07)	14.3 (05)	22.9 (08)	22.9 (08)	33.1 (106)	23.0 (074)
Imported Processed Oranges:										
Will Increase	28.8 (62)	57.2 (123)	31.4 (11)	40.0 (14)	25.7 (09)	37.1 (13)	40.0 (14)	51.4 (18)	30.0 (096)	52.5 (168)
Will Remain the Same	27.0 (58)	20.5 (044)	22.9 (08)	22.9 (08)	31.4 (11)	28.6 (10)	28.6 (10)	28.6 (10)	27.2 (087)	22.5 (072)
Will Decrease	44.2 (95)	22.3 (048)	45.7 (16)	37.1 (13)	42.9 (15)	34.3 (12)	31.4 (11)	20.0 (07)	42.8 (137)	25.0 (080)
Locally Processed Mangoes:										
Will Increase	37.2 (80)	45.1 (97)	51.4 (18)	51.4 (18)	40.0 (14)	45.7 (16)	54.3 (19)	54.3 (19)	40.9 (131)	46.9 (150)
Will Remain the Same	34.4 (74)	34.4 (74)	20.0 (07)	22.9 (08)	34.3 (12)	37.1 (13)	17.1 (06)	25.7 (09)	30.9 (099)	32.5 (104)
Will Decrease	28.4 (61)	20.5 (44)	28.6 (10)	25.7 (09)	25.7 (09)	17.2 (06)	28.6 (10)	20.0 (07)	28.2 (090)	20.6 (066)
Imported Processed Mangoes:										
Will Increase	54.0 (116)	64.2 (138)	37.1 (13)	40.0 (14)	31.4 (11)	37.1 (13)	31.4 (11)	42.9 (15)	47.2 (151)	56.2 (180)
Will Remain the Same	20.0 (043)	20.5 (044)	20.0 (07)	25.7 (09)	25.7 (09)	34.3 (12)	28.6 (10)	37.1 (13)	21.6 (069)	24.4 (078)
Will Decrease	26.0 (056)	15.3 (033)	42.9 (15)	34.3 (12)	42.9 (15)	28.6 (10)	40.0 (14)	20.0 (07)	31.2 (100)	19.4 (062)

Figures in parentheses represent number of sample households' heads

4.4.8 Households expenditure on processed fruits and vegetables

It should be borne in mind that the examination of households' expenditure with respect to processed fruits and vegetables was important in understanding how the households' disposable income between income groups was allocated among competing brands of processed products available in the market. Specifically, the analysis of household expenditure shows the extent to which households have been allocating their financial resources to imported processed products relative to similar products of Tanzanian origin. The results are presented in Table 47. From the table the following can be observed: (i) households in all income groups spent more money during off-season than during harvest season for almost all processed products except in Tanga region for locally processed tomatoes in the low and high income groups, imported processed orange in the high income group as well as both locally and imported processed mangoes in all income groups. A similar feature was also seen in Iringa region for the case of imported processed oranges and mangoes in the low income group. This may partly reflect unavailability of fresh raw fruits and vegetables during off season whereby the households are forced to allocate more money to purchase processed products. (ii) Notable differences were also found in the amount of money spent by households on purchasing processed fruits and vegetables between income groups across the study regions. For instance, households in medium income group spent significantly more money on purchasing processed products compared to the other two income groups.

Table 47: Average monthly households expenditure for processed fruits and vegetables by income group in 2003 (in TShs)

Processed Product	Region/Season								Total Sample	
	DSM		Tanga		Iringa		Dodoma			
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Locally Processed Tomatoes:										
Low Income Group	800 (26)	850 (31)	2200 (04)	2200 (04)	2250 (12)	2800 (12)	1200 (06)	1400 (06)	1420 (048)	1570 (053)
Medium Income Group	1468 (70)	1530 (74)	3730 (16)	3734 (18)	2910 (17)	3560 (18)	1719 (17)	2477 (18)	2500 (120)	2830 (128)
High Income Group	1140 (04)	1130 (07)	3000 (02)	3000 (02)	Nil	Nil	Nil	Nil	1180 (006)	1268 (009)
Imported Processed Tomatoes:										
Low Income Group	1450 (06)	1600 (23)	1200 (02)	1400 (04)	3700 (04)	4100 (06)	1500 (04)	1900 (06)	1530 (16)	2180 (039)
Medium Income Group	1668 (25)	2958 (70)	1583 (04)	2431 (13)	4200 (06)	5275 (15)	2475 (12)	2653 (14)	2320 (47)	2900 (112)
High Income Group	1600 (06)	2600 (07)	1300 (01)	1750 (01)	Nil	Nil	Nil	Nil	1450 (07)	2170 (008)
Locally Processed Oranges:										
Low Income Group	1020 (16)	1100 (24)	1800 (03)	2050 (03)	2400 (05)	2470 (05)	2450 (05)	2600 (06)	1800 (029)	2150 (038)
Medium Income Group	1763 (60)	1803 (72)	2378 (13)	2628 (13)	3450 (14)	3573 (14)	3100 (15)	3200 (16)	2430 (102)	2600 (115)
High Income Group	1300 (05)	1400 (07)	2000 (01)	2400 (01)	Nil	Nil	Nil	Nil	1260 (006)	1500 (008)
Imported Processed Oranges:										
Low Income Group	1400 (11)	1550 (24)	1156 (02)	1160 (02)	3500 (06)	3500 (06)	1800 (04)	2703 (04)	1760 (023)	1800 (036)
Medium Income Group	2600 (70)	2750 (73)	2100 (13)	2146 (13)	4785 (14)	4800 (15)	2264 (13)	4590 (13)	2800 (110)	3200 (114)
High Income Group	2183 (06)	2225 (06)	1500 (01)	1500 (01)	Nil	Nil	Nil	Nil	1800 (007)	1860 (007)
Locally Processed Mangoes:										
Low Income Group	1100 (08)	1180 (22)	2100 (02)	2100 (02)	2200 (04)	2600 (04)	2400 (02)	2800 (02)	1550 (016)	1770 (029)
Medium Income Group	1328 (72)	1363 (72)	2856 (08)	2856 (08)	2375 (06)	3100 (06)	3096 (16)	4342 (17)	2600 (102)	2900 (103)
High Income Group	1150 (05)	1300 (06)	2000 (01)	2000 (01)	Nil	Nil	Nil	Nil	1100 (006)	1350 (007)
Imported Processed Mangoes:										
Low Income Group	1200 (18)	1300 (27)	1050 (03)	1050 (03)	2200 (04)	2200 (04)	2500 (05)	2800 (05)	1420 (030)	1800 (039)
Medium Income Group	1756 (73)	1870 (74)	1490 (10)	1490 (10)	3263 (08)	4350 (10)	3236 (14)	3579 (14)	2400 (105)	2800 (108)
High Income Group	1500 (08)	1519 (09)	1250 (02)	1250 (02)	Nil	Nil	Nil	Nil	1103 (010)	1280 (011)

Figures in parentheses represent number of sample households' heads

While households in high income group in Dar es Salaam and Tanga regions allocated substantial part of their disposable income on purchasing processed fruits and vegetables, the opposite was true for their counterparts in Iringa and Dodoma regions (Table 47). These findings suggest that households in the medium income group were the main consumers of processed fruits and vegetables probably due to differences in consumers' preferences across the income groups. (iii) With the exception of Tanga region, households in the other three regions spent significantly more money on purchasing imported processed products than locally processed products. The differences in the amount of money spent between products and study regions were probably due to differences in availability and market prices of a particular product between regions.

Based on the findings presented in Table 47, one-way ANOVA was carried out in order to establish whether the households' monthly expenditure on processed fruits and vegetables were significantly different between income groups. The results are summarized in Table 48 with details given in Appendix 4b. From the table the following can be observed: With the exception of the other three regions, the F-values of average monthly expenditures for all processed fruits and vegetables in Dar es Salaam region were statistically significant. Interestingly, Tukey HSD results confirmed significant differences at ($p=0.05$) for average monthly expenditures of all processed products between low income and high income households. A similar picture was observed for high income viz-a-viz medium income households (Table 48; Appendix 4b).

Table 48: Dar es Salaam region: ANOVA and Tukey HSD summarized results for average monthly expenditure of processed fruits and vegetables (in TShs)

Variable	F-values from ANOVA	Multiple Comparisons Using Tukey HSD			
		(I) Income Group	(J) Income Group	Mean Differences	Significance Level
Locally Processed Tomatoes (Harvest)	11.131*	Low	High	-63 266.71*	0.01
		High	Medium	63 769.88*	0.00
Locally Processed Tomatoes (Off)	13.503*	Low	High	-65 556.49*	0.00
		High	Medium	68 219.43*	0.00
Imported Processed Tomatoes (Harvest)	9.645*	Low	High	-45 228.03*	0.03
		High	Medium	46 734.96*	0.00
Imported Processed Tomatoes (Off)	21.327*	Low	High	-54 982.32*	0.00
		High	Medium	54 214.87*	0.00
Locally Processed Oranges (Harvest)	10.392*	Low	High	-460 714.96*	0.01
		High	Medium	466 074.42*	0.00
Locally Processed Oranges (Off)	43.811*	Low	High	-278 522.81*	0.00
		High	Medium	278 877.04*	0.00
Imported Processed Oranges (Harvest)	13.364*	Low	High	-140 046.22*	0.00
		High	Medium	143 334.60*	0.00
Imported Processed Oranges (Off)	15.276*	Low	High	-134 938.51*	0.00
		High	Medium	138 069.38*	0.00
Locally Processed Mangoes (Harvest)	6.058*	Low	High	-563 058.70*	0.04
		High	Medium	579 926.46*	0.01
Locally Processed Mangoes (Off)	36.165*	Low	High	-441 423.99*	0.00
		High	Medium	452 002.92*	0.00
Imported Processed Mangoes (Harvest)	11.464*	Low	High	-228 550.00*	0.01
		High	Medium	241 992.67*	0.00
Imported Processed Mangoes (Off)	13.873*	Low	High	-212 647.22*	0.00
		High	Medium	229 956.32*	0.00

* Significant at prob. ≤ 0.05

4.4.9 Average market prices paid by consuming households

Analysis of average prices paid by households was important in understanding whether there were disparities in the market prices between the products across the study regions. The results are summarized in Table 49. It is clear from the table that households in all four regions paid significantly more money during off-season than

harvest season for all processed products, partly as a consequence of the unavailability of the unprocessed fruit and vegetable products during off season.

Table 49: Average prices for major types of processed fruits and vegetables by season by region, 2003 (in TShs per unit)

Products	Region/Season								Total Sample	
	DSM		Tanga		Iringa		Dodoma			
	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Locally Tomatoes (TShs/Kg)	948 (100)	998 (112)	1046 (24)	1050 (24)	886 (29)	915 (30)	1063 (27)	1067 (27)	968 (180)	1001 (193)
Imported Tomatoes (TShs/Kg)	2388 (37)	2411 (100)	2000 (07)	1786 (18)	2250 (10)	2391 (21)	2275 (16)	2420 (20)	2316 (70)	2324 (159)
Locally Oranges (TShs/Litre)	1416 (81)	1524 (103)	1159 (17)	1162 (17)	1040 (21)	1045 (20)	1480 (17)	1500 (17)	1339 (140)	1388 (156)
Imported Oranges (TShs/Litre)	1450 (86)	1537 (103)	1350 (16)	1375 (16)	1240 (21)	1250 (20)	1485 (17)	1506 (17)	1339 (140)	1388 (156)
Locally Mangoes (TShs/Kg)	1473 (85)	1555 (99)	1264 (11)	1286 (11)	1350 (10)	1370 (10)	1600 (18)	1614 (19)	1463 (124)	1529 (139)
Imported Mangoes (TShs/Kg)	1497 (98)	1526 (110)	1393 (15)	1399 (14)	1408 (12)	1385 (14)	1647 (19)	1685 (19)	1499 (144)	1515 (157)

Figures in parentheses represent number of sample households' heads

However, notable disparities in the market prices between the products across the study regions were apparent (Table 49). For example, sample households in Dar es Salaam region paid more money to purchase imported processed tomatoes (during harvest) and locally processed oranges (during off season) than consumers who purchased the same products in the other three regions. A similar observation was also noted for Dodoma region in the case of locally processed tomatoes and mangoes (harvest and off seasons), locally processed oranges (harvest season), imported processed tomatoes (during off season), imported processed oranges (harvest season), and imported processed mangoes (harvest and off seasons). This is mainly due to differences in market prices caused by variations in marketing costs between regions.

Based on the results presented in Table 49 one-way ANOVA was carried out in order to establish whether the average prices paid by households were significantly different between regions. The results are summarized in Table 50 with details in Appendix 4a. From the table the following observations can be made: With the exception of price of imported processed tomatoes during harvest season, the F-value of the remaining products was significantly different from zero. For instance, the F-value for price of locally processed tomatoes was statistically significant at (prob. ≤ 0.01) during harvest season. *Post Hoc Test* preferably Tukey HSD was run to show the variation between each region. The outcome was that the price of locally processed tomatoes paid by households in Dar es Salaam region was statistically different from zero at 5% confidence level with households in Dodoma region. A similar observation was found in Tanga viz-a-viz Iringa region and Iringa viz-a-viz Dodoma region for the same product. The F-value for the price of locally processed tomatoes during off season was statistically significant at (prob. ≤ 0.05). The Tukey HSD test results suggest that the price of locally processed tomatoes paid by households in Iringa region was significantly different from zero at 5% confidence level with households in Dodoma region. On the other hand, the F-value for the price of imported processed tomatoes was statistically significant at (prob. ≤ 0.01) during off season. Tukey HSD test results also suggest that the price of imported processed tomatoes paid by households in Dar es Salaam region was statistically different from zero at 5% probability level with households in Tanga region. The same pattern was observed in Tanga viz-a-viz Iringa and Dodoma viz-a-viz Tanga region for the same product.

With regard to processed oranges, the F-value for the price of locally processed oranges was statistically significant at (prob. ≤ 0.01) during harvest season. The Tukey HSD test seems to suggest that the price of locally processed oranges paid by households in Dar es Salaam region was statistically different from zero at 5% probability level with households in Tanga. A similar pattern was observed in Tanga viz-a-viz Dodoma regions and Iringa viz-a-viz Dodoma region for the same product. Moreover, the F-value for the price of locally processed oranges was statistically significant at (prob. ≤ 0.01) during off season. Tukey HSD test shows that the price of locally processed oranges paid by households in Dar es Salaam region was significantly different from zero at 5% probability level with households in Tanga. The same picture was observed for Tanga viz-a-viz Dodoma regions for the same product. On the other hand, F-values for imported processed oranges during harvest and off seasons were statistically significant at (prob. ≤ 0.01). Tukey HSD test results indicate that the prices of imported processed oranges paid by households during harvest and off seasons in Dar es Salaam region were statistically different from zero at 5% probability level with households in Iringa region. The same trend was observed in Tanga viz-a-viz Iringa region as well as Dodoma and Iringa region for the same product.

Table 50: ANOVA and Tukey HSD summarized results for average prices of processed fruits and vegetables (in TShs)

Variable		F-values from ANOVA	Multiple Comparisons Using Tukey HSD			
			(I) Region	(J) Region	Mean Differences	Significance Level
Locally Processed Tomatoes (Harvest)		6.034*	DSM	Dodoma	-115.36*	0.02
			Tanga	Iringa	159.97*	0.01
			Iringa	Dodoma	-177.10*	0.00
Locally Processed Tomatoes (Off)		2.817*	Iringa	Dodoma	-152.00	0.04
Imported Processed Tomatoes (Off)		4.757*	DSM	Tanga	602.12*	0.00
			Tanga	Iringa	-604.92*	0.02
			Dodoma	Tanga	634.44*	0.01
Locally Processed Oranges (Harvest)		7.003*	DSM	Tanga	257.60*	0.01
			Tanga	Dodoma	-407.84*	0.00
			Iringa	Dodoma	-319.30*	0.01
Locally Processed Oranges (Off)		4.669*	DSM	Tanga	365.25*	0.00
			Tanga	Dodoma	-345.34*	0.03
Imported Processed Oranges (Harvest)		32.197*	DSM	Iringa	467.14*	0.00
			Tanga	Iringa	411.91*	0.00
			Dodoma	Iringa	547.20*	0.00
Imported Processed Oranges (Off)		17.061*	DSM	Iringa	391.70*	0.00
			Tanga	Iringa	330.00*	0.00
			Dodoma	Iringa	460.88*	0.00
Locally Processed Mangoes (Harvest)		5.230*	DSM	Tanga	209.54*	0.04
			Iringa	Dodoma	-250.00*	0.05
			Tanga	Dodoma	-336.36*	0.00
Locally Processed Mangoes (Off)		7.148*	DSM	Tanga	268.69*	0.00
			Iringa	Dodoma	-228.68*	0.05
			Dodoma	Tanga	327.32*	0.00
Imported Processed Mangoes (Harvest)		6.774*	DSM	Dodoma	-149.60*	0.01
			Tanga	Dodoma	-253.51*	0.00
			Iringa	Dodoma	-238.51*	0.00
Imported Processed Mangoes (Off)		7.848*	DSM	Iringa	215.29*	0.01
			Tanga	Dodoma	-286.17*	0.00
			Dodoma	Iringa	374.02*	0.00
			Dodoma	DSM	-158.74*	0.04

* Significant at prob. ≤ 0.05

Apart from tomatoes and oranges, results in Table 50 and Appendix 4a also show that F-values for the prices of locally processed mangoes during harvest and off seasons were statistically significant at (prob. ≤ 0.01). Tukey HSD test results show that the

price of locally processed mangoes paid by households in Dar es Salaam region during harvest and off seasons were significantly different from zero at 5% probability level with households in Tanga. A similar trend was observed in Tanga viz-a-viz Dodoma region as well as Iringa viz-a-viz Dodoma region for the same product. Almost the same pattern was noted for the case of imported processed mangoes for which F-values for the prices of imported processed mangoes during harvest and off seasons were statistically significant at (prob. ≤ 0.01). The results of Tukey HSD test during harvest season suggests that the price of imported processed mangoes paid by households in Dar es Salaam region was statistically different from zero at 5% confidence level with households in Dodoma region. This pattern was observed for Tanga viz-a-viz Dodoma region as well as Iringa viz-a-viz Dodoma region. Likewise, the results of Tukey HSD test during off season indicate that the price of imported processed mangoes paid by households in Dar es Salaam region was statistically different from zero at 5% confidence level with households in Iringa and Dodoma regions. A similar pattern was observed for Tanga viz-a-viz Dodoma region as well as Dodoma viz-a-viz Iringa region for the same product.

Unlike processors whose objective is high prices for their products, households are concerned with paying low and stable retail prices. The findings presented in Table 49, Table 50 and Appendix 4a suggest that the marketing system for processed fruits and vegetables in the study areas was not effective in terms of its ability to create satisfaction among consuming households by maintaining the required level and stability of consumer prices.

4.4.10 Factors influencing purchasing decisions

Households were asked to indicate factors that influence their purchasing decisions. The responses are summarized in Table 51. Out of the seven factors mentioned, the most prominent factor advanced by the majority of households was quality of products, which was the most important factor mentioned by households in all four regions. However, very few households in Dar es Salaam and Tanga regions and none of sampled households in Iringa and Dodoma regions indicated personal preference as one of the major factors to be considered when making decisions to purchase processed fruits and vegetables. The importance of the remaining factors varied across the study regions. These findings seem to suggest that households in all four regions were more conscious of quality products when purchasing processed fruits and vegetables.

Table 51: Factors influencing households purchasing decisions by region (%)

Factor	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Price Offered	18.3 (067)	24.7 (20)	23.5 (19)	16.7 (14)	19.6 (120)
Product Quality	45.5 (167)	33.3 (27)	39.5 (32)	33.3 (28)	41.4 (254)
Availability of Product at Right Time	12.8 (047)	14.8 (12)	14.8 (12)	21.4 (18)	14.5 (089)
Availability of Product at Right Place	12.5 (046)	12.4 (10)	13.6 (11)	14.3 (12)	12.9 (079)
Personal Relations With Traders and/or Processors	02.7 (010)	02.5 (02)	02.5 (02)	08.3 (07)	03.4 (021)
Consumer Purchasing power	07.4 (027)	11.1 (09)	06.1 (05)	06.0 (05)	07.5 (046)
Personal Preference	00.8 (003)	01.2 (01)	Nil	Nil	00.7 (004)

Figures in parentheses represent number of sample households' heads and the total number of responses for Dar es Salaam (367); Tanga (81); Iringa (81) and Dodoma (84)

4.4.11 Problems affecting consumption of locally processed fruits and vegetables

Households were also asked to indicate problems affecting consumption of locally processed fruits and vegetables. The responses are given in Table 52. Several problems affecting consumption of locally processed fruits and vegetables in the study areas were mentioned by households. However, variations across the study regions were apparent. For example, while poor quality of products by far remain to be the most important problem affecting consumption of locally processed products in Dar es Salaam region, a similar observation was made for Tanga region in case of poor quality of products, and lack of advertisement and promotion.

Table 52: Problems affecting consumption of locally processed fruits and vegetables (%)

Problem	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Not Affordable	11.5 (101)	10.3 (23)	10.7 (20)	11.3 (28)	11.2 (172)
Not Easily Available at Right Time and Place	13.6 (120)	12.1 (27)	11.2 (21)	13.3 (33)	13.0 (201)
Low Purchasing Power Among Consumer	09.5 (084)	12.1 (27)	15.0 (28)	13.7 (34)	11.2 (173)
Strong Competition with Imported processed Products	04.9 (043)	05.4 (12)	07.5 (14)	05.2 (13)	05.3 (082)
Tendency to Value Imported Products	10.5 (093)	10.7 (24)	09.6 (18)	10.8 (27)	10.5 (162)
Lack of Frequent Advertisement and Sales Promotion	13.8 (122)	14.7 (33)	14.4 (27)	13.3 (33)	13.9 (215)
Poor Quality Products	19.4 (171)	14.7 (33)	12.8 (24)	11.6 (29)	16.7 (257)
Not Trusted due to Fear of Expiring Date and Nature of Packaging Materials Used	01.2 (011)	06.7 (15)	02.7 (05)	08.8 (22)	03.4 (053)
Not the habit of the Households to Consume Processed Products	09.1 (080)	11.1 (25)	12.3 (23)	08.4 (21)	09.7 (149)
People' Ignorance on Significance Role that Processed Fruits and Vegetables Play to Human Health	06.5 (057)	02.2 (05)	03.8 (07)	03.6 (09)	05.1 (078)

Figures in parentheses represent number of households' heads and the total number of responses for Dar es Salaam (882); Tanga (224); Iringa (187) and Dodoma (249)

Specifically, low purchasing power among consumers appeared to be the major problem affecting consumption of locally processed fruits and vegetables in Iringa and Dodoma regions (Table 52). These findings seem to suggest that the problems affecting consumption of locally processed fruits and vegetables are location specific and hence requiring location specific intervention strategies aimed at promoting the consumption of locally processed fruits and vegetables.

The problems reported by households were verified with information from key informants and government officials during informal discussions. Most of them reported that failure of the locally processed products to meet quality standards laid down by Tanzania Bureau of Standards (TBS), stiff competition with similar products from abroad, lack of advertisement and promotion, tendency of people to believe that imported products are better than local products and low purchasing power among people negatively affected consumption of locally processed fruits and vegetables. Other problems reported by both key informants and government officials were inconsistency in supply that affect the availability of the products in the market at the right time and place, inefficient distribution systems to meet both effective and potential demand and lack of confidence in the products. These findings are not different from those reported by Commonwealth Secretariat (1997) and Tiisekwa *et al.* (2005).

Further descriptive analysis of availability and quality of processed fruit and vegetable products was carried out to verify afore-discussed information. Table 53 shows proportions of the sample households who reported availability of processed fruits and vegetables during harvest and off seasons.

Table 53: Percent of households which reported availability of processed products in the market (%)

Product/availability	Region								Total Sample	
	DSM		Tanga		Iringa		Dodoma			
Locally Processed Tomatoes:	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off	Harvest	Off
Easily available	88.4 (190)	83.7 (180)	80.0 (28)	65.7 (23)	94.3 (33)	85.7 (30)	74.3 (26)	57.1 (20)	86.6 (277)	79.1 (253)
Not easily available	11.6 (025)	16.3 (035)	20.0 (07)	34.3 (12)	05.7 (02)	14.3 (05)	27.7 (09)	42.9 (15)	13.4 (043)	20.9 (067)
Imported Processed Tomatoes:										
Easily available	89.3 (192)	88.8 (191)	80.0 (28)	82.9 (29)	88.6 (31)	88.6 (31)	68.6 (24)	68.6 (24)	85.9 (275)	85.9 (275)
Not easily available	10.7 (023)	11.2 (024)	20.0 (07)	17.1 (06)	11.4 (04)	11.4 (04)	31.4 (11)	31.4 (11)	14.1 (045)	14.1 (045)
Locally Processed Oranges:										
Easily available	46.5 (100)	31.2 (067)	51.4 (18)	34.3 (12)	57.1 (20)	34.3 (12)	42.9 (15)	34.3 (10)	47.8 (153)	39.1 (101)
Not easily available	53.5 (115)	68.8 (148)	48.6 (17)	65.7 (23)	42.9 (15)	65.7 (23)	57.1 (20)	65.7 (25)	52.2 (167)	60.9 (219)
Imported Processed Oranges:										
Easily available	89.3 (192)	90.2 (194)	80.0 (28)	74.3 (26)	91.4 (32)	97.1 (34)	68.6 (24)	77.1 (27)	86.3 (276)	87.8 (281)
Not easily available	10.7 (023)	09.8 (021)	20.0 (07)	25.7 (09)	08.6 (03)	02.9 (01)	31.4 (11)	22.9 (08)	13.7 (044)	12.2 (039)
Locally Processed Mangoes:										
Easily available	43.7 (094)	47.9 (103)	48.6 (17)	37.1 (13)	60.0 (21)	45.7 (16)	42.9 (15)	25.7 (09)	45.9 (147)	47.8 (141)
Not easily available	56.3 (121)	52.1 (112)	51.4 (18)	62.9 (22)	40.0 (14)	54.3 (19)	51.1 (20)	74.3 (26)	54.1 (173)	52.2 (179)
Imported Processed Mangoes:										
Easily available	82.8 (178)	86.5 (186)	80.0 (28)	74.3 (26)	71.4 (25)	74.3 (26)	74.3 (26)	74.3 (26)	80.3 (257)	82.5 (264)
Not easily available	17.2 (037)	13.5 (029)	20.0 (07)	25.7 (09)	28.6 (10)	25.7 (09)	25.7 (09)	25.7 (09)	19.7 (063)	17.5 (056)

Figures in parentheses represent number of sample households' heads

It is apparent from Table 53, a large proportion of sample households reported that imported processed products were available in the market during both harvest and off season as opposed to similar products processed within the country except locally processed tomatoes. As can be seen from the same table, both locally processed oranges and mangoes were not easily available in the market during off season in all four regions. A similar situation was also observed during harvest season for locally processed oranges in Dar es Salaam and Dodoma regions, and locally processed mangoes in Dar es Salaam, Tanga and Dodoma regions. These findings suggest that the supply of locally processed oranges and mangoes is not adequate to meet the needs of the domestic market.

In addition, households were asked to rank the quality of locally processed fruits and vegetables against similar products processed from abroad. The responses are shown in Table 54. The results in the table show that a large proportion of the sample households reported that the qualities of both locally and imported processed products were moderate. There were, however, notable variations between products in terms of quality across the sample regions. In Iringa, for instance, significantly larger proportion of the sample households reported that the quality of locally processed tomatoes was good. A similar observation was also reported in Tanga region for imported processed tomatoes as well as in Iringa and Dodoma regions for imported processed oranges and mangoes.

The following criteria were used by the sample households to judge quality of products: bad smell, product texture in terms of thickness, poor presentation of packaging materials, presence of particles and product tastes. This result suggests that

households had knowledge of judging the quality of products. The higher level of knowledge on product quality among households might have serious consequences on the performance of most of the local processing firms which are not registered and whose products lack the “tbs” certification mark.

Table 54: Percent of households reported quality of major types of processed fruits and vegetables by origin (%)

Product/product quality	Region				Total Sample
	DSM	Tanga	Iringa	Dodoma	
Locally Processed Tomatoes:					
Good quality	31.2 (67)	37.1 (13)	71.4 (25)	34.3 (12)	36.6 (117)
Moderate quality	46.0 (99)	51.4 (18)	17.2 (06)	51.4 (18)	44.0 (141)
Poor quality	22.8 (49)	11.4 (04)	11.4 (04)	11.4 (05)	19.4 (062)
Imported Processed Tomatoes:					
Good quality	33.0 (71)	60.0 (21)	25.7 (09)	34.3 (12)	35.3 (113)
Moderate quality	44.7 (96)	34.3 (12)	54.3 (19)	45.7 (16)	44.7 (143)
Poor quality	22.3 (48)	05.7 (02)	20.0 (07)	20.0 (07)	20.0 (064)
Locally Processed Oranges:					
Good quality	29.3 (63)	25.7 (09)	25.7 (09)	34.3 (12)	29.1 (093)
Moderate quality	42.8 (92)	54.3 (19)	42.9 (15)	45.7 (16)	44.4 (142)
Poor quality	27.9 (60)	20.0 (07)	31.4 (11)	20.0 (07)	26.5 (085)
Imported Processed Oranges:					
Good quality	34.0 (073)	42.9 (15)	62.9 (22)	45.7 (16)	39.4 (126)
Moderate quality	50.7 (109)	48.6 (17)	25.7 (09)	40.0 (14)	46.6 (149)
Poor quality	15.3 (033)	08.6 (03)	11.4 (04)	14.3 (05)	14.0 (045)
Locally Processed Mangoes:					
Good quality	28.4 (61)	25.7 (09)	25.7 (09)	28.6 (10)	27.8 (089)
Moderate quality	45.1 (97)	54.3 (19)	54.3 (19)	51.4 (18)	47.8 (153)
Poor quality	26.5 (57)	20.0 (07)	20.0 (07)	20.0 (07)	24.4 (078)
Imported Processed Mangoes:					
Good quality	36.3 (078)	40.0 (14)	54.3 (19)	45.7 (16)	39.7 (127)
Moderate quality	49.8 (107)	51.4 (18)	34.3 (12)	40.0 (14)	47.2 (151)
Poor quality	13.9 (030)	08.6 (03)	11.4 (04)	14.3 (05)	13.1 (042)

Figures in parentheses represent number of sample households' heads

4.5 Factors Influencing Demand for Processed Mangoes

4.5.1 Results of the multinomial logit analysis

Empirical results of the econometric model used to determine factors influencing demand for processed mangoes are summarized in Table 55. As can be seen from the table, the specified multinomial logit model fits very well the data as measured by McFadden (R^2). The high value of McFadden (76.4%) suggests a good predictive ability of the model implying that the variables included in the empirical model explain about 76.4% of the variation in the dependent variable. Specifically, the chi-square statistic shows that the model is highly significant at 1% confidence level. Likewise, using 50% as the cut-off probability of being a consumer, the model correctly predicted 99.5% of households willing to consume processed mangoes. Even after excluding ancillary variables, ten out of fourteen variables included in the empirical model are statistically significant. The only variables whose coefficients were statistically insignificant were education level attained by household heads (*EDUC*), age of the household heads (*AGE*), household size (*HSIZE*) and availability of locally processed mangoes (*AVALPM*).

Table 55: Estimated coefficients of demand for processed mangoes using multinomial logit model**Dependent:** Binary Variable Denoted as “1” Consumed Processed Mangoes and “0” Otherwise

Variable Included	Coefficients	Standard Error	b/St.Er.	Marginal Probability	Significance Level (P[Z]>z)
SEXR	0.51706*	0.21893	2.159	0.01188	p=0.0243
EDUC	0.26686	0.07036	0.381	0.00614	p=0.7032
AGE	-0.11006	0.21966	-0.501	-0.02624	p=0.7160
HSIZE	0.03371	0.03922	0.851	0.00767	p=0.3948
D ₁ PFNP	0.20384*	0.22379	3.132	0.04749	p=0.0001
NTAWS	0.06229*	0.22549	2.684	0.01429	p=0.0053
AVALPM	0.12154	0.21608	0.562	0.02792	p=0.5738
QTYPM	-0.40017*	0.25941	-2.707	-0.00923	p=0.0024
PRMM	0.11501*	0.24382	2.842	0.02669	p=0.0007
PCFM	0.00794*	0.00046	2.782	0.00096	p=0.0016
PCLPM	-0.00773*	0.00106	-4.054	-0.00187	p=0.0000
PCIPM	0.00242*	0.00106	2.276	0.00026	p=0.0220
INCOME	0.00901*	0.00075	2.621	0.02714	p=0.0163
D ₂ RG	-0.14463*	0.24293	-3.242	-0.03301	p=0.0000
Log Likelihood Function	-176.3369				
Restricted Log Likelihood Function	-213.1729				
LR Statistic	388.1221*				P=0.0000
Pseudo R-Squared	0.7635*				P=0.0000
Chi-Squared (X ²)	73.6721*				P=0.0000
Hosmer-Lemeshow chi-squared	205.5555*				P=0.0000
Degree of Freedom (df)	13				
McFadden	0.7635				
Threshold Value for Predicting (Y=1)	0.5				
Households Consumed Mangoes	167				
Households not Consumed Mangoes	153				
Total Sampled Households	320				
Percentage of Right Prediction (%)	99.492				
Prediction Failure (%)	0.508				

SEXR	=	Sex of respondents intended to capture the effect of gender on consumption of processed mangoes specified as “1” for female and “0” otherwise
EDUC	=	Education level attained by household head (Years)
AGE	=	Age of the head of households specified as “1” below 36 years old and “0” otherwise
HSIZE	=	Households size (Number of Persons)
D ₁ PFNP	=	Dummy variable intended to capture household preference of consuming particular type of product specified as 1= Preferred locally Processed mangoes and 0= Otherwise
NTAWS	=	Awareness of vital nutritional role that mangoes play in human diet specified as 1= aware and 0= otherwise
AVALPM	=	Availability of processed mangoes in the markets specified as 1= if processed mangoes are available in the market at right time and place and 0 = otherwise
QTYPM	=	Quality of processed mangoes specified as “1” for good quality and “0” otherwise
PRMM	=	Effect of promotion specified as “1” for frequently promoted and “0” otherwise
PCFM	=	Price of fresh mangoes (TShs)
PCLPM	=	Price of locally processed mangoes (TShs)
PCIPM	=	Price of imported processed mangoes (TShs)
INCOME	=	Household Income in TShs
D ₂ RG	=	Dummy for study regions intended to capture location differences in terms of consumption specified as “1” for Dar es Salaam region and “0” otherwise
*	=	Significance at p < 0.1

The results in Table 55 also clearly suggest that sex of household heads (*SEXR*), household preference for particular type of processed mangoes (*D₁PFNP*), awareness of the vital nutritional role that mangoes play in the human diet (*NTAWS*), frequency of promotion (*PRMM*), price of fresh mangoes (*PCFM*), price of imported processed mangoes (*PCIPM*) and household income (*INCOME*) were statistically significant at specified confidence levels and predicted positively the probability of consuming processed mangoes. For instance, the coefficient of respondent's sex had positive sign and was statistically significant at 5% probability level. A plausible explanation of this is that female-headed households are more likely to increase the likelihood of purchasing processed mangoes than male-headed households. These results concur with that of Kuperis *et al.* (1999) in the case of milk product in Canada and Ruel *et al.* (2005) in the case of fruits in Burundi.

As expected, the coefficient of household preference for particular type of processed mangoes is in agreement with the hypothesized *a priori* sign and was statistically significant at 1% conventional level. This partly suggests that increase in the number of households who prefer to purchase locally processed products increases the likelihood of consuming locally processed mangoes. The coefficient for awareness of the vital nutritional role that mangoes play in the human diet is in agreement with the hypothesized *a priori* sign and was statistically significant at 1% confidence level. A plausible explanation of this is that households having knowledge of the vital nutritional role that mangoes play in the human diet have a greater likelihood of purchasing processed mangoes than their counterparts who do not have this knowledge. Likewise, the coefficient for the frequency of promotion was positive and statistically different from zero at 1% confidence level. This implies that increase in

the frequency of promotion is more likely to increase the probability of consuming processed mangoes. This is partly due to the fact that promotion helps to create awareness and interest to customers in terms of purchasing processed products. In addition, price of fresh mangoes was found to have positive relationship with demand for processed mangoes as expected and its coefficient was statistically significant at 1% probability level, indicating that probability of consuming processed mangoes increases with increase in price of fresh mangoes.

However, the coefficient for price of imported processed mangoes had not exhibited *a priori* sign but statistically significant at 5% probability level implying that the household's reaction toward increase in price of imported processed mangoes led to an increase in the consumption of locally processed mangoes. This is partly an indication that the two products are substitutes. As expected, the coefficient of household income was statistically significant at 5% probability level and agrees with *a priori* expectation sign, suggesting that as household income increases the likelihood of consuming processed mangoes would also increase. Similar results have been reported elsewhere by Ruel *et al.* (2005) in the case of fruits partly due to the fact that households with adequate financial resources to meet the most pressing basic needs will definitely afford to purchase processed mangoes than those with limited financial resources.

The corollary is that the probability of consuming processed mangoes decreases with quality of processed mangoes (*QTYPM*), price of locally processed mangoes (*PCLPM*) and dummy for study region (*D₂RG*). In view of the afore-mentioned factors, the coefficient for quality of processed mangoes is in agreement with *a priori*

sign and was statistically significant at 1% probability level partly implying that poor quality processed mangoes are less likely to be consumed by households in the study areas. This could be due to the fact that quality is an essential prerequisite for the acceptance of a food product among consumers. The coefficient for price of locally processed mangoes had the expected sign and statistically different from zero at 1% confidence level, indicating that as the price of locally processed mangoes increases relative to imported processed mangoes, the likelihood of consuming them would also decrease. This is partly an indication that households in the study areas are sensitive to market price changes. Thus, given two similar products which are sold at different prices, households will purchase the products offered at relatively lower prices.

The dummy for study regions was found to have negative relationship with demand for processed mangoes and its coefficient was statistically different from zero at 1% confidence level, suggesting that households in Tanga, Iringa and Dodoma regions are more likely to increase the probability of consuming processed mangoes than their counterparts in Dar es Salaam region. This is confirmed by the multinomial logit model which shows the existence of significant regional differences in the demand for processed mangoes between regions. This could probably be attributed by differences in prices, preferences and availability of products in the market at right time and place.

Table 55 also shows how changes in specific variables included in the multinomial logit model affect the probability of households reacting positively toward consumption of processed mangoes. As pointed out in Chapter Three section 3.8.2,

the marginal probability computed for continuous variables is not comparable with those computed for dichotomous variables. For example, a 1% increase in price of fresh mangoes, price of imported processed mangoes and household income, increases the marginal probabilities of a positive response toward consuming processed mangoes among households in the study areas by 0.00096%, 0.00026% and 0.02714% respectively. These results seem to suggest that household income had a greater influence in explaining increase in the probability of consuming processed mangoes than the other two factors.

In the case of dichotomous variables such as household preference for particular type of processed mangoes, the marginal probability of a positive response by households toward consuming processed mangoes with respect to a change of customers preferences from not having preference in consuming imported processed mangoes to having preference for locally processed mangoes is 0.04749%. It was also observed that the marginal probabilities of positive responses by households toward consuming processed mangoes with respect to sex of the household head, awareness of the vital nutritional role that mangoes play in human diet and frequency of promotion are 0.01188%, 0.01429% and 0.02669% respectively. In a similar vein, it appears that household preference for particular type of the processed mangoes had a greater influence in increasing probability of consuming processed mangoes than the other three dichotomous variables.

Similar to factors which influenced demand for processed mangoes positively, the results in Table 55 also indicate marginal effects of variables that affect the probability of households reacting negatively toward consumption of processed

mangoes. For example, a 1% increase in price of locally processed mangoes, results into a 0.00187% marginal probability of a negative response toward consuming processed mangoes among households in the study areas. Similarly, the marginal probabilities of a negative response by households toward consuming locally processed mangoes with respect to quality of processed mangoes and dummy for study regions are 0.00923% and 0.03301% respectively. Based on the marginal effect concept, it can be concluded that of all the dichotomous factors which have negative response towards consumption, dummy for study regions appeared to be the most important factor.

4.5.2 Results of the OLS regression analysis

Further analysis of the factors hypothesized to influence the probability of consuming processed mangoes were carried out using OLS regression model to see whether they have similar effects on the quantity of locally processed mangoes consumed by sample households. Table 56 presents coefficients of demand for locally processed mangoes estimated using ordinary least square linear regression method. The goodness of fit of the model is high as measured using adjusted Coefficient of Determination (adjusted- R^2). The higher value of adjusted R^2 suggests that variables included in the model explain about 66% of the variations in the dependent variable. The F-value is highly significant at 1% probability level, indicating that the explanatory variables were statistically significant in explaining variation in the dependent variable.

Table 56: Estimated coefficients of demand for locally processed mangoes using OLS regression model

Dependent: Quantity of Locally Processed Mangoes Consumed per Month (kg or litre)

Variable Included	Coefficients	Standard Error	t-ratio	Significance Level (P[T >t])	VIF
SEXR	0.29899	0.60790	1.559	p=0.1230	1.453
EDUC	-0.29517**	0.19338	-2.132	p=0.0360	1.187
AGE	-0.16832*	0.58621	-2.708	p=0.0019	1.181
HSIZE	0.53665*	0.10901	4.923	p=0.0000	1.676
D ₁ PFNP	-0.03853	0.22379	-0.384	p=0.7020	1.170
NTAWS	0.36831	0.59601	0.617	p=0.5377	1.152
AVALPM	-1.23221**	0.58169	-2.118	p=0.0380	1.184
QTYPM	-0.29097**	0.60354	-2.482	p=0.0244	1.195
PRMM	0.37782	1.50102	0.252	p=0.8014	1.157
PCFM	0.11200	0.00200	1.090	p=0.2790	1.290
PCLPM	-0.04800*	0.00234	-9.088	p=0.0000	1.668
PCIPM	0.17200**	0.00343	2.148	p=0.0324	1.596
INCOME	0.01163**	0.000189	2.602	p=0.0310	1.425
D ₂ RG	-1.09662**	0.73566	-2.491	p=0.0242	1.531
Constant	-5.8820*		-3.257	P=0.0000	
R-Squared	0.72975*			P=0.0000	
Adjusted R-Squared	0.65684*			P=0.0000	
Durbin-Watson Statistic	1.95863				
Durbin-Watson Statistic u(t)	2.03433				
Autocorrelation: u(t)	-0.01717				
Model test: F[13, 306]	21.64000*			P=0.0000	
Households Consumed Products (n)	167				

SEXR	=	Sex of respondents intended to capture the effect of gender on consumption of processed mangoes specified as “1” for female and “0” otherwise
EDUC	=	Education level attained by household head (Years)
AGE	=	Age of the head of households specified as “1” for below 36 years old and “0” otherwise
HSIZE	=	Households size (Number of Persons)
D ₁ PFNP	=	Dummy variable intended to capture household preference of consuming particular type of product specified as 1= Preferred locally Processed mangoes and 0= Otherwise
NTAWS	=	Awareness of the vital nutritional role that mangoes play in human diet specified as 1= aware and 0= otherwise
AVALPM	=	Availability of locally processed mangoes in the markets specified as 1= if the product is available in the market at right time and place and 0 = otherwise
QTYPM	=	Quality of processed mangoes specified as “1” for good quality and “0” otherwise
PRMM	=	Effect of promotion specified as 1= frequently promoted and 0= otherwise
PCFM	=	Price of fresh mangoes (TShs)
PCLPM	=	Price of locally processed mangoes (TShs)
PCIPM	=	Price of imported processed mangoes (TShs)
INCOME	=	Household Income in TShs
D ₂ RG	=	Dummy for study regions intended to capture location differences in terms of consumption specified as “1” for Dar es Salaam region and “0” otherwise
*	=	Significance at 1% probability level
**	=	Significant at 5% probability level

Furthermore, the values of Variance Inflation Factor (VIF) confirm absence of serious collinearity problem to each variable included in the empirical model. Similarly, Durbin-Watson test confirms absence of autocorrelation. Even after excluding ancillary variables, nine out of fourteen variables included in the model are statistically significant. The only variables whose coefficients were statistically insignificant were sex of respondents, household preference for locally processed mangoes, awareness of the vital nutritional role that mangoes play in human diet, frequency of promotion and price of fresh mangoes.

The results in Table 56 show that, the coefficient of household size was positive and statistically significant at 1% probability level, indicating that addition of one member in households increases the quantity of locally processed mangoes by 0.54%. Likewise, the coefficients for price of imported processed mangoes and household income had positive signs and statistically significant at 5% probability level implying that a unit increase in price of imported processed mangoes and household income increases the quantity of locally processed mangoes by 0.17% and 0.01% respectively.

The results in the table also indicate that the coefficients for education level attained by respondents, age of household head, availability of locally processed mangoes, quality of locally processed mangoes, price of locally processed mangoes and dummy for study regions were negative and statistically significant in explaining the reduction of the quantity of locally processed mangoes consumed at specified conventional levels. Contrary to the OLS regression model results, the results of multinomial logit model discussed above show that education level attained by

respondents, age of the household heads, household size and availability of locally processed mangoes had no significant influence on probability of consuming processed mangoes. Disparities in the statistical significant were also observed for sex of the household heads, households' preferences for processed mangoes, awareness of the vital nutritional role that mangoes play in the human diet, frequency of promotion and price of fresh mangoes.

In the multinomial logit model, for instance, the coefficient of sex of the household heads was statistically significant at 5% confidence level in explaining the probability of consuming processed mangoes. In OLS regression model, however, the same variable had no significant influence in explaining the variation in the quantity of locally processed mangoes consumed by sample households in the study areas. Nevertheless, it is revealed from the table that quality of processed mangoes, prices of locally and imported processed mangoes, household income and dummy for study regions have similar effects on probability of consuming processed mangoes and quantity of locally processed mangoes consumed by households in the study areas.

4.6 Factors influencing demand for processed tomatoes

4.6.1 Results of the multinomial logit analysis

Table 57 summarizes the factors hypothesized to influence probability of consuming processed tomatoes estimated using multinomial logit model. As it was for processed mangoes, the specified model was statistically significant at 1% probability level as suggested by the likelihood ratio test. The likelihood ratio test follows a chi-square distribution with 13 degrees of freedom.

The goodness of fit of the model is relatively high as measured using McFadden (R^2). The high level of McFadden ratio (about 75%) suggests a good predictive ability of the model. This implies that the variables included in the model explain about 75% of the variation in the probability of consuming processed tomatoes. Likewise, using 50% as the cut-off probability of being a consumer, the model correctly predicted that 98.99% of households are willing to consume processed tomatoes. Even after excluding ancillary variables, seven out of fourteen variables included in the empirical model were found to be statistically significant at specified confidence levels. The only variables whose coefficients were statistically insignificant were education level attained by respondents (*EDUC*), age of the household heads (*AGE*), household size (*HSIZE*), awareness of the vital nutritional role that tomatoes play in the human diet (*NTAWAS*), availability of processed tomatoes in the market at right time and place (*AVALPT*), price of fresh tomatoes (*PCFT*) and household income (*INCOME*).

Table 57: Estimated coefficients of demand for processed tomatoes using multinomial logit model**Dependent:** Binary Variable Denoted as “1” Consumed Processed Tomatoes and “0” Otherwise

Variable Included	Coefficients	Standard Error	b/St.Er.	Marginal Probability	Significance Level (P Z >z)
SEXR	0.03736*	0.25012	2.945	0.01495	p=0.0034
EDUC	0.03380	0.07794	0.488	0.00870	p=0.6258
AGE	0.08595	0.25027	0.343	0.01965	p=0.7313
HSIZE	0.01101	0.04794	0.230	0.00252	p=0.8184
D ₁ PFNP	0.10510*	0.34925	3.301	0.02483	p=0.0004
NTAWS	0.09445	0.32430	0.291	0.02182	p=0.7709
AVALPT	0.08197	0.31435	0.261	0.01890	p=0.7943
QTYPT	0.06948*	0.25745	3.270	0.01587	p=0.0053
PRMT	-0.03468*	0.61102	-4.057	-0.07980	p=0.0000
PCFT	0.00581	0.04846	0.120	0.00253	p=0.9045
PCLPT	-0.04121*	0.01758	-2.343	-0.00217	p=0.0191
PCIPT	0.00378*	0.00102	2.286	0.00168	p=0.0280
INCOME	0.00686	0.07868	0.087	0.00469	p=0.9306
D ₂ RG	0.05470*	0.28498	3.800	0.01879	p=0.0000
Log Likelihood Function	-154.2149				
Restricted Log Likelihood Function	-213.1729				
LR Statistic Test	117.9160*				P=0.0000
Pseudo R-Squared	0.7518*				P=0.0000
Chi-Square (X ²)	117.9160*				P=0.0000
Hosmer-Lemeshow chi-squared	186.2971*				P=0.0000
Degree of Freedom	13				
McFadden	0.7518				
Threshold Value for Predicting (Y=1)	0.5				
Households Consumed Products	197				
Households not Consumed Products	123				
Total Sampled Households	320				
Percentage of Right Prediction (%)	98.985				
Percentage of Prediction Failure (%)	1.015				
SEXR	=	Sex of respondents intended to capture the effect of gender on consumption of processed tomatoes specified as “1” for female and “0” otherwise			
EDUC	=	Education level attained by household head (Years)			
AGE	=	Age of the head of households specified as “1” for below 36 years old and “0” otherwise			
HSIZE	=	Households size (Number of Persons)			
D ₁ PFNP	=	Dummy variable intended to capture household preference of consuming particular type of product specified as 1= Preferred locally Processed tomatoes and 0= Otherwise			
NTAWS	=	Awareness of the vital nutritional role that tomatoes play in human diet specified as 1= aware and 0= otherwise			
AVALP	=	Availability of processed tomatoes in the markets specified as 1= if processed tomatoes are available in the market at right time and place and 0 = otherwise			
QTYPT	=	Quality of processed tomatoes specified as “1” for good quality and “0” otherwise			
PRMT	=	Effect of promotion specified as 1= frequently promoted and 0= otherwise			
PCFT	=	Price of fresh tomatoes (TShs)			
PCLPT	=	Price of locally processed tomatoes (TShs)			
PCIPT	=	Price of imported processed tomatoes (TShs)			
INCOME	=	Household Income in TShs			
D ₂ RG	=	Dummy for study regions intended to capture location differences in terms of consumption specified as “1” for Dar es Salaam region and “0” otherwise			
*	=	Significance at p < 0.1			

According to Table 57, sex of household head (*SEXR*), household preference for particular type of processed tomatoes (*D₂FNP*), quality of processed tomatoes (*QTYPT*), price of imported processed tomatoes (*PCIPT*) and dummy for study regions (*D₂RG*) were statistically significant at specified confidence levels and positively associated with probability of consuming processed tomatoes. As it was the case with mangoes, the coefficient for sex of respondents had positive sign and statistically significant at 1% conventional level. This finding seems to suggest that female-headed households are more likely to increase the consumption of processed tomatoes compared to male-headed households. This finding complements the study done by Ruel *et al.* (2005) who found that female-headed households allocated a significantly larger share of their budget to fruits and vegetables than male-headed households in most of the sub-Saharan Africa. The pattern was stronger and more consistent in the case of the demand for vegetables than in the demand for fruits. Similarly, the coefficient for price of imported processed tomatoes had positive sign and statistically significant at 5% probability level, suggesting that a unit increase in the price of imported processed tomatoes relative to similar product of Tanzanian origin is more likely to increase consumption of locally processed tomatoes. This supports the theoretical statement which states that the demand for a particular product increases as prices of other related products increase.

As expected, the coefficient for product quality was found to be positive and statistically different from zero at 1% confidence level. This implies that processed tomatoes with higher quality have a greater probability of being consumed by households than lower quality processed tomatoes because quality is an essential prerequisite for the acceptance of a food product among consumers. As it was the

case with mangoes, the coefficient for household preference for particular types of processed tomatoes was found to be positive and was statistically significant at 1% probability level. The interpretation of this is that as the number of households who prefer to consume locally processed products increases, the likelihood of consuming imported processed tomatoes would also decrease mainly because households who have a greater tendency to prefer locally processed products will definitely not develop any interest in consuming imported processed tomatoes.

Unlike the case of mangoes, the coefficient of dummy variable for study regions had positive sign as expected and statistically significant at 1% probability level, indicating that households in Dar es Salaam region are more likely to increase the probability of consuming processed tomatoes than households in the other three regions. This is a reflection of differences in consumption preferences among households across the study regions. For example, it was noted during the field survey that there was substantial high consumption of tomato sauce in “chips” (food made from Irish potatoes) by the majority of people in the study areas, specifically in Dar es Salaam region.

The corollary is that the probability of consuming processed tomatoes decreases with frequency of promotion (*PRMT*) and price of locally processed tomatoes (*PCLPT*). As can be seen in Table 57 that the coefficient of price of locally processed tomatoes is in agreement with the *a priori* sign and statistically significant at 5% confidence level, indicating that as price of locally processed tomatoes increases, the likelihood of consuming locally processed tomatoes among households would decrease partly due to the fact that many consumers are very sensitive to changes of product prices. A

similar relationship has also been reported elsewhere by Ruel *et al.* (2005) for the case of vegetable products. As opposed to the case of processed mangoes discussed earlier, the coefficient for frequency of promotion was statistically significant at 1% conventional level and negatively related to consumption of processed tomatoes. A plausible explanation of this is that a decrease in the frequency of promotion has a greater likelihood of decreasing the consumption of processed tomatoes.

Similar to the case of processed mangoes, marginal effects of variables included in the multinomial logit model were computed and shown in Table 57. The results suggest that a 1% increases in price of imported processed tomatoes, would results into a marginal probability of 0.00168% of a positive response toward consuming processed tomatoes. It also appears that household preference for particular type of processed tomatoes had the greatest influence than sex of household heads, quality of processed tomatoes and dummy for study regions. As it was with the factors which influenced demand for processed tomatoes positively, the results in Table 57 also show the marginal effects for variables that affect the probability of households reacting negatively toward consumption of processed tomatoes. For example, a 1% increases in price of locally processed tomatoes, the marginal probability of a negative response toward consuming processed tomatoes is 0.00217%. Likewise, the marginal probability of a negative response toward consuming processed tomatoes with respect to frequency of promotion is 0.07980%. Based on the magnitude of marginal effects, the results of multinomial logit model suggest that frequency of promotion was the most important factor which had negative response towards consumption of processed tomatoes.

4.6.2 Results of the OLS regression analysis

As it was with the case of mangoes, the factors hypothesized to influence the probability of consuming processed tomatoes were verified using Ordinary Least Square (OLS) regression model to see whether they have similar effects on the quantity of locally processed tomatoes consumed by households in the study areas. Table 58 shows coefficients of demand for locally processed tomatoes estimated using Ordinary Least Square linear regression method. The goodness of fit of the model is relatively high as measured using adjusted Coefficient of Determination (adjusted- R^2). Likewise, the value of adjusted (R^2) suggests that the variables included in the model explain about 58% of the variation in the dependent variable. The F-value is highly significant at 1% probability level, indicating that the explanatory variables were statistically significant in explaining variations in the dependent variable. The values of Variance Inflation Factor (VIF) confirm absence of serious collinearity problem to each variable included in the empirical model. Likewise, Durbin-Watson test confirms absence of autocorrelation. Even when ancillary variables are excluded, ten out of fourteen variables included in the model are statistically significant at specified conventional levels. The only variables whose coefficients were statistically insignificant were education level attained by respondents, availability of locally processed tomatoes, frequency of promotion and price of imported processed tomatoes.

Table 58: Estimated coefficients of demand for locally processed tomatoes using OLS regression model

Dependent: Quantity of Locally Processed Tomatoes Consumed per Month (Kg)

Variable Included	Coefficients	Standard Error	t-ratio	Significance Level (P/[T/]>t)	VIF
SEXR	1.21799*	0.99316	3.226	p=0.0018	1.579
EDUC	0.11691	0.31046	0.377	p=0.7068	1.762
AGE	1.60721*	0.99176	3.621	p=0.0006	1.221
HSIZE	0.44827**	0.18760	2.390	p=0.0174	1.409
D ₁ PFNP	1.83047*	1.10004	4.664	p=0.0000	1.723
NTAWS	1.41711*	1.31525	2.477	p=0.0108	1.550
AVALPT	-0.35880	1.23855	-0.290	p=0.7722	1.844
QTYPT	1.30174**	1.04693	2.443	p=0.0148	1.685
PRMT	0.55106	2.48596	0.222	p=0.8247	1.194
PCFT	0.00465*	0.00334	2.368	p=0.0135	1.602
PCLPT	-0.00353*	0.00059	-5.953	p=0.0000	1.330
PCIPT	0.00187	0.00037	0.269	p=0.7879	1.352
INCOME	0.00521*	0.00032	3.648	p=0.0004	1.622
D ₂ RG	-1.41361*	1.14674	-4.233	p=0.0000	1.539
Constant	12.563*		2.975	P=0.0050	
R-Squared	0.61043*			P=0.0000	
Adjusted R-Squared	0.57689*			P=0.0000	
Durbin-Watson Statistic	1.93568				
Durbin-Watson Statistic u(t)	2.01824				
Autocorrelation: u(t)	-0.00912				
Standard Deviation: u(t)	8.53808				
Model test: F[13, 306]	6.27000*			P=0.0000	
Durbin-Watson	1.7050				
Households Consumed	197				
Products (n)					

SEXR	=	Sex of respondents intended to capture the effect of gender on consumption of locally processed tomatoes specified as “1” for female and “0” otherwise
EDUC	=	Education level attained by household head (Years)
AGE	=	Age of the head of households specified as “1” for below 36 years old and “0” otherwise
HSIZE	=	Households size (Number of Persons)
D ₁ PFNP	=	Dummy variable intended to capture household preference of consuming particular type of product specified as 1= Preferred locally Processed tomatoes and 0= Otherwise
NTAWS	=	Awareness of the vital nutritional role that tomatoes play in human diet specified as 1= aware and 0= otherwise
AVALPT	=	Availability of processed tomatoes in the markets specified as 1= if the product is available in the market at right time and place and 0 = otherwise
QTYPT	=	Quality of locally processed tomatoes specified as “1” for good quality and “0” otherwise
PRMT	=	Effect of promotion specified as 1= frequently promoted and 0= otherwise
PCFT	=	Price of fresh tomatoes (TShs)
PCLPT	=	Price of locally processed tomatoes (TShs)
PCIPT	=	Price of imported processed tomatoes (TShs)
INCOME	=	Household Income in TShs
D ₂ RG	=	Dummy for study regions intended to capture location differences in terms of consumption specified as “1” for Dar es Salaam region and “0” otherwise
*	=	Significance at 1% probability level
**	=	Significant at 5% probability level

Unlike the results of multinomial logit model, it is apparent from Table 58 that the coefficients for age of the respondents, household size, awareness of vital nutritional role that tomatoes play in the human diet, price of fresh raw tomatoes and households income had the expected signs and statistically significant at the specified confidence levels, indicating that the afore-mentioned factors have significant influence on the amount of locally processed tomatoes consumed. For instance, an increase in the awareness of vital nutritional role that tomatoes play in the human diet significantly increases the quantity of locally processed tomatoes by 1.42%. Like the results of multinomial logit model, the results of OLS linear regression model in Table 58 show that sex of the respondents, household preference for particular type of processed tomatoes, quality of processed mangoes and price of locally processed tomatoes have similar effects on probability of consuming processed tomatoes and quantity of locally processed tomatoes consumed by households in the study areas.

Notable differences in the statistical significant were observed for frequency of promotion and price of imported processed tomatoes. As can be seen from Table 58, the afore-mentioned factors had no significant effect in explaining the variation in the quantity of locally processed tomatoes consumed. However, using multinomial logit model the same variables appeared to have significant influence on probability of consuming processed tomatoes among households. Although the dummy for study regions had significant influence on both probability of consumption and quantity of locally processed tomatoes consumed, disparities in the *a priori* signs were observed between multinomial logit and OLS regression models' results. Contrary to the multinomial logit model results, the coefficient for dummy for study regions seemed to suggest that households in Tanga, Iringa and Dodoma regions consumed larger

quantities of locally processed tomatoes than their counterparts in Dar es Salaam region. This is probably due to the fact that there is availability of many brands of processed products in Dar es Salaam region compared to the other three regions subsequently households may choose to consume imported processed tomatoes and not similar products of Tanzanian origin.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This study provides empirical evidence relating to processing, marketing and demand for processed fruits and vegetables in Tanzania using Dar es Salaam, Tanga, Iringa and Dodoma region as case studies. Specifically, the study aimed at (i) assessing processing potential and identify constraints affecting the performance of fruits and vegetables processing firms; (ii) examining the marketing system for processed products and identify constraints affecting marketing of locally processed fruits and vegetables; (iii) analyzing the consumption pattern for processed fruits and vegetables and determine the main factors affecting their demand and (iv) suggesting strategies for stimulating and promoting processing, marketing and consumption of locally processed fruits and vegetables.

Data for the study were collected from 320 households, 77 traders and 59 processors through interviews using structured questionnaires. A multi- stage sampling procedure was used as a technique for sample selection. Both descriptive statistics and econometric models were employed to analyze the data. While a substantial part of the analysis was based on descriptive statistics, multinomial logit model was used to determine factors that influence demand for processed mangoes and tomatoes at the household level. Correspondingly, OLS regression model was used as an error correction model to verify whether the factors influencing the probability of consuming processed mangoes and tomatoes have similar effects on quantity of locally processed mangoes and tomatoes consumed by households in the study areas.

This chapter presents conclusions and recommendations based on the major findings of the study.

5.1 Conclusions

5.1.1 Fruits and vegetables processing

The analysis of fruits and vegetables processing at firm level have shown that processing firms were operating below their capacities throughout the year with higher capacity utilization being achieved during peak period of production of fresh fruits and vegetables than off season, partly due to unavailability of raw fresh materials during off-season. Lack of market, inadequate working capital, stiff competition from similar products processed abroad, weak linkages with suppliers of fresh raw materials and high costs for certifying products were the major constraints that affect performance of local fruit and vegetable processing firms across the study regions.

5.1.2 Marketing of processed fruit and vegetable products

The analysis of marketing system for processed products indicates that processing firms had difficulties in disposing off locally processed products probably due to competition from fresh fruits and vegetables and similar imported processed products. On average, the quantities of imported processed products marketed by sample traders in almost all four regions were significantly larger than similar products of Tanzanian origin except for tomato. The market for processed fruits and vegetables in all four regions was not monopolized by few individuals. However, retailers by far seemed to be the major and reliable source of supply of all processed fruits and vegetables in all four regions. Despite the fact that constraints affecting marketing of

locally processed fruits and vegetables in the study areas were location specific, it seems that lack of promotion and advertisement, lack of market and stiff competition from similar products processed abroad were the major constraints across all four study regions.

5.1.3 Consumption pattern of processed products

From the analysis of consumption pattern of processed products using descriptive statistics, it can be further concluded that locally processed fruits and vegetables were preferred more by households in all four regions to similar products processed from abroad, indicating that there is demand for locally processed products. However, the quantities of almost all processed products consumed were significantly higher during off season than during harvest season. This is partly attributed to unavailability of fresh raw fruits and vegetables during off season. With the exception of tomatoes, households in all four study regions consumed significantly larger quantities of imported processed fruits and vegetables than similar products processed in the country, partly due to availability in the market at the right time and place and stiff competition from imported processed products in terms of quality and prices.

5.1.4 Factors influencing demand for processed mangoes

Based on the results of the multinomial logit model, it can be concluded that sex of household heads, household preference of consuming particular type of processed mangoes, awareness of the vital nutritional role that mangoes play in the human diet, frequency of promotion, price of fresh mangoes, price of imported processed mangoes and household income are important factors that increase the probability of consuming processed mangoes in the study areas. On the other hand, quality of

processed mangoes, price of locally processed mangoes and dummy for study regions are significant factors that reduce the probability of consuming processed mangoes. The results of OLS model revealed price of imported processed mangoes, household income, education level attained by respondents, age of household head, availability of locally processed mangoes, quality of locally processed mangoes, price of locally processed mangoes and dummy for study regions are important factors that affect the quantity of locally processed mangoes consumed by households in the study areas.

5.1.5 Factors influencing demand for processed tomatoes

Based on the results of the multinomial logit model, it can also be concluded that sex of household heads, household preference for particular type of processed tomatoes, quality of processed tomatoes, price of imported processed mangoes and dummy for study regions are important factors that increase the probability of consuming processed tomatoes in the study areas. On the other hand, frequency of promotion and price of locally processed tomatoes are significant factors that had negative influence the probability of consuming processed tomatoes. Based on OLS results, the study also revealed that sex of respondents, age of household head, household size, household preference of consuming locally processed tomatoes, awareness of vital nutritional value that processed tomatoes play in human diet, quality of locally processed tomatoes, price of fresh tomatoes, price of locally processed tomatoes, household income and dummy for study regions are important factors that affect the quantity of locally processed mangoes consumed in the study areas.

5.2 Recommendations

In view of the major findings of the study and the above conclusions, the following recommendations are made in order to stimulate and promote processing, marketing and consumption of locally processed fruits and vegetables in Tanzania.

5.2.1 Policy recommendations

(a) Improving capacity utilization of processing firms

Analysis of the results showed that processing firms were not able to utilize their capacities almost throughout the year, but more serious during the off season. In order to off-set the situation, deliberate efforts should be made by policy makers and other stakeholders to ensure that full potential for processing of fruits and vegetables is exploited. Such measures may include: (i) Encouraging investment in fruit and vegetable processing in areas with high potential for producing fruits and vegetables. This can be achieved by facilitating processors' accessibility to credit for purpose of overcoming their financial needs as stipulated in the Small and Medium Enterprises Development Policy (*SMEDP*), National Trade Policy (*NTP*) and National Microfinance Policy (*NMP*). (ii) Strengthening links between processors and suppliers of fresh raw materials in order to overcome constraints relating to unavailability of fresh raw materials and weak linkages with suppliers of fresh raw materials. This can be achieved by facilitating establishment of contracts between different actors along fruit and vegetable value-chains.

(b) Regulating importation of fruits and vegetables

Stiff competition from imported processed fruits and vegetables found to be one of the important factors affecting performance of processing firms. This constraint can

be reduced by regulating imports through tax harmonization and rationalization to encourage further investment in the fruit and vegetable processing factories and ensure that all imported fruits and vegetables should be well-monitored and accordingly taxed for purpose of reducing unfair competition from them.

(c) Reducing certification costs of locally processed products

High cost for certifying products was one of the most important constraints influencing performance of fruit and vegetable processing firms. In order to address the situation, there is a need for the government to harmonize and decentralize activities undertaken by TBS and TFA in order to avoid unnecessary costs attributed by duplication of the activities and to cater for the needs of various beneficiaries in the country, particularly for those located to peripheral.

(d) Improving market access

Lack of market for locally processed fruits and vegetables was mentioned as a major constraint which led to difficulties of disposing off processed products among interviewed processors. In order to improve the situation, it is recommended that market development strategies for locally processed fruits and vegetables should be established and strengthened. This can only be successfully achieved through: (i) Encouraging processors and traders to frequently promote products in order to inform and attract customers to buy locally processed fruits and vegetables, (ii) understanding customers' needs and take them into accounts in making decisions about what products to process and how to process and handle/package products, (iii) selecting strategic location of business premises convenient to customers with the aim of getting more customers, and (iv) providing both processors and traders of local

products with business and marketing skills to enable them compete with traders of similar products processed abroad.

(e) Establishing advertisement and promotion campaigns and programmes

Inadequate advertisement and promotion were found to be among the major problems affecting marketing of locally processed products. Also, advertising was one of the most important factors significantly influencing the probability of consuming processed mangoes and tomatoes. To promote consumption and expand market for locally processed products, therefore, deliberate efforts should be made by government and all actors within the fruit and vegetable value chains to frequently advertise and promote their products. One way of ensuring this would be for the government to establish a low cost effective system as an incentive for local processors and traders to advertise and promote their products at relatively affordable costs.

(f) Improving availability and accessibility of market information

Lack of market information was one of the factors affecting marketing of locally processed fruits and vegetables. In order to improve the situation, there is a need to establish market information network and encouraging different actors within the fruits and vegetables commodity chain to exploit fully the potential of modern information technology available in Tanzania. One way of achieving this is to ensure that both processors and traders have access to internet, cell phones, Television (TV), radio and magazines.

(g) Improving and maintaining quality standards of processed products

It was also observed that quality of products was one of the most important factors influencing households purchasing decisions and demand for locally processed mangoes and tomatoes. These results suggest that any policy related to total quality control (TQC) and improvement of quality standards of processed products could be used as strategy for promoting consumption of locally processed products in Tanzania. One way of achieving this would be for the regulatory institutions like TBS and TFDA set quality standards for locally processed products and be effective and efficient on enforcing legislations and laws related to quality control and maintenance for food products.

(h) Reducing prices of locally processed fruits and vegetables

The demand for locally processed mangoes and tomatoes was found to be responsive to change in own prices. This suggests that price related policies could be used to promote consumption of locally processed fruits and vegetables. However, setting low prices for consumers can be achieved if efforts are made to lower processing and marketing costs through scale economies and improvement in processing, handling and distribution.

5.2.2 Suggestions for future research

Since consumer preferences may change over time and consumption patterns may vary geographically, similar study should be conducted in other areas of the country to ascertain the extent to which the findings of this study are applicable in other areas. Research is also needed to establish how Tanzania's farmers, traders and processors can be effectively co-ordinated to become competent suppliers of processed fruits and

vegetables to niche markets both domestic and internationally. Research along these lines will generate important information on alternative approaches to be used in order to stimulate and promote processing, marketing and consumption of locally processed fruits and vegetables in the country.

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APPENDICES

Appendix 1: Questionnaire for households

RESEARCH ON ANALYSIS OF PROCESSING, MARKETING AND DEMAND FOR PROCESSED FRUITS AND VEGETABLES IN TANZANIA

Dear respondent, I am requesting you to participate in this study by filling in a questionnaire and respond to a few questions. As an interviewee you are very important part in this study because you present million of consumers in Tanzania who are not in the selected sample. I assure you that your answers will only be used for scientific purposes in the framework of this study. Thus, **YOUR INFORMATION WILL BE TREATED STRICTLY CONFIDENTIALLY** and will be presented in the form of statistical reports.

It should be noted that the findings emanating from this study will be an important tool for policy makers, government institutions and other development agencies such as NGO's, CBO's and international organizations to better design or fine-tune their development policies, design specific planning intervention strategies and develop long-term research policies aimed at stimulating and promoting the consumption of locally processed agricultural products in both domestic and foreign market so as to prevent the high magnitude levels of post harvest losses of perishable agricultural products and hence augment production and productivity sustainably amongst small holder farmers in Tanzania. Thank you very much for your kind participation and God bless you abundantly.

PART I : BACKGROUND INFORMATION

- (i) Date of interview _____
- (ii) Name of respondent _____
- (iii) Role in the household _____ 1= Head of household 2 = House wife 3= Son/daughter of the household
4 = Others specify...
- (iv) Ethnicity _____
- (v) Nationality _____
- (vi) Gender/sex _____ 1 = Male 2 = Female
- (vii) Highest level of education attained by the respondent/owner _____ (Years in school)
1.= Primary level std 1-8 2. = Secondary level 0' level 1-4 3.= Secondary level A' level 5-6 4. = Diploma level
5.= Degree level 6. = Others (specify)
- (viii) Age of respondent _____(years)
- (ix) Marital status _____ 1. = Married 2 = Single 3 = Separated 4 = Widow
- (x) Occupation _____
1. = Civil servant 2 = Business man/woman
3 = Retired officer with pension 4 = Retired officer without pension
5 = Farming 6. = Salaried employment 7 = Others (specify).....
- (xi) Please indicate your job status _____ 1= Full time 2= Part time 3= Infrequent 4= None of the above (Specify).....
- (xii) Number and sex of family members in the following age groups:-

Sex	0 – 6 Years	7 – 17 Years	18–45 Years	46–59 Years	Over 60 Years	Total
Males						
Female						
Total						

- (xiii) Residence:-
(1) Village/street _____ (2) Ward _____
(2) Division _____ (4) District _____
(5) Region _____
- (xiv) Location of the buyer _____
1. = 0-0.5 km from city/town centre 2.= 0.51-5 km from city/town centre
3. = Over 5 km from city/town centre.
- (xv) How long have you been staying in this region? _____
1. = Below 5 years 2.= Between 5 – 9 years 3.= Between 10 – 15 years
4. = Between 16 – 20 years 5. = Between 21 – 25 years 6. = Above 25 years
- (xvi) Religion of the household head or consumer _____ 1 = Christian 2 = Muslim 3 = Others (Specify)
.....

PART II: CONSUMPTION PATTERN OF PROCESSED FRUITS AND VEGETABLES

- (i) Do you consume processed fruits and vegetables such as oranges and tomatoes?
(If not consuming go to item v) _____ 1 = Yes 2. = No
- (ii) (a) If yes which processed fruits and vegetables do you prefer to eat? _____
1 = Locally processed products 2 = Imported processed products
(b) Why? Give reasons _____
1 = Less expensive 2. = Available at right time 3 = Available at right place
4 = Good quality product 5. = Others (specify)
- (iii) How often do you consume the following food items? {Choose the most correct answer below table}

Food items	During harvest season	Reason	During off season	Reason
Locally fresh tomatoes				
Locally processed tomatoes				
Imported processed tomatoes				
Locally fresh oranges				
Locally processed oranges				
Imported processed oranges				
Locally fresh mangoes				
Locally processed mangoes				
Imported processed mangoes				

Frequency of consumption:- 1= often 2= Rarely 3= Others (Specify).....

Reasons:- 1= Easily available at right time 2= Easily available at right place 3= Not available at right time

4= Not available at right place 5= Good quality product 6= Poor quality product 7= affordable 8= Not affordable 9= Personal preference 10= Often advertised/promoted 11= Not often advertised/promoted 12= Others (specify).....

(iv) Indicate the quantity purchased and price paid for each of the following food item shown below *(Thereafter go to item ix)*

Food items	Average quantity during harvest season			Average price/litre/kg/tin/heap/debe/bottle	Average quantity during off season			Average price /litre/kg/heap/debe/bottle
	Daily	Weekly	Monthly		Daily	Weekly	Monthly	
Locally processed tomatoes (Specify)								
Imported processed tomatoes (Specify)								
Locally processed oranges (Specify)								
Imported processed oranges (Specify)								
Locally processed mangoes (Specify)								
Imported processed mangoes (Specify)								

- (v) If no what are reasons for not consuming processed fruits and vegetables? _____
 1 = High price 2 = Low purchasing power. 3 = Not available at right time.
 4 = Not available at right place 5 = Poor quality 6 = Lack of awareness.
 7 = Not our habit to consume processed food. 8 = Processed product affect human health.
 9 = Others (Specify).....

- (vi) (a) What type of unprocessed fruits and vegetables do you prefer to eat? _____
 1 = Locally unprocessed fruits/vegetables 2 = Imported unprocessed fruits/vegetables
 (b) Why give reasons?.....

(vii) How often do you consume each of the following unprocessed fruits and vegetables? *{Select the most correct answer below table}*

Food items	During harvest season	Reason	During off season	Reason
Locally fresh tomatoes				
Imported fresh tomatoes				
Locally fresh oranges				
Imported fresh oranges				
Locally fresh mangoes				
Imported fresh mangoes				

Frequency of consumption:- 1= often 2= Rarely 3= Others (Specify)

Reasons:- 1= Easily available at right time 2= Easily available at right place 3= Not available at right time 4= Not available at right place 5= Good quality product 6= Poor quality product 7= affordable 8= Not affordable 9= Personal preference 10= Often advertised/promoted

11= Not often advertised/promoted 12= Others (specify).....

(viii) Indicate the quantity purchased and price paid for each of the following unprocessed fruits and vegetables shown below

Food items	Average quantity during harvest season			Average price /litre/kg/heap/debe/bottle	Average quantity during off season			Average price /litre/kg/heap/debe/bottle
	Daily	Weekly	Monthly		Daily	Weekly	Monthly	
Locally fresh tomatoes								
Imported fresh tomatoes								
Locally fresh oranges								
Imported fresh oranges								
Locally fresh mangoes								
Imported fresh mangoes								

(ix) What factors do you consider when you decide to purchase each of the above mentioned food items?
 1. = Price offered 2. = Quality of the product 3. = Availability at right time 4. = Availability at right place 5. = Personal relationship with Traders/processors
 6. = Purchasing power/availability of cash 7 = Honesty of traders/processors
 8 = Others (specify).....

(x) In your own opinion, what specific age groups (of household members) often consume each of the following food items and why? Give reasons. *{Choose the most correct answer below table}*

Food items	During harvest season	Reason	During off season	Reason
Locally processed tomatoes				
Imported processed tomatoes				
Locally processed oranges				
Imported processed oranges				
Locally processed mangoes				
Imported processed mangoes				

Age group family members: 1= 0-6 years old 2= 7-17 years old 3= below 18 years old 4= Above 18 years old 5= All of the above age groups 6= Others (Specify).....

- (xi) In your opinion, how do you rate the following food items as far as consumption preferences among your household Members are concerned? *(Tick appropriate column)*

Food item	Ranking			
	1	2	3	4
Locally processed oranges				
Locally processed mangoes				
Locally processed pineapples				
Locally processed pension				
Locally processed tomatoes				
Imported processed Oranges				
Imported processed mangoes				
Imported processed pineapples				
Imported processed pension				
Imported processed tomatoes				

Ranking: 1= Most preferred 2 = preferred 3 = Less preferred 4 = Not preferred at all.

- (xii) In your own opinion, what is the likely consumption pattern of each of the following food items in the next 10 years? *{Choose the most correct answer below table}*

Food item	Expected consumption pattern during harvest season	Reasons for change	Expected consumption pattern during off season	Reason for changes
Locally processed tomatoes				
Imported processed tomatoes				
Locally processed oranges				
Imported processed oranges				
Locally processed mangoes				
Imported processed mangoes				

Expected consumption pattern over time horizon

1= Will decrease 2= Will remain the same 3= Will increase 4= Will stop 5= Others (Specify).....

Reasons for the expected changes

1= Less expensive 2= Very expensive 3= increased availability 4= Not available 5= Good quality product 6= Poor quality product 7= Improved marketing and distribution system 8= Poor marketing and distribution system 9= Increased awareness amongst consumers due to advertisement and promotion 10= Lack of consumer awareness due to lack of advertisement and promotion 11= Improved purchasing power amongst consumers 12= Low purchasing power amongst consumers 13= Excessive government efforts to promote consumption of locally processed and fresh products 14= Lack of government strategies to promote the consumption of locally processed and fresh products 15= Increased awareness of negative effect in terms of disease associated with processed products 16= Others (specify).....

- (xiii) Comment on the consumption habit with regard to each of the following food items and then give reason. *{Choose the most correct answer below table}*

Food item	Consumption habit	Reason
Processed tomatoes		
Processed oranges		
Processed mangoes		

Consumption habit: 1= Commonly used as part of human diet 2= Not commonly used as part of human diet 3= Others (Specify).....

- (xiv) (a) Do you generally believe that consumption of locally processed fruits and vegetables such as oranges and tomatoes in Tanzania is affected by strong competition caused by illegal importation of all kinds of processed fruits and vegetables? _____ 1 = Yes 2 = No.

- (b) If yes, assess the effect of competition on consumption of each of the following food item. *{Select the most correct answer below table}*

Food item	During harvest season	Reason	During off season	Reason
Locally processed tomatoes				
Locally processed oranges				
Locally processed mangoes				
Imported processed tomatoes				
Imported processed oranges				
Imported processed mangoes				

Consumption pattern: 1= Consumption increased 2= Consumption remain the same

3= Consumption decreased 4= Others (specify).....

Reasons: 1= Strong competition lead to low consumption 2= Competition accelerated/promoted consumption amongst people 3= Others (specify).....

- (c) How can government policies such as importation and taxation system be improved or fine tuned in order to stimulate and promote the consumption of locally processed fruits and vegetables in Tanzania and expand exports to neighbouring countries?.....

- (xv) (a) Which are the most serious problems affecting the consumption of both locally and imported processed oranges and tomatoes in your area? *{Select the most correct answer below table}*

Food items	Problem during harvest season	Problem during off season
Locally processed tomatoes		
Locally processed oranges		
Locally processed mangoes		
Imported processed tomatoes		
Imported processed oranges		
Imported processes mangoes		

Problems 1= High price 2= Not easily available at right time 3= Not easily available at right place 4= Low purchasing power amongst consumers 5= Strong competition caused by illegal importation of all kind of products 6= Poor infrastructure facilities such as transport and electricity 7= Tendency to value imported product as the best as compared with locally processed products 8= Lack of sales promotion and advertisement resulted to unawareness amongst consumers 9= Poor quality product 10= Bad consumption habit due to people do not consider processed oranges and tomatoes as the main food in human diet 11= Ignorance of significant role that processed products play in human diet 12= Low level of technology for processing fruits and vegetables 13 = Others (Specify).....

- (b) In your own opinion, please specify the main route cause and possible solution of the problems highlighted in item (a)

Specific Problem	Problem code	Route cause	Possible solution

- (xvi) From your own assessment, how can consumption of locally processed fruits and vegetables such as oranges and tomatoes be stimulated?.....

- (xvii) (a) Are you aware of vital role that processed fruits and vegetables playing on human health and nutrition?.....
1= Yes 2= No

- (b) Justify your answer.....

PART III: AVAILABILITY, PROMOTION AND QUALITY OF PROCESSED FRUITS & VEGETABLES

- (i) Which kind of processed fruits and vegetables are easily available in the market?, If not available give reasons *{Select the most correct answer below table}*

Food items	During harvest season		During off season	
	Option	Reason (if not easily available)	Option	Reason (if not easily available)
Locally processed tomatoes				
Locally processed oranges				
Locally processed mangoes				
Imported processed tomatoes				
Imported processed oranges				
Imported processed mangoes				

Option:- 1= Easily available 2= Not easily available 3= I don't know

Reasons:- 1= Lack of preference 2= Poor marketing system caused by lack of infrastructure facilities such as transportation 3 = Strong competition caused by illegal importation of all kind of products 4= Lack of awareness caused by lack of advertising and sales promotion 5 = Others (Specify)
.....

- (ii) (a) Please indicate source of purchasing each of the following food items? *{Select the correct answer below table}*

Food items	Frequency of purchasing during harvest	Source	Frequency of purchasing during off season	Source
Locally processed tomatoes				
Locally processed oranges				
Locally processed mangoes				
Imported processed tomatoes				
Imported processed oranges				
Imported processed mangoes				

Frequency of purchasing: 1= Daily basis 2= weekly basis 3= Monthly basis 4= Others (Specify).....

Sources:- 1= Retailers 2= Whole sellers 3= Processors 4= Others (Specify).....

- (b) Which of the sources mentioned above is the most efficient? Why? Give reasons *{Choose the correct answer below table}*

Food item	Source code	Reason
Locally processed tomatoes		
Locally processed oranges		
Locally processed mangoes		
Imported processed tomatoes		
Imported processed oranges		
Imported processed mangoes		

Sources :- 1= Retailers 2= Whole sellers 3= Processors 4= Others (specify)

- (iii) (a) Please comment on the condition of marketing system of the following food items for the last 5 years *{Choose the correct answer below table}*

Food item	Condition of marketing system during harvest season	Condition of marketing system during off season
Locally processed tomatoes		
Imported processed tomatoes		
Locally processed oranges		
Imported processed oranges		
Locally processed mangoes		
Imported processed mangoes		

Condition of marketing system: 1 = Efficiently conducted 3= Improved tremendous 2= Not efficiently conducted 4= Not improved 5= Others (specify).....

- (b) With regard to question in item “a” above, do you think the marketing system of the following food items could be improved? **Option:-** 1= Yes 2= No

Food items	Option
Locally processed tomatoes	
Imported processed tomatoes	
Locally processed oranges	
Imported processed oranges	
Locally processed mangoes	
Imported processed mangoes	

- (c) If yes, what kind of improvements required to be put in place or how efficiency of the marketing system of processed fruits and vegetables be improved?
- (iv) Indicate which of the following food items known to majority of people in your area? Why? Give reasons. **{Choose the correct answer below table}**

Food items	Level of awareness	Reasons
Locally processed tomatoes		
Imported processed tomatoes		
Locally processed oranges		
Imported processed oranges		
Locally processed mangoes		
Imported processed mangoes		

Level of awareness amongst consumers 1= Very known 2= Not known 3= Others (Specify).....

Reasons:- 1= Often advertised/ promoted 2= Not advertised/ promoted 3= Others (specify).....

- (v) In your opinion, indicate the quality (in terms of nutrition value) of each of the following food items.

{Choose the correct answer below table}

Food item	Quality it terms of nutrition value
Locally processed tomatoes	
Imported processed tomatoes	
Locally processed oranges	
Imported processed oranges	
Locally processed mangoes	
Imported processed mangoes	

Ranking of quality:- 1= Good quality 2= Moderate quality 3= Poor quality 4= Others (specify).....

- (vi) In your opinion, how important were the following factors for your decisions to purchase / consume the following food items. **{Choose the most correct answer below table}**

Factor	Locally processed fruits and vegetables	Imported processed fruits and vegetables
Frequent advertisement		
Quality of products		
Price offered		
Availability at right time		
Availability at right place		
Consumption habits amongst consumers		
Norms and believes		
Purchasing power (Economic status)		
Gender		
Credit availability		
Location of supermarkets / shops		
Awareness of vital role of processed fruits and vegetables on human health		
Psychological effects (Tendency to value imported products)		

Option: 1 = Very important 2 = Important 3 = Not important at all

(i) What is your main source of income (*List them in order of importance*)?

Source	Rank	Reasons
Formal employment		
Business		
Farming		
Remittances		
Others (specify)		

(ii) What is average monthly income? _____ TZS

(iii) Does the income you receive differ from month to month? _____ 1 = Yes 2. = No

(iv) In which months does it differ and by how much? _____

(v) Circle the income in which your average monthly lie _____

1 = Below 40,000 TZS

2 = Between 40,000 and 100,000 TZS

3 = Between 100,001 and 500,000 TZS 4 = Above 500,000 TZS

(vi) Could you please indicate the total amount of Tanzania shillings spent on each of the following food items as shown below:-

Products	Total average expenditure (TZS) during harvest period per Month	Total average expenditure (TZS) during off season per Month
Fresh Tomatoes		
Locally Processed Tomatoes		
Imported Processed Tomatoes		
Fresh Oranges		
Locally Processed Tomatoes		
Imported Processed Tomatoes		
Fresh Mangoes		
Locally Processed Mangoes		
Imported Processed Mangoes		

Appendix 2: Questionnaire for traders

PART I:- BACKGROUND INFORMATION

- (i) Date of interview _____
 (i) Name of Respondent/Organization/Company _____
 (iii) Ethnicity _____
 (iv) Nationality _____
 (ii) Gender/Sex _____ 1 = Male 2 = Female
 (vi) Highest educational level of respondent/owner attained _____
 1 = Primary level (1-8) 2 = Secondary 'O' level (1-4) 3 = Secondary A' level (5-6)
 4 = Diploma level 5 = Degree level (6) other specify
 (vii) Age of Respondent (years) _____
 (viii) Marital Status _____ 1 = Married 2 = Single 3 = Separated 4 = Widow
 (ix) Residence or Location:-Village/Street _____ 2. Ward _____ 3. Division _____
 4. District _____ 5. Region _____

PART II:- BUSINESS DESCRIPTION

- (i) How long have you been working as a trader? _____ years/months
 (ii) Form of ownership of the business ____ 1= Individual 2. = Partnership 3 = State/cooperative 4 = Others (specify).....
 (iii) Year established the business _____ Years.
 (iv) Location of the business _____ 1 = Urban 2 = Peri-urban 3 = Rural
 (v) Reasons for establishing business
 (vi) How much capital did you use to start the business _____
 1 = Below 100,000.00 TZS 2 = Between 100,000.00 – 500,000.000 TZS
 3 = Between 500,001.00 – 1,000,000.00 TZS 4 = Above 1,000,000.00 TZS
 (vii) How did you get the start up capital? _____ 1 = Own saving 2 = family 3 = friends 4 = Money lender 5 = Bank loan
 (viii) What were conditions for 2,3,4, and 5 in question (vii) above
 (ix) Type of business/trade _____ 1 = Retailer 2 = Wholesaler 3= Both 1 and 2 4= Transporters 5 = Other specify
 (x) What is the status of business? _____ 1= Full time 2= Part time 3= Infrequent 4= None
 (xi) (a) Do you have technical knowledge relating to your business ? _____ 1= Yes 2= No
 (b) How did you get your business knowledge ? _____ 1= Formal training 2= Informal training
 3= Trial and error 4= None of above
 (xii) (a) Have you registered your business ? _____ 1= Yes 2= No
 (b) If no Why ? Give reasons ?.....
 (c) Did you obtain your license easily ? _____ 1= Yes 2= No
 (d) If no why, Give reasons.....
 (xiii) (a) Do you hire or own this business premise ? _____ 1= hire 2= own
 (b) If hired, what is the rent per month or year _____ TShs.

PART III:- PROCESSED FRUITS AND VEGETABLES HANDLING

- (i) Please specify the following concerning the processed fruits and vegetables you normally handle in the period of five years.

Year	Origin	S/no	Product type	Average quantity (tons, kg, litre)	Source country/region
2003	Local	1			
		2			
	Imported	1			
		2			
2002	Local	1			
		2			
	Imported	1			
		2			
2001	Local	1			
		2			
	Imported	1			
		2			
2000	Local	1			
		2			
	Imported	1			
		2			
1999	Local	1			
		2			
	Imported	1			
		2			

- (ii) State reasons for preferring each of the above sources mentioned in question (ii) above.

S/No.	Source	Reasons

Reasons

1. = Easily available at right time 2. = easily available at right place 3. = Affordability
 4. = Good quality products 5. = Personal tie with processors 6. = honesty of processors
 7. = availability of credit. 8. = Others (specify).....

- (iii) (a) Which processed fruits and vegetables do you prefer to handle ? _____ 1= locally manufactured 2= Imported

- (b) Why? Give reasons _____

- 1= Readily available at right time 2= Readily available at right place 3= Both 1 and 2
 4= Frequently consumed by customers 5= Good quality products 6= Obtain on credit basis
 7= Affordability 8= Personal interest 9= (Others specify).....

PART IV:- MARKETING CONDITION OF PROCESSED FRUITS AND VEGETABLES

- (i) (a) Who are your major customers? (List them in order of importance)

S/No.	Name of customer	Place/region
1		
2		
3		

- (b) Has the number of customers increased, decreased or remained the same during the past 5 years?

- 1= Increased 2= Decreased 3= Remained the same 4= Others (Specify).....

- (c) Give reasons for answer in part "b" above.....

- (ii) (a) Which processed fruits and vegetables are easily sold to consumers and why? ____

- 1 = Locally processed Oranges 2 = Locally processed Tomatoes
 3 = Imported processed Oranges 4 = Imported processed tomatoes
 5 = Others (specify).....

- (b) What are the reasons for your answer in item (a) ? _____

- 1 = Good quality products 2 = Awareness of consumers 3 = Highly advertised
 4 = Highly preferred 5 = less expensive as compared with other products
 6 = Customers tend to value imported products as opposed to locally manufactured products.
 7 = Other (specify)

- (iii) What is the approximate numbers of buyers per day/ week/ month per products?

Type of product	Number of buyers per day/week/month					
	Locally made			Imported		
	Day	Week	Month	Day	Week	Month
Processed tomatoes						
Processed oranges						
Others (Specify)						

- (iv) (a) Is there any seasonality in the demand of your customers for both locally and imported processed fruits and vegetables?

- _____ 1= Yes 2= No

- (b) If yes, specify time and why?

Product type	Time horizon	Changes	Reasons
Locally made	Jan-March		
	April-June		
	July-Sept		
	Oct-Dec		
Imported	Jan-March		
	April-June		
	July-Sept		
	Oct-Dec		

- Changes experienced** 1= Number of customers increasing 2 = Number of customers remain the same
 3= Number of customers decreasing 4 = Number of customers fluctuating

Reasons for changes

- 1= Increase in purchasing power 2= Decrease in purchasing power 3= Products are readily available
 4= Others (Specify).....

- (i) What are average quantities and prices for each of the following food items?

Food item	Average selling quantity in kg/litre/ton				Buying price/ton/kg/litre/bottle	Selling price/ton/kg/litre/bottle
	Daily	Weekly	Monthly	Yearly		
Locally processed tomatoes						
Locally processed orange						
Imported processed tomatoes						
Imported processed oranges						
Others (Specify)						

- (vi) How well do you know about consumption of each of the following food items?

S/No.	Food items	Condition of consumption	Reasons
1	Locally processed tomatoes		
2	Locally processed oranges		
3.	Imported processed tomatoes		
4.	Imported processed Oranges		

Condition of consumption

1= Very high 2 = high 3= average/moderate 4 = low 5 = very low

Reasons:-

1 = Highly advertised 2 = Lack of promotion/advertising 3. = Expensive
 4 = Less expensive 5 = awareness of consumer 6 = consumer's not aware 7 = Good quality
 8 = Low quality 9 = others (specify) _____

- (vii) What kind of efforts have you made to ensure that customers know your products?

- (viii) Which specific role have you played in the marketing of locally processed products? _____

1 = selling to retailers 2 = selling to consumers 3 = selling to wholesalers
 4 = Buying from processors within the country 5 = importing processed products
 6 = Others (specify).....

- (ix) (a) What is your appropriate mode of delivery for product marketed to customers? _____

1= Own transport 2= Hired transport 3= None of the above but customers come to buy at business premises 4= Others (specify)

- (b) State the effectiveness and /or efficient of the delivery mode mentioned in part " a" above? _c _____

1= Very effective/efficient 2= Moderate 3= Not effective/ efficient

(c) If not effective/efficient, propose the alternative solutions to be put in place in order to overcome the prevailing situation...

- (x) How much do you pay for the following items when marketing your products?

Items	Amount in TZS	
	Monthly	Yearly
Transport facilities		
Loading/Unloading		
Government levy and other taxes		
Miscellaneous costs		

- (xi) (a) Do you advertise and /or promote your products? _____ 1= Yes 2 = No

(b) What is frequency of advertisement and/ or sales promotion per season and why?

Seasons	Response	Reasons
Harvest season		
Off Season		
Total		

Response for frequency of advertisement 1= One time 2= Two times 3= Three times 4= More than three times

- (c) Please comment on the impact of advertisement and/ or sales promotion in terms of marketing of your product?

Options:- 1= increased volume of product marketed 2= reduced volume of product marketed

3= Increased awareness of products amongst customers 4= Reduced awareness of products amongst customers

5= Both 1 and 3 above 6= Both 2 and 4 above 7= Others (Specify).....

- (xii) Please comments, the effect of trade liberalization adopted by the government on marketing of your products _____

Effects of trade liberalization 1= Increased volume of market share 2= Reduced volume of market shares 3= Increased customer's awareness 4= Reduced customer's awareness 5= Increased competition and hence reduced volume of market shares 6= Both 1 and 3 above 7= Both 2 and 4 above 8= Others (Specify).....

- (xiii) (a) Do you face any problem relating to losses associated with expiry of products, damage of product or closure of business by local council ? _____ 1= Yes 2= No

(b) If yes, indicate the average quantity and amount in Tanzania shilling for losses you incur per product

Type of losses	Product	Locally made		Imported	
		Average quantity in tons	Amount in TShs.	Average quantity in tons	Amount in TShs.
Expiry of products	Orange				
	Tomato				
Damaged products	Orange				
	Tomato				
Closure of business	Orange				
	Tomato				
Others (specify)					

(c) How do you overcome the losses itemized in part " b"

- (xiv) Which are the most serious problems you face in carrying out trading of food items:-

Problem			Cause	Possible solution
Government policy	Marketing system	Personal		

Problem related to government policy: 1 = Very high tax rate 2 = Difficulties in obtaining license 3 = Unnecessary by laws formulated by local government 4 = Failure to protect locally processed product through illegal importation of all kind of products 5 = Lack of government efforts to ensure that processors should produce good quality product 6 = Others (Specify)

Problem related to marketing system: 1 = Poor infrastructure facilities such as transport 2 = Lack of sales promotion and advertisement 3 = Lack of market 4 = Poor quality of locally processed products as opposed to imported processed products 5 = Unavailability of locally processed products 6 = Locally processed products are expensive 7 = Lack of credit facilities 8 = Lack of improved appropriate processing technology 9= Others (specify).....

Personal problems: 1 = Lack of working capital 2 = Lack of business knowledge 3 = Lack of business experience 4 = Limited labour forces 5. = Others (specify).....

- (xv) In your own opinion, suggest the kind of immediate and long term improvement that should be undertaken to improve the marketing systems of locally processed fruits and vegetables in Tanzania

(a) Immediate improvements.....

(b) Long term improvements.....

- (xvi) What kinds of capacity building required to promoting and strengthening the marketing of locally processed fruits and vegetables in Tanzania.....

Appendix 3: Questionnaire for processors

PART I:- BACKGROUND INFORMATION OF ENTREPRENEUR

- (i) Date of interview _____
- (ii) Name of Respondent/processor _____
- (iii) Ethnicity _____
- (iv) Nationality _____
- (v) Gender/Sex _____ 1 = Male 2 = Female
- (vi) Highest educational level attained _____
 1 = Primary level (Std 1-8) 2 = Secondary level O' level (Form 1-4)
 3 = Secondary level A' level (Form 5-6) 4 = Diploma level
 5 = Degree level 6 = Others (specify) _____
- (vii) Age of respondent (years) _____
- (viii) Marital Status _____
 1 = Married 2 = Single 3 = Separated 4 = Widow
- (ix) Residence:-
 (1) Village/Sheet _____ (2) Ward _____
 (3) Division _____ (4) District _____
 (5) Region _____

PART II:- DESCRIPTION OF THE FIRM

- (i) How long have you been involved in processing of fruits and vegetables products? _____ (years)
- (ii) Form of ownership of the firm ____ 1. = Individual 2. = Partnership 3. = State/Cooperative 4. = Others (specify) _____
- (iii) Year established the firm _____ Years
- (iv) Reasons for establishing the firm _____
- (v) How much capital did you use to start the firm? _____
 1 = Below 100,000.00 TZS 2 = Between 100,000.00 – 500,000.00 TZS
 3 = Between 500,001.00 – 1,000,000.00 TZS 4 = Above 1,000,000.00 TZS
- (vi) How did you get the start-up capital to establish the firm? _____
 1 = Own saving 2 = Family 3 = Friends 4 = Money lender (specify) _____
 5 = Bank loan 6 = Others (specify) _____
- (vii) What were conditions for 2-6 in question (vi) above? _____
- (viii) (a) Have you registered the firm? _____ 1. = Yes 2. = No
 (b) If no why? Give reasons _____
- (ix) (a) Did you obtain your license easily? _____ 1 = Yes 2 = No
 (b) If no Why ? Give reasons _____
- (x) Location of the firm _____ 1 = Urban 2 = Periurban 3 = Rural
- (xi) (a) Do you receive technical advice? _____ 1. = Yes 2. = No
 (b) If Yes where? _____
 (c) Comments on usefulness of technical advice obtained _____ 1. = Very useful 2. = Not useful 3. = I don't know
- (xii) Please tell me about the status of your firm 1= Full time 2= Part time 3= Infrequent 4= Others (Specify).....
- (xiii) (a) Do you hire or own this premise ? _____ 1= Hire 2= Own
 (b) If hired, what is the rent per month or year ? _____ TZS
- (xiv) What would you like for the government to do for the growth of your firm ?

PART III:- PRODUCTION PATTERN OF PROCESSED FRUITS AND VEGETABLES

- (i) What are the main products you process?
- (ii) (a) Please indicate the production capacity of your firm for each of the products listed in question (i) above

Type of product	During harvest season (Bottle, kgs, tons, litre)			During off season (Bottle, kgs, tons, litre)			Annual average total capacity (Bottle, Kgs, tons, litre)
	Daily	Weekly	Monthly	Daily	Weekly	Monthly	

(b) Are you able to reach your capacity for each of the products listed above If no, why? Give reasons

Type of product	Option during harvest season	Reasons (If no)	Option during off season	Reasons (If no)

Option:- 1= Yes 2= No

Reasons:- 1= Inadequate fresh products 2= Lack of working capital 3= Lack of market 4= Shortage of spare parts 5= Shortage of labour 6= Not profitable 7= Shortage of power (Electricity) 8= Lack of packaging materials 9.=Other (specify).....

(iii) Please indicate the average/actual quantity of products processed and prices obtained for the last five years

Year	S/No	Product type	Average quantity in tons/litres/bottle			Price/tons/kg/litre/bottle		
			Harvest season	Off season	Annual average quantity	Harvest season	Off season	Annual average price
2003	1							
	2							
2002	1							
	2							
2001	1							
	2							
2000	1							
	2							
1999	1							
	2							

(iv) (a) Do you plan to expand the production of your products in future? _____ 1= Yes 2= No

(b) If yes, indicate specific product, quantity and reasons for expansion

Specific product	Quantity/Month/Year	Reasons for expansion

Reasons for expansion

1= Availability of fresh products 2= Increased demand amongst consumers 3= Most profitable

4= Support from stakeholders that is NGO's, CBO's etc. 5= Availability of packaging materials

6 = Others (specify)

.....

(c) If no, why? Give reasons.....

1= Inadequate fresh products especially during off season 2= Lack of market

3= High cost of production 4= Lack of credit facilities 5= Lack of working capital

6=Limited business premises 7= Strong competition resulted from failure to protect locally processed product through illegal importation of all kind of products 8= Very high tax rate 9= Un-necessary by-laws formulated by local governments which hamper expansion of processing firms 10= Lack of support from governments and Other stakeholders 11= Others (specify).....

(v) (a) Which are the most serious problems affecting the performance of your firm?

(Please rank them in order of importance)

Rank	Problem relating to government policy	Problem relating to marketing systems	Personal problem
1			
2			
3			
4			
5			

Problem related to government policy: 1 = Very high tax rate 2 = Difficulties in obtaining license/registration 3= Unnecessary by laws formulated by local government 4 = Failure to protect locally processed product through illegal importation of all kind of products 5 = Others (specify).....

Problem related to marketing system: 1 = Poor infrastructure facilities such as transport 2 = Lack of sales promotion and advertisement 3 = Lack of market 4 = Poor quality of locally processed products as opposed to imported processed products 5 = Unavailability of raw materials 6 = High transport cost 7 = Lack of credit facilities 8 = Lack of appropriate processing technology 9 = Others (specify).....

Personal problems: 1 = Lack of working capital 2 = Lack of experience 3 = Lack of technical know how to run the business 4 = Limited labour forces 5 = Others (specify).....

(b) Please indicate the route cause and possible solution for the most critical problem listed above

Problem	Code	Route cause	Possible solution
Government policy			
Marketing systems			
Personal			

PART IV:- MARKETING OF PROCESSED FRUITS AND VEGETABLES

- (i) (a) Do you have any contracts with your suppliers of fresh products? _____ 1= Yes 2= No
 (b) How long have operated by contracting with your product suppliers? _____ Years
 (ii) (a) Do you have any contracts with your product customers? _____ 1= Yes 2= No
 (b) How long have you operated by contracting with your product customers? ----- (Years)

(iii) (a) Who are your major customers in the domestic and /or foreign market?

Domestic market		Foreign market	
Name of customer	Region/Place	Name of customer	Country

(b) Has the number of customers increased, decreased or remained the same during the past 5 years ? _____
 1 = Increased 2 = remained the same 3 = Decreased 4 = Fluctuating 5 = Others (specify).....

(c) Give reasons for answers in item "b" above.....

(d) What kind of efforts have you taken to ensure that your products are known to customers? ____

Kind of efforts undertaken

1= Advertisement and sales promotion using appropriate media 2= Improving product quality
 3= Both 1 and 2 4= Reducing price of the product 5= None of the above
 6= Getting license/ registration 7 = Others (Specify).....

- (iv) How well do you know about prices prevailing in the market? _____1= very well 2 = not very well 3 = others (specify)...
- (v) How do you get information regarding market price of your products _____
 1 = Direct visit to market 2 = Cross check with many middlemen
 3 = Hear from neighbours and friends 4 = Hear from mass media
- (vi) What major factors did you consider when you decide to sell your products? _____
 1 = Price offered 2 = Personal tie with Middlemen 3 = Honesty of middleman 4 = Others (specify).....

(vii) What are the average selling quantity and price of your products in the domestic market per season

Type of product	Quantity sold (tons)			Selling price (TZS/tons)		
	Harvest season	Off season	Annual average	Harvest season	Off season	Annual average

(viii) What are the average selling quantity and price of your products in foreign market per season? (Applicable to those processors who export the products)

Product type	Quantity sold (tons /litre)			Selling price (U.S dollars)		
	Harvest season	Off season	Annual average	Harvest season	Off season	Annual average

(ix) (a) Are the sales increasing, decreasing or remaining the same for each of the following markets.

Type of market	Type of product	Seasons	
		Harvest season	Off season
Domestic market			
Foreign market			

Option:- 1= Increasing 2= Decreasing 3= Remaining the same 4= Fluctuating 5 = Others (Specify)

.....
(b) Give reasons for answers in item " b" above.....

- (x) (a) How do you deliver your products ? _____
1= Own transport 2= Hired transport 3= None of the above but customers come to buy at production premises
4= Others (Specify).....
- (b) State the effectiveness and /or efficient of the delivery mode mentioned in part " a" above? ____
1= Very effective/efficient 2= Moderate 3= Not effective/ efficient 4= Others (Specify).....
- (c) If not effective/efficient, propose the alternative solutions to be put in place in order to overcome the prevailing situation.....
- (xi) (a) Do you face any competition (specify) from imported processed products/other similar firms? ____ 1. = Yes 2.= No
- (b) If yes, specify the extent of competition _____
1 = Very strong competition 2 = Moderate 3 = Low 4. = Very low 5= I don't know
- (c) How do you overcome the problem of competition?.....
- (d) If no why? give seasons

(xii) How much do you pay the following items when marketing your product?

Items	Average amount in TZS per season		
	Harvest season	Off season	Annual average
Transport facilities			
Loading and unloading			
Storage			
Packaging			
Government levy and other taxes			
Miscellaneous costs			

(xiii) (a) Do you advertise and /or promote your products ? _____ 1= Yes 2 = No

(b) What is frequency of advertisement and/ or sales promotion per season and why?

Seasons	Response	Reasons
Harvest season		
Off Season		
Total		

Response for frequency of advertisement 1= One time 2= Two times 3= Three times 4= More than three times

(c) Please comment on the impact of advertisement and/ or sales promotion in terms of marketing of your product?
.....

Options:- 1= increased volume of product marketed 2= reduced volume of product marketed
3= Increased awareness of products amongst customers 4= Reduced awareness of products amongst customers 5= Both 1 and 3 above 6= Both 2 and 4 above 7 = Others (Specify).....

(xiv) Please comments, the effect of trade liberalization adopted by the government on marketing your products

Effects of trade liberalization:-

1= Increased volume of market share 2= Reduced volume of market shares
3= Increased customer's awareness 4= Reduced customer's awareness
5= Increased competition and hence reduced volume of market shares 6= Both 1 and 3 above
7= Both 2 and 4 above 8= Others (Specify).....

- (xv) Which specific role have you played within value added commodity chain in marketing system? _____
1 = Buying raw material from farmer and processing 2 = Processing and selling to trader
3 = Processing and distributing the products to various customers 4. = All of the above
5 = Others (specify) _____

(xvi) Point out the most serious marketing problems you face in selling your products?.....

(xvii) In your own opinion, suggests the kind of immediate and long-term improvement that should be undertaken to improve the marketing systems of locally processed fruits and vegetables in Tanzania

- (a) Immediate improvements.....
(b) Long term improvements.....

(xviii) What kinds of capacity building required to promoting and strengthening the marketing of locally processed fruits and vegetables in Tanzania.....

Appendix 4a: ANOVA results for average quantities and prices of processed fruits and vegetables

(a) Part One: Results of ANOVA

Variable		Sum of Squares	df	Mean Square	F- Value	Significanc e
Price Per Unit Locally Processed Tomatoes During Harvest Season (in TShs)	Between					
	Groups	626145.6999	3	208715.2333	6.034537397	0.000618867
	Within					
	Groups	6087273.745	176	34586.78264		
	Total	6713419.444	179			
Price Per Unit (kg or Litre) Locally Processed Tomatoes during off season (in TShs)	Between					
	Groups	398889.0291	3	132963.0097	2.816588858	0.040418634
	Within					
	Groups	8922143.095	189	47207.10632		
	Total	9321032.124	192			
Price Per Unit (litre or kg) Locally Processed Oranges During Harvest Season (in TShs)	Between					
	Groups	2002504.25	3	667501.4165	7.003075162	0.00020659
	Within					
	Groups	12772273.29	134	95315.47229		
	Total	14774777.54	137			
Price Per Unit (litre or kg) Locally Processed Oranges During Off Season (in TShs)	Between					
	Groups	2042552.559	3	680850.853	4.669126123	0.003729626
	Within					
	Groups	23185341.92	159	145819.7605		
	Total	25227894.48	162			
Price Per Unit Locally Processed Mangoes During Harvest Season (in TShs)	Between					
	Groups	911538.5855	3	303846.1952	5.230088165	0.001989636
	Within					
	Groups	6971496.898	120	58095.80749		
	Total	7883035.484	123			
Price Per Unit Locally Processed Mangoes During Off Season (in TShs)		1058352.703	3	352784.2342	7.147789084	0.000171846

Variable		Sum of Squares	df	Mean Square	F- Value	Significanc e
	Between					
	Groups					
	Within					
	Groups	6663021.398	135	49355.71406		
price per unit-imported processed tomatoes during harvesting season (in TShs)	Total	7721374.101	138			
	Between					
	Groups	1102038.61	3	367346.2033	0.979563133	0.407825954
	Within					
price per unit-imported processed tomatoes during off season (in TShs)	Groups	24750675.68	66	375010.2375		
	Total	25852714.29	69			
	Between					
	Groups	5897109.851	3	1965703.284	4.756841853	0.003356777
price per unit-imported processed oranges during harvesting season per litre (in TShs)	Within					
	Groups	63638505.34	154	413237.0477		
	Total	69535615.19	157			
	Between					
price per unit-imported processed oranges during off season per litre (in TShs)	Groups	4118221.598	3	1372740.533	32.19676604	8.65061E-16
	Within					
	Groups	5798492.688	136	42635.97565		
	Total	9916714.286	139			
price per unit-imported processed mangoes during harvesting season (in TShs)	Between					
	Groups	2836179.796	3	945393.2654	17.06123484	1.33144E-09
	Within					
	Groups	8422589.435	152	55411.7726		
	Total	11258769.23	155			
	Between					
	Groups	681708.3512	3	227236.1171	6.773539357	0.000268056
	Within	4696666.649	140	33547.61892		
	Groups					

Variable		Sum of Squares	df	Mean Square	F- Value	Significanc e
	Total	5378375	143			
	Between					
price per unit-imported processed mangoes during off season (in TShs)	Groups	1334727.763	3	444909.2542	7.848281964	6.61601E-05
	Within					
	Groups	8673377.97	153	56688.7449		
	Total	10008105.73	156			
	Between					
Average Quantity Locally Processed Tomatoes During Harvest Season (Kg per Month)	Groups	1665.092353	3	555.0307844	4.404981808	0.005141576
	Within					
	Groups	22176.12292	176	126.0006984		
	Total	23841.21528	179			
	Between					
Average Quantity Locally Processed Tomatoes During Off Season (Kg per Month)	Groups	1531.15044	3	510.3834801	4.183778243	0.006778533
	Within					
	Groups	23056.30751	189	121.991045		
	Total	24587.45795	192			
	Between					
Average Quantity Locally Processed Oranges During Harvest Season (Litre per Month)	Groups	1437.931846	3	479.3106152	2.853674488	0.039673085
	Within					
	Groups	22506.98974	134	167.96261		
	Total	23944.92159	137			
	Between					
Average Quantity Locally Processed Oranges During Off Season (Litre per Month)	Groups	1317.257164	3	439.0857212	2.942694646	0.034816998
	Within					
	Groups	23724.72787	159	149.2121249		
	Total	25041.98503	162			

Variable		Sum of Squares	df	Mean Square	F- Value	Significanc e
Average Quantity Locally Processed Mangoes During Harvest Season (Litre/Kg per Month)	Between					
	Groups	69.47285258	3	23.15761753	1.429998689	0.237423825
	Within					
	Groups	1943.298357	120	16.19415298		
	Total	2012.77121	123			
Average Quantity Locally Processed Mangoes During Off Season (Litre/Kg per Month)	Between					
	Groups	87.61652363	3	29.20550788	1.557135721	0.20274483
	Within					
	Groups	2532.048754	135	18.7559167		
	Total	2619.665278	138			
Average Quantity Imported Processed Tomatoes During Harvest Season (Kg per Month)	Between					
	Groups	0.66769293	3	0.22256431	0.155879239	0.925540296
	Within					
	Groups	94.23477136	66	1.427799566		
	Total	94.90246429	69			
Average Quantity Imported Processed Tomatoes During Off Season (Kg per Month)	Between					
	Groups	8.650563693	3	2.883521231	0.609098839	0.610068998
	Within					
	Groups	729.0479661	154	4.734077702		
	Total	737.6985297	157			
Average Quantity Imported Processed Oranges During Harvest Season (Litre Per Month)	Between					
	Groups	1188.4671	3	396.1557001	3.778663522	0.012122193
	Within					
	Groups	14258.26219	136	104.8401631		
	Total	15446.72929	139			
Average Quantity Imported Processed Oranges During Off Season (Litre Per Month)	Between					
	Groups	4339.385837	3	1446.461946	0.131796359	0.941032373

Variable		Sum of Squares	df	Mean Square	F- Value	Significanc e
	Within					
	Groups	1668196.429	152	10974.97651		
	Total	1672535.815	155			
Average Quantity Imported Processed Mangoes During Harvest Season (Litre/Kg Per Month)	Between					
	Groups	1174.821477	3	391.6071589	5.312995353	0.001694122
	Within					
	Groups	10319.03825	140	73.70741604		
Average Quantity Imported Processed Mangoes During Off Season (Litre/Kg Per Month)	Total	11493.85972	143			
	Between					
	Groups	1236.754121	3	412.2513738	5.174692343	0.001964304
	Within					
	Groups	12189.02613	153	79.66683747		
	Total	13425.78025	156			

(a) Part Two: Post Hoc Tests Multiple Comparisons Using Tukey HSD Test

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significanc e	95% Confidence Interval	
						Lower Bound	Upper Bound
Price Per unit Locally Processed Tomatoes During Harvest Season (in TShs)	Dar es Salaam	Tanga	-98.23333333	42.27273081	0.096536246	-207.8780261	11.41135942
		Iringa	61.73793103	39.22391495	0.396130786	-39.99891021	163.4747723
		Dodoma	-115.362963*	40.33434983	0.024305655	-219.9799894	-10.74593657
	Tanga	Dar es Salaam	98.23333333	42.27273081	0.096536246	-11.41135942	207.8780261
		Iringa	159.9712644*	51.32020675	0.011364944	26.85972428	293.0828045
		Dodoma	-17.12962963	52.17382383	0.987746388	-152.4552349	118.1959757
	Iringa	Dar es Salaam	-61.73793103	39.22391495	0.396130786	-163.4747723	39.99891021
		Tanga	-159.9712644*	51.32020675	0.011364944	-293.0828045	-26.85972428
		Dodoma	-177.100894*	49.73569771	0.002657907	-306.1026214	-48.09916662
	Dodoma	Dar es Salaam	115.362963*	40.33434983	0.024305655	10.74593657	219.9799894
		Tanga	17.12962963	52.17382383	0.987746388	-118.1959757	152.4552349

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significanc		
					e	95% Confidence Interval	
Price Per unit Locally Processed Tomatoes During Off Season (in TShs)		Iringa	177.100894*	49.73569771	0.002657907	48.09916662	306.1026214
	Dar es Salaam	Tanga	-52.32142857	48.87181994	0.707860893	-178.9988569	74.35599979
		Iringa	83.01190476	44.6661195	0.249598251	-32.76420426	198.7880138
		Dodoma	-68.98809524	46.58222157	0.450997809	-189.7308063	51.75461585
	Tanga	Dar es Salaam	52.32142857	48.87181994	0.707860893	-74.35599979	178.9988569
		Iringa	135.3333333	59.50237789	0.107716801	-18.89886472	289.5655314
		Dodoma	-16.66666667	60.95386869	0.992834681	-174.6611785	141.3278452
	Iringa	Dar es Salaam	-83.01190476	44.6661195	0.249598251	-198.7880138	32.76420426
		Tanga	-135.3333333	59.50237789	0.107716801	-289.5655314	18.89886472
		Dodoma	-152.0000000*	57.6366338	0.044451426	-301.3961256	-2.603874411
	Dodoma	Dar es Salaam	68.98809524	46.58222157	0.450997809	-51.75461585	189.7308063
		Tanga	16.66666667	60.95386869	0.992834681	-141.3278452	174.6611785
		Iringa	152.0000000*	57.6366338	0.044451426	2.603874411	301.3961256
Price Per unit Locally Processed Oranges During Harvest Season (in TShs)						Lower Bound	Upper Bound
	Dar es Salaam	Tanga	257.5962237*	82.36216797	0.011480348	43.32585745	471.8665899
		Iringa	169.051332	78.69776382	0.143421645	-35.68585605	373.7885201
		Dodoma	-150.2469136	75.60136401	0.197902801	-346.9286226	46.43479541
	Tanga	Dar es Salaam	-257.5962237*	82.36216797	0.011480348	-471.8665899	-43.32585745
		Iringa	-88.54489164	103.0698612	0.825840527	-356.6876258	179.5978425
		Dodoma	-407.8431373*	100.7254908	0.000497524	-669.8868442	-145.7994303
	Iringa	Dar es Salaam	-169.051332	78.69776382	0.143421645	-373.7885201	35.68585605
		Tanga	88.54489164	103.0698612	0.825840527	-179.5978425	356.6876258
		Dodoma	-319.2982456*	97.75190954	0.007472737	-573.6059936	-64.99049763
	Dodoma	Dar es Salaam	150.2469136	75.60136401	0.197902801	-46.43479541	346.9286226
		Tanga	407.8431373*	100.7254908	0.000497524	145.7994303	669.8868442
		Iringa	319.2982456*	97.75190954	0.007472737	64.99049763	573.6059936
Dar es Salaam	Tanga	365.2541405*	99.96678849	0.001970978	105.6995581	624.8087228	

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significanc e	95% Confidence Interval		
Price Per unit Locally Processed Oranges During Off Season (in TShs)	Tanga	Iringa	113.5513541	95.34385175	0.633446151	-134.0001977	361.1029059	
		Dodoma	19.91100324	86.55373582	0.99569467	-204.8178201	244.6398266	
		Dar es Salaam	-365.2541405*	99.96678849	0.001970978	-624.8087228	-105.6995581	
	Iringa	Iringa	-251.7027864	127.4847332	0.202058209	-582.7051842	79.29961143	
		Dodoma	-345.3431373*	121.0514615	0.025065851	-659.642136	-31.04413854	
		Dar es Salaam	-113.5513541	95.34385175	0.633446151	-361.1029059	134.0001977	
	Dodoma	Tanga	251.7027864	127.4847332	0.202058209	-79.29961143	582.7051842	
		Dodoma	-93.64035088	117.2627289	0.85499367	-398.1022536	210.8215518	
		Dar es Salaam	-19.91100324	86.55373582	0.99569467	-244.6398266	204.8178201	
		Tanga	345.3431373*	121.0514615	0.025065851	31.04413854	659.642136	
		Iringa	93.64035088	117.2627289	0.85499367	-210.8215518	398.1022536	
							Lower Bound	Upper Bound
	Price Per unit Locally Processed Mangoes During Harvest Season (in TShs)	Dar es Salaam	Tanga	209.540107*	77.23287598	0.03782827	8.317761544	410.7624524
Iringa			123.1764706	80.57953113	0.423703393	-86.76524192	333.1181831	
Dodoma			-126.8235294	62.53818792	0.183545614	-289.7603706	36.11331181	
Tanga		Dar es Salaam	-209.540107*	77.23287598	0.03782827	-410.7624524	-8.317761544	
		Iringa	-86.36363636	105.3139012	0.844884247	-360.748216	188.0209433	
		Dodoma	-336.3636364*	92.24414293	0.002205888	-576.6962998	-96.03097292	
Iringa		Dar es Salaam	-123.1764706	80.57953113	0.423703393	-333.1181831	86.76524192	
		Tanga	86.36363636	105.3139012	0.844884247	-188.0209433	360.748216	
		Dodoma	-250.0000000*	95.06379757	0.046980849	-497.6789847	-2.321015266	
Dodoma		Dar es Salaam	126.8235294	62.53818792	0.183545614	-36.11331181	289.7603706	
		Tanga	336.3636364*	92.24414293	0.002205888	96.03097292	576.6962998	

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significanc	95% Confidence Interval	
					e		
Price Per unit Locally Processed Mangoes During Off Season (in TShs)		Iringa	250.0000000*	95.06379757	0.046980849	2.321015266	497.6789847
	Dar es Salaam	Tanga	268.6868687*	70.60754678	0.001212493	85.01406045	452.3596769
		Iringa	170.0505051	73.71644303	0.101546415	-21.70953649	361.8105466
		Dodoma	-58.63370548	55.64361354	0.718107641	-203.3805381	86.11312719
	Tanga	Dar es Salaam	-268.6868687*	70.60754678	0.001212493	-452.3596769	-85.01406045
		Iringa	-98.63636364	97.06932833	0.740287849	-351.1447277	153.8720004
		Dodoma	-327.3205742*	84.16978233	0.000896989	-546.273094	-108.3680543
	Iringa	Dar es Salaam	-170.0505051	73.71644303	0.101546415	-361.8105466	21.70953649
		Tanga	98.63636364	97.06932833	0.740287849	-153.8720004	351.1447277
		Dodoma	-228.6842105*	86.79424271	0.045882308	-454.4637911	-2.904629964
	Dodoma	Dar es Salaam	58.63370548	55.64361354	0.718107641	-86.11312719	203.3805381
		Tanga	327.3205742*	84.16978233	0.000896989	108.3680543	546.273094
		Iringa	228.6842105*	86.79424271	0.045882308	2.904629964	454.4637911
						Lower Bound	Upper Bound
Price Per unit Imported Processed Tomatoes During Harvest Season (in TShs)	Dar es Salaam	Tanga	410.8108108	252.4050374	0.370448885	-254.4567486	1076.07837
		Iringa	160.8108108	218.2577274	0.881905307	-414.4541964	736.075818
		Dodoma	135.8108108	183.2308699	0.880063896	-347.133408	618.7550296
	Tanga	Dar es Salaam	-410.8108108	252.4050374	0.370448885	-1076.07837	254.4567486
		Iringa	-250.0000000	301.7845503	0.840796985	-1045.417847	545.4178465
		Dodoma	-275.0000000	277.5086141	0.755067391	-1006.433415	456.433415
	Iringa	Dar es Salaam	-160.8108108	218.2577274	0.881905307	-736.075818	414.4541964
		Tanga	250.0000000	301.7845503	0.840796985	-545.4178465	1045.417847
		Dodoma	-25.0000000	246.8585903	0.999624231	-675.6487097	625.6487097
	Dodoma	Dar es Salaam	-135.8108108	183.2308699	0.880063896	-618.7550296	347.133408
		Tanga	275.0000000	277.5086141	0.755067391	-456.433415	1006.433415
		Iringa	25.0000000	246.8585903	0.999624231	-625.6487097	675.6487097
	Dar es Salaam	Tanga	602.1212121*	164.717107	0.001976539	174.3007896	1029.941635

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
Price Per unit Imported Processed Tomatoes During Off Season (in TShs)							
		Iringa	-2.799422799	154.4411417	0.999997851	-403.930038	398.3311924
		Dodoma	-32.32323232	157.5943018	0.996935481	-441.6435635	376.9970988
	Tanga	Dar es Salaam	-602.1212121*	164.717107	0.001976539	-1029.941635	-174.3007896
		Iringa	-604.9206349*	206.4838212	0.020213058	-1141.221917	-68.61935329
		Dodoma	-634.4444444*	208.8527379	0.014720241	-1176.898523	-91.99036555
	Iringa	Dar es Salaam	2.799422799	154.4411417	0.999997851	-398.3311924	403.930038
		Tanga	604.9206349*	206.4838212	0.020213058	68.61935329	1141.221917
		Dodoma	-29.52380952	200.847721	0.998863045	-551.1864249	492.1388058
	Dodoma	Dar es Salaam	32.32323232	157.5943018	0.996935481	-376.9970988	441.6435635
		Tanga	634.4444444*	208.8527379	0.014720241	91.99036555	1176.898523
		Iringa	29.52380952	200.847721	0.998863045	-492.1388058	551.1864249
						Lower Bound	Upper Bound
Price Per unit Imported Processed Oranges During Harvest Season (in TShs)							
	Dar es Salaam	Tanga	55.23255814	56.21846348	0.759672153	-90.99617439	201.4612907
		Iringa	467.13732000*	50.25984195	4.78506E-13	336.40744	597.8672001
		Dodoma	-80.06155951	54.80662119	0.464028659	-222.617977	62.49485797
	Tanga	Dar es Salaam	-55.23255814	56.21846348	0.759672153	-201.4612907	90.99617439
		Iringa	411.9047619*	68.52031109	9.54728E-08	233.6779371	590.1315867
		Dodoma	-135.2941176	71.92181203	0.240989217	-322.3685192	51.78028393
	Iringa	Dar es Salaam	-467.1373200*	50.25984195	4.78506E-13	-597.8672001	-336.40744
		Tanga	-411.9047619*	68.52031109	9.54728E-08	-590.1315867	-233.6779371
		Dodoma	-547.1988796*	67.36678055	1.94789E-12	-722.4252789	-371.9724802
	Dodoma	Dar es Salaam	80.06155951	54.80662119	0.464028659	-62.49485797	222.617977
		Tanga	135.2941176	71.92181203	0.240989217	-51.78028393	322.3685192
		Iringa	547.1988796*	67.36678055	1.94789E-12	371.9724802	722.4252789
	Dar es Salaam	Tanga	61.69902913	63.25515127	0.763654957	-102.6175597	226.015618
Price Per unit Imported Processed Oranges During Off Season							

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
(in TShs)							
	Tanga	Iringa	391.6990291*	57.52014434	1.27743E-09	242.2801483	541.1179099
		Dodoma	-69.18332381	61.62381366	0.676138623	-229.262221	90.89557332
		Dar es Salaam	-61.69902913	63.25515127	0.763654957	-226.015618	102.6175597
	Iringa	Iringa	330.0000000*	78.95457186	0.000284546	124.9013533	535.0986467
		Dodoma	-130.8823529	81.99238881	0.383812399	-343.8722735	82.10756759
		Dar es Salaam	-391.6990291*	57.52014434	1.27743E-09	-541.1179099	-242.2801483
	Dodoma	Tanga	-330.0000000*	78.95457186	0.000284546	-535.0986467	-124.9013533
		Dodoma	-460.8823529*	77.65374856	1.14448E-07	-662.6018781	-259.1628278
		Dar es Salaam	69.18332381	61.62381366	0.676138623	-90.89557332	229.262221
		Tanga	130.8823529	81.99238881	0.383812399	-82.10756759	343.8722735
		Iringa	460.8823529*	77.65374856	1.14448E-07	259.1628278	662.6018781
						Lower Bound	Upper Bound
Price Per unit Imported Processed Mangoes During Harvest Season (in TShs)							
	Dar es Salaam	Tanga	103.9115646	50.78218753	0.176238855	-28.13006644	235.9531957
		Iringa	88.91156463	56.01747542	0.389223675	-56.74263387	234.5657631
		Dodoma	-149.5972073*	45.91281734	0.007598863	-268.9777142	-30.21670042
	Tanga	Dar es Salaam	-103.9115646	50.78218753	0.176238855	-235.9531957	28.13006644
		Iringa	-15.0000000	70.9375982	0.996643846	-199.4488516	169.4488516
		Dodoma	-253.5087719*	63.26272269	0.000570588	-418.0017467	-89.01579721
	Iringa	Dar es Salaam	-88.91156463	56.01747542	0.389223675	-234.5657631	56.74263387
		Tanga	15.0000000	70.9375982	0.996643846	-169.4488516	199.4488516
		Dodoma	-238.5087719*	67.53739012	0.003110294	-414.1165506	-62.90099323
	Dodoma	Dar es Salaam	149.5972073*	45.91281734	0.007598863	30.21670042	268.9777142
		Tanga	253.5087719*	63.26272269	0.000570588	89.01579721	418.0017467
	Dar es Salaam	Iringa	238.5087719*	67.53739012	0.003110294	62.90099323	414.1165506
		Tanga	127.4285714	67.56144086	0.23829715	-48.06162362	302.9187665
Price Per unit Imported Processed Mangoes During Off Season							

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
Season Litre/(Kg per Month)					e		
		Iringa	-6.993571429*	2.270588894	0.012617007	-12.87901548	-1.108127376
		Dodoma	0.72494709	2.367993373	0.990014802	-5.412972701	6.862866881
	Tanga	Dar es Salaam	4.668571429	2.484384425	0.240489305	-1.771037949	11.10818081
		Iringa	-2.325000000	3.024785675	0.86849263	-10.1653479	5.515347895
		Dodoma	5.393518519	3.098571778	0.305651186	-2.63808548	13.42512252
	Iringa	Dar es Salaam	6.993571429*	2.270588894	0.012617007	1.108127376	12.87901548
		Tanga	2.325000000	3.024785675	0.86849263	-5.515347895	10.1653479
		Dodoma	7.718518519*	2.929941129	0.044785466	0.124010928	15.31302611
	Dodoma	Dar es Salaam	-0.7249470900	2.367993373	0.990014802	-6.862866881	5.412972701
		Tanga	-5.393518519	3.098571778	0.305651186	-13.42512252	2.63808548
		Iringa	-7.718518519*	2.929941129	0.044785466	-15.31302611	-0.124010928
						Lower Bound	Upper Bound
Average Quantity Locally Processed Oranges During Harvest							
Season (Litre/Kg per Month)	Dar es Salaam	Tanga	-3.683209877	3.457421872	0.711182547	-12.67791059	5.311490833
		Iringa	-9.367420403*	3.303596501	0.026816819	-17.96193472	-0.772906083
		Dodoma	-0.657495591	3.173614973	0.996840585	-8.913854781	7.598863599
	Tanga	Dar es Salaam	3.683209877	3.457421872	0.711182547	-5.311490833	12.67791059
		Iringa	-5.684210526	4.326695148	0.555827347	-16.9403804	5.571959347
		Dodoma	3.025714286	4.228282518	0.890758135	-7.974428936	14.02585751
	Iringa	Dar es Salaam	9.367420403*	3.303596501	0.026816819	0.772906083	17.96193472
		Tanga	5.684210526	4.326695148	0.555827347	-5.571959347	16.9403804
		Dodoma	8.709924812	4.103456701	0.151226335	-1.965476184	19.38532581
	Dodoma	Dar es Salaam	0.657495591	3.173614973	0.996840585	-7.598863599	8.913854781
		Tanga	-3.025714286	4.228282518	0.890758135	-14.02585751	7.974428936
		Iringa	-8.709924812	4.103456701	0.151226335	-19.38532581	1.965476184
Average Quantity Locally Processed Oranges During Off	Dar es Salaam	Tanga	-4.134266134	3.197787552	0.568828371	-12.43702773	4.168495464

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
Season (Litre/Kg per Month)							
		Iringa	-8.604854369*	3.049906743	0.027378871	-16.52365703	-0.686051706
		Dodoma	-2.479854369	2.768724125	0.807103505	-9.668592197	4.708883459
	Tanga	Dar es Salaam	4.134266134	3.197787552	0.568828371	-4.168495464	12.43702773
		Iringa	-4.470588235	4.078045311	0.692341196	-15.05885823	6.117681763
		Dodoma	1.654411765	3.872254601	0.973737435	-8.399541562	11.70836509
	Iringa	Dar es Salaam	8.604854369*	3.049906743	0.027378871	0.686051706	16.52365703
		Tanga	4.470588235	4.078045311	0.692341196	-6.117681763	15.05885823
		Dodoma	6.125000000	3.751058731	0.363196309	-3.614279386	15.86427939
	Dodoma	Dar es Salaam	2.479854369	2.768724125	0.807103505	-4.708883459	9.668592197
		Tanga	-1.654411765	3.872254601	0.973737435	-11.70836509	8.399541562
		Iringa	-6.125000000	3.751058731	0.363196309	-15.86427939	3.614279386
						Lower Bound	Upper Bound
Average Quantity Locally Processed Mangoes During Harvest							
Season (Litre/Kg per Month)							
	Dar es Salaam	Tanga	1.202994652	1.289463133	0.787226755	-2.156569428	4.562558733
		Iringa	0.481176471	1.345338152	0.984253212	-3.023964248	3.986317189
		Dodoma	2.048954248	1.044123849	0.208131828	-0.671403464	4.76931196
	Tanga	Dar es Salaam	-1.202994652	1.289463133	0.787226755	-4.562558733	2.156569428
		Iringa	-0.721818182	1.758297763	0.976552776	-5.302882855	3.859246491
		Dodoma	0.845959596	1.540087949	0.946576487	-3.166581764	4.858500956
	Iringa	Dar es Salaam	-0.481176471	1.345338152	0.984253212	-3.986317189	3.023964248
		Tanga	0.721818182	1.758297763	0.976552776	-3.859246491	5.302882855
		Dodoma	1.567777778	1.587164284	0.756670403	-2.567416149	5.702971704
	Dodoma	Dar es Salaam	-2.048954248	1.044123849	0.208131828	-4.76931196	0.671403464
		Tanga	-0.845959596	1.540087949	0.946576487	-4.858500956	3.166581764
		Iringa	-1.567777778	1.587164284	0.756670403	-5.702971704	2.567416149
	Dar es Salaam	Tanga	0.855757576	1.376421825	0.924966377	-2.724755746	4.436270898
Average Quantity Locally Processed Mangoes During Off							

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
Season (Litre/Kg per Month)					e		
		Iringa	0.388484848	1.437026574	0.993060844	-3.349680806	4.126650503
		Dodoma	2.312695375	1.084715269	0.148247962	-0.508995912	5.134386662
	Tanga	Dar es Salaam	-0.855757576	1.376421825	0.924966377	-4.436270898	2.724755746
		Iringa	-0.467272727	1.89226716	0.994686925	-5.389664725	4.45511927
		Dodoma	1.456937799	1.64080372	0.811125972	-2.811317376	5.725192974
	Iringa	Dar es Salaam	-0.388484848	1.437026574	0.993060844	-4.126650503	3.349680806
		Tanga	0.467272727	1.89226716	0.994686925	-4.45511927	5.389664725
		Dodoma	1.924210526	1.691964887	0.667188009	-2.477131206	6.325552259
	Dodoma	Dar es Salaam	-2.312695375	1.084715269	0.148247962	-5.134386662	0.508995912
		Tanga	-1.456937799	1.64080372	0.811125972	-5.725192974	2.811317376
		Iringa	-1.924210526	1.691964887	0.667188009	-6.325552259	2.477131206
						Lower Bound	Upper Bound
Average Quantity Imported Processed Tomatoes During Harvest Season (Litre/Kg Per Month)	Dar es Salaam	Tanga	-0.082625483	0.492504359	0.998303643	-1.380726252	1.215475287
		Iringa	-0.254054054	0.425874552	0.932767011	-1.376537689	0.868429581
		Dodoma	-0.169679054	0.357528531	0.964419182	-1.112022105	0.772663997
	Tanga	Dar es Salaam	0.082625483	0.492504359	0.998303643	-1.215475287	1.380726252
		Iringa	-0.171428571	0.588855944	0.991329518	-1.723484588	1.380627445
		Dodoma	-0.087053571	0.541487617	0.998505864	-1.514260212	1.340153069
	Iringa	Dar es Salaam	0.254054054	0.425874552	0.932767011	-0.868429581	1.376537689
		Tanga	0.171428571	0.588855944	0.991329518	-1.380627445	1.723484588
		Dodoma	0.084375000	0.481681876	0.998070987	-1.185200795	1.353950795
	Dodoma	Dar es Salaam	0.169679054	0.357528531	0.964419182	-0.772663997	1.112022105
		Tanga	0.087053571	0.541487617	0.998505864	-1.340153069	1.514260212
		Iringa	-0.084375000	0.481681876	0.998070987	-1.353950795	1.185200795
	Dar es Salaam	Tanga	0.655454545	0.557515276	0.643098431	-0.792582185	2.103491276
Average Quantity Imported Processed Tomatoes During Off							

					Significanc		
Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	e	95% Confidence Interval	
Season (Litre/Kg Per Month)							
	Tanga	Iringa	8.333932039	25.59886707	0.988037926	-58.16371174	74.83157582
		Dodoma	11.39716733	27.42517135	0.975738473	-59.84462902	82.63896369
		Dar es Salaam	-13.35893204	28.15118473	0.964581034	-86.48667824	59.76881416
	Iringa	Iringa	-5.02500000	35.13808272	0.998952584	-96.30246557	86.25246557
		Dodoma	-1.961764706	36.49003816	0.999943976	-96.75117677	92.82764736
		Dar es Salaam	-8.333932039	25.59886707	0.988037926	-74.83157582	58.16371174
	Dodoma	Tanga	5.025000000	35.13808272	0.998952584	-86.25246557	96.30246557
		Dodoma	3.063235294	34.55916201	0.999749397	-86.71038001	92.83685059
		Dar es Salaam	-11.39716733	27.42517135	0.975738473	-82.63896369	59.84462902
		Tanga	1.961764706	36.49003816	0.999943976	-92.82764736	96.75117677
	Iringa	-3.063235294	34.55916201	0.999749397	-92.83685059	86.71038001	
						Lower Bound	Upper Bound
Average Quantity Imported Processed Mangoes During Harvest							
Season (Litre/Kg Per Month)							
	Dar es Salaam	Tanga	5.414285714	2.380324395	0.108961967	-0.77493005	11.60350148
		Iringa	-4.919047619	2.62571917	0.244213406	-11.74632818	1.908232946
		Dodoma	5.393233083	2.152081359	0.063316215	-0.202515086	10.98898125
	Tanga	Dar es Salaam	-5.414285714	2.380324395	0.108961967	-11.60350148	0.77493005
		Iringa	-10.33333333*	3.325073293	0.012103439	-18.97904401	-1.687622653
		Dodoma	-0.021052632	2.965327203	0.999999871	-7.731367205	7.689261942
	Iringa	Dar es Salaam	4.919047619	2.62571917	0.244213406	-1.908232946	11.74632818
		Tanga	10.33333333*	3.325073293	0.012103439	1.687622653	18.97904401
		Dodoma	10.3122807*	3.165694609	0.007617563	2.080979532	18.54358187
	Dodoma	Dar es Salaam	-5.393233083	2.152081359	0.063316215	-10.98898125	0.202515086
		Tanga	0.021052632	2.965327203	0.999999871	-7.689261942	7.731367205
		Iringa	-10.3122807*	3.165694609	0.007617563	-18.54358187	-2.080979532
Average Quantity Imported Processed Mangoes During Off							
Season (Litre/Kg Per Month)							
	Dar es Salaam	Tanga	6.11025974	2.532732194	0.078972675	-0.468487858	12.68900734

Appendix 4b: ANOVA results for average monthly expenditure of processed fruits and vegetables

Region = Dar es Salaam

ANOVA

		Sum of Squares	df	Mean Square	F-value	Significance
Locally Processed Tomatoes-harvest season (TShs)	Between Groups	181129439904.84	2	90564719952.42	11.131	.000
	Within Groups	1749336467715.80	215	8136448687.05		
	Total	1930465907620.64	217			
Locally Processed Tomatoes-off season (TShs)	Between Groups	208732176012.79	2	104366088006.40	13.503	.000
	Within Groups	1739010469945.11	225	7728935421.98		
	Total	1947742645957.89	227			
Imported Processed Tomatoes-harvest season (TShs)	Between Groups	43426236721.71	2	21713118360.86	9.645	.000
	Within Groups	202608245106.25	90	2251202723.40		
	Total	246034481827.96	92			
Imported Processed Tomatoes-off season (TShs)	Between Groups	76828514327.02	2	38414257163.51	21.327	.000
	Within Groups	270180469117.22	150	1801203127.2		
	Total	347008983444.24	152			
Locally Processed Oranges-harvest season (TShs)	Between Groups	7941624112743.03	2	3970812056371.52	10.392	.000
	Within Groups	65337682163649.60	171	382091708559.36		
	Total	73279306276392.60	173			
Locally Processed Oranges-off season (TShs)	Between Groups	1593666175292.25	2	796833087646.13	43.811	.000
	Within Groups	2946450742907.14	162	18187967548.81		
	Total	4540116918199.39	164			
Imported Processed Oranges-harvest season (TShs)	Between Groups	249305334108.69	2	124652667054.35	13.364	.000
	Within Groups	1054012871011.14	113	9327547531.07		

		Sum of Squares	df	Mean Square	F-value	Significance
	Total	1303318205119.83	115			
Imported Processed Oranges-off season (TShs)	Between Groups	250527559732.70	2	125263779866.35	15.276	.000
	Within Groups	1074221805306.86	131	8200166452.72		
	Total	1324749365039.55	133			
Locally Processed Mangoes-harvest season (TShs)	Between Groups	8023175495918.38	2	4011587747959.19	6.058	.003
	Within Groups	63572933989780.60	96	662218062393.55		
	Total	71596109485698.90	98			
Monthly expenditure on-locally processed mangoes-off season (TShs)	Between Groups	2315901737304.70	2	1157950868652.35	36.165	.000
	Within Groups	2401419231994.02	75	32018923093.25		
	Total	4717320969298.71	77			
Monthly expenditure on-imported processed mangoes-harvest season (TShs)	Between Groups	382682638325.33	2	191341319162.67	11.464	.000
	Within Groups	784449605036.67	47	16690417128.44		
	Total	1167132243362.00	49			
Monthly expenditure on-imported processed mangoes-off season (TShs)	Between Groups	393078314419.19	2	196539157209.60	13.873	.000
	Within Groups	807524153599.15	57	14167090414.02		
	Total	1200602468018.33	59			

Region = Dar es Salaam

Post Hoc Tests: Multiple Comparisons: Tukey HSD

Dependent Variable	(I) Distribution of Respondents' Income	(J) Distribution of Respondents' Income	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Locally Processed Tomatoes-harvest season (TShs)	Low income	Medium income	503.17	15082.44	.999	-35092.30	36098.66
		High income	-63266.71(*)	16566.34	.001	-102364.28	-24169.13
	Medium income	Low income	-503.18	15082.44	.999	-36098.65	35092.30
		High income	-63769.88(*)	14537.41	.000	-98079.05	-29460.71
	High income	Low income	63266.71(*)	16566.34	.001	24169.13	102364.28
		Medium income	63769.88(*)	14537.41	.000	29460.71	98079.06
Locally Processed Tomatoes-off season (TShs)	Low income	Medium income	2662.95	14416.25	.981	-31349.75	36675.64
		High income	-65556.49 (*)	16011.24	.000	-103332.29	-27780.68
	Medium income	Low income	-2662.95	14416.25	.981	-36675.64	31349.75
		High income	-68219.43(*)	13892.35	.000	-100996.09	-35442.78
	High income	Low income	65556.49(*)	16011.24	.000	27780.68	103332.29
		Medium income	68219.43(*)	13892.35	.000	35442.77	100996.09
Imported Processed Tomatoes-harvest season (TShs)	Low income	Medium income	1506.93	12539.32	.992	-28375.56	31389.42
		High income	-45228.03(*)	13317.93	.003	-76966.02	-13490.03
	Medium income	Low income	-1506.93	12539.32	.992	-31389.42	28375.56
		High income	-46734.96(*)	11399.45	.000	-73901.00	-19568.91
	High income	Low income	45228.03(*)	13317.93	.003	13490.03	76966.03
		Medium income	46734.96(*)	11399.45	.000	19568.91	73901.01
Imported Processed Tomatoes-off season (TShs)	Low income	Medium income	-767.65	8168.95	.995	-20105.27	18569.98
		High income	-54982.52(*)	9925.41	.000	-78478.03	-31487.00
	Medium income	Low income	767.65	8168.95	.995	-18569.97	20105.28
		High income	-54214.87(*)	8796.70	.000	-75038.50	-33391.23
	High income	Low income	54982.52(*)	9925.41	.000	31487.00	78478.04
		Medium income	54214.87(*)	8796.70	.000	33391.23	75038.51
Locally Processed Oranges-harvest season (TShs)	Low income	Medium income	5359.46	117407.26	.999	-272226.67	282945.61

Dependent Variable	(I) Distribution of Respondents' Income	(J) Distribution of Respondents' Income	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
	Medium income	High income	-460714.96(*)	126866.59	.001	-760665.79	-160764.12
		Low income	-5359.46	117407.26	.999	-282945.60	272226.68
	High income	High income	-466074.42(*)	110035.85	.000	-726232.33	-205916.51
		Low income	460714.96(*)	126866.59	.001	160764.12	760665.79
Locally Processed Oranges-off season (TShs)	Low income	Medium income	354.23	23968.43	1.000	-56341.99	57050.46
		High income	-278522.81(*)	33715.69	.000	-358275.76	-198769.87
	Medium income	Low income	-354.23	23968.43	1.000	-57050.46	56341.99
		High income	-278877.04(*)	30877.20	.000	-351915.66	-205838.43
	High income	Low income	278522.81(*)	33715.69	.000	198769.87	358275.76
		Medium income	278877.04(*)	30877.20	.000	205838.43	351915.66
Imported Processed Oranges-harvest season (TShs)	Low income	Medium income	3288.38	20285.70	.986	-44889.99	51466.76
		High income	-140046.22(*)	30669.09	.000	-212885.08	-67207.36
	Medium income	Low income	-3288.38	20285.70	.986	-51466.76	44889.99
		High income	-143334.60(*)	28344.72	.000	-210653.11	-76016.10
	High income	Low income	140046.22(*)	30669.09	.000	67207.36	212885.08
		Medium income	143334.60(*)	28344.72	.000	76016.09	210653.11
Imported Processed Oranges-off season (TShs)	Low income	Medium income	3130.87	17805.35	.983	-39079.41	45341.16
		High income	-134938.51(*)	27612.89	.000	-200399.05	-69477.96
	Medium income	Low income	-3130.87	17805.35	.983	-45341.16	39079.41
		High income	-138069.38(*)	25454.16	.000	-198412.34	-77726.43
	High income	Low income	134938.51(*)	27612.89	.000	69477.96	200399.05
		Medium income	138069.38(*)	25454.16	.000	77726.43	198412.34
Locally Processed Mangoes-harvest season (TShs)	Low income	Medium income	16867.75	229676.66	.997	-529902.01	563637.51
		High income	-563058.70(*)	224174.04	.036	-1096728.89	-29388.51
	Medium income	Low income	-16867.75	229676.66	.997	-563637.51	529902.01
		High income	-579926.46(*)	182477.96	.006	-1014334.62	-145518.23
	High income	Low income	563058.70(*)	224174.04	.036	29388.51	1096728.89
		Medium income					

	(I) Distribution of Respondents' Income	(J) Distribution of Respondents' Income					
Dependent Variable	Income	Income	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Medium income	579926.46(*)	182477.96	.006	145518.23	1014334.68
Locally Processed Mangoes-off season (TShs)	Low income	Medium income	10578.94	48956.49	.975	-106481.61	127639.48
		High income	-441423.99(*)	63025.97	.000	-592126.24	-290721.73
	Medium income	Low income	-10578.94	48956.49	.975	-127639.45	106481.61
		High income	-452002.92(*)	54759.45	.000	-582938.99	-321066.84
	High income	Low income	441423.99(*)	63025.97	.000	290721.73	592126.24
		Medium income	452002.92(*)	54759.45	.000	321066.84	582938.99
Imported Processed Mangoes-harvest season (TShs)	Low income	Medium income	13442.67	44127.26	.950	-93350.68	120236.01
		High income	-228550.00(*)	58967.54	.001	-371258.61	-85841.39
	Medium income	Low income	-13442.67	44127.26	.950	-120236.01	93350.68
		High income	-241992.67(*)	51406.71	.000	-366403.15	-117582.19
	High income	Low income	228550.00(*)	58967.54	.001	85841.39	371258.61
		Medium income	241992.67(*)	51406.71	.000	117582.19	366403.15
Imported Processed Mangoes-off season (TShs)	Low income	Medium income	17309.10	39291.85	.899	-77243.52	111861.73
		High income	-212647.22(*)	52485.35	.000	-338948.92	-86345.52
	Medium income	Low income	-17309.10	39291.85	.899	-111861.73	77243.52
		High income	-229956.32(*)	44015.68	.000	-335876.45	-124036.19
	High income	Low income	212647.22(*)	52485.35	.000	86345.52	338948.92
		Medium income	229956.32(*)	44015.68	.000	124036.20	335876.45

* The mean difference is significant at the .05 level.

Region = Dar es Salaam

Region = Tanga

ANOVA

		Sum of Squares	df	Mean Square	F-value	Significance
Locally Processed Tomatoes-harvest season (TShs)	Between Groups	239073107.42	2	119536553.71	.233	.794
	Within Groups	10243535588.24	20	512176779.41		

	Total	10482608695.65	22			
Locally Processed Tomatoes-off season (TShs)	Between Groups	232636483.376	2	116318241.69	.227	.799
	Within Groups	10250962647.06	20	512548132.35		
	Total	10483599130.44	22			
Imported processed tomatoes-harvest season (TShs)	Between Groups	4720333.33	1	4720333.33	1.728	.259
	Within Groups	10928000.00	4	2732000.00		
	Total	15648333.33	5			
Imported Processed Tomatoes-off season (TShs)	Between Groups	6595208.33	2	3297604.17	.411	.671
	Within Groups	104289166.67	13	8022243.59		
	Total	110884375.00	15			
Locally Processed Oranges-harvest season (TShs)	Between Groups	26679378.79	2	13339689.39	.353	.710
	Within Groups	453634204.55	12	37802850.38		
	Total	480313583.33	14			
Locally Processed Oranges-off season (TShs)	Between Groups	140664378.79	2	70332189.39	1.817	.204
	Within Groups	464434204.55	12	38702850.38		
	Total	605098583.33	14			
Imported Processed Oranges-harvest season (TShs)	Between Groups	1113605.77	2	556802.89	.302	.744
	Within Groups	23955769.23	13	1842751.48		
	Total	25069375.00	15			
Imported Processed Oranges-off season (TShs)	Between Groups	2283605.77	2	1141802.89	.609	.558
	Within Groups	24355769.23	13	1873520.71		
	Total	26639375.00	15			
Locally Processed Mangoes-harvest season (TShs)	Between Groups	37375104.17	1	37375104.17	.539	.491
	Within Groups	416162083.33	6	69360347.22		
	Total	453537187.50	7			
Locally Processed Mangoes-off season (TShs)	Between Groups	37375104.17	1	37375104.17	.539	.491

	Within Groups	416162083.33	6	69360347.22		
	Total	453537187.50	7			
Imported Processed Mangoes-harvest season (TShs)	Between Groups	40111.11	1	40111.11	.034	.859
	Within Groups	9468888.89	8	1183611.11		
	Total	9509000.00	9			
Imported Processed Mangoes-off season (TShs)	Between Groups	40111.11	1	40111.11	.034	.859
	Within Groups	9468888.89	8	1183611.11		
	Total	9509000.00	9			

Region = Tanga

Post Hoc Tests: Multiple Comparisons using Tukey HSD

Dependent Variable	(I) Distribution of respondents' income	(J) Distribution of respondents' income	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Locally Processed Tomatoes-harvest season (TShs)	Low income	Medium income	-7623.53	12576.65	.818	-39442.24	24195.18
		High income	-11450.00	19599.30	.830	-61035.88	38135.88
	Medium income	Low income	7623.53	12576.65	.818	-24195.18	39442.24
		High income	-3826.47	16917.93	.972	-46628.53	38975.59
	High income	Low income	11450.00	19599.30	.830	-38135.88	61035.88
		Medium income	3826.47	16917.93	.972	-38975.59	46628.53
Locally Processed Tomatoes-off season (TShs)	Low income	Medium income	-7488.24	12581.21	.824	-39318.48	24342.00
		High income	-11350.00	19606.40	.833	-60953.85	38253.85
	Medium income	Low income	7488.24	12581.21	.824	-24342.00	39318.48
		High income	-3861.76	16924.06	.972	-46679.34	38955.81
	High income	Low income	11350.00	19606.40	.833	-38253.85	60953.85
		Medium income	3861.76	16924.06	.972	-38955.81	46679.34

Region = Tanga

Region = Iringa

ANOVA

		Sum of Squares	df	Mean Square	F-value	Significance
Locally Processed Tomatoes-harvest season (TShs)	Between Groups	857630340.28	1	857630340.28	1.425	.250
	Within Groups	9631318687.50	16	601957417.97		
	Total	10488949027.78	17			
Locally Processed Tomatoes-off season (TShs)	Between Groups	712021058.61	1	712021058.61	1.231	.283
	Within Groups	9836424204.55	17	578613188.50		
	Total	10548445263.16	18			
Imported Processed Tomatoes-harvest season (TShs)	Between Groups	648000.00	1	648000.00	.016	.904
	Within Groups	292512000.00	7	41787428.57		
	Total	293160000.00	8			
Imported Processed Tomatoes-off season (TShs)	Between Groups	115714.29	1	115714.29	.003	.955
	Within Groups	486674285.71	14	34762448.98		
	Total	486790000.00	15			
Locally Processed Oranges-harvest season (TShs)	Between Groups	18113437.50	1	18113437.50	.786	.396
	Within Groups	230361562.50	10	23036156.25		
	Total	248475000.00	11			
Locally Processed Oranges-off season (TShs)	Between Groups	6561000.00	1	6561000.00	.295	.596

Region = Iringa

Region = Dodoma

ANOVA

		Sum of Squares	df	Mean Square	F-value	Significance
Locally Processed Tomatoes-harvest season (TShs)	Between Groups	3487580.21	2	1743790.12	.814	.458
	Within Groups	40685147.06	19	2141323.53		
	Total	44172727.27	21			
Locally Processed Tomatoes-off season (TShs)	Between Groups	13361724.60	2	6680862.30	.729	.496
	Within Groups	174236911.77	19	9170363.78		
	Total	187598636.36	21			
Imported Processed Tomatoes-harvest season (TShs)	Between Groups	8167500.00	1	8167500.00	30.250	.032
	Within Groups	540000.00	2	270000.00		
	Total	8707500.00	3			
Imported Processed Tomatoes-off season (TShs)	Between Groups	11865686.28	2	5932843.14	.819	.461
	Within Groups	101376666.67	14	7241190.48		
	Total	113242352.94	16			
Locally Processed Oranges-harvest season (TShs)	Between Groups	14229101.67	2	7114550.83	.160	.853
	Within Groups	756103743.33	17	44476690.78		
	Total	770332845.00	19			
Locally Processed Oranges-off season (TShs)	Between Groups	21303878.35	2	10651939.17	263	.771
	Within Groups	728365585.94	18	40464754.77		
	Total	749669464.29	20			

Imported Processed Oranges-harvest season (TShs)	Between Groups	24712166.67	2	12356083.33	.351	.709
	Within Groups	598939208.33	17	35231718.14		
	Total	623651375.00	19			
Imported Processed Oranges-off season (TShs)	Between Groups	42654075.86	2	21327037.93	1.192	.331
	Within Groups	268404951.92	15	17893663.46		
	Total	311059027.78	17			
Locally Processed Mangoes-harvest season (TShs)	Between Groups	34983807.69	2	17491903.85	.358	.707
	Within Groups	488123500.00	10	48812350.00		
	Total	523107307.69	12			
Locally Processed Mangoes-off season (TShs)	Between Groups	143932730.77	2	71966365.39	.243	.789
	Within Groups	2964971500.00	10	296497150.00		
	Total	3108904230.77	12			
Imported Processed Mangoes-harvest season (TShs)	Between Groups	47830324.68	2	23915162.34	.833	.460
	Within Groups	315821818.18	11	28711074.38		
	Total	363652142.86	13			
Imported Processed Mangoes-off season (TShs)	Between Groups	87813116.88	2	43906558.44	.909	.431
	Within Groups	531310454.55	11	48300950.41		
	Total	619123571.43	13			

Region = Dodoma