ECONOMICS OF INDIGENOUS VEGETABLE MARKETING: A CASE STUDY IN ARUMERU DISTRICT.

BY

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ABSTRACT

Study objective was to analyze the marketing efficiency of indigenous vegetables in Arumeru district. Specifically to (i) identify the present marketing channels of Amaranthus, African nightshade and African eggplant and the role played by various market participants' objectives were (ii) To examine the relative competitiveness of Amaranthus, African eggplant and African nightshade with the selected exotic vegetables grown in the study area. (iii) Determine price differences and market margin among various market participants and selected IVs. Structural Conduct Performance model showed Indigenous Vegetables (IV) have similar marketing channel with other selected crops except the occurrence of seasonal collectors. There was no producers or traders organization to influence market price. IV sellers concentration index showed there is possibility of oligopolistic behavior in African eggplant farmer's sellers (CI=82.03%) since most of their revenues were obtained from selling to traders/transporters from other regions especially Dar-es-Salaam rather than Arusha city markets. Amaranthus and Africa nightshade sellers were found to have weak oligopolistic behavior since the concentration index was 38.92% and 36.7% respectively. From Gross Margin (GM) analysis the performances of IVs were competitive. African nightshade (*Solanum aethiopicum*) GM was higher (190 079.59 TSh) than selected exotic vegetables (Chinadese cabbage and spinach). Their GM was 39 796.67 TSh and 20 840.47 TSh for Chinese cabbage and spinach respectively. Also Market Margin (MM) among market participants were excessive at retailer-consumer level for all studied vegetables. MM for amaranthus was regressed against buying prices as a representative of indigenous vegetables to find correlation between MM and selling prices. It was found that 72.1% of the variation in selling prices is explained by buying prices and the remaining percent (27.9%) might be explained by other factors such as marketing costs. Also correlation analysis shows that there is positive correlation coefficient (r>0.765; p=0.01) between MM and selling price.

Indicating there is subsequent price movement to the next market level. There was positive correlation between MM, selling and buying prices.

DECLARATION

I, Festo Ezekiel Maro, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work and has not been submitted for a degree award in any other University.

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The above declaration is confirmed

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DEDICATION

To my dear parents-for the immense sacrifices and efforts they went through to ensure my education achievements and success.

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LIST OF ABBREVIATIONS

AVRDC	Asian Vegetable Research Development Centre
BOT	Bank of Tanzania
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IPAR	Institute of Policy Analysis and Research
IPGRI	International Plants Genetic Resource Institute changed to
	Biodiversity International
IV	Indigenous Vegetables
URT	United Republic of Tanzania

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

African indigenous vegetables play a highly significant role in food security of the underprivileged in both urban and rural settings (Schippers, 1997). They can serve primary foods or secondary condiments to dishes prepared from domesticated varieties. They are also source of energy and micronutrients in the diets of isolated communities (Okeno *et al*, 2003). Further they may serve as income sources and may be marketed or traded locally, regionally, even internationally, and the primary importance of edible wild species during periods of drought and social unrest or war is well documented (Humphrey *et al*., 1993, Smith *et al*, 1995).

However, the important role of indigenous vegetables (IV) in Tanzania's health sector, diets and as an income source is threatened through extinction of the genetic resources of these species. Production areas of IVs are in the process of being replaced by modern varieties (FAO, 1998). This neglect of traditional vegetables is not reasonable at all as these vegetables are especially important to the countries of sub-Saharan Africa, being better adapted to the environment than the introduced commercial vegetables. Furthermore, traditional vegetables represent cheap but quality nutrition for large parts of the population in both rural and urban areas (Chweya & Eyzaguirre, 1999). In fact, almost all of these vegetables are good sources of micronutrients including iron and calcium, as well as vitamins A, B complex, C and E. For example, amaranthus contains a multiple of these nutrients compared to green cabbage (IPGRI, 2003[1]).

One of the strategies to promote IV consumption is to ensure high producer prices as an incentive to increase production (supply) while maintaining affordable prices to insure

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[1] Currently named Bioversity International

consumers' access (demand) to these products, this can be achieved by improvement of marketing efficiency. Improvements in market efficiency will likely lead to stimulate more consumption and increased marketing of such products and hence increased nutritional security for the households in both rural and urban areas. (Weinberger and Msuya, 2004)

In this study, indigenous vegetables refers to a crop species or variety genuinely native to a region, or to a crop introduced into a region where over a period of time it has evolved, although the species may not be native. Hybrid crops will be excluded from this definition. In contrast, exotic crops are crops that have been imported to a certain region (Engle and Altoveros, 2000). Indigenous vegetables considered in this study are Amaranthus (*Amaranthus spp*), African eggplant (*Solanum aethiopicum L*) and African night shade (*Solanum americanum Mill*)

1.2 Production of IV in Tanzania

In Tanzania information on indigenous vegetables is inadequate and dispersed (Mnzava, 1993). Early studies by Manyafu (1971), Fleuret (1979) and Gerson (1989) are exploratory in nature. There are varieties of different indigenous vegetables commonly found in all districts. Their composition of species varies to a great extent in the different agro-ecological zones as well as the five different phyto-geographical regions of the country. Furthermore, the importance and number of IV species used are distinct between the zones (Ruffo, *et al.*, 2002). IVs can be classified as cultivated, semi-cultivated and gathered from the wild (FAO, 2003a). Important IVs domesticated and undomesticated crops grown in Tanzania are listed in the table 1.

Table 1: List of most common indigenous vegetables in Tanzania

Common name	Botanical name
Domesticated IVs	
Africancabbage	*Brassica carinata*
African eggplant	*Solanum aethiopicum*
Amaranth White	*Amaranthus cruentus*
Amaranth Broad	*Amaranthus dubius*
Amaranth grain	*Amaranthus hypochondiacus*
Cowpea leaves	*Vigna sinesis*
Night Shade	*Solanum nigrum*
Pumpkin leaves	*Cucurbita moschata*
Sweet potato leaves	*Ipomea batatas*
Cassava leaves	*Manihot esculenta*
Bottle gourd	*Legenaria siceraria*

Common name	Botanical name
Undomesticated IVs	
Black Jack	*Bidens pilosa*
Jews Mallow	*Corchorus olitorius*
Sider Flower Plant	*Gynandrropsis gynadra*
Water cress	*Rorippa nasturtium L.*
Trapoelum	*Nasturtium officinale*
Amaranthus- broad	*A. Blitum/ A. lividus*
Crotalaria	*Clotalaria spp.*
Rosella	*Hibiscus sabdariffa L.*

Source: Ngwediagi, S.P.N and Marandu, D.A, 2002

Cultivated IVs follow typical agricultural practices such as land preparation, sowing, weeding, watering are performed, semi-cultivated IVs often emerge at the onset of the rains and are allowed to grow between planted crops until ready for consumption (FAO, 2003a). If IV is gathered from the wild, it is mainly found on uncultivated land e.g. in forests. Wild vegetables serve as buffer food supplies during periods of food shortage, which are usually the month of November to February in Tanzania, where extreme drought occurs (FAO, 2003b). In Singida and Kongwa districts, which are located in central Tanzania and where drought is more extreme IVs can form complete meals where staples (e.g. maize flour) are not available (FAO, 2003b). From March onwards (with the

beginning of the rainy season), IVs from cultivated fields replace those collected from the forests.

Production statistics vary widely across regions for some of the IV crops, probably in part attributable to different production patterns (pure stand versus intercropped). A study conducted by Weinberger and Msuya (2004), in four districts[2] found the mean average yield levels of amaranthus are considered higher in Arumeru and Kongwa as compared to the other two districts. The yields of amaranthus and African eggplant in Arumeru were 12.8 t/ha and 10 t/ha respectively and for Kongwa amaranth yield was 8.2 t/ha.

1.3 Marketing of IV crops

Market integration of producers of fruits and vegetables is usually higher than that of staple crops (Minot et al., 2005). The same hold for marketing of IV crops. About half of IVs produced, reach the market; the rest being used for home consumption. Countrywide commercialization of IV is higher in Arumeru and Muheza followed by Singida and lowest is Kongwa (Weinberger and Msuya, 2004).

1.4 Problem Statement and Justification

Research work on marketing of indigenous vegetables (IV) crops in sub-Saharan Africa has been quite scarce. Most studies have concentrated on species identification and nutrient analysis of IVs (Lyimo *et al*., 2003). In the recent years it has been noted that the cultivation of IVs is declining. It is generally believed that the introduction of exotic vegetable varieties contributed to the decline in the production and consumption of indigenous vegetables (Smith and Eyzaguirre, 2007). Modernization and the onset of the market economy in Africa have meant that scientific agronomic research and development has shifted over to exotic crops that are suitable for export (Gockowski *et al*., 2003). Furthermore, there is no explicit government policy that attempts to promote production

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[2] Arumeru, Kongwa, Singida and Muheza.

and marketing of these products. The purpose of this study was to examine the marketing constraints of indigenous vegetables in urban and peri-urban centers.

Examples from South East Asia (i.e. Thailand and West Africa) show that IVs have a good potential to be exploited commercially (AVRDC, 2005). Urban super markets increasingly stock a wide variety of IVs for affluent consumers (Ngugi *et al*, 2006). It is essential that small and resource scarce farmers be enabled to participate in such a development of exploitation of IVs.

In spite of a large and expanding market in urban areas to absorb IVs produced, market functions such as assembling, grading, transport and others seem to lag behind the expanding demand for vegetables (Keller, 2004). This problem is further magnified by the uncertainty in producing IVs and selling prices in the market, thus increasing market risks which in turn affect the decision making process of producers and other market participants.

It is therefore essential to ascertain the level of efficiency in the marketing of IVs. This can be achieved by evaluating costs and price spread at different levels of the market chain, such as: farm gate price, trucking, wholesale and retail levels. Understanding of IVs competitiveness could partly help to find ways to minimize market risks to producers and traders.

Wien *at el*, 1990 identified marketing as one of the main problems facing the vegetable industry. Little attention was given to IVs such as Amaranthus (*amaranthus spp*), African nightshade (*Solanum aethiopicm L*) and African eggplant (*Solanum americanum Mill*). Also Nyange (1993) conducted a study that analyzed the economics of marketing

vegetables. Selected vegetables were tomatoes, onions, cabbage and potatoes. But Amaranthus, African nightshade and African eggplant were not studied.

Therefore the current study analyzed the relative competitiveness of IVs with exotic vegetables and their potential profitability in terms of cost efficiency in production and marketing in Arumeru district. Vegetablesselected in this study were amaranthus, African nightshade and African eggplant. Based on consumption survey, amaranthus, African nightshade and African eggplant were identified as main IVs most widely purchased in Tanzania (Weinberger and Msuya, 2004).

1.5 Justification of the study

- Improvement of IVs such as amaranthus, African eggplant and African nightshade marketing and production will result in sustainable income generation to women, since the production and marketing of IVs is often the domain of women farmer*s*, where as men tend to dominate the exotic crop sector (Gockowski *et al.,* 2003).

- The study will lead to better understanding of IV activities since current literatures are lacking in amaranthus, African eggplant and African nightshade marketing problems in Tanzania.

- Study findings will contribute to policy making because currently there is lack of policy in IV sub sector.

1.6 Objectives of the study

The primary objective of the study is to examine the marketing structure, conduct and performance of amaranthus, African eggplant and African nightshade in the selected areas

and thus be able to identify the priority areas for improving the efficiency of marketing activities.

1.6.1 Specific objectives

- Identify the present marketing channels of amaranthus, African nightshade and African eggplant and the role played by various market participants

- To examine the relative competitiveness of Amaranth, African eggplant and nightshade with the selected exotic vegetables (Chinese cabbage and spinach) grown in the study area in terms of profitability.

- Determine price differences and market margin among various market participants and selected IVs

1.7 Hypothesis

- **Ho:** Amaranthus, African eggplant and African nightshade are not competitive in terms of profitability compared to exotic vegetables grown in the study area.

- **Ho:** There were no price changes passed on from farmers to other market participants.

1.8 Organization of the study

This dissertation is organized into five chapters including the introduction. Chapter two is a review of relevant literature. Chapter three describes the theory and methodological framework. Chapter four gives the major findings and discussion of the study. Finally, chapter five evaluates and presents the marketing implications of IVs to smallholder farmers and summarizes by concluding remarks and policy recommendations.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Over view of Tanzania Horticultural Sector

In Tanzania agriculture is the main stay of the economy and for the year 2004 it accounted for over 51% of the country's foreign exchange earnings. Agriculture supports about 75% of total population and contributes about 47% of the Gross Domestic Product (GDP) (BOT, 2005). In spite of the large contribution of the agricultural sector to the economy, the horticultural industry remained dormant for many years and its contribution to foreign exchange was negligible. This is partly due to the fact that priority was given to production of export cash crops such as coffee, cotton, cashew nut and tobacco. Second priority was given to staple food crops such as maize, beans and sorghum. Therefore, little attention was given to the horticultural sector. This affected the allocation of resources into research, extension and manpower development for this sector (Weinberger and Lumpkin, 2005).

With the decline in terms of trade of the country's main traditional export crops and the increase in concern about food security, new strategies had to be adopted so as to diversify the country's exports while ensuring better health for its population. One of the strategies was to promote non-traditional exports such as horticultural crops. Since then, the horticultural sector received more attention and a much higher priority in the allocation of resources. In terms of production, there has been a significant increase in horticultural products for both domestic and consumption and export in recent years (URT, 2004).

In spite of this increase, indigenous vegetables cultivation has not received due attention in terms of research or political advocacy as a result production is declining. In general a decline in consumption of traditional food crops and increasing consumption of refined and processed foods, fats sugars, and animal foods is an observable trend.

In Tanzania horticultural crops are usually grown on a small scale basis but usually generate higher earnings per unit area and represent an alternative for farmers with too small cultivable land to provide adequate income from field crops. Recently a rapid increase in fruit and vegetable production has occurred in the course of the revival of economic growth and liberalization of nontraditional export marketing. The ten most important vegetables produced in terms of yield in 1995/96 were cabbage, tomato, onion, garden pea, amaranthus, Chinese cabbage, African eggplant, carrots, cauliflower and okra (Mwasha, 1998).

2.2 Marketing channels or chains

Defining marketing chains means the series of steps a commodity moves from one point to the next. Marketing chain analysis can reveal the connection between price and other marketing services performed by actors. It also provides information on transport and storage destinations and who is the ultimate consumer/user. This permits the analyst to specify the likely causal direction of product movement in the market (Timmer *et al,* 1983). This is crucial for subsequent market margin analysis if they are to provide meaningful assessment of marketing efficiency.

Marketing chains are important in understanding which firms/dealers are engaged and they can be used to illustrate and clarify not only the movement of commodities, but also financial, credit and information flows, and the strategic location of storage and processing

facilities in the system. The patterns revealed through such illustration may shed light on opportunities and constraints faced by traders, consumers and/ or producers.

In order to establish meaningful classes of participants in the market chain, criteria used are often specific to the objectives of the research. For instance, functional categories, like rural assemblers, wholesalers, wholesaler-retailers, retailers, processors, transporters, farmers-traders, commission agents and money lenders are universally used. Functional categories will often not be mutually exclusive through and because individuals or firms may combine several market roles. But through identifying the various functions undertaken, and the exchange relations between the institutions responsible for them, marketing chains can be built up and the means by which commodities move from producers to consumers more clearly understood (Timmer *et al*, 1983).

2.3 Market Margin, Price Spread and Share of Consumer Shilling

As stated earlier marketing efficiency is important to ensure steady supply of IVs. Efficiency is normally expressed as output per unit of input and it implies minimizing costs of market services without reducing services or improving services without increasing costs. In order to ascertain the efficiency of the market, the concept of "market margin" is normally adopted as an indicator of market efficiency (Loh, 1974). From these margins producers' shares of consumer's shilling, are still useful as an indicator of efficiency though limited to comparing the marketing efficiency of alternative marketing channels for a particular commodity (Tomek, 1990). Bruce (1986) also stated the necessity of determining whether or not margins are excessive.

Market Margin is of great importance because of the impact of intermediary market participants upon the prices paid by the consumer and that received by the producer.

Research studies on margins, market efficiencies and price spreads in Tanzania are lacking, especially as far as the Indigenous Vegetables (IVs) are concerned. This section reviews findings of such studies.

Ashimogo and Lazaro (1989a) studied vegetable marketing in Morogoro district along the Mgeta-Dar es Salaam market channel which consisted of producers, village middleman, transporters and retailers in urban markets. Transporters were involved in shipping and wholesaling of vegetables. The study revealed that, margins for cabbage were highest for transporters who deliver vegetables to the city for wholesaling. Transportation costs contributed about 37% to 40% of the total costs along the channel. Profit margins ranged from 25% to 71% of the producer's price and were found to be highest for both village middleman and lorry traders. Producers' share of consumer shilling ranged from 6% to 22%. Retailers' obtained the largest profit margin of about 30% to 51% of the retail price.

Mlambiti (1975) carried-out a similar study to that of Ashimogo and Lazaro along the same market channel in the Morogoro district. The purpose of the study was to asses margins for selected fruits and vegetables. He estimated that profit margins ranged between 37% and 220% of the producer price.

Mascarenhas and Mbilinyi (1969) carried-out a study on banana marketing from the Morogoro and Coast regions to the Dar es Salaam city markets. Their channel consisted of producer, wholesaler (trucker) and retailers at the city main market, Kariakoo. Also, an alternative channel where retailers in other small city markets (sub-markets) purchased their supply from wholesalers was included. Result of their study indicate that, transport share of the total marketing costs was highest than other costs. The retailers' share of

consumer shilling was highest relative to other market participants. Producers' share of consumer shilling was about 19%.

In another study, Mascarenhas and Mbilinyi (1969b) estimated market margins for oranges from the coastal zone marketed in Dar es Salaam. The study indicates that retailers received the largest share of margins, that is, 40 cents from every one shilling paid by the consumer. The share of transport cost to total marketing costs was 50%. Farmers' share of consumer price was estimated to be 12.5 percent. Delobel *et al.* (1991) observed that retail prices for plums along Mgeta Morogoro market channel were 10 to 30 times the producer price, depending on the season of the year.

All these studies suggest that producers received the smallest share of the consumer shilling. Transport contributed much to the total marketing cost and retailers received the largest margins. Explanations given for these observations can be concluded that the smallest share of consumer shilling received by the producer is due to their low bargaining power which arises from lack of capital required for marketing their own produce. Also, because of their aversion to risk, only few farmers are willing to take the risk of delivering their produce to urban markets, high transport costs arise from poor infrastructures such as roads. Lack of storage and handling facilities creates high risks of perishability.

2.4 Conceptual Frame work of market efficiency studies

Agricultural marketing has been defined in various ways by different authors on the schools of thoughts. For the purpose of this study the definition by Gittinger (1982) has been adopted. Gittinger (1982) defined agricultural marketing as the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until the same goods are in the hands of ultimate consumer. By this

definition it means the performance of marketing system will depend very much on the efficiency by which the marketing functions are carried.

The efficiency, with which marketing functions are undertaken and priced, will be largely determined by the extent of competition between marketing enterprises at each stage of the marketing chain, since this is the dominant factor in limiting of profit. Therefore analyzing market margins is an important means of assessing the efficiency of price formation in and transmission through the system. Nevertheless, analyzing gross market margins can provide insights into other aspects of marketing and can lead to the formation of initial hypotheses concerning economic efficiency. (Scarborough and Kydd, 1992).

Theoretical framework to guide studies in marketing efficiency have been given by Scarborough and Kydd (1992). These are the internal productive efficiency of marketing enterprises, the structure-conduct-performance model (S-C-P), and the food system framework. The first one is a measure of firm level economic efficiency which is a combination of technical and operational efficiency of individual firms. Under this school, the method of descriptive analysis of accounting data is commonly used.

Secondly; the structure-conduct-performance model (S-C-P) emphasizes on the relationships between functionally similar firms and their market behavior as a group. 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 structure of relevant market. Timmer *et al*. (1983) emphasizes that, the food systems framework emerged from the concern that the internal productive efficiency model and S-C-P model could not analyze horizontal relationships between firms in assessing market performance.

Further more, it fails to identify binding constraints in the system, and opportunities for enhancing its productivity and performance.

Consequently the food systems framework combines elements of both the previous tools. It looks at the constraints on and opportunities for markets to contribute to improved economic performance (Scarborough and Kydd, 1992). Such constraints and opportunities are defined either through interviews with the market participants, or through classical market analysis tools.

2.5 Conceptual framework of this study

2.5.1 Market structure

According to Scarborough and Kydd (1992), market structure refers to the organization characteristics of a market that influence the nature of competition and pricing mechanism within the market. Structural characteristics may be used as a basis to classify markets. Markets may be perfectly competitive, monopolistic or oligopolistic (Pomeroy and Trinidad, 1995). The common measures of efficiency of this component are the degree of concentration, market transparency (information), barriers to market entry and product differentiation (Scott, 1995).

According to this, performance is expected to be satisfactory under the following three conditions: if sufficient number of buyers and sellers exist to provide alternative outlets without one of them having the market power to dominate others; if market transparency with regard to product quality, varieties, grades and prices is given and if there are no serious barriers to market entry and exit (Scarborough and Kydd, 1992).

2.5.2 Market conduct

It is one of the determinants of performance of a system. Market conduct refer to the patterns of behavior that firms follow in adapting or adjusting to the markets in which they sell or buy (Pomeroy and Trinidad, 1995). Pomeroy and Trinidad further identified two closely interrelated aspects of market conduct; the first is the manner in which devises and mechanisms by which the different sellers coordinate their rivals decisions and actions. This deals with how sellers adapt to each other, or succeed in making their decisions mutually consistent as they react to demand for their product in the common market. The second aspect concern to the characteristics of pricing policies and related market policies that sellers in the industry adopt. The assessment of market conduct can be assessed in

terms of the individual or collective aims or goals that different sellers pursue as they determine selling prices, their sales promotion outlays and the designs and qualities of their products. Analysis of markets conduct entails an examination of (i) the buying and selling behavior of various market participants, (ii) forms which competition amongst them takes (pricing, terms of payment and credit), (iii) level of activity and (iv) actions to avoid competition for instance, collusion (Scarborough and Kydd, 1995).

2.5.3 Market performance

This refers to the impact of structure and conduct as measured in terms of variables such as prices, costs and volume of outputs (Pomeroy and Trinidad, 1995). By analysis levels of marketing margins and their cost components, it is possible to evaluate the impact of the structure and conduct characteristics on market performance. It is generally acknowledged that a distribution system displaying acceptable performance is the one that allows technological progress, has the ability to adopt, innovate and utilize resources efficiently and to transmit prices that reflect costs common indicators of performance are trends in retail prices, level of stability of farms prices and income spread of marketing margins, marginal propensity to consume and farmers' share of the consumers shilling spent on agricultural product, middlemen profit and parity farm prices (Kohls and Uhl, 1990). Analysis under this concept normally includes evaluation of operational, technical and pricing efficiency.

2.5.4 Relationship between S-C-P models

According to Schmidt (1979) market structure (environment) determines market conduct (the behavior of economic agents within the environment) and thereby sets the level of market performance (how close the industry comes to meeting the norm or standard of reference of social welfare). Causational may however run both ways, from economic performance to conduct to structure. The relationship may also be dynamic in character

and change with time. This issue may limit the predictive and analytical value of the approach and must be considered when interpreting the results of industrial organization analysis.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the study area

The study was done in Arumeru district. This is one of the four districts in Arusha Region. The district is main supplier of vegetable to the city of Arusha. This area is topographically undulating, averaging 1300 meters above sea level and its peak elevation at Mount Meru 4,566 m.a.s.l.. Arumeru district covers 2,900 square kilometers and it has a population of 514,651 people living in 133 villages (URT, 2005). The area receives short rains from November to January and long rains from March to June with peak in April. Annual rainfall ranges from 500-1500 millimeters.

3.2 Location of villages

The studied villages were Nambala, Mlangarini, Olevolosi and Moivaro-Ambureni. Olevolosi lies along latitude 238216.732 and longitude 9633038.866. It has an area of 2.756 Km^2 and a population of 4 932. Neighbouring villages are; north Kimnyaki south Saitabali east Olimringaringa and west Lemanyata. Moivaro-Amboreni lies along latitude 251960.295 and longitude 9629770.685. It has an area of 4.195 Km^2 and a population of 6,227. Neighbouring villages are; north Loita south Moshono east Nguruma and west Sasi. Mlangarini lies along latitude 238216.732 and longitude 9633038.866. It has an area of 35.318 Km^2 and a population of 4,112. Neighbouring villages are; north Patandi south Nduruma east Manyire and west Kisarani. Nambala lies along latitude 238216.732 and longitude 9633038.866. It has an area of 12.213 Km^2 and a population of 2,275.

Neighbouring villages are; north Mlangarini south Kigongoni east Marurani and west Kisariani. The map of the studied areas is shown next page.
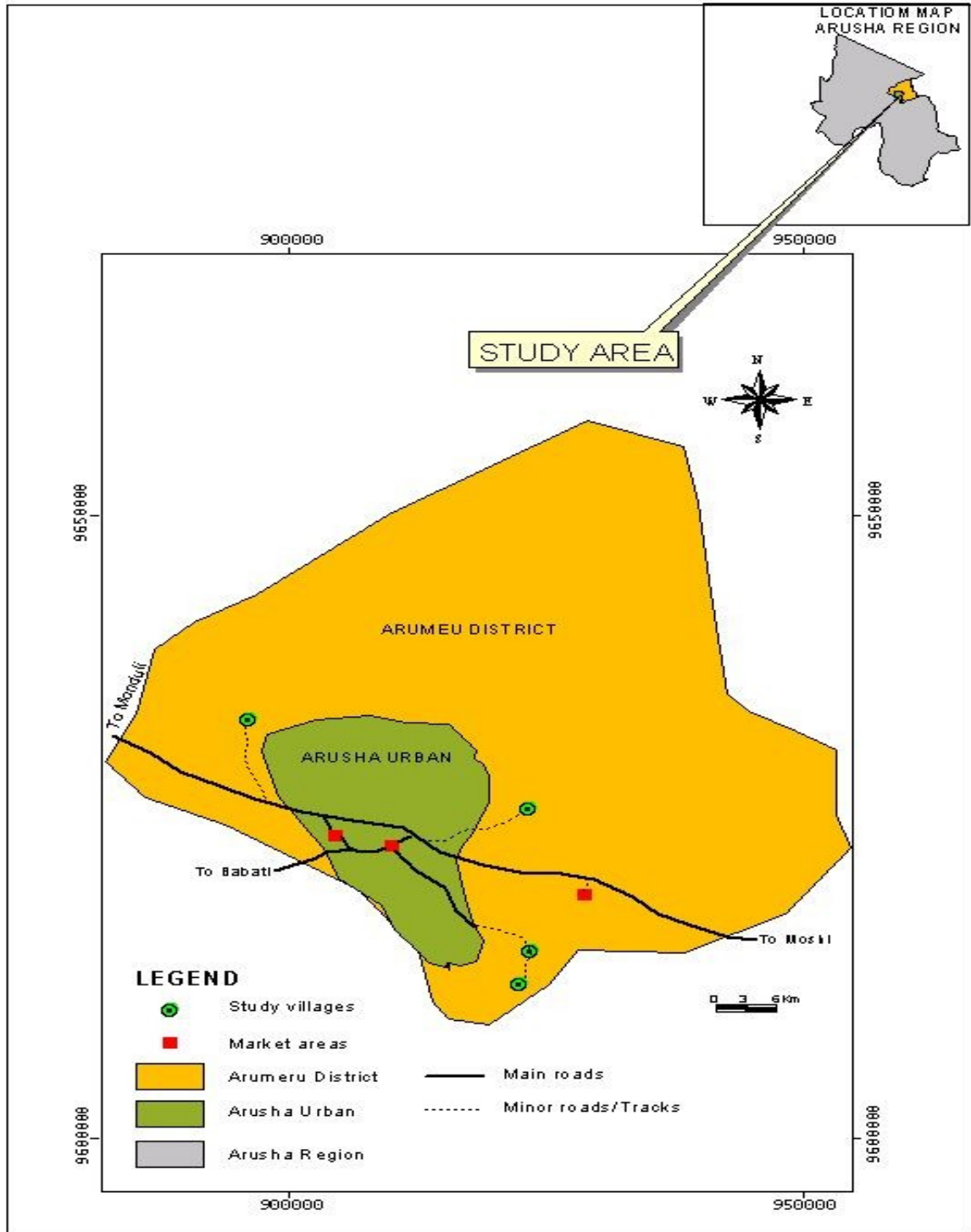
SOURCE: ESRI (1991-1996)

Figure 1: Arusha region Map illustrating locations of the study

3.2.1 Economic activities

The main economic activities are agriculture, livestock-keeping and business. The main crops grown are maize, banana, beans, exotic vegetables such as tomato, cucumber, saro, broccoli, Chinese cabbage, spinach, Ethiopian mustard and fruits such as avocado, oranges, mangoes etc. Other crops were coffee, indigenous vegetables such as African eggplant, amaranthus, African nightshade, okra and asparagus. Main livestock reared are cattle, poultry, goats and sheep.

3.3 Study design

The study involved a cross sectional single visit survey. This design allowed collection of data at one point in time i.e. during October and December 2006. According to Bailey (1994) and Casley and Kumar (1988), the design allows data to be collected at a single point. According to the nature of the study the design is feasible, economical and data collected can be used to determine relationship between different variables.

3.4 Sampling technique

3.4.1 Study population

The study population of IVs producers residing in Ambureni-Moivaro, Olevolazi, Mlangarini and Nambala villages in Arumeru District. The villages were selected after consultation with Arumeru horticultural and extension officers. In Arumeru, a number of villages have become urbanized leading farmers to migrate to other areas due to insufficient agricultural land. The studied villages had less urban influence. Wholesalers and retailers were also interviewed.

3.4.2 Methods of data collection

Two stage stratified sampling was applied in this study. Stratification was done based on altitude, climate, soil and farming system. Also types of vegetables grown were considered

in site selection because vegetables like eggplant was not grown in high altitude areas but was mainly grown in low land areas. A sample of 75 farmers obtained.

For wholesalers and retailers nine city markets were identified and three of them were chosen as representative based on the market characteristics features. Selection criteria were number of participants, number of working days and organization in terms of infrastructure. Central market was chosen as a representative of well organized market in terms of administrations and infrastructure. It is the largest market in terms of number of participants and amount of vegetables handled. It functions during all days of the week and is centrally located in the city. Tengeru is a suburban market with the least of all characteristics mentioned above working only in two days of the week whereas Kilombero can be characterized as between the two. A two stage stratified sampling technique was adopted for urban markets as well. First, the nine markets were grouped into 3 categories according to their features that are well organized, moderately organized and least organized. From each market, representative market participants were randomly chosen resulting into a total sample of 60 respondents. Therefore the total sample of the study was 135 respondents.

3.5 Type of data collected

Both primary and secondary data were collected for the purpose of this study. Primary data for this study were collected through informal and formal surveys to get an in-depth understanding of issues related to IVs cultivation and marketing of three IVs (Amaranthus, African nightshade and African eggplant). The formal survey involved personal interviews using a pre-tested questionnaire. The information collected included socio-economic data, inputs used, vegetables outputs (yields) and output markets as well as IVs marketing and profitability. The researcher had to train two enumerators to conduct the interviews. To

ensure quality in capturing of responses from the interviewers, the team conducted interview with respondents at their homestead and few others on their farms.

Secondary data were collected from reports and other documentary materials from the relevant institutions and offices such as Tengeru institute, Asian Vegetable Development Research Centre-Regional Centre for Africa (AVDRC-RCA), District Agricultural and Livestock Development Officer (DALDO), internet and Sokoine National Agricultural Library (SNAL).

3.6 Data analysis

A substantial part of the analysis is based on descriptive statistics to describe the responses, characteristics and trends of some of the data and information. Responses from the interview were coded, summarized and entered in a computer. The data were analyzed using Statistical Package for Social Science (SPSS) computer package. SPSS was employed for both descriptive and quantitative analysis of the data, based on the objectives stated. Descriptive analysis employed was the use of means, percentages, crosses tabulation and ranges whereas quantitative analysis involved the use of regression analysis, correlation analysis, gross margin analysis and market margin analysis.

3.6.1 Assessment of IV market structure

Market structure was analyzed by using descriptive analysis. Areas studied under market structure included; market channel structure and distribution, IV seller's concentration, collaboration between market participants and barriers to market entry. The analysis of IV market structure and its distribution was done so as to determine the movement of produce. The following measures of market structure were used.

    a) **Market channel structure**

The analysis of IV market structure and its distribution was done so as to determine the movement of produce from point of production to the point of consumption. This was done by looking at various market functionaries and their roles in providing the product with time, form and place utility. Respondents were asked to mention sources and customers of respective IVs for the months of October and November 2006, means of transport and costs associated with marketing of the produce.

b) IV seller's concentration

In this study market concentration of sellers was used in determining the degree of concentration of sellers in the market. As defined by (Pomeroy and Trinidad, 1995) market concentration is the number and size of distribution of sellers and/or buyers in the market. This distribution can be measured by an index known as seller concentration given by:

CI= (MR/TR) X 100

Where; CI = Concentration Index

MR= Revenue accrued to sampled farmers who sold their IVs to wholesalers

TR= Total revenue accrued to all sampled farmers in the study area.

According to Kohls and Uhl (1990), the concentration ratio of over 50% is an indicator of strong monopolistic industry, 33-50% weak monopolistic industry, less than 33% is an indication of an un-concentrated industry.

c) Barrier to market entry

Barriers to market entry were addressed by including specific questions in questionnaires such as what constraints they face with regard to daily marketing activities. Following their responses, answers were analyzed by using descriptive analysis.

d) **Market collaboration**

Market transparency in sharing different information was analyzed by using descriptive statistics. Also questions on grading and sorting of IVs were recorded and analyzed.

3.6.2 Assessment of IV market conduct

The analysis of market conduct aimed at examining the buying and selling behavior of various market participants. This involved examining the pricing methods, whether they have contracts or not, and if they have any formal or informal organization, which can have impact in competitiveness in the marketing places. Descriptive analysis was done so as to analyze the responses collected.

3.6.3 Assessment of IV marketing performance

The assessment of IV market performance was done by computing the market margins, gross margins, producer's share and price variations as described from the following sub sections.

a) **Gross margin analysis**

To define the concept of gross margin, we first have to distinguish between variable and fixed costs. Variable costs are those that increase with or decrease as output changes, while fixed costs do not change as out put changed (Cramer *et al.*, 2001). The common examples of variable costs in crop production include seeds, fertilizers and pesticides. The most important fixed costs in agricultural production are owned land, family labor, farm building and farm machinery and implements. The gross margin of a farm activity is the difference between the gross income earned and the variable costs incurred (Makeham *et al.*, 1986) it is given by; $GM_i = TR_i - TVC_i$

Where; GM_i = Average gross margin (Tshs/ha).

TR_i= Average total revenue (Tshs/ha)

TVC_i= Average variable costs (Tshs/ha)

Gross margin analysis employed to examine the relative competitiveness of IV and selected exotic vegetables, the size of gross margins may provide insights into other important characteristics, and can aid formation of hypotheses concerning farming or market efficiency. If gross margins decline with increased raw materials supply, economies of scale may be a factor, and if they rise with farm production, bottlenecks or constraints in the provision of marketing services may be implied.

It was useful to study the gross margins of IVs and selected exotic vegetables grown in the study area in order to establish the relative economic profitability of the crops. It is generally known that due to scarcity of resources smallholder farm producers tend to allocate their resources more to those enterprises which earn more returns. Thus more returns warrant future production of that crop as transferable resources are switched from the low paying enterprises to more paying one. However, as Mwala *et al.* (1988) pointed out that in attempting such comparisons it is necessary to take into account of the differences in product perishability. Ishuza (1984) pointed out that this method of analysis has one major weakness in small scale farming. Farmers usually attempt to attain self sufficiency in food stuffs, thus a large portion of family labor is devoted to food production thereby affecting labor allocation to other enterprises. Gross margin analysis was done in this study to determine relative competitiveness (economic profitability) of IV and selected exotic vegetables grown by farmers at different level of marketing chain.

b) Market margin analysis

The formation of marketing margins, through their influence on price levels, is a major determinant of the efficiency of resource allocation in production, distribution and consumption. Therefore analyzing market margins is an important means of assessing the efficiency of price formation in and transmission through the system. (Scarborough and Kydd, 1992). Market margin are difference between prices at two market levels. The term market margin is commonly used to refer to the difference between producer and consumer prices of an equivalent quantity and quality of a commodity. However it may also describe price difference between other points in the marketing chain, Market margin analysis represents the price charged for one or a collection of marketing services. For example the difference between producer and consumer or retailer's prices is the amount charged for all the marketing services rendered between production and consumption or retail place, including buying, bulking, transport, storage, processing, market fees etc,. Under competitive conditions, the size of market margins would be the outcome of the supply and demand for marketing services, and they would equal the minimum costs of service provision plus 'normal profit'. This was done by comparing the differences between IVs selling prices per Kg and buying prices per Kg. the difference in prices was established for individual IVs (Amaranthus, African eggplant and African nightshade) and also for Spinach and Chinese cabbage. So as to measure the share of the final selling pricing that is captured by a particular market functionary in a market chain.

For the purpose of this study, the market margin analysis was represented by

Mm = Sprice - Bprice

Where; Mm = marketing margin of vegetable

Sprice = selling price

Bprice= buying price

c) **Producer's share**

The producer's share is the ratio of producer price to consumer price (retail price). Depending on the level of marketing chain, producers share was calculated by using the following relationship:

$Ps = Px/Pr = 1- MM/Pr$

Where: Ps = Producer's share

Px = Producer's price

Pr = Retail price

MM= Market margin

d) **Price variation**

The degree of price changes from one market level to another or buying point and selling point was analyzed. Analysis aimed at testing the hypothesis as to weather or not price changes are passed on to other market level (Schmidt, 1979). In other words it was aimed at checking the price information flow. The analysis was done using regression and correlation analyses to test to what extent markets are statistically associated with buying and selling prices. This was done by running the simple regression model:

$MM = f (P_i, \mu)$

Where: MM = Market margin

P_i = Buying price at a specific market

μ = Error term

3.6.4 Farmer's Characteristics

Farmer's characteristics were analyzed descriptively using household variables obtained from the survey. A variable analyzed includes age, gender, education, household size and marital status. Such analysis provides insights and motives in IVs producers and some information on their socio economic activities dynamics. To some extent the variable such as education can have impact in producing and marketing IVs innovatively. Therefore such a descriptive analysis of farmer's characteristics was important to be analyzed and discussed with the context of the study.

3.7 Limitation of the data

Some farmers either showed an obvious interview fatigue due to past research studies or did not appear for the interview for reasons not known by the researcher. Some farmers had problems of memory recall due to poor record keeping. In some cases the researcher had to rely on their estimates. Problems related to price data collection is a possibility that prices reported do not apply in all markets at the same time, partly, because of differences in markets operating days and hours. Also the fact that there were generally no regulations as to the time when prices were to be collected. Data were collected for crops grown and marketed in the months of August to November 2006 season. Other limitation includes the following.

a) Using cross-section data limits observation over time. This makes it difficult for the study to account for changes due to time difference

b) A case study approach as used by this study limits observation to only one location. Hence the conclusion reached may not hold for other similar IVs marketing activities and their efficiencies in other study areas.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Preamble

This chapter presents and discusses the results of the study in line with the study objectives. The main purpose of this chapter is to provide detailed information on smallholder Indigenous Vegetable (IV) producers marketing activities efficiency. The chapter also discusses IV market participant's structure, conduct and their performance using the data collected in the study area. In this study two types of exotic vegetables were purposively selected (Chinese and Spinach) for the intention of comparison of profitability and gross margin with the IV produced in the study area.

4.2 Farmers characteristics

Table 2 shows selected characteristics of farmers-respondents about the composition of households by age, size, education level, gender and marital status which are quit similar in the study areas. This table also presents the percentage of those who are married. For the purpose of the study, a household was defined as a person or a group of persons, related or unrelated, who live together and share a common source of food. The data show that 35% of age distribution in the surveyed villages range between 31-40 years and 31% range between 20-30 years, this show most of respondents are in the category of economically active age which are regarded to have enough energy to undertake production activities in the farm to ensure constant supply of traditional vegetables in the market channel through out the year. The household size mean in the surveyed villages is slightly larger 5.2 compared to the 2004 Tanzania Demographic and Health Survey for rural population which is 5.0. There fore production and marketing of IVs serve as source of food and income to contribute to household welfare.

About 60% of the respondents were married. This shows that the society is stable; divorce rate was low 4% and few incidence of death among couples because only 1% was represented by widows. A stable family is more productive in that they concentrate more on production to meet their ends than an unstable one and thus may influence on efficiency in production and marketing activities (Msuya, 2003).

Table 2: Household variables

Age distribution (N=75)	Number	Percent (%)
20-30	23	30.67
31-40	26	34.67
41-50	18	24.00
51-60	7	9.33
>61	1	1.33
Household size		
1-5	46	61.33
6-10	27	36
>11	2	2.67
Mean	5.2	
Education level		
Primary education	64	85.34
Secondary education	10	13.33
None	1	1.33
Gender of respondent		
Male	47	62.67
Female	28	37.33
Marital status		
Married	60	80
Single	11	14.67
Divorced	3	4
Widow	1	1.33

It also depicted from Table 2 that 15% were single and 4%.were divorced. This shows that married women do production and marketing activities to support their family's welfare. From the sampled respondents, 85% have primary education level, 13% have secondary education while 1% did not have any formal education. This literacy level of respondents is encouraging as it also has influence in carrying out basic marketing

activities at optimum level. However it shows production and marketing of IV is opted when low skilled individuals missed other employment opportunities in other areas.

During data collection many who interviewed were males 63% compared to 37% of females in the surveyed villages as indicated in Table 2. In Arumeru district IV and other vegetables is a female domain while farm activities are distributed among males and females. Men prefer to work in farms than going away to market IV in the markets.

4.2.1 Economic activities of respondents

In the surveyed villages, it was found that over 40% of respondents were involved in farming or animal keeping. Table 3 indicates, 45% were involved in farming and animal keeping, 41% were only involved in farming and 13% were involved in farming and formal employment. Few respondents were employed in formal sector because of their low level of education and skills hence most were depending on farming activities.

Table 3: Main Occupation of producers

Occupation	Village				Overall (%)
	Nambala (N=18)	Mlangarini (N=20)	Olevolosi (N=17)	Ambureni-Moivaro (N= 20)	
Farming	22.22	40.00	41.18	60.00	41.34
Farming and Animal Keeping	72.22	40.00	47.06	25.00	45.33
Farming and Employed	5.56	20.00	11.76	15.00	13.33
Total	**100**	**100**	**100**	**100**	**100**

Note: N= Number of respondents

4.2.2 Reasons for growing IVs

Production of IVs is mainly dominated by resource poor farmers[3] who mostly are located outskirt of towns or by new immigrants from other villages. According to IITA (1999), found that edible wild food provides a cushion against starvation during drought, while economically important species provides a buffer against unemployment during cyclical economic depression.

Table 4: Main reasons for producing Ivs

Main reasons for growing Ivs	Frequency	Percent (%)
Good prices	47	62.67
Contract with partner	1	1.33
Production experience	32	42.67
Available market	56	74.67
Opportunity to earn extra income	70	93.33
Cultural reasons	7	9.33
Home consumption	58	77.33

Note: Producer's N=75

It was found that the major reasons for producing IVs was an opportunity to earn extra income (93%), for family consumption (77%), availability of markets for selling Ivs (75%) and good prices in the market (63%). However, other reasons were production experience (32%) and having contract to the buyer (1%).

4.3 IV production aspects

IVs producers in the study area were not different from producer of other crops e.g. cereals, for instance they diversify risks in crop production so as to overcome the problem of crop failures which could lead into food insecurity and loss of income. More than 50% of IV producers who were interviewed in four villages reported to have grown other crops

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[3] Resource poor farmers do not have enough land, lack capital and use low inputs technology

than IV crops in the same production area or far in the other areas around their respective villages but none of them rented a farm for IV crops production.

The results in Table 5 show that 70% of IV farmers in Arumeru district grow other crops than IV crops e.g. cabbage, spinach, Chinese cabbage, tomatoes, Ethiopian mustard, okra, banana, maize, beans and coffee. The major reason reported by respondents for growing more than one crop was to earn more income and to ensure food security to their families.

Table 5: Distribution of Producers growing more than one crop

	Village (%)				
Crops grown	**Nambala (N=18)**	**Mlangarin i (N=20)**	**Olevolosi (N=17)**	**Ambureni-Moivaro (N=20)**	**Overall (%)**
Growing IV only and other crops	55.56	75	88.23	90	77.33
Growing IV only	44.44	25	11.76	10	22.67
Total	**100**	**100**	**100**	**100**	**100**

4.3.1 Allocation of land for IV production

The study revealed that no single farmer rent a land for IV production. Farmers reported that it was expensive to rent a piece of land for IV production. Home gardening was mainly practiced for production of IVs. Table 6 indicates the percentage of land area allocated by respondent to grow IV crops, Chinese cabbage and spinach.

Table 6: Allocation of land to vegetables production

Crops	Vegetables grown area (ha) (%)								
	0.125	0.188	0.25	0.333	0.5	1	1.5	2	Crop not grown
Amaranthus	17.33	--	46.67	1.33	10.67	4.00	--	--	20.00
African nightshade	16.00	--	46.67	4.00	14.67	2.67	--	--	16.00
African eggplant	1.33	--	17.33	--	17.33	6.67	1.33	2.68	53.33
Chinese cabbage	18.67	1.33	44.00	1.33	9.33	--	--	--	25.33
Spinach	8.00	--	24.00	1.33	2.67	--	--	--	64.00

Note: Producer's N=75

Closely competing exotic vegetable for production area was Chinese cabbage, 44% farmers allocated the same size (0.25ha) for production. Also 24% and 17% of farmers located the same area for producing spinach and African eggplant respectively. 17% of farmers located 0.5 ha of land for African eggplant production, African nightshade 15% of farmers, 11% farmers for amaranthus. 9% and 3% were allocated for cultivation of Chinese cabbage and Spinach respectively.

Table 6 revealed that 17% farmers allocated 0.125ha of land for amaranthus and 16% farmers allocated similar land area for African nightshade production. The research found that few individual farmers grows all the vegetables cited by the researcher, the last column shows vegetables selected for the study which were not grown by respondent-farmers. 53% of farmers did not grow African eggplant. The percentage was larger since African eggplant grows well in dry areas which constitute small sample size farmers compared to sample size of farmers where water can easily be found. 20% and 16% of farmers did not grow amaranthus and African nightshade.

4.3.2 Input use in IV production

About 48% of IV producers use organic manures than inorganic fertilizers. Main types of organic manure observed in the study area were farm compost, livestock manure which includes chicken, cattle, goats and sheep. Farmers said it was cheap and easily available.

Table 7: The use of farm inputs in IV production

Input used	Villages (%)				Overall %
	Nambala (N=18)	Mlangarini (N=20)	Olevolazi (N=17)	Ambureni-Mwaivaro (N=20)	
Organic manure	50.00	40.00	47.06	45.00	46.67
Pesticides	16.67	30.00	23.53	25.00	22.67
Inorganic fertilizer	33.33	30.00	29.41	30.00	30.67
Total	**100**	**100**	**100**	**100**	**100**

About 47% of farmers used organic manure in producing IV crops. Pesticides application was low, only 22% used pesticides. Pesticides were mainly used in exotic vegetables. Farmers reported, exotic vegetables were attached frequently than IV crops. Inorganic fertilizers were used by 31% of farmers. Ngwediagi and Marandu (2002), emphasized on IV crops low level of input use and purchasing price than exotic vegetables.

4.3.3 Labor requirements for IV production

Table 8 shows labor requirements for IV crops production from the villages surveyed, 51% of respondent-farmers use both hired and family labors, 48% used only family labor only and 1% hired labor for farm activities. Larger percent of family labor minimize production costs hence lowering IV crops prices.

Table 8: Distribution of IV farmers by labor requirements

Villages (%)

Type of labor	Nambala (N=18)	Mlangarini (N=20)	Olevolosi (N=17)	Ambureni- Moivaro (N= 20)	Overall (%)
Family Labor	61.11	45.00	35.29	50.00	48.00
Hired Labor	5.56	--	--	--	1.33
Both hired and Family Labor	33.33	55.00	64.71	50.00	50.67
Total	**100**	**100**	**100**	**100**	**100**

4.4 Marketing problems faced by IV farmers

Fig. 2 below indicates farmer's response on marketing limitation experienced while selling IVs. 65% reported that there are many constraints in selling IVs crops while 35% did not have. It can be concluded that farmers encountered many market obstacles in selling IVs.
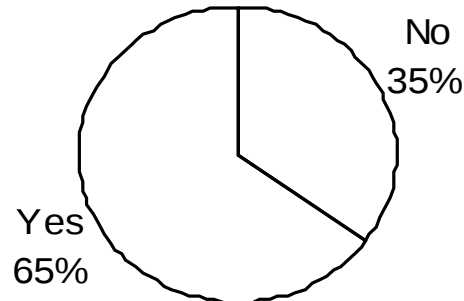
Figure 2: Farmer's marketing constraints response

Table 9 shows, marketing constrains farmer's are facing. Market by-law was the major constraints (77%) experienced by farmers who brought their produces to the market. Market by-laws form a major barrier to enter the market. The market fee of 200 Tshs which was taxed to a farmer is for three hours starting from 6 am to 9am. In some cases produces were seized by market authorities and dumped. Presence of many seller (74%) and low price (68%) for their crops were other constraints. The two constraints have causal relationship as a counteractive measure most of participants set a profit margin which they struggle to maintain to avoid losses. Another problem was lack of capital but few farmers described as not major constraint, since producing IV crops wasn't costly as

producing exotic vegetables. Ngediagi and Marandu (2002) also found that indigenous vegetables do not require high input costs as commercially grown exotic vegetables.

Table 9: Marketing constraints

Constraints	Frequency	Percent (%)
Low price	51	68.00
Many sellers	56	74.00
Lack of capital	17	22.67
Market by laws	58	77.33

4.4.1 Marketing constraints at retail and wholesale level

Marketing problems as experienced by wholesale and retailers were different from those found in the producer's category because of the differences in the marketing environment. Most IV and exotic vegetable producers sell their produces directly in the farm while retailers and wholesalers have to transport to town or village market after purchasing from the producer. Table 10 indicates the nature of marketing constraints faced by wholesaler and retailers in the marketing places.

Table 10: Marketing constraints at retail and wholesale level

Marketing Problem	Market level (%)		Overall %
	Retailer (N=30)	Wholesaler (N=30)	
Harassment by market Official	13.33	10.00	23.33
Too Many Sellers	43.33	44.33	87.66
No Space	3.33	6.66	9.99
Customers don't prefer leafy vegetables	33.33	16.67	50.00
No problem	6.67	23.33	30.00

From the Table 10 it is clearly observed that the common problem was the presence of too many sellers of identical IV crops in the market. About 43% and 44% of retailers and wholesaler respectively responded the presence of too many sellers selling identical IVs and exotic vegetables. Absence of barrier to enter into this business has motivated resource poor farmers to participate in the marketing of IVs. This situation escalates price competition to attract customers. The competition found to be in customer's favor because of lowering of prices between competing wholesalers or retailers. Customer preference was observed to impede smooth marketing of Ivs, 33% of retailers and 17% of producers said customers have negative preference of IVs crops over other exotic vegetables. The negative attitude was due to the sour taste felt when eating some of IV crops also IPAR (2005) found that there was no specific standard in IVs or exotic vegetable sold in the markets. Customers chose what appeal to their tastes based on experience and perceived individual quality preferences.

13% and 10% of retailers and wholesalers respectively reported that harassment by market officials i.e. by chasing them away and throwing their products when the time for their levy ends. They were levied on daily basis for selling produces around the market areas as they don't have permanent desks (stalls) in the market. 7% and 3%of wholesalers and retailers complained lack of space to market their products. The small percentage of

retailer concerned on the problem was because most of retailers observed to have permanent desks in the market compared to wholesalers.

4.5 Wholesaler and retailer of IVs Household characteristics

4.5.1 Age of wholesalers and retailers

43% of respondents were of age between 31 and 40 years (see table 11). Majority were retailers than wholesalers from the data collected. 37% of respondents were having age between 20 years and 30 years old. In this age group many were wholesaler than retailers. 13% were between 41 and 50 years and above 51 years were 8% only. However the mean average age for retailers and wholesalers was 28 and 32 years old respectively.

Table 11: Age of respondents

Years	Wholesaler (N=30)	Retailer (N=30)	Overall (%)
20-30	43.33	30.00	36.67
31-40	40.00	43.33	42.67
41-50	10.00	16.67	13.33
51-60	6.67	10.00	8.33
Total	**100**	**100**	**100**

*Mean age wholesaler=28, Retailers= 32

4.5.2 Marital status

Most of wholesalers (50%) were married compared to 43% of the married retailers. Also 30% of wholesalers were single while 27% of retailers were singles. However overall widow and divorced were 12% and 13% respectively. It was observed that many retailers and wholesalers of Ivs were women.

Table 12: Marital status of the respondents

Status	Wholesaler (N=30)	Retailer (N=30)	Overall (%)
Single	30.00	26.67	28.33
Married	50.00	43.33	46.67
Widow	10.00	13.33	11.67
Divorced	10.00	16.67	13.33

Total		100	100	100

4.6 Marketing channel of IVs

4.6.1 Producer level

It was observed that producers have more than one place for selling their produces. The places identified were farm, town market, village market and garden. According to informal interview with some producers, mostly their customers came directly to negotiate prices in the farm or garden. The customer harvests the crops upon agreement on prices. The researcher tried to find operational definition to distinguish production areas (which appear to be used also as a selling spot) for the sake of simplicity. A farm is large field located some distant away and its size start from 0.5 ha and above. A garden (kitchen garden) is commonly located few steps from the homestead mostly the area is less than 0.5 ha in the study area. Town markets are places where larger population of all sort of trading activities takes place and is operating all days of the week. Village markets were regarded as seasonal market having specific days of the week for operating.

From table 13 it shows that in overall crops were mainly traded in the farm. 30% of producers reported to sell their produces in town markets and 20% sold on their home gardens. However, very few producers sold their crops at village markets.

Table 13: Producer's main places for selling indigenous vegetables

Place of sale	Crops (%)					Overall (%)
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	
Farm	20.00	36.00	22.67	41.33	28.00	42.53
Town market	26.67	8.00	28.00	16.00	24.00	29.50
Village market	2.67	6.67	9.33	6.67	2.67	8.05
Garden	9.33	2.67	10.67	28.00	18.67	19.92

Note: Producer's N=75

4.6.2 Link between farmers and wholesalers

Wholesalers go straight to farmers where they negotiate prices. When agreed, the wholesaler harvests the produce. The costs of harvesting and packing were borne by wholesalers. Sometimes farmers harvest their own produce and bring them to the markets either in town markets or village markets. Producers reported that sometimes wholesalers do not stick to agreement made and fail to come and harvest in the plots. When this happens, producers directly sell to retailers and to end users (consumers). Retailers normally did not place orders in advance.

4.6.3 Link between wholesalers and retailers

Retailers receive the produce from wholesalers or any middlemen and they sell them to final consumers on retail basis. There were no specific measurement units for selling IV crops. Some use bare hands for approximating quantities to be sold or small buckets for selling African eggplants. Table 14 indicates wholesalers' main buyers according to interviewed respondents in the urban markets. 40% reported to sell their crops to retailers, mostly African nightshade, amaranthus and Chinese cabbage. 33% sold to individual customers, though some resale crops again in the streets especially Chinese cabbage and African nightshade. It was observed that, wholesalers found difficult to characterize the nature of their customers. But others admitted to be familiar with some hotel and restaurant owners who purchased from them. 28% of wholesalers reported to sell to hotel and restaurants owners. African eggplant and Chinese cabbage were mostly purchased to this category of buyers than other crops.

Table 14: Wholesaler's main buyers

Buyers	Crops (%)					Overall (%)
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	
Individual customers	23.33	5.00	30.00	40.00	26.67	32.54

Retailers	43.33	10.00	56.67	23.33	10.00	39.68
Hotels/restaurant	6.67	30.00	16.67	26.67	3.33	27.78

Note: Wholesaler's N=30

4.6.4 Indigenous vegetables suppliers

4.6.4.1 Wholesale level

Table 15, indicates the source of purchasing IV crops and exotic vegetables at wholesale market level, the study revealed that 96% of wholesalers purchased from producers. 4% of wholesalers sourced from collectors. Surprisingly Chinese cabbage and Spinach no collectors found to supply wholesalers. This is because spinach and Chinese cabbage do not grow like other wild plants. Generally African nightshade was traded more than amaranthus or African eggplant and producers were main suppliers than collectors. African eggplants were mainly transported to other regions e.g., to Dar es Salaam.

Table 15: Suppliers of produces to wholesalers

Source	Crops (%)					Overall (%)
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	
Collectors	6.67	3.33	3.33	--	--	3.74
Producers	50.00	33.33	60.00	100	100	96.26

Note: Wholesaler's N=30.

Mainly public transportation was used to transport vegetables to the market. Except for African eggplants which were transported out of Arusha city. Respondents reported that involvement of collectors in the market chain was very seasonal. They were basically shifting from one crop to another irregularly depending on the market demand and other special occasions during the year.

4.6.4.2 Retail level

More than 50% of amaranthus and African nightshade retailers procure their crops at producer's level. Table 16 shows 65% of retailers sourced from producers while 35% sourced from wholesalers in the markets. It was observed that all crops both IV and exotic retailers purchased were mainly sourced from producers. Retailers by pass wholesalers to minimize the costs and maximize their returns or maintaining a certain profit margin. However, among the three IVs, amaranth was found to have larger percentage of retailers purchasing directly from wholesalers (37%), followed by Chinese cabbage and African nightshade with 27% and 23% of retailers respectively.

Table 16: Suppliers of produces to retailers

Source	Crops (%)					Overall (%)
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	
Producers	56.67	46.67	60.00	30.00	33.33	64.76
Wholesalers	36.67	16.67	23.33	26.67	20.00	35.24

Note: Retailer's N=30.

At retail level they also reported that it was tricky to distinguish between different customers unless they have long term "customer-seller" association. Though, over 50% of their customers were individual customers. African nightshade and amaranthus were mostly purchased by individual customers (see Table 17). Hotel/restaurant owners were purchasing mostly Chinese cabbage than indigenous vegetables.

Table 17: Retailer's main buyers

Buyers	Crops (%)					Overall (%)
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	

Individual customers	76.67	60.00	80.00	46.67	30.00	81.48
Restaurants/ Hotels	6.67	3.33	6.67	36.67	13.33	18.52

Note: Retailer's N=30

4.7 IV seller's concentration

IV seller's concentration was calculated from the revenue farmer's received (of respective crops) after selling to the wholesalers divided by the revenue of the same numbers of farmers sold to different buyers (appendix Table 2). The ratio obtained help to understand the concentration of Ivs (amaranthus, African eggplant and African nightshade) sellers in the market using Khols and Uhl rule of thumb market concentration indicative indices. The same procedure was used to calculate seller's concentration for exotic vegetables and result compared. It was found there is possibility of oligopolistic behavior in African eggplant farmer's sellers (CI=82.03%) since most of their revenues were obtained from selling to traders/transporters from other regions especially Dar-es-Salaam rather than city markets. Amaranthus and African nightshade sellers were found to have weak oligopolistic behavior since the concentration index was 38.92% and 36.7% respectively. There was weak monopoly for farmers selling Chinese cabbage (CI=33.46%) due to presence of larger number of farmers selling Chinese cabbages. Tendency of small number of consumers' preference on purchasing spinach makes Spinach sellers unconcentrated (CI=32.01%).

4.8 Market information

Table 18 shows market information received by market participants. In overall 19% did not receive any information that will facilitate trading of their crops. Farmers and wholesalers were mostly by passed in receiving marketing information among the actors. It was observed many wholesalers were also farmers. 40% of all categories received price information and wholesalers are more prices informed than other categories. It was interesting to find out information on IV crops or exotic vegetables highly on demand in the market was not sufficiently flowing among the actors. Both of them were bringing their produces as is their tradition to do so. All actors did not pay attention on finding or

receiving information on product quality standard and size and other physical attributes of the crop (e.g. shape & leaf area etc). Large quantities of IV crops were sold regardless of these attributes compared to exotic vegetables, but little attention was paid on African eggplant.

Table 18: Market information received

Information received	Category (%)			Overall (%)
	Farmers (N=75)	Wholesalers (N=30)	Retailers (N=30)	
Prices	40.00	46.67	33.33	40.00
Product quality	10.67	10.00	23.33	20.74
Product physical traits (shape&leaf size etc)	9.33	6.67	16.67	10.37
Demanded crop	6.67	16.67	20.00	9.63
Did not respond	24.00	20.00	6.67	19.26
Total	**100**	**100**	**100**	**100**

4.9 Market conduct activities

Market conduct in this study was analyzed descriptively and summarized by percentages. Activities performed by market participant, that might influence a particular crop price were also asked. Variables asked includes ;presence of contract arrangements, labor requirements, trader 's organization, form of payment used, repackaging, form of selling crops, mode of transport, form of payment used and criteria for market selection.

The discussion on marketing conduct activities is segmented into three market levels namely producers, wholesalers and retailers. The research revealed that IV crops and exotic vegetables producers, wholesalers and retailers operate their activities without having contracts from their respective buyers. This deprives traders' ability to sell their crops at the price which reflects costs of production. (See Table 19).

Table 19: Producers and Traders under contract

Response	Category (%)			Overall (%)
	Producer (N=75)	Retailers (N=30)	Wholesaler (N=30)	
Yes	4.00	3.00	--	3.00
No	96.00	96.67	100	97.00
Total	**100**	**100**	**100**	**100**

4.9.1 Form of payments to producers

Table 20 shows major types of payment conditions used by wholesalers and retailers to pay IV and exotic vegetable producers. In overall (53%) of traders pay on pre selling arrangements (credit arrangement), that a trader promises to pay after selling. Farmer and trader negotiate price on the amount harvested and later farmers paid after sales. However this payment condition is mainly done by wholesalers (73%) than 33% of retailers. Traders without pre selling arrangements (means paid in cash) in overall were 47% and 67% of them where retailers and 27% were wholesalers. Forms of payments to both crops were basically the same for crops studied. Since one farmer produces both IV crops and exotic vegetables. Except for African eggplants payment were in cash.

Table 20: Payments forms to producers

Payment condition	Category (%)		Overall (%)
	Wholesalers (N=30)	Retailers (N=30)	
Traders with pre selling arrangement	73.33	33.33	53.33
Traders without pre selling arrangement	26.67	66.67	46.67
Total	**100**	**100**	**100**

4.9.2 IVs market participant's organization

Among interviewed farmers, only 11% were members of the local farmer's organization (see Table 21). Both accept the existence of those organizations but neglects to join organization. Problem of collective selling was major draw back for participation farmer's

reported Wholesalers and retailers of both studied crops also did not have any formal organization as it is for cereal traders.

Table 21: Farmers response on marketing organization membership

Response	Frequency	Percent
Yes	8	10.67
No	56	74.67
Did not respond	11	14.67
Total	**75**	**100**

4.9.3 Post harvest handling of IV

Harvested crops were handled in fresh loose sorted or unsorted from the farms to markets. IVs were mainly handled and sold in fresh loose unsorted (62.17%), particularly amaranthus and African nightshade. Fresh loose sorted sold crops were 38% (see Table 22). African eggplant and Chinese cabbage were sold also in fresh loose sorted form. Both vegetables sold in the market were placed few centimeters above the ground.

Table 22: Forms IV handled by producers

Form	Crops (%)					Overall (%)
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	
Fresh loose unsorted	73.33	5.33	86.67	13.33	12.00	62.17
Fresh loose sorted	8.00	41.00	1.33	37.33	28.00	37.83

Producer's N=75

Quantities sold were approximated using bare hands. This indicates the traditional level of marketing activities performed by most of interviewed farmers. For producers it was easy

to sort African eggplant than amaranthus. African eggplant can be counted and price was based on the quantities sold.

4.9.4 Handling of IVs by retailers and wholesalers

Vegetables purchased by retailers and some wholesalers divided into small bundles tied with plastic rope or banana plant fiber. Most vegetables received were packed in 50 or 60 Kgs polyethylene bags. (Locally called kiroba). Table 23 indicates percentages of traders who repacked purchased crops into bundles.

Table 23: Handling of IVs at retailer and wholesaler level

| Traders | Crops repacked into bundles (%) | | | | | Overall (%) |
	Amaranthus	African eggplant	African nightshade	Chinese cabbage	Spinach	
Retailers	76.00	50.00	53.33	63.33	40.00	65.90
Wholesalers	40.00	13.33	16.67	46.67	30.00	34.11

Wholesaler N=30 and Retailer N=30

Many retailers (66%) repacked vegetables compared to wholesalers (34%). Wholesalers concentrated in repackaging of Chinese cabbage and amaranthus than other crops). Traders reported exotic vegetables need to be divided and sold carefully to avoid loss. Also the same for IVs crops like amaranthus and African eggplant. The prices were charged depending on amount packed for each crop.

4.9.5 Criteria for market selection

Many factors were believed to influence producers, wholesalers or retailers to select a particular market for his/her produce. Three variables were selected as criteria for market selection namely good price, short distance and transport availability. Table 24 presents results obtained from producer's response in selecting a particular market.

Table 24: Criteria for producer's market selection

| Criteria | Producers' response (%) | | Overall (%) |
	Yes	No	

Good price	68	32	100
Short distance	13.33	86.67	100
Transport availability	34.67	65.33	100

Kilombero and central were largest markets, where Arusha residents get daily service an dproducts. Most of producers (68%) received good price in these urban markets. Transport availability was reported by 35% of producers from all villages. Transport becomes difficulties during marketing days on Wedsdays and Saturdays for producers from nambala and mlangarini. On these days getting products to the market takes longer than other normal days. However 35% have readily transport availability. Few producers (13%) said short distance was criteria to choose the market. Producers from Olevolosi and Mlangarini preferred central or Kilombero market and producers from Ambureni-Moivaro and nambala preferred Tengeru market. It was observed that regardless of market location, producers prefer the market where he/she could trade all crops.

4.10 Transportation used by market participants

Both actors (47%) relied on public transportation to reach selling places as depicted from table 25. Wholesalers (57%) transported consignments from farms to the markets and 45% of farmer's relied public transport during special marketing days and other days to reach markets. Vehicles hired were minimal in overall compared bicycle/motorbike usage. No wholesalers walked but few retailers (17%) walked between central market (purchasing market) to kilombero market (selling market) and 9% of producers walked from their home to Tengeru market especially on wedsdays and Saturdays.

Table 25: Means of transportation

Type of transport	Category (%)			Overall (%)
	Producer	**Retailers**	**Wholesaler**	
Public transport (hiace)	45.33	43.33	56.67	47.41
Bicycle/motorbike	25.33	20	30	25.19
Walking	9.33	16.67	--	8.89

Rented vehicle	12	13.33	30	16.3

4.10.1 Distance and cost

Average distance farmers traveled from farms/home to market was 20 km transportation average cost was 581 Tshs (see Table 26). Public transport was main means of transport. Average distance covered by retailers and wholesalers was 1Km and 10 Km respectively. Most of traders used public transportation which average costs was 355 Tsh to wholesalers and 254 Tshs to retailers. Costs charged to all actors included the crops carried. Wholesalers and retailers observed purchasing vegetables from central market and transported by bicycles while women carried on their heads to kilombero market or sold along the streets. Larger population and good prices attracted many producers and traders from different areas to transport produces to central market and kilombero market than tengeru market.

Table 26: Distance and Costs

Actor	Distance (km)		Costs (Tshs)		Time (hrs)	
	Mean	SD	Mean	SD	Mean	SD
Producers	19.50	9.38	581.25	241.92	2.01	2.22
Wholesalers	10.26	8.40	355.30	185.71	1.04	0.80
Retailers	1.31	0.51	254.51	151.23	0.55	1.01

However the average transporting time for producer was 2 hrs, which allowed produces to reach the markets in fresh conditions (see Table 26). The handling materials used caused damage while produces in transit. Retailers used less time (0.55 hrs) compared to other actors. Wholesalers used an average of 1 hr to reach to their selling markets. Many

retailers operate between central market (purchasing point) and kilombero market (selling point).

4.11 Market performance

Market performances measures selected were, gross margins and marketing margins. Gross margin was used to measure producers' performance. Wholesalers and retailers market performance was determined by market margin. Gross margin for producers was calculated as follows; for vegetables (Amaranthus, African nightshade, Spinach, and Chinese cabbage) which were sold as whole on the farm plot. First quantities harvested of vegetables were packed in polyethylene bags/sacks (locally called kiroba) weighed and bags counted to find total quantity harvested on a particular plot/farm. Respective prices were recorded. For African eggplant quantities harvested were packed into bags of varying capacities and their respective prices per bag recorded. All weights were measured in Kgs by weighing instrument. Table 27 shows producer's quantities yield and sold. Quantities yield and sold were higher for IVs than selected exotic vegetables.

Table 27: Total yield and quantities sold by producers

Crops	Total yield (in Kg)	Quantities Sold (Kg)	Average price (Tshs/Kg)	Total revenue (Tshs)
Amaranth	4425.75	2029.26	59.96	121674.20
African eggplant	2490	2149.19	85.88	184572.60
African nightshade	3827.25	1221.18	172.90	211142.49
Chinese cabbage	705.60	585.85	92.01	53903.71
Spinach	354.25	259.18	99.27	25728.87

4.11.1 Producer's gross margin

At producers level market efficiency was measured using gross margin analysis for the IVs and exotic vegetables. Exotic vegetables selected were spinach and Chinese cabbage. They compete with IV in the market place and for the production resources. It was hypothesized that amaranthus, African eggplant and African nightshade are not competitive in terms of profitability compared to exotic vegetables grown in the study area. Table 28 shows the breakdown of the analysis of profitability per 0.5 ha for period of two months. A period of two months was selected since crops can stay 6 weeks to 8 weeks on the field before incurring next production costs again. Under good management, harvesting of African eggplant can last for one year before replanting again. Harvesting of African eggplant starts after two months. There fore harvesting of African eggplant on the field can be done after every one week. Harvesting of amaranthus starts after 21 days to 30, African nightshade 60 days, Chinese cabbage and spinach start after 30 to 45 days. Both crops can be harvested for three weeks from respective sowing dates. As a result gross margin was calculated for the first, second and third week. Three weeks were chosen to reduce complexity since African eggplant can be harvested for more than three weeks while remained crops do not. Gross margin figure on third week used to approximate one year production cycle gross margin for respective crops. The figure was calculated from dividing number of days in year and respective crop harvesting days from planting multiply by the third week gross margin.

Farm production cost figures, both human labor and inputs used were obtained from respondents. There was a lack of specific unit of measure of quantities and prices (to producers, retailers and wholesalers). Thus the gross and not the net marketing margins were calculated. According to Mendoza (1991), the marketing margins should be understood as gross marketing margins.

All IVs found to have more than 100 000 Tshs gross margin at the end of the two month while selected exotic vegetables had less than 50 000 Tshs. The highest gross margin was registered to African nightshade by a gross margin of 190 079.59 Tshs, followed by African eggplant (139 032.10 Tshs) the least in the category was amaranthus with gross margin of 109 796.67 Tshs. The higher gross margin to African nightshade can be explained by fetching relatively higher prices and quantities sold compared to other IVs and the larger number of farmers producing it. Also African nightshade was preferred by retailers and wholesalers thus inducing more farmers to produce it in large quantities to meet market demand. Amaranthus had highest one year approximated production cycle gross margin 1 317 178 Tshs and African nightshade 1 140 478 Tshs. Chinese cabage and spinach had 318 373 and 166 723.8 Tshs respectively. The lower production cycle gross margin to Africa eggplant is due to exclusion of harvests in the fourth or fifth week harvest on which other crops can not be harvested. Also during the interview there were few farmers in the study areas who grow African eggplant.

Table 28: Producers gross margin analysis

Variable cost	African nightshade	African eggplant	Amaranthus	Chinese cabbage	Spinach
Average fertilizer cost	9989	10511.47	3480	5932.4	1184.67
Average seed cost	0	0	0	1350	1250
Average organic cost	364.13	455.47	381.47	94.67	13.33
Average pesticides cost	802.42	2521.07	134.6	553.07	118.4
Total inputs average cost	11155.6	13488.01	3996.07	6580.14	1316.4
Farm activities average costs					
Farm preparation	3618.67	8056.67	3136	2827.56	1317.33
Bed preparation	2898.67	7850.22	2037.33	2071.34	1028
Sowing/transplanting	2064.67	2317.33	1554.67	1599.33	680
Irrigation (using bucket)	1272	4628.33	1152	978.67	546.67
Spraying	53.33	6613.47	33.33	500	550

Harvesting	--	2586.47	--	--	--
Total farm activities average cost	9907.34	32052.49	7913.33	7526.9	3572
Total average variable costs	21062.9	45540.5	11909.4	14107.04	4888.4
Revenue 1 week	38456.7	29059.9	22854.19	15218.33	7202.22
Revenue 2 week	58021.4	62799.72	72749.81	22825.62	10144.4
Revenue 3 week	114664	92712.99	26070.17	15859.76	8382.22
Gross margin 1 week	17393.8	-16480.6	10944.79	1111.29	2313.82
Gross margin 2 week	75415.2	46319.12	83694.6	23936.91	12458.3
Gross margin 3 week	190 079.59	139 032.1	109 764.8	39 796.67	20 840.47
Production cycle (1 year) gross margin	1 140 478	834 19.6	1 317 178	318 373.4	166 723.8

From the figures of gross margin analysis and one year production cycle for studied exotic vegetables show they have less competitive than IV since both Chinese cabbage and Spinach figures were relatively lower than the figures registered to IVs. Also IVs registered larger amount of quantities sold and purchased. Negative gross margin of egg plant in the first week is due to few matured fruits per plant. The number of mature eggplants increases for the proceeding week's hence positive gross margin. The lower gross margins, quantities of exotic vegetables produced and sold could be explained by few farmers (who were interviewed) preferred to grow exotic vegetables. High costs in the production and demand of intensive care on the farm were some of the draw back factors to produce exotic reported by producers. These influence them to produce less despite having relatively good prices at retail and wholesale selling prices.

From the analysis of gross margin between exotic and indigenous vegetables, it clearly shows that indigenous vegetable are more competitive in terms of profit generation than exotic. This derivation nullified the hypothesis that Amaranthus, Africa eggplant and

African nightshade are not competitive in terms of profitability compared to exotic vegetables grown in the study area.

4.11.2 Wholesalers and retailers market margins

Retailers and wholesalers quantities sold on their desks were weighed to make 1Kg. Since one bundle range between 0.25 Kg to 0.35 Kg for retailers and 0.5 Kg to 0.75 Kg for wholesalers. Bundles marked 1 Kg were counted and price (in Tshs) approximated. Quantities purchased and sold for each crop as shown in table 29. Average purchased price and sold price for each crop were calculated. Market margin was determined from difference between average sold price and purchased prices. Transportation and marketing costs were difficult to calculate. Since producers, retailers and wholesalers used to carry multiple produces hence costs were distributed to all produces (including crops not studied). Revenue was calculated using the average selling prices and quantities sold for respective crops. Both traders had higher revenues for African nightshade, African eggplant and Amaranthus (see Table 29). Costs incurred were distributed to other crops traded which were not part of the study. It was difficult to include in the calculations.

Table 29: Quantities purchased and sold by traders

Crops	Wholesalers			Retailers		
	Quantity purchased (Kg)	Quantity sold (Kg)	Revenue (Tshs)	Quantity purchased (kg)	Quantity sold (Kg)	Revenue (Tshs)
Amaranthus	1340.01	1258.51	75460.26	678.51	365.19	130007.64
African eggplant	1121.97	975.42	83769.06	578.39	398.01	114758.22
African nightshade	1480.24	1360.37	235207.97	703.81	411.72	326.563.95
Chinese cabbage	670.32	580.71	53431.13	416.75	320.1	96350.1
Spinach	550.83	390.42	38.756.99	352.31	200.07	48145.95

Based on the selling and buying prices, the marketing margins and gross marketing margins for amaranthus, African eggplant, African nightshade, Chinese cabbage and spinach were calculated and summarized in Table 30. The high market margin reflects less income for example to IV producers and more benefit to the other market functionaries.

Wholesale and retailers of IV in both markets received at least 50% of consumer's price per 1 Kg (Table 30). Also it has been noted that retailer's received higher market margins compared to other market participants.

Table 30: Marketing margin of the studied crops at wholesale and retail level

Traders level	Mma	Mme	MMn	MMs	MMc
Whole sellers					
Average purchasing price	59.96	85.88	172.90	92.01	99.27
Average selling price	116.33	127.83	434.67	166.33	322.33
Market Margin	56.37	41.95	261.77	74.32	223.06
Retailers					
Average purchasing price	116.33	85.88	172.90	92.01	99.27
Average selling price	356.00	288.33	793.17	301.00	485.00
Market Margin	239.67	203.33	620.27	208.99	385.73
Consumer price	356.00	288.33	793.17	301.00	485.00

Note: Market margin for amaranthus (Mma), market margin for African eggplant (Mme), marketing margin for African nightshade (MMn), marketing margin for spinach (MMs), marketing margin for Chinese cabbage (MMc).

On the other hand retailers get higher market margin from Ivs sales than exotic vegetables.

The lowest market margin is attained from African eggplant at both wholesaler's and retailer's level. Wholesalers get very low when they trade on IVs than exotic vegetables except Chinese cabbage. Low margin could be due to selling without a specific measure of quantities sold.

Correlation analysis was carried out to find the extent to which selling price buying price and marketing margin are correlated to each other from wholesaler to retailers. The analysis was performed from amaranthus traders who sell also other IVs as representative for all IVs traders. Table 31 depicts that selling and buying prices at the wholesale level were highly correlated with each other ($r > 0.765$; $p = 0.01$). Also based on the same data from amaranthus trader's regression analysis was done. It was found (72.1%) (Appendix Table 1) of the variation in selling prices is explained by buying prices and the remaining percent (27.9%) might be explained by other factors such as marketing costs. Further more

a unit price changes of amaranthus purchasing price could make an increase in marketing margin by 1.7 (see appendix table 1).

Positive correlation coefficient (see Table 31) implies marketing margin is related to buying price and selling prices. This indicates price changes are being passed on the subsequent channel level. This is an indication that traders are earning excessive profits (which do not reflect marketing cost). This indicates farmers are selling at prices that do not reflect production costs in order to compete with collectors who mostly do not incur production costs. The competition is therefore to the advantage of traders.

Table 31: Wholesale and retail IV trade: Correlation between market margin, buying and selling prices.

Wholesale IV traders Correlation	Margin(W)	Selling price (W)	Buying price (W)
Margin (W)	1	0.992**	0.675**
Selling price (W)		1	0.765**
Buying price (W)			1
Retail IV trade Correlation	**Margin**	**Selling price (R)**	**Buying price (R)**
Margin (R)	1	0.905**	0.52
Selling price ®		1	0.472**
Buying price ®			1

**Correlation is significant at 0.01 levels (1-tailed). W and R represent Wholesale and Retail level

From the above statistical analysis, it is evident that it refuted the null hypothesis that there are no price changes passed on from farmers to other market participant. The analysis from market margin shows price difference from producer to wholesalers and from whole seller to retailers amid small margins exhibited per crops and market participants.

Therefore the null hypothesis is rejected and accepts the alternative hypothesis that there is price changes passed on from farmers to other markets participants.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The major objective of this study was to assess indigenous vegetables marketing efficiency using gross margin and market margin analysis. Specific objectives were: (i) To examine the relative competitiveness of amaranthus, African eggplant and African nightshade with the selected exotic vegetables grown in the study area in terms of profitability (ii) Identify the present marketing channels of amaranthus, African nightshade and African eggplant and the role played by various market participants (iii) Determine price differences and market margin among various market participants and selected indigenous vegetables (iv) To determine pricing efficiency of indigenous vegetables marketing.

5.2 Indigenous vegetables market channel

The involvement of collectors in the marketing chain caused unbalanced competition with farmers. Collectors sold IVs at lower prices to traders which subsequently forced farmers to sell at prices that did not cover actual production costs. The involvement of collectors in chain was seasonal, since during dry season IVs do not sprout out with out sowing and watering seeds.

All actors along the chain were efficient to bring produces to the markets on time. But the handling of produces was not good and hygienic. Produces reach in time but were observed to have damages on leaves and shoots. Crops studied along the chain were packed in polythene bags (locally called kiroba) or in sacks (made from sisal materials) when moved from point of production to selling point.

5.3 Role played by various market participants

Producers sold mainly raw produces, no value addition made except transporting IVs to marketing places. IVs sold by traders were tied into bundles, this was only minimum value added. It was also observed during evening some women selling vegetables along road side did slicing (cutting into small pieces) to attract employed consumers who were returned from works. IVs were poorly displayed nearly by all actors since most sold fresh unsorted and uncovered (not packed). Some retailers and wholesalers observed to place produces on top of polyethylene bags (just few centimeters above the ground). These practices exposed produces to poorly hygienic conditions and endangering consumer's healthy. Actually some crops placed along narrow roads in the market and feeder roads to the market were stepped by pedestrians or moving vehicles. Despite the poor marketing infrastructure and services, IVs sales generated incomes to all actors.

5.4 Competitiveness between Indigenous vegetables and selected exotic vegetables

Both indigenous and exotic vegetables were reported to be competitive in terms of profit generated by farmers though limited by land resource. Table 25 indicates that indigenous vegetables have larger gross margin than exotic ones, because they are produced in large quantities (multiple harvests) and in low production costs. Though they are profitable but farmers received low producer's share as compared to other market participants. Because farmers usually sell the whole plot without regarding how much their plots yield. These results suggest that indigenous vegetables production is profitable and competitive comparably to exotic but the largest share of consumer's shilling is accrued to other market level participants (wholesalers and retailers).

5.5 Indigenous vegetables marketing efficiency

Marketing conduct activities to influence IV crop prices and demand was minimal; study findings revealed that there were no defined grades, sorting and packaging on indigenous vegetables marketed by both farmers and traders. Farmer's and traders have no organizations where they can collude and have collective influence on prices. Further more market information flow was not very efficient and helpful to all market participants. However market price variations on subsequent market level participants was stable indicating smooth market pricing of indigenous vegetables between participants.

5.6 Indigenous vegetable market margin

On overall indigenous vegetable trading performance was found to be profitable, however the extent of profit varied within market levels and different types of indigenous vegetables. High retailer's margin was associated with low purchasing prices and high selling prices. Retailers also purchased quantities which can be sold with minimum loss resulted from unsold quantities. Producers were observed to have huge unsold quantities since they had few operating hours. Insufficient time induce producers to sell at lower prices to reduce loss from unsold quantities hence lowered market margins.

5.7 Hypothesis conclusion

Both hypothesis of the study were nullified based on respective techniques and statistical analysis employed. The first hypothesis was tested by gross margin, the derivation conclude by accepting alternative hypothesis that Amaranthus, Africa eggplant, and Africa nightshade were competitive in terms of profitability compared to exotic vegetables grown in the study area (Spinach and Chinese). Also the second hypothesis was nullified based on market margin, regression and correlation analysis methods. From the analytical technique used, the alternative hypothesis was accepted, there are price changes passed on from farmers to other market participants.

5.8 Recommendations

5.8.1 Addressing marketing constraints

There is need to address marketing constraints facing both actors in the supply chain to increase efficiency of marketing activities. There is huge potential for marketing IVs if the following will be improved and considered; Construction of new marketing sites and improving the infrastructures of present markets. Training provision to farmers and traders in proper delivery of marketing incentives/services to consumers e.g. proper packaging using transparent materials to allow consumers to make proper selection, grading, proper post harvest handling of produces and selling produces at high hygienic standards.

5.8.2 Need for policy promotion on IV crops and areas of further research

Strategy for improved indigenous vegetables production and marketing requires addressing the agronomic, economic and cultural factors that constrain the expansion and competitiveness of these crops. As part of the strategy, the role of indigenous vegetables in the livelihoods of the urban and per-urban poor should be explicitly recognized and addressed by the various poverty reduction strategies being developed in Tanzania .e.g. National Strategy for Economic Growth and Poverty Reduction (NSEGPR) in Swahili known as MKUKUTA. These vegetables despite forgotten by policy makers the study finding show that they have a potential role in contributing income to support livelihood. Therefore putting a priority in improving marketing infrastructure will enable many growers of these vegetables to improve their lives as source of income and making better living through improved healthy.

Also there is need of further research and development in the following areas; need more research along the supply chain to determine quantities and value of post harvest loss per crop. Research studies in developing simple processing or preservation technology and

varieties which have long shelf life. Need for diversification of IVs recipes and dissemination of awareness materials of improved recipes of IVs to communities in order to create demand.

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APPENDICES

Appendix 1: Regression results market margin against amaranthus purchasing price

Table 1: Regression results market margin against amaranthus purchasing price

Variable	Value	Significance
R	0.85	--
R Square	0.72	--
Adjusted R Square	0.71	--
Std of estimate	68.57	--
Constant (α)	7.56	0.66
Amaranthus purchasing price (β)	1.7	0.00

Note: The model was; Market margin (Y)= α + amaranthus purchasing price (β) + μ

Prices in (Tshs/Kg)

Table 2: IV seller's concentration values

Ivs	Sellers concentration index (CI)in %
Amaranth	38.92
African nightshade	36.7
African eggplant	82.03
Chinese cabbage	33.46
Spinach	32.01

Appendix 2: Questionnaires

Producers' questionnaire for Indigenous Vegetables marketing, in Arumeru District.

Questionnaire No………………..Date of Interview………………………………….

Division……………………Ward…………………………………..Village……………….

Interviewer's name…………………………………………..

Name of Respondent……………………………………...

A. Socio-demographic information

1. Age………………………..   2. Gender………………… [1=Male, 2=Female]

3. Marital Status of household…………………………

    [1=Married, 2=Single, 3=Divorced, 4=Widowed]

4. Level of education…………………….

    [1=None, 2=Adult education, 3=Primary education, 4=Secondary, 5=Others(specify)]

5. How many people belong to your family and share the same kitchen?.........................

6. What is your main occupation?..

B. Farm information

7. Do you grow either of the following vegetables on your farm?

Crop	Area (ha) owned	Area (ha) rented
Amaranthus		
African eggplant		
Nightshade		
Spinach		
Chinese cabbage		

8. Do you grow other crops in your farm?(mention them)…………………………

9. What is the main reason for growing IVs on your farm? (Tick all that apply)

selling/business

☐

☐ Contract with trader's remove

☐ Available market

☐ Opportunity to earn extra income

☐ Family consumption

☐ Others' specify

10. What are your main reasons for growing Spinach and Chinese cabbage? (Tick all that apply)

selling/business	
☐	☐ Opportunity to earn extra income
☐ Contract with trader's	☐ Family consumption
☐ Available market	☐ Others' specify

11. Do you grow IV under contract [yes=1/no=2] …………………..

12. What is name of contracting firm/individual?...

13.Do you have pre-selling arrangements with your trading partner(s)you normally transact with?..................[Yes=1, No=2]

C. Farm Input Information

14. Which fertilizer are you using in your farm?

a) Organic fertilizer……….. b) inorganic fertilizers……………… *(tick all that apply)*

15. Where is the source of fertilizer you have used? *(tick all that apply)*

a) From shop   .(b) neighbor/friends (c) from NGO's   (d)none   (e)Others (specify)

Crop	Inputs	Unit price(Tshs)	Cost (Tshs)
1. Amaranthus **2.African eggplant** **3. Nightshade** **4.Spinach** **5.Chinese cabbage**	**1. fertilizer (kg)** **2. FYM (kg)** **3. compost (kg)** **4.pesticides(liters)**		

16. Which type of labor you employ in your vegetable cultivation?................................

[1=family labor, 2=hired labor, 3=Exchange labor]

D. Indicate the costs of labor

Crop	Activity	Labor cost (Tshs/manday)
1. Amaranthus 2. African eggplant 3. African nightshade 4. Spinach 5. Chinese cabbage		
1.		
2.		
3.		
4.		
5.		

E. Harvest and traded quantities

Crop	Total Yield (kg/ha)	Quantity sold (kg/ha)	Transport costs(Tshs/kg)
1.Amaranthus			
2.African eggplant			
3.African nightshade			
4.Spinach			
5.Chinese cabbage			

F. Sales information

Crop	Frequency of harvest (days/week)	Main form sold (Tick all that apply)	Main place of sale(Tick all that apply)
1.Amaranthus 2.African eggplant 3.African nightshade 4.Spinach 5.Chinese cabbage		1. fresh (loose unsorted 2.fresh (loose sorted) 3.Fresh (packed) 4.preserved 5. others (specify)	1. garden 2. farm 3. village market 4. town/city market 5.others (specify)
1.			
2.			
3.			
4.			
5.			
6.			

17. Do you sell to farm collectors? [yes/no] ……………

18. Do you transport the IV from the garden or farm to your place of business?[yes/no]…..

19. How these crops usually transported to the market place?

Crop/Kg or bag	Means of transport	Cost(Tshs)

20. What are the criteria for market place selection? (Tick appropriate answers)

(a) Good prices (b) Short distance from the farm (c) Transport availability (d) others (specify)

21. What kind of marketing information are you receiving?..(Tick all that apply)

a)Price………b)Product quality………..c)Product physical traits……………….d)Crop high in demand…………e)Others (specify)……………………..

21. What currently preventing you from selling more of Amaranthus, African eggplant and nightshade?

(Mention)...
....

22. Is there any marketing problems in marketing the following vegetables Amaranthus, African eggplant, nightshade, Chinese cabbage and spinach?................[yes/no]

23. If yes, can you list those
    problems?..
24. How would you rank these vegetables in terms of marketing problems?
   1)…………………2)………………3)………………4)………………5)……………..

Thanks for your cooperation

Appendix 3: Questionnaire for Indigenous Vegetable Market Participants in Arumeru District.

Retailers'/wholesalers' questionnaire.

A. Tracking information

1. Name of the market…………………………….

2. Name of the respondent…………………………

3. Age………………………..   4. Gender………………. [1=Male, 2=Female]

5. Marital Status of household…………………………

    [1=Married, 2=Single, 3=Divorced, 4=Widowed]

6. Level of education…………………….

    [1=None, 2=Adult education, 3=Primary education, 4=Secondary, 5=Others(specify)]

7. How many people belong to your family and share the same kitchen?........................

B. Source of the produce
9. Indicate the source and prices you pay in purchasing your produce

Type of vegetable	Supplier market 1= Producer, 2=collectors 3=Trucker 4= Wholesaler/retailer	Prices (Tshs/Kg)
Amaranthus		
African eggplant		
African nightshade		
Spinach		
Chinese cabbage		

C. Market Outlets and Prices

10. In each of the following type of vegetables indicate the market outlet where you sell your produce and prices received.

Type of vegetable	Outlet market 1= Individual customer 2= Hotel/restaurant 3=Retailer/wholesalers 4= Others(specify)	Prices (Tshs/Kg)
Amaranthus		
African eggplant		
nightshade		
Spinach		
Chinese cabbage		

D. Marketing Costs

11. Indicate the expenses you incur in selling your produce.

Item	Description	Cost (Tshs)
Transport		
Market fee		
Labor charges		
Tax		
Others expenses		

12. Do you own/operate means of transport? (Y/N). If yes indicate the type of transport, capacity and ownership.

Type of transport	Capacity (give units)	Ownership(1=own, 2=hired)
Pick up Truck Tricycle Bicycle Oxen/donkeys carts Push carts Others		

E. Quantity of produce handled

13. How much of each of the following vegetables do you normally trade per month?

Type of vegetable	Quantity (Kgs)	
	Purchased	Sold
Amaranthus		
African eggplant		
African nightshade		
Spinach		
Chinese cabbage		

F. General questions

14. Do you repackage your produce after purchasing?..

15. If yes explain how?…………………………………………………………………

16. Do you have contract arrangement with trading partner(s) you normally transact

with?..............[1=Yes, 2=No]

17. Did you have pre selling arrangement with your trading partner(s) you normally

transact with?..........[Yes=1, No=2]

18. Do you belong to retailer/wholesaler marketing organization?......................[1=Yes,

2=No]

19. What kind of marketing information are you receiving?..(Tick all that apply)

a)Price………b)Product quality………..c)Product physical traits……………….d)Crop

high in demand…………e)Others (specify)………………………..

20. What currently preventing you to sell more of Amaranth, African eggplant and

nightshade?...

....

21. Is there any marketing problems in marketing the following vegetables Amaranth,

African eggplant, nightshade, Chinese and spinach?................[yes/no]

22. If yes, can you list those

problems?...

Thanks for your cooperation