



**ANALYSIS OF MARKETS FOR AFRICAN LEAFY VEGETABLES
WITHIN NAIROBI AND ITS ENVIRONS AND IMPLICATIONS FOR ON-
FARM CONSERVATION OF BIODIVERSITY**

by
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ABBREVIATIONS AND ACRONYMS

ACTS	African Centre for Technology Studies
AIDS	Acquired Immune Deficiency Syndrome
ALV	African Leafy Vegetable
AVRDC	Asian Vegetable Research and Development Centre (AVRDC - The World Vegetable Centre)
CGIAR	Consultative Group on International Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
FC	Farm Concern International
FORMAT	Forum for Organic Resource Management and Agricultural Technologies
GBK	Genebank of Kenya
GFU	Global Facilitation Unit for underutilized species
HIV	Human Immunodeficiency Virus
ICDC	Industrial and Commercial Development Corporation
IAD	Institutional Analysis and Development
IPGRI	International Plant Genetic Resources Institute (<i>now</i> Bioversity International)
IPK	Institute of Plant Genetics and Crop Plant Research, Gatersleben, Germany
KACE	Kenya Agricultural Commodity Exchange
KARI	Kenya Agricultural Research Institute
KBC	Kenya Broadcasting Corporation
KENRIK	Kenya Resource Centre for Indigenous Knowledge
KEPHIS	Kenya Plant Health Inspectorate Service
MATF	Maendeleo Agricultural Technology Development
MoA	Ministry of Agriculture, Kenya
MoH	Ministry of Health, Kenya
NFCI	Nairobi Friends Club International
NGO	Non-Governmental Organisation
NMK	National Museums of Kenya
ROP	Rural Outreach Program
UoN	University of Nairobi

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EXECUTIVE SUMMARY

African Leafy Vegetables (ALVs) are important sources of essential macro and micro-nutrients. In addition they offer a source of livelihood when marketed, and also contribute to crop biodiversity. Despite these positive aspects, only a few ALVs are grown, marketed and consumed in Kenya. This study analyses the ALV market in Nairobi and the neighbouring areas, highlighting the factors that enable or inhibit its development. Furthermore, the study determined different factors influencing inter- and intra-specific on-farm biodiversity, with a focus on the role of ALV market development. Data for the study were generated using both qualitative and quantitative research methods. Qualitative data was generated from in-depth interviews with key informants, with the main stakeholders in the ALV trade and from general observation. Data for the quantitative analysis was generated using a semi-structured questionnaire circulated to 97 randomly-selected market suppliers to council markets and supermarkets in both urban and peri-urban areas.

The results of the study indicate that over the last decade, the ALV market in Nairobi has grown enormously. The main species traded have been African nightshade, leafy amaranth, cowpea and spider-plant, and the market gross value has increased by some 213% between the period 2001 and 2006. Such growth has been greatly influenced by an increase in consumer demand, caused by a number of factors. These include promotional strategies by local NGOs and international organizations, increased health awareness and consciousness on the part of the people of Nairobi, the effects of HIV/AIDs, and improved ALV presentation in supermarkets and upmarket grocery stores. Furthermore, supply has been enhanced by the above-mentioned strategies in peri-urban and upcountry key production areas, through external marketing support provided by NGOs, by farmers' capacity for self-organization, and improvement in telecommunications technology.

The fact that ALVs are on sale in the major reputable supermarkets in the capital has particularly helped in enhancing the rating of these vegetables in the eyes of the consumers. Demand has been matched by supply, mainly due to increased production by small-scale farmers in the peri-urban areas of the city, as well as an increase in supplies from distant traditional production areas in western and eastern Kenya.

The major constraint to the growth of the ALV market in Nairobi was found to be the inadequacy of physical infra-structural development in terms of road network, storage facilities and actual physical trading space. Other hindering factors include unfavourable policies for production and marketing, lack of capacity to regulate drastic oscillations in supply, lack of product differentiation and value addition, and lack of credit and other forms of support to council market traders.

Among the key determinants of inter-specific on-farm biodiversity of ALVs have been women's participation in production and trade, and the level of education of the producers both of which were found to play a positive and significant role. The two factors also had a positive and significant influence on intra-specificity in on-farm biodiversity. Market development was found to have a negative influence on biodiversity but was not significant. This is nevertheless an indication that such influence is important and should be kept under constant investigation in the future. Similarly, it will be important to watch the negative influence of market support to producers provided by NGOs and other development partners.

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1 INTRODUCTION

Over the last decade, African Leafy Vegetables (ALVs) have featured increasingly in both formal and informal markets in Nairobi and its neighbouring areas. Before 2000, ALVs were to be found only in the back-streets and in a few open-air markets but since then they have become a common occurrence in most supermarkets, where they are sold in increasing quantities on a daily basis. The city and its peri-urban areas are also dotted with grocery shops in the main shopping areas, as well as retail kiosks in neighbourhood areas that also stock various types of the ALVs. The priority species marketed include African nightshades (*Solanum scabrum*), leafy amaranth (*Amaranthus* spp.), spiderplant (*Cleome gynandra*), cowpeas (*Vigna unguiculata*), Ethiopian kale (*Brassica carinata*), mitoo (*Crotalaria ochroleuca* and *C. brevidens*), kahuhura (*Cucurbita ficifolia*), jute plant (*Corchorus olitorius*) and pumpkin leaves (*Cucurbita maxima* and *C. moschata*).

Since 1995, IPGRI (now Bioversity International) its partners have been promoting the production and consumption of ALVs in a number of countries of Sub-Saharan Africa and their efforts seem to have borne fruit. ALVs or Traditional African Vegetables, which were once considered primitive and unfashionable, have become a delicacy in most Nairobi homes at all levels. This is quite a contrast to a decade ago when ALVs were limited to their native production areas, and very few such vegetables were marketed in the local rural markets (Maundu et al., 1999). At the time, demand for these vegetables was very low, albeit most farmers in the growing areas were found to be increasing their production but mainly for home consumption. The production of ALVs has become increasingly commercialised, especially on the outskirts of Nairobi - a contrast from the small kitchen gardens of the past decade. Marketing and consumption of ALVs has also been extended to the main urban centres, thanks to people's increasing awareness of their nutritive value (Kimiye, 2006). Nairobi, with its cosmopolitan nature, has attracted a great diversity of ALVs from all over the country to its markets, as different communities have always had their traditional specialities, and the demand for same seems to have re-emerged.

ALVs are known to be rich in micronutrients such as vitamins and minerals. A number of studies have been done on some of these vegetables and compared to exotic leafy vegetables such as cabbage, they were found to be higher in vitamin content (especially vitamins A and C), fibre and minerals. Some are known to be rich in lysine, an essential amino acid that is lacking in diets based on cereal and fibres, while others are medicinal (Imungi and Porters, 1983, Maundu et al., 1995, Imungi, 2002). The green, leafy ALVs contain polyphenols which have beneficial physiological effects on humans as antioxidants. They are also known to be anticarcinogenic and anti-arteriosclerotic (Imungi, 2002). A study carried out in Nairobi showed that consumption of ALVs is associated with the treatment of various diseases including therapy for patients with HIV/AIDS, diabetes, high blood pressure and other common ailments (Kimiye, 2006).

Both poverty and, in particular, food security are major developmental problems in Kenya. About 56% of Kenyans live below the poverty line and about 50.6% of the population lack access to adequate food; moreover, even the little they get is of poor nutritional value and quality (Republic of Kenya, 2004). The consequence of food insecurity is malnutrition and other health-related problems, which have socio-

economic consequences at the micro and aggregate level, besides the physiological consequences. The main aim of the Kenyan food security policy, as stated in sessional paper number four, is to ensure that an adequate supply of nutritionally-balanced food is available in all parts of the country at all times (Abrefa, 2004). As acknowledged in this policy, indigenous foods including ALVs would contribute to the alleviation of these problems, both as a source of income and as a food component.

1.1 Study Rationale

For many years, the use and hence the commercialisation of ALVs has remained low despite their nutritive value and potential economic use. Their commercialisation has only begun to gain prominence in the Kenyan markets and especially in the cities of Nairobi and Kisumu, and other towns such as Nakuru, Kisii and Kakamega (Mburu and Wale, 2006). The successful development of the ALV market in Nairobi could be considered as a milestone in re-introducing underutilised local food crops for food security as well as for on-farm biodiversity conservation. However, there is limited information available concerning the state of the ALV market in Nairobi and indeed in the whole country.

Increased consumption of these vegetables brings with it social, economic and health benefits. From direct observation, there seems to be an increase in both demand and supply of ALVs within Nairobi markets. There is a need, therefore, to identify the driving factors behind these changes and fill any information gaps on the whole issue of ALV market development. Given that for a long time these vegetables have remained unmarketable, it would be worthwhile identifying the policy, socio-economic and institutional conditions that have led to the development of the ALV market. If this could be replicated for other traditional food crops, it would be a great milestone towards national food security, as the country would no longer rely on just a few crops that are ill-adapted to the Kenyan agro-ecological zones.

Most Sub-Saharan African countries, including Kenya, have been faced with a situation of serious food insecurity. It has been reported that food security has worsened in Sub Saharan Africa since 1970, with the percentages of malnourished people remaining at around 35% but with absolute numbers increasing due to population growth (Rosegrant et al., 2005). Thus, enhanced production, marketing and consumption of traditional foods such as ALVs that are well adapted to the agro-ecological conditions would go a long way in ensuring food security. Lack of socio-economic studies on the dynamics of market development implies that factors both for and against the marketing of ALVs have remained largely unknown. Promotion from either supply or demand ends, without the balancing effect of one on the other, could be an inhibiting factor to further market development.

Past studies have shown that on-farm conservation of crop genetic resources can easily be enhanced through provision of markets for traditional crops such as ALVs (Meng et al., 1998). However, increased consumer demand for certain specific ALV species could also lead to loss of on-farm biodiversity. Other studies have empirically demonstrated that farmers are likely to specialize in the few varieties demanded by the market, thus leading to a low level of diversity or uniformity of crop varieties conserved on-farm (Smale and Bellon, 1999; Mburu and Wale, 2006). Consequently, there is a need for more thorough investigation into this ambiguous role of markets on on-farm conservation of crop genetic resources. The present study investigates the case of marketing ALVs in Nairobi and the surrounding areas.

1.2 Objectives

The general objective of the study is to analyse factors that have a positive and/or negative influence on the development of the ALV market in Nairobi and its environs, and investigate determinants of intra- and inter-specific on-farm biodiversity. In order to pursue this broad objective, the study uses both

primary and secondary datasets that are qualitative and quantitative in nature. Its specific objectives are as follows:

To explore and describe the initial situation before the development of the market in Nairobi and its environs, and the current situation with respect to:

- Actors involved in the ALV market chain, links and relationship among them, and the constraints they encounter
- The supply and demand trends, producer and consumer prices, and the income contribution of ALVs to small-holder farmers

To analyse the role of the private and public sector in the development of ALV markets in the study area

To explore and document specific marketing strategies implemented with respect to ALV markets in the study area

To evaluate the impact of any existing policies and infrastructure on market development

To critically examine the constraints faced during market development, and

To analyse the effects of the market development on intra- and inter-specific on-farm biodiversity

Together with other additional studies on underutilised species, this study will assist the GFU in further understanding market development for the underutilised species

1.3 Importance of the expected outputs

This study is expected to contribute to a broader scientific knowledge of important constraints and drivers of marketing strategies in the area of market development for traditional foodstuffs. It will also contribute to the current discussion as to how underutilised species can be promoted to contribute to the fight against food insecurity and poverty among both rural and urban poor. Traditional foodstuffs have attracted little attention from policy makers. An analysis of the enabling and inhibiting factors of market development for ALVs will generate useful information that can be used to promote other traditional food crops and also ALVs in other parts of the country and in Africa as a whole. Exploring the effect of market development of these underutilised species on on-farm biodiversity will also shed more light in the direction to be taken by international development and research organisations, e.g., Bioversity International, and policy makers in the promotion of markets for ALVs. It is expected that the results of this study will be useful to all actors involved (producers, traders, consumers, researchers, non-government organizations and policy makers) and will lead to improved strategies for enhancing food security as well as conserving the on-farm biodiversity of these important underutilized crop species.

The continuation of this text is structured as follows: Section 2 outlines the conceptual framework guiding the study, while Section 3 details the research methodology for data collection and analysis. Sections 4 to 8 provide detailed discussions on the main results of the study. In Section 9, a summary is given of the key factors facilitating and inhibiting ALV market development. Finally, Section 10 provides some conclusions and policy implications in relation to factors affecting ALV market development and determinants of inter- and intra-specific on-farm biodiversity of ALVs.

2 CONCEPTUAL FRAMEWORK

2.1 Conceptualizing the economic importance of ALVs

ALVs fall under what is currently referred to as ‘underutilised species’. Public awareness of these species has continued to increase since they were first brought into the limelight by the Convention on Biological Diversity (1992), and the Global plan of action for the conservation and sustainable utilisation of plant genetic resources for food and agriculture (FAO, 1996). Since then, a number of organisations, both research and otherwise, have developed an interest in studying and promoting these crops for various reasons.

ALVs, just like other underutilised species, fulfil three internationally accepted conditions: they are locally available but globally rare; scientific information and knowledge on them is scant; and their current use is limited relative to their economic potential (Gruère et al., 2006). As underutilised crops, ALVs continue to exist because local people still value them. In some cases they are well adapted to the agro-ecological conditions, supply essential nutrients, and are considered to have medicinal value, while in others they are simply preserved due to cultural beliefs. Their role in the livelihoods of rural people has long been recognised by ethno-botanists who have even documented traditional knowledge associated with these species (Maundu et al., 1999). For most species, documented scientific knowledge is only beginning to emerge.

Like other underutilised species, ALVs have a potential value which is usually greater than the observed value and hence their under-utilisation (Horna and Gruère, 2006). For many years, the use and commercialisation of ALVs has remained low despite their potential economic use. Commercialisation of these and other underutilised crops is affected by their current and potential economic value, as well as the socio-economic and policy problems of their external environment. The observed and potential value of a species can be characterised according to whether private or public, the level of competition, the existing knowledge gap and according to spatial or temporal dimensions (Gruère et al., 2006). The private value, i.e. the value to the user, is shown by its ability to generate income to the user, ability to meet the user's household needs for food, medicine, and socio-cultural obligations, as well as its ability to be used occasionally as a general household risk-management option. ALVs have a 'private' value that is increasingly being realised. This fact has been acknowledged by the producers, the middlemen and the consumers - as shown by growing market demand and the associated growth in supply (Abrefa, 2004).

Farmers producing ALVs are generally rational and risk averse, and will only continue with a venture that is profitable to them (Ellis, 1983). The continued growing of ALVs and the emerging markets would seem to suggest that they are increasingly being perceived as relatively profitable, compared to other alternative uses of land or trading in other commodities. For the former, it shows that the value of the crops is increasing, hence the increasing supply of ALVs. For the latter, it would seem that the marketing systems are becoming more efficient and therefore encourage increased trading in ALVs. These issues are looked into in this study.

Public value, on the other hand, is the total sum of the value of a species and its products that is not private. This includes its contribution to the maintenance of tradition and culture, to sustainable development and - specifically - to the conservation of biodiversity together with ecosystem benefits. When making a decision to continue using a crop, it is basically the private value that is considered. In most cases, public value is generated as a positive externality of production (Wale et al., 2005). With regard to public value, therefore, the cultivation of the ALV species has continued to contribute to agricultural biodiversity. Exploitation of these species on a commercial level is likely, however, to lead to a situation where the preferred species and subspecies will be promoted, to the neglect of those that are less favoured in the market. Thus the question: what are the implications for on-farm conservation of these species as commercialisation increases? It can certainly be hypothesised that the exploitation of ALVs for income generation (for private value) and the resultant commercialisation threatens on-farm biodiversity.

2.2 Analysis of market development for ALVs and its outcomes

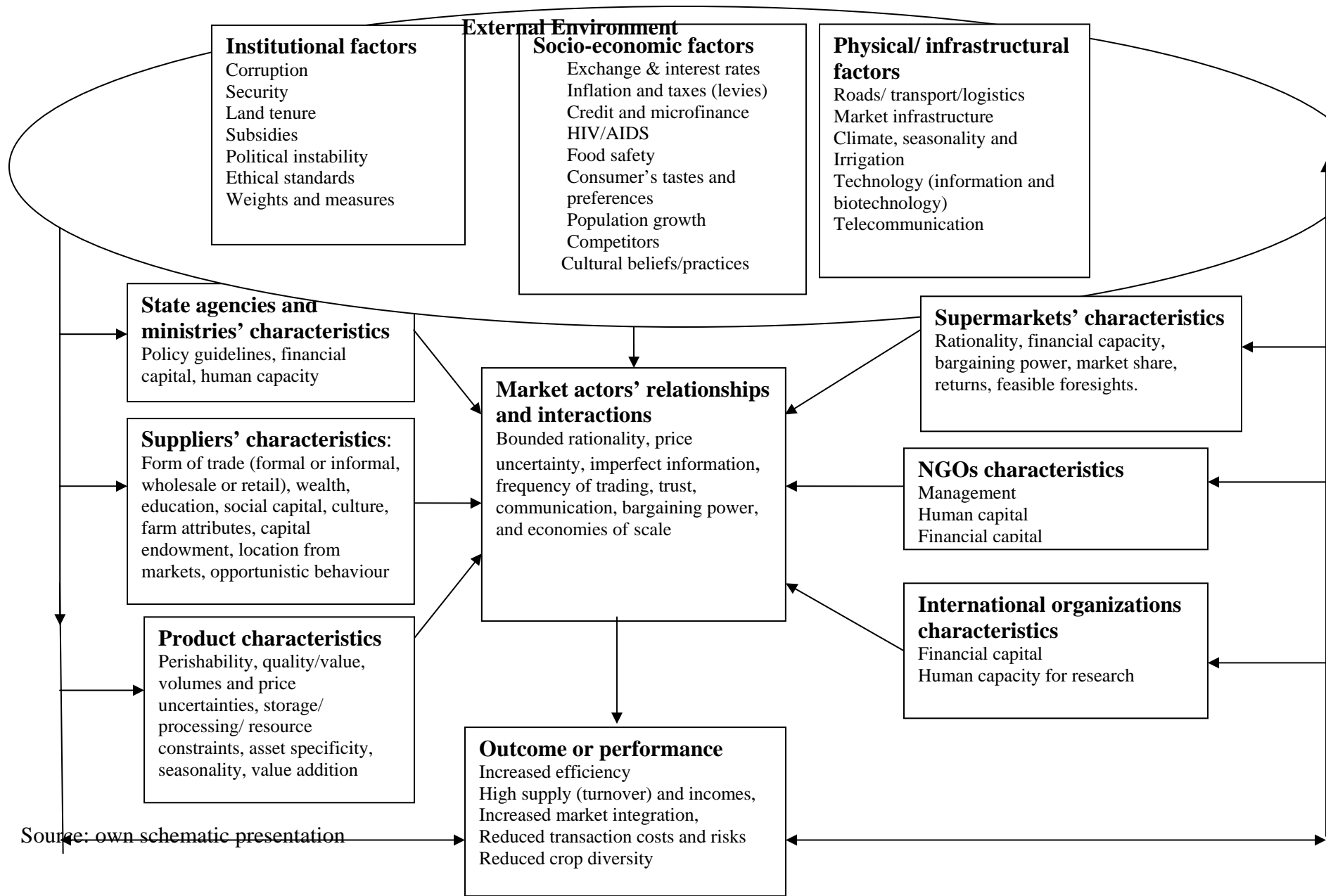
Market development can be influenced by various factors. The Institutional Analysis and Development (IAD) framework (Ostrom, 1998) is being widely applied to analyse institutions such as markets. This approach helps to develop hypotheses about market actors' behaviour and outcomes from changes in

some exogenous variables and to analyse factors affecting interrelationships between institutions, actors and their activities and resources. Dorward (2001) adapted the IAD approach and development framework for the quantitative analysis of factors determining contractual forms and terms found in specific markets. Drawing on this framework, ALV market development is hypothesized to be influenced by stakeholder (traders and partners) characteristics, product characteristics and the prevailing institutional, socio-economic and physical and infrastructural conditions. The interaction of these actors and factors affect market efficiency, product volumes, level of market integration, level of transaction costs and level of crop diversity (Figure 1). The framework is divided into three main, interrelated components: *the first component is the external environment*, consisting of institutional, socio-economic and physical/infrastructure factors. These factors are exogenous and assumed to be out of the control of the traders, supermarkets and organizations involved in the promotion of consumption of ALVs. For instance, depending on the country, existing national policies may hinder or facilitate the use and production of ALVs. The presence or absence of storage facilities and the associated technological advancement may also be critical to reduction of waste and deterioration of quality. Lack of credit, poor infrastructure, and lack of market information may all curtail the ability of market actors in the value chain to improve or increase supplies.

The second component is the action domain, consisting of the main actors or stakeholders, their activities (including the product or resource) and interactions or interrelationships, and where social and economic exchange takes place (Ostrom et al., 1994). As shown in Figure 1, only the main actors are included in such a framework (and only after grouping them into categories). This does not mean that the role of minor players, such as the ALV transporters, county council management and others, is not considered in ALV trade. For the sake of brevity, only a few attributes are explained since most of them are highlighted in Figure 1. For example, ALVs are considered to be highly perishable, and therefore the handling and haul conditions may affect their quality and, consequently, their price. Asset specificity is also high when one invests in ALVs, since there are few other commodities with similar characteristics.

The third component of the framework is the outcome. The question here is: what is the outcome of the different actors' activities, given their interactions or institutions and the prevailing conditions of the external environment? Drawing on Section 2.1, supposed outcomes in relation to the marketing of ALVs would include ALV market growth in terms of turnover, increased market efficiency, increased incomes for traders, increased market integration, reduced transaction costs and risks and reduced crop diversity. This study does not, however, investigate all the outcomes listed above, as some are beyond its scope. Similarly, most of the external environment factors are not covered by the objectives of this study.

Figure 1. A conceptual framework for analyzing factors influencing market development for ALVs



3 RESEARCH METHODOLOGY

3.1 The study area

The study was carried out in the city of Nairobi and its peri-urban areas, including Ngong, Karen, Kiserian, Ongata Rongai, and Kiambu (Gitaru, Kikuyu, Wangige, Limuru, Muguga, Kiambu, Githunguri and Ruiru areas). Nairobi is a cosmopolitan city of about three million people. It is both the capital and the largest city in Kenya, and as such all the ethnic backgrounds are represented. The food consumed in the city comes from right across the republic and this also includes ALVs. Some of the production areas of these ALVs are close to Nairobi, e.g., Ngong, Limuru and Githunguri, whereas others are more than 100 km away. The latter include Transmara, Kisii, Nakuru, Machakos, Makueni and some pockets in Western and Nyanza Kenya (Abrefa, 2004; Mburu and Wale, 2006). The study targeted traders marketing ALVs in the capital and nearby production areas. Distant production areas were therefore not visited during the market surveys.

Nairobi has ten large markets where ALVs are traded in large quantities. In addition, there are several estate markets that serve residential areas, as well as small groceries, kiosks and local evening vendors all of which stock varying amounts of ALVs. Gikomba market serves as the main wholesale market for ALVs within Nairobi. Other large and important ALV markets include: Wakulima, Githurai, Kangemi, Toi, Kawangware, Ngara, City Park, Korogocho, and Dagoretti. Many of these markets provide significant wholesale as well as retail services. Those in the peri-urban areas include Gitaru, Wangige, Ngong, Kiserian, Ongata rongai and Ruiru. They serve mainly as producer markets, whereby farmers in the neighbouring areas bring their produce, and middlemen from other markets in the city come to buy the goods and bring them to Nairobi's urban markets. They, therefore, serve as an important source of most of the ALVs marketed and consumed in and around Nairobi. Most supermarket chains, such as Uchumi, Nakumatt, Tuskermarket and Ukwala, as well as other smaller estate supermarkets, are also important outlets for ALVs - especially for the working upper and middle classes who have little time to visit the open-air and seemingly congested Nairobi City Council markets.

3.2 Sampling procedure and data generation

The study involved both primary and secondary data collection. Secondary data collection proved a challenge as very few institutions had data concerning ALVs except for a few nutritional studies. Both qualitative and quantitative data generation was carried out. Primary qualitative data were obtained from discussions and detailed interviews with key stakeholders or actors involved in the marketing of the ALVs both in the public and private sectors. These included staff in the Ministry of Agriculture, Kenya Resource Centre for Indigenous Knowledge (KENRIK) of the National Museums of Kenya, Farm Concern International (formerly Family Concern), the Nairobi Friends Club International, FORMAT, and Uchumi Supermarket management, among others. Key informants among the market actors were also interviewed in every market visited during a preliminary survey.

Quantitative data was generated through the distribution of a semi-structured questionnaire. This questionnaire targeted randomly selected market actors in identified key markets in the city and the peri-urban areas. It was carefully pre-tested and adjusted several times before being distributed. Trained enumerators used direct observation and informal interviews to complement the questionnaire and to fill any gaps, as they moved from market to market. They were encouraged to note any extra information in their notebooks which were collected at the end of the survey period.

The quantitative data were collected in markets that can generally be termed as 'formal'. An exception is the 'Kisii bus stage' which looks informal although it can be treated as a *de facto* formal market since it

operates with the full knowledge of the city council although the council neither stops it nor licenses it - probably due to its precarious position. It is right in the middle of town and very close to the city council offices, giving credence to the fact that it is known to them. In fact, the council officials even visit the market at times, to collect fees.

The sampling procedure involved sampling first the markets and then the actors who were actively participating in ALV marketing. For the purpose of the study, markets were categorised as either wholesale or retail. A market place could house both retail and wholesale markets, depending on timing and characteristics (see Appendix 1). This was necessitated by the differing characteristics of the markets and the actors in the two categories. Those in wholesale markets sold their wares on a wholesale basis to retailers, while the retailers usually sold directly to consumers. In general, the wholesalers traded very early in the morning and within a limited period of time while the retailers sat the whole day and retailed. Following this categorization, there was a total of 12 wholesale and 18 retail markets in the sample. The sampled market actors covered all marketing channel levels, such as producer wholesalers, first and second level wholesalers, producer retailers and retailers. A total of 97 suppliers from 30 market outlets were interviewed. In the following two sections, details are given as to how the 97 suppliers were sampled.

3.2.1 Sampling suppliers to council markets

During the preliminary survey it was noted that there are many outlets for ALVs but some, such as the kiosks and small groceries, were managed by only one or two retailers. In some areas of the city, local evening vendors gather to sell combinations of exotic vegetables and ALVs for just a few hours, without any license from the respective council or local authority. So as to eliminate these small and *ad hoc* trading venues from the quantitative analysis, it was decided to include in the sample only formal (licensed) markets that had at least five suppliers. After considering the cost and time taken for wholesale activities in some of the markets, it was decided to sample randomly 20% of the actors in each of the selected markets (Appendix 1). Thus, a systematic, proportional-to-size, random sampling was done. A sample of 20% of the traders was taken in each market, which meant that markets with many suppliers had a larger representation accordingly.

A head count of market suppliers of ALVs was conducted. For the wholesale markets, this was done just after the market opened, sometimes at 4 a.m. The head count was then authenticated or validated by key informants, regular ALV traders and licensing officers or 'Askaris', by asking them to confirm the number of suppliers who normally frequented a particular market. This number included those who were absent at the time of the head count but were frequent suppliers of that particular market. This method of establishing the sampling frame was used due to the fact that it was not possible to establish in advance the total population, hence the lack of a predetermined sampling frame. The only disadvantage of this method was that formal markets with less than five actors were disqualified from the quantitative analysis and probably these would have provided a greater variation in the dataset. However, during the preliminary survey it was found that there were very few such markets and a large sample like the one used in this study would minimize any loss of variation in most of the variables¹. Efforts were made to avoid double counting of suppliers who move from one market to another (mobile traders). This was possible because there were very few of the latter, representing only 6% of the sample.

¹ The regression analyses do not however benefit from the largeness of the sample since they are conducted from selected sub-samples due to the nature of the dependent variables.

3.2.2 *Sampling supermarket suppliers*

Among the supermarkets, only the Uchumi suppliers were included in the sample. This is because other major supermarkets, e.g., Nakumatt, Ukwala and Tuskermarket, usually outsource their vegetables from a single source (i.e. the Fresh N Juici) which obtains its merchandise from a variety of sources. The Fresh N Juici buys directly from traders or from an intermediary called Rispes who outsources from farmers and traders. This supply chain was found to be a bit complicated, leading to its exclusion from the quantitative analysis. However, these supermarkets were visited for informal discussions. The Uchumi supermarket chain was found to be sourcing its supplies from individual producers or producer groups who are listed and personally known to the chain. Its personnel even visit the farms to ensure quality. It was easy to sample randomly from the list of suppliers (farmers) linked to this supermarket chain.

Preliminary information on the Uchumi ‘market’ pointed to the fact that before the June 2006 closure² of the stores and subsequent operations in receivership, all vegetables were being handled centrally. Following the reopening in July 2006, each store was expected to make its own purchases. However, close examination revealed that the suppliers have remained the same, despite this arrangement. Consequently, after visiting three branches and discovering that the same names were being forwarded to us, we settled on taking a single sample from the main branch which had supplied all the others with ALVs before the June closure. This was the Uchumi, City Square branch. The list included individual farmers, both large and small, and several groups supplying ALVs under Farm Concern International³. A 20% sample was taken from the direct suppliers and another 20% from the ‘Farm Concern International’ groups. Since the unit of analysis was the individual market supplier and not other entities, such as groups, we further sampled a random 20% of the members (producers) of each of the randomly sampled groups.

3.3 Data Analysis and limitations

The data was entered and cleaned using SPSS Data Entry 4.0 and analysed using SPSS Version 12 software. Descriptive statistics such as frequencies, means, modes, standard deviations, bivariate correlations, etc. were elaborated using SPSS. Three econometric analyses were conducted using Limdep Version 7.0. The first involved determination of factors affecting market development. This is realised with the positive difference of the gross value of sales between years 2006 and 2001 being the dependent variable. The second and third regressions are carried out with the number of ALV species and sub-species being the dependent variables. Details of these analyses and their importance are provided in Section 7.

In the preceding sub-sections on sampling, various limitations of the data used in this study are highlighted. In addition to these limitations, it is important to note a further clarification on how the study treats producers (farmers) and consumers. Due to time and financial constraints, the quantitative analysis was confined to market suppliers, leaving out some producers who are likely to be selling ALVs from their own farms. This implies that only producers who participate in the marketing activities by selling their ALVs in market places (physical markets) were included. Consumers are not included in the

² Uchumi supermarket chain is the oldest supermarket retail chain in Kenya having started operation back in 1976. Due to mismanagement often reported as an over-ambitious expansion plan, Uchumi over time accumulated so much debt that it ended up closing its door on 1st June 2006. Being a local company whose shareholders included the government through Industrial and Commercial Development Corporation (ICDC), means to revive it were sought and after 45 days it was reopened under receivership. The government loaned it about Kshs 675 million and the major shareholders injected a further Kshs 300 million. At the time of this research Uchumi supermarket was still under receivership.

³ These are the farmers groups linked to Uchumi through Farm Concern International.

quantitative analysis either, since it is almost impossible to generate a random sample of this group, given the time and finances allocated to the study. The study relied on secondary sources to generate data related to these two categories of actors.

4 DESCRIPTION OF MARKETS AND ACTORS' ATTRIBUTES AND INTERACTIONS

4.1 Initial situation and historical development of ALV market in Nairobi and its environs

Many of the people in Nairobi were born and brought up in the rural areas. Those who grew up in the city have rural links, in the sense that most have relatives or neighbours who visit from rural areas or who visit rural areas regularly. These bring with them rural food supplies, including ALVs. To this extent, many people in Nairobi have occasionally consumed one or two species of ALVs. Before the current status of the ALV market in the city, where most of the required species are available, neighbours and relatives would bring each other vegetables from rural areas. This would often happen during normal visits or other rural functions. The costs were minimal since with low population density such vegetables were plentiful during the rainy seasons. Social cohesion and networks with relatives and neighbours in rural areas enabled the people in Nairobi to get ALVs sometimes at no cost. With modernisation and the increase in population density, this situation gradually changed. Today, most of the ALVs consumed in Nairobi are bought in the local markets and supermarkets.

An impromptu questioning of shoppers in the Uchumi supermarket as to their awareness of ALVs revealed that one out of every three, i.e., 33% of shoppers, currently consuming them, would often answer 'I have known and eaten these vegetables from my childhood'. That notwithstanding, the current market status for ALVs could be termed a 'recent' development. From the quantitative data, it was found that only 17.5% of the suppliers knew when the ALVs were first traded in the surveyed markets. This implies that most of the suppliers were either new entrants to the ALV market (i.e. they joined an on-going process) or had no historical knowledge of the trade. The former is true since, as Figure 2 shows, there was little likelihood of a data recall situation. The earliest date mentioned was 1960 (this was Kangemi market) but the single year when most traders started selling ALVs was 2004. It can be seen from Figure 3 that most of the markets started trading in ALVs after 1991, although a good number of them (35.3%) started only six years ago.

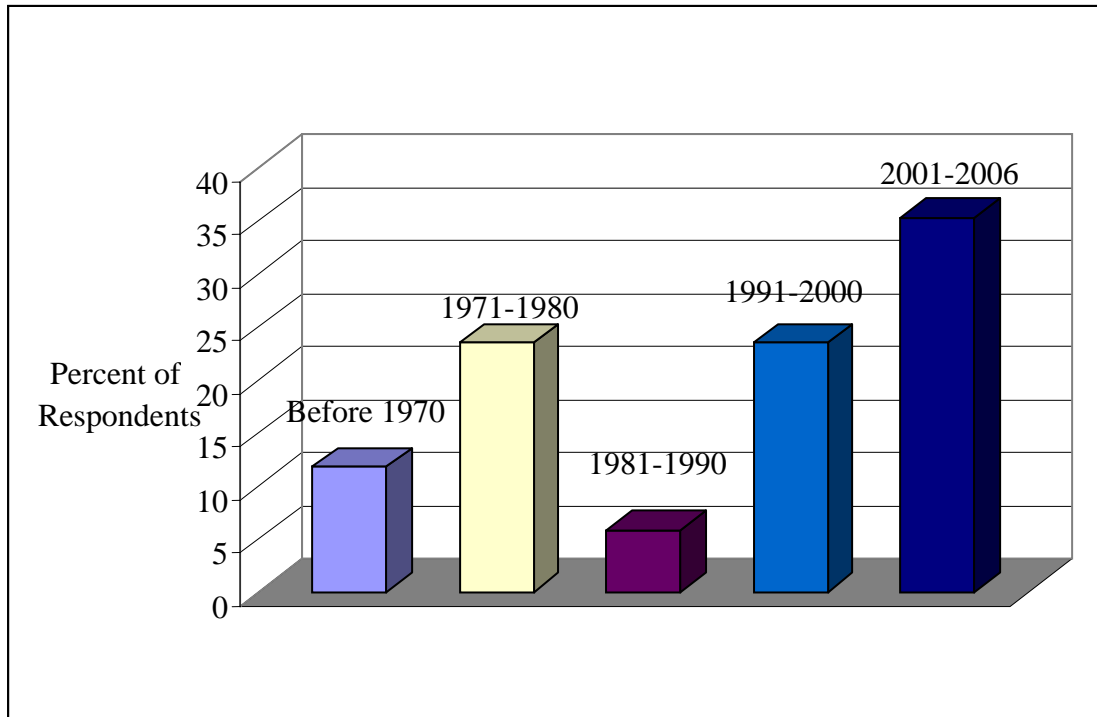


Figure 2. When the ALV trade started in the markets

When individual traders were asked in what year they themselves started trading in ALVs, the responses given ranged between 1964 and 2006, with 50% having started around or before 2001 (see Figure 3). The single year in which most traders started selling ALVs was 2004. This shows that although there has been some ALV marketing activities going on for several decades, development seems to have picked up in the last six years. This trend can be linked to the promotional activities of international research organizations such as Bioversity International and national NGOs.

According to the survey results, the earliest places where ALVs were traded included Kangemi (1960), Gikomba (1972), and Wangige (1974). Other older markets included Ngara and Kisii bus-stage (1980 and 1986, respectively). At first, these ALVs would be brought from the growing areas for specific clientele - this included people who come from the growing areas. Kangemi is home mainly to people from Western Kenya (Adeka, et al., 2005), while Gikomba is close to the city's country bus park therefore guaranteeing easy access for the traders from upcountry. Kisii bus-stage is a peculiar market as this is where the buses from Kisii park. Traders from Kisii and Transmara Districts would bring the vegetables and sell to others and so a market eventually developed in this spot. The buyers, too, would be mainly from the Kisii ethnic group but living in the city. It is possible, therefore, to link earlier market development to settlement patterns in Nairobi of particular ethnic groups that had indigenous knowledge as to the nutritional importance of ALVs.

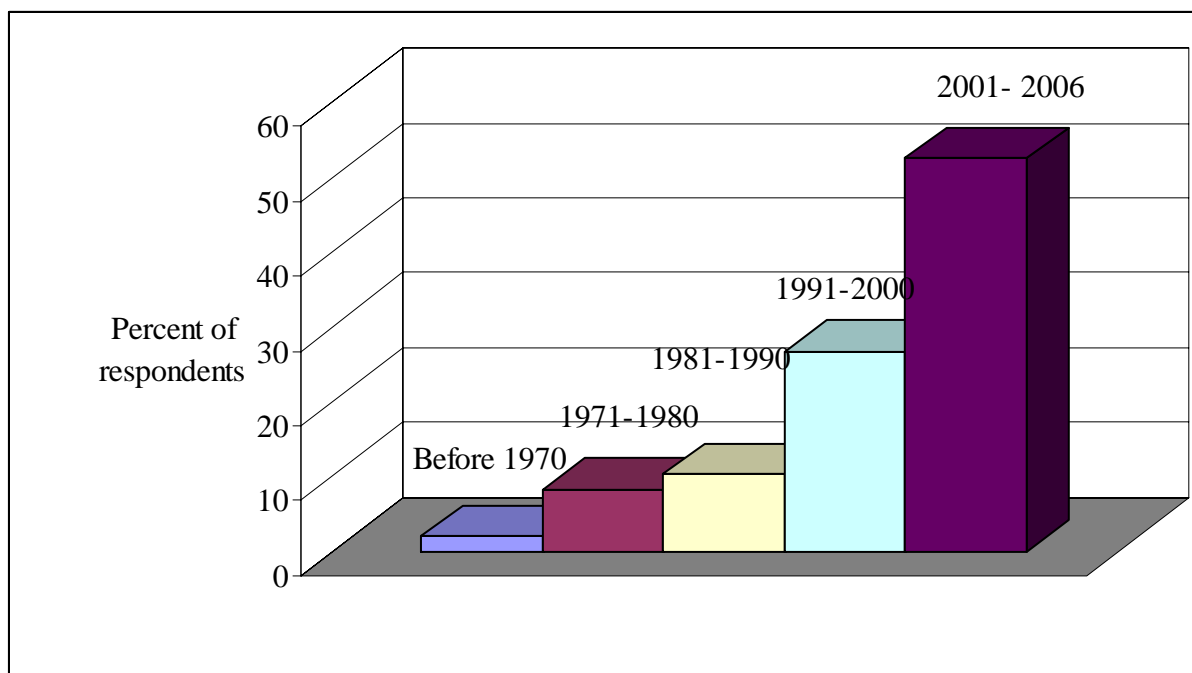


Figure 3. Year when market supplier started trading in ALVs

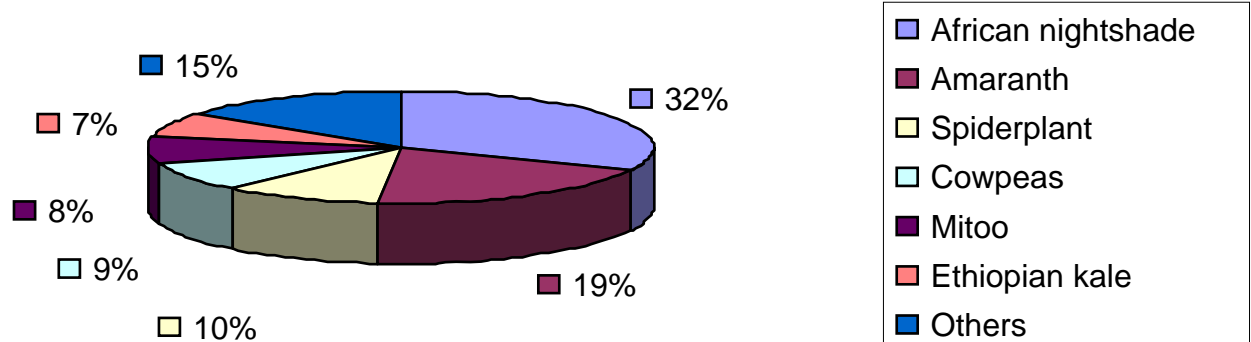
The first three ALVs to be traded included African nightshade, leafy amaranth, and spiderplant. Others included cowpea leaves, *mitoo* (*Crotalaria ochroleuca* and *C. brevidens*), and Ethiopian kales. From Table 1 it can be seen that for most of the markets, their ‘first born’ ALV was African nightshade. To-date, this is also the most common ALV in Nairobi’s urban markets, followed by amaranth, as shown in Figure 4. Most of the vegetables have two or more traded sub-species. These different types are sometimes even different species, e.g. African nightshade consists of a group of species belonging to the *Solanum nigrum* complex with the two most common being *S. scabrum* (a broad-leafed species) and *S. villosum* (a smaller-leafed species). Appendix 2 summarises the most popular subspecies in terms of daily market share in the study area.

Prior to 2000, the ALV trade was conducted exclusively in the council markets. However, this trade was on a lesser scale than that of today since only 38.1% of the current suppliers were involved. The increase in trade after 2000 was mainly due to the opening of supermarket outlets which started stocking ALVs - mainly African nightshade and leafy amaranth.

Table 1. The first ALVs traded in various Nairobi markets

Name of Market	First ALVs to be traded	Year
1. Gikomba Wholesale	African nightshade, cowpeas, <i>mitoo</i>	1972
2. Kangemi Retail	African nightshade	1960
3. Kangemi Wholesale	Leafy amaranth, cowpeas	1968
4. Toi Retail	African nightshade	1994
5. Ngara Retail	African nightshade	1980
6. Githurai Wholesale	Cowpeas	2001
7. City park retail	Leafy amaranth, cowpeas, <i>mitoo</i>	1991
8. Kisii stage Retail	African nightshade, leafy Amaranth	1986
9. Wangige Wholesale	African nightshade, Ethiopian Kales	1974
10. Ngong Retail	African nightshade	1998

Figure 4. Relative Importance of ALV species in markets within and around Nairobi



4.2 Reasons for increased trade in ALVs

As mentioned earlier, the growth of the ALV market picked up within the last six years. It was important therefore to investigate why traders started getting involved, and to analyse any relationship with this recent trend after decades of slow ALV market growth. Table 2 summarises the reasons different traders gave for starting the ALV trade. The following subsections discuss the two major reasons: increased demand for ALVs and trader networks.

Table 2. Reasons for starting to trade in ALVs

Reason	No (n=97)	Percent
1. Increased demand (enquires from consumers)	51	53.1
2. Introduced by other producers who sell in Nairobi	25	26
3. Introduced by a friend or relative	7	7.3
4. Noted ready supply (farmers had limited outlets)	6	6.3
5. Good profits	7	7.3

4.2.1. Increased demand for ALVs

The main reason given for initiating trade in ALVs was increased demand for these vegetables (53% of the respondents). Qualitative information indicated that consumers would ask for these vegetables while buying other produce and this made the traders start stocking them. Failure to diversify to ALVs would lead to losing ‘customers’ even for the other market produce. Further information showed that those who had started selling ALVs earlier in the 1990s would finish their supplies faster and get better returns than those with other vegetables. The thirst for faster and higher returns was therefore a key driving factor for the new traders to join in the ALV trade. These explanations point to the fact that recent ALV market

development is more of a demand-driven scenario than anything else. In most markets, increased consumer demand has led traders of other vegetables to introduce ALVs along with the rest, or else to start trading purely in ALVs.

From qualitative interviews with suppliers, consumers and NGOs, it emerged that demand has been pushed up by a number of interrelated underlying aspects, including:

(a) General health awareness

From around the late 1990s, there has been an increasing general awareness associating many of the diseases of the affluent (such as diabetes, high blood pressure, and ulcers) with an unhealthy food consumption pattern. From newspapers to scientific writings, there has been general awareness pointing to the fact that our great grandparents lived longer and mainly because they ate indigenous food such as ALVs. This, coupled with campaigns by nutritionists and conservationists of genetic resources, has made a great impact on the eating pattern of the consumers.

(b) HIV/AIDs pandemic

With the advent of the HIV/AIDs scourge, ALVs have also been floated as health boosters. They are said to be rich in micro-nutrients (vitamins, iron, potassium), polyphenols and are generally considered good for people who are ill. Most ALVs, especially African nightshade and *mitoo* are considered medicinal. In some cases HIV/AIDs patients have been given a general recommendation from health practitioners and herbalists to consume such vegetables.

(c) Increased knowledge on preparation methods for the various ALVs

A number of NGOs, national and international institutions, have been actively promoting ALVs throughout the last decade through the press and audio-visual media. They have also been holding cooking exhibitions, engaging the public in talk shows through popular media and holding exhibitions in the selected retail outlets. All these activities led to some people hearing of these vegetables for the first time and being told how to prepare them.

(d) Peer influence

Other key informant interviews indicated that people have been learning from acquaintances, ALV traders and work colleagues about the nutritive value of these vegetables. At the start, this group of consumers would not have chosen to eat ALVs because of their nutritive importance but mainly because their friends and people of their social class do so. The group has benefited mainly from the introduction of ALVs on the shelves of the major supermarket chains in the early 2000s. Selling ALVs at these chains also helps to boost their image and acceptance in the minds of would-be consumers.

4.2.2. Supply increase through trader networks

As indicated in Table 1, producers were informed about the demand for ALVs by other producers (26% of the sample) and other traders heard from relatives or friends (7.3%). These ways of passing information to traders are known as ‘trader networks’. The role of trader networks in convincing traders to start trading in ALVs is represented by 33.3% (a third) of the sample. These networks positively affected the supply side of the ALV trade in Nairobi. Their role cannot be ignored since ALVs, unlike other farm products, are not served by the Kenya Agricultural Commodity Exchange (KACE) which supplies daily market information on supply, demand and price trends. Thus, there was no other way for producers and other traders to get updated market information on ALVs. Additional gains from trader networks were realized mainly because some the producers in peri-urban areas had already formed producer groups. These producer groups were important in ensuring quality and in maintaining a regular supply of vegetables. However, they were not found to have any significant influence in price negotiations, particularly with regard to the supermarket chain.

4.3 Categorisation and description of market outlets within Nairobi and the neighbouring areas

As mentioned in the methodology section, there are different types of market outlets for ALVs in Nairobi. These include formal markets - such as supermarkets, groceries, roadside kiosks and licensed markets operating on city/municipal/county council or public grounds (hereafter referred to as 'council markets') - and informal markets, such as the estate roadside vendors. Most markets have their own characteristics with respect to the kind of vegetables and the type of buyers. The latter vary in terms of socio-economic characteristics, including income level, cultural background, and levels of education. For the purpose of this survey, formal markets are those major farm-produce markets that are recognised by the Nairobi City Council - or the relevant municipal council, in the case of the peri-urban markets. Traders in these markets pay market fees to the respective authorities, whereas the supermarkets, groceries, and kiosks pay for annual licences.

4.3.1 Council markets

Most of these markets have both a wholesale component - which usually operates very early in the morning - and a retail component, which usually continues throughout the day. In Nairobi, Gikomba, Kangemi, Toi, Kawangware, Githurai, Ngara, City Park, Wakulima, Korogocho, Westlands, Mutindwa, Savannah and Kenyatta markets can all be categorized as council markets. In peri-urban areas, council markets include Wangige, Gitaru, Dagorreti, Ruiru, Ongata Rongai, Kiserian, Ngong, and Kiambu.

The wholesale component in these markets begins operations from very early morning, at around 03.00hrs or earlier to around 07.00hrs. Most markets have specific market days (two days per week) while others operate throughout the week. On the market days, producers and mobile traders come to sell their goods while on normal days the usual more or less permanent retailers are found within built-up shelters. Markets that have specific market days include Kangemi and Kawangware within the urban area and virtually all in the peri-urban areas (see Appendix 3 for a detailed description of individual markets).

4.3.2 Supermarkets, green groceries and vegetable kiosks

It was noted that supermarkets are becoming important ALV outlets for the people in Nairobi, especially those who do not have the time to go to other markets. Most of the upper and middle class groups find themselves busy all day and prefer to make do all their shopping at one time. Secondly, the presentation of ALVs in the supermarkets is better than in the usually open and sometimes dirty council markets. As mentioned earlier, virtually all supermarkets in the city and the estates have introduced grocery corners. In the supermarkets, bunches differ in size: those in Uchumi being bigger and fairer-priced than the others. This is because Uchumi has vertically integrated its trade in ALVs with the production interests of certain farmer groups. The Uchumi bunches weigh on average 500-700 grams and sell at between Kshs 10-15 depending on availability, which is a function of seasonality. The main species sold by Uchumi include African nightshade, cowpeas leaves, leafy amaranth and spiderplant. Others that were sold on a much lower scale included jute plant, stinging nettle, Ethiopian kales, pumpkin leaves, *kahurura*, and *mitoo*.

Most large shopping centres in the city have green-grocers that stock small amounts of ALVs. These include groceries in Westlands, Yaya centre, Highridge, ABC Place on Waiyaki way, Village Market and other large shopping centres. In addition, some of the vegetable kiosks found in most shopping centres within the residential areas stock small amounts of ALVs, mainly for their established 'customers'. Generally, supermarkets, green-grocers and vegetable kiosks sell their ALVs at higher prices than those of the council and informal markets.

4.3.3 Informal markets

The informal markets include hawking activities that are usually unauthorised and operate in areas not gazetted as market places - along the roadsides, usually next to formal markets, and in open sections of residential areas. The importance of these markets is that they support the livelihoods of some urban poor traders; they also serve those who cannot get time to go to distant formal council markets, as well as consumers who cannot afford to buy ALVs in the supermarkets. Being unlicensed, these markets play an ambiguous role in the promotion of ALV trade since it is the opportunistic behaviour of the traders involved that leads to enhanced market development. This poses a challenge for ALVs since such behaviour is likely to have an adverse affect on ALV market development in the long term.

4.4 Analysis of market Actors and their Interactions

4.4.1 Categorization of market traders and their attributes

In this study, the market traders were divided into four categories: producer-wholesalers, producer-retailers, trader-wholesalers (first and second levels) and retailers. As indicated in Section 3, a market was conceptualised as having three main actors: producers, traders and consumers. Most traders preferred trading in a particular market as opposed to moving from one market to another. Almost two thirds of the traders were more or less permanent in the same markets while the others were either mobile traders (6.2%) or occasional traders (mainly peri-urban producers), usually on market days or during specific seasons (29.9%). Producers who market their produce beyond the farm-gate fall into two categories: those who sell in bulk to other wholesalers or retailers and those who choose to retail direct to consumers. Most producers sold wholesale to the traders in order to get time to undertake other activities and minimize transaction costs. Only a limited number (3%) choose to retail and, even then, only on market days in their nearest market centres (Table 3). About 38% of the sample traders were producer-wholesalers. In an effort to maximise profits from their ALVs and minimize costs and risks, these producers choose to bring their produce directly to the markets. As Table 3 indicates, most of these traders are more involved in the peri-urban markets and also receive external support to enable them to market their ALVs.

Table 3. Categories of ALV market traders and their characteristics

Category of traders	% in the sample	Location of market (%)		Received trade support (%)	
		Urban	Peri-urban/rural	Yes	No
Producer-wholesalers	38.1	40.5	59.5	62.2	37.8
Producer-retailers	3.1		100.0	33.3	66.7
Trader-wholesalers 1 st level	20.6	50.0	50.0	45.0	55.0
Trader-wholesalers 2 nd level	1.0		100.0		100.0
Trader-retailers	37.1	58.3	41.7	38.9	61.1
n = 97	100.0	47.4	52.6	48.5	51.5

Such rationalization on the part of producer-wholesalers is a major factor in enabling this key group of market actors to benefit from ALV trade. The producer-wholesalers save on losses due to perishability and other costs that they would incur during harvesting and transportation of the produce and waiting at the markets. This may explain why only 3% of producer-retailers participate in the market. Nevertheless, if producers' opportunity cost on time is not considered, their profit margin is lower than when ALVs are retailed directly to consumers. An accurate estimate of the profit that goes to the producer-wholesalers has

therefore to account for benefits or returns from the other activities they undertake after the ALV wholesale business is over.

The trader-wholesalers were classified into first level and second level, as shown in Table 3. The first level wholesalers (about 21% of the sample) get their produce direct from the producers in the growing areas and sell wholesale to traders in the market. The second level wholesalers actually buy wholesale from the first level wholesalers and sell wholesale at the same market. Only a few traders (1%) choose the latter, as the margin of profit is low. Some would sell wholesale at the second level just for a short time in the morning and retail the rest during the course of the day. Thus, even though there are many 'early morning' second-level wholesalers, most of them were classified as trader-retailers. The trader-wholesalers live in Nairobi or in far-away rural areas such as Limuru, Kisii, etc. and are better endowed with financial capital than any other category of suppliers. They avoid risks such as losses due to perishability by buying and selling in bulk within a period of 18-24 hours. The trader-wholesalers enable the producers to save on the cost of transportation and market fees and on the transaction costs of trading in the market. In some cases, the farmers take their produce to the nearest markets, from where these first level trader-wholesalers buy them. In other cases, the wholesalers will go to the farms and even harvest the ALVs for themselves. In both cases, the wholesalers are driven by profit maximisation and choose the option that suits them best.

Retailing to consumers is done mainly by the trader-retailers, who comprise 37% of the sampled market suppliers. This group of suppliers normally remain in one place and sell ALVs the whole day. The trader-retailers are well-endowed with financial capital although not to the level of wholesalers. Most of the retailers live near the retail markets. Often they own temporary stalls in the council markets, and in some cases have employed assistants.

4.4.2 Socio-economic characteristics of ALV traders⁴

As shown in Table 4 below, the majority of suppliers of ALVs to markets in Nairobi and the neighbouring areas are women (65% of the sample). This confirms the trend shown in other reports that most of the ALV traders are women. Particularly Nekesa and Meso (1997) and Maundu, et al. (1999) indicate that as much as 95% of the traders are women and it was only in Kisii where a significant number of men were found to be involved in this trade.

The current figures for Nairobi of 35% of men participating in the ALV trade imply that the capital city is rather different from other areas and/or more men are increasingly venturing into this business. Nevertheless, the ALV business remains a woman's venture despite the fact that the wholesale trade is carried out very early in the morning when it is normally considered to be insecure⁵. As Table 4 indicates, the majority of the traders in all the categories were women.

About 75% of the traders were also married, showing that this trade is well-accepted in the family and by the community at large. The retailers were found to have relatively more unmarried members than the other trader categories. This might be because it is easier in terms of finance and general logistics to set up a retail business than a wholesale one. Sometimes retailing ALVs required merely sitting down alongside the market entry points, roads, paths, etc. with an open bag of a few bunches of vegetables. Such a task could easily be performed without assistance from partners.

Table 4. Descriptive statistics of selected socio-economic characteristics of the ALV traders

⁴ This term here includes all the trader categories in the sample, i.e. producer traders and professional traders.

⁵ To visit some of these markets, the enumerators were forced to put up in some lodging houses nearby due to the insecurity of the city. However, there was no problem for vehicles even when they had to travel in and around the city at 5 am.

Characteristics of traders	Sample n = 97	Producer- wholesalers n = 37	Producer- retailers n = 3 ^a	Trader- wholesalers 1 st level n = 20	Trader- wholesalers 2 nd level n = 1 ^a	Trader- retailers n = 36
Age (mean years)	41.6	41.7	48.7	40.5	39	41.5
Education (mean years)	8.83	10.0	8.67	7.32	11	8.29
Experience in trading in ALVs (mean years)	9.86	8.65	5.0	8.55	2	12.4
Marital status (% married)	74.2	83.6	33.3	90	100	58.3
Gender (% female)	64.9	61.1	100	65	100	67.7

^a The sample sizes of producer-retailers and 2nd level trader-wholesalers are very small to conduct comparison with the other categories

On average, the traders' level of education was above primary school level (9 years of education). A more in-depth examination of this attribute showed that about 16% of the sample traders had secondary education while 13.8% had post secondary education. Surprisingly, the producers are more educated than the other categories of traders, implying that the production of ALVs is a field for those endowed with human capital. This might be because one has to acquire knowledge on several aspects of ALVs, e.g. their nutritive value, marketing strategies, etc., before embarking on their production. The effect of this attribute (human capital) on on-farm conservation is evaluated in Section 7.

The mean age of the sample traders was 42 years. About 24.2% were 30 years of age or below, while 20% were 55 years and above. Most of the latter were pensioners who had retired from their previous occupations and had turned to the ALV business. The ALV market seems to be attracting fairly young people and cannot be said to be the domain of the elderly. Generally, the ages of the different trader categories do not differ so much from the mean of one another, implying that this attribute may not play an important role in determining traders' choice in form of trade.

4.4.3 Institutional arrangements and Interactions among traders and other actors

So far, the ALV market is still in its early stages of development. It emerged that many ALV traders learn a lot from each other and from other actors. Many learned from the others where to source their supplies, as well as prices details, while some were introduced to the trade by other actors. Traders were selling at the same price in almost all markets visited, meaning that market information was well shared. In most of the markets, traders sell from one place only, supporting one another in various ways. Competitiveness among traders was rarely observed although it does exist.

In some cases, the producers are organised into groups through the efforts of Farm Concern International and other stakeholders, and are able to bulk their commodities to gain from economies of scale. Although other stakeholders play an important role in organizing the farmers, it is difficult for such groups to be formed if there is no capacity for self-organization (collective action) among the producers (Meinzen-Dick, et al. 2001). The groups have survived many difficulties, an indication that there is strong leadership and willingness on the part of the members to pursue their common objectives.

Since small-scale farmers are organized into groups, they are able to penetrate the supermarket outlets. This has contributed positively to market development as the supply matches demand. The 'group' strategy has had multiple effects: encouraging production and sales by the farmers and their neighbours

(see Section 4.2.2), providing a source of income, enhancement of social capital through membership in the groups, and ensuring a steady supply of ALVs in Nairobi supermarkets and informal markets.

Farm Concern International farmers have relational contracts and formal rules that are observed by both parties (see Section 5). The Uchumi Supermarket, which is the key recipient of ALVs from Farm Concern International farmers, usually interacts closely with the producers. For instance, the chain makes visits to the farms before awarding supply tenders in order to improve the issue of information asymmetry that may exist. Thus, supermarkets' contractual arrangements with farmers ensure that quality vegetables are supplied. Any ALV losses at supermarkets fall on the suppliers, as only what is sold is paid for. There is an aspect of moral hazard in this case since if one farmer's vegetables are of poor quality the whole consignment would be bought at a lower price or rejected altogether. However, the farmers are organized in groups and it would be assumed that with good leadership and presence of collective action they are able to avoid such problems and any opportunistic behaviour (Mburu and Wale, 2006). Another NGO, Rural Outreach Programme (ROP), has also been supporting the producer traders with seeds and information on marketing. Generally, the traders - and the producers, in particular - are well connected to actors outside the market domain who have been promoting the production and consumption of ALVs.

To minimize risk and transport costs, the wholesalers have integrated ALV trade with the local transport system and market activities of other traders. For example, ALV loads are often charged lower transportation costs than would normally be the case. Sometimes producers and transporters enter into informal contracts with wholesalers such that ALVs are traded and transported on short-term loans (1-2 days). These relations and contracts often make it difficult for interested wholesalers to penetrate the ALV market without first being introduced to the marketing systems by the existing wholesalers.

A point of concern is the sustainability of the externally-supported institutional arrangements involving farmers and supermarkets. In the first instance, NGOs went to the farmers and encouraged them to form groups or strengthen the already-existing ones and then linked them to the markets. Groups have been able to remain cohesive beyond the NGO intervention and have gone on to encourage other farmers to form such groups. After noting the benefits of ALV production, a few groups and farmers, especially from Ruiru, visited the initial groups on their own initiative to learn more about ALV production and have continued to seek technical support from Farm Concern International and other service providers in their area⁶. The ministry of agriculture in the production areas of Kiambu, and staff of KARI national horticultural centre at Thika, have also embraced ALV production and are continuing to advise farmers to produce and market them. Farmers are also continuing to train each other. On the issue of seeds, some farmers have been trained in seed production and are producing for their own use and for sale to others. In addition to ROP, Simlaw seeds - a subsidiary of the Kenya Seed Company - also stocks ALV seeds, particularly African nightshade, leafy amaranth, *mitoo* and spiderplant.

Secondly, Farm Concern International acts as a go-between for farmers and supermarkets by ensuring timely delivery of vegetables from the farmer groups. It also has an arrangement whereby farmer groups are paid on production of delivery notes from supermarkets and these funds are recovered when the supermarkets settle the accounts directly at the end of 60 working days as is the practice. This arrangement has enabled most groups to keep up the production and supply, which would not have been possible otherwise, since few farmers can wait for two months to receive payment. Although virtually all groups are still using this facility, the point to note is that it is not a subsidy, as the funds are recovered in full. Furthermore, groups are showing signs of maturity, as those that had started by being assisted in the organization of transport are now managing fairly well on their own.

⁶ Farm Concern International notes that there has been a big multiplier effect in that after training initially about 500 farmers, many more have been reached mainly through farmer to farmer training (Personal Communication).

4.5 Market and product (ALV) attributes and strategies

4.5.1 Marketing channels and product presentation

The marketing channels for ALV are generally of the conventional types. As discussed in Sections 3 and 4, there are producers, wholesalers and retailers. In some cases, there is limited vertical integration whereby producers are involved in both wholesale and retail activities. Horizontal integration is mainly limited to producers who have the option of producing and marketing different kinds of ALVs. There is no agreed form of pre-packaging of ALVs in the market outlets. ALVs are usually marketed in bundles of varying sizes, depending on the season and locality. Normally the vegetables are harvested and presented in two forms: plucked branches and stems with leaves (sometimes the leaves are left only in the case of Ethiopian Kales) packed in bunches or bundles and uprooted whole plants which are tied into bundles. The former is common with produce from Kisii and Ukambani areas. The bundle is also the unit measure in supermarkets. However, Uchumi has an additional requirement in that the bundle should weigh between 500-700 g. Suppliers usually pack them to weigh close to 700 g, in order to ensure that they continue getting the supply contract.

Bunches or bundles are usually tied together with various types of fibre. The most common is banana, but in some cases synthetic fibres are used. Uchumi Supermarket insists on natural fibres such as banana fibre and where this is not possible sisal fibre can be used. As expected, the size of the bunches vary depending on the ALV species. Those of cowpeas, leafy amaranth and African nightshade are usually larger than the others. In some markets, cowpeas are sold in heaps, in polythene paper bags. The heaps were equated to corresponding bunches by the traders. Bunches in the council markets are usually smaller than those in the supermarkets as there are no standard measures. It was estimated that council market bunches weigh between 350-400g for cowpea, African nightshade and leafy amaranth, and are much lighter for *mitoo* and spiderplant.

4.5.2 Quality control, product differentiation and labelling

Except for Uchumi Supermarkets where there is quality control, the rest of the market actors simply buy and sell. Thus, some of the healthiest looking ALVs may be produced in the sewages around the city. This may cause a health risk, especially with respect to heavy metals. Product differentiation and labelling is non-existent in the ALV market in Nairobi and in Kenya in general. Thus, only a few consumers who are very familiar with ALVs may be able to distinguish between produce from different places. One way of making sure that one knows the origin of the produce is to visit the likely market outlets of the preferred areas, e.g. Kisii stage and Kangemi markets for products from Kisii. Labelling the produce with the aid of some eco-labelling mechanism may further enhance consumer confidence when purchasing ALVs and probably raise producer prices. Fortunately, ALV prices have not changed for a long time. Consequently, there was price certainty during the time of this study. The quality of the produce is affected by seasonality, with over production during the rainy season and under production during the dry seasons. Other factors affecting quality include growing conditions, such as soil nutrients and handling during harvesting and transportation.

Organic production

One of the reasons given by consumers for preferring organically-produced ALVs to exotic ones was that they are grown free of chemicals. However, this aspect was not tested in the quantitative survey. From the qualitative survey no organization or individuals claimed to promote or encourage purely organic production. Most ALVs have qualities that generally repel pests and disease pathogens but others are prone to red spider mites - especially during the dry season - and therefore need to be sprayed. Most require only a low input – if any - of chemical compounds, whereas the greater part do well with organic manure only.

4.5.3 Supply and demand trends

The number of bunches sold in the markets have been increasing rapidly. The percentage increase between 2001 and 2006 is estimated at 164%. The figures for the number of bunches sold for particular ALV species are shown in Table 5.

Table 5. Weekly traded quantities of ALVs⁷

Species sold by sample traders	No. of bunches	
	2006	2001
African nightshade	83,835	50,830
Leafy amaranth	51,054	41,293
Spiderplant	31,942	27,670
Cowpeas	23,980	10,060
Ethiopian kales	20,492	7,585
<i>Mitoo</i>	14,795	8,675
Pumpkin leaves	11,440	5,535
Kahurura	10,251	4,323
Jute plant	6,035	1,425
Common comfrey	3,564	315
Vine spinach	520	-
Totals for sample	257,908	157,711
Population totals	1,289,540	788,556

Most of these are sold at the council markets, since the supermarkets do not handle large quantities. For example, in September 2006, the Uchumi supermarkets sold about 2,500 bunches of ALVs daily (17,500 bunches per week).

Along with the increase in volumes sold, it would appear from the results that the number of species traded has increased from seven to twelve - an increase of 71.4% between 1996 and 2006. The percentage increase in the gross margin is much greater since, in some cases, prices had also changed. However, after a thorough investigation it was found that it is the packaged *quantities* that have reduced, whereas the prices have remained the same for the last decade. This is also evident during periods of scarcity. Instead of traders increasing the price per bundle, they tie together fewer vegetable leaves or stems, to reduce the weight per bundle.

⁷ 1. The values were worked on a weekly basis since some traders only trade on market days while others do it every day. The figures gotten were multiplied by five since our sample was 20% of the actors in the markets visited.

2. The figures for 2001 were obtained through recall by the traders. Only one supermarket chain was included in the sample, as explained in section 3.2.2. At the time of the survey Uchumi was yet to regain its pre-closure sales volumes.

The weekly turnover of ALVs in gross value in Kshs for 2006 and 2001 is shown in Table 6. The increase in gross value between these periods was 213%. These results imply that Ksh.7 million worth of ALVs are consumed per week.

Table 6. Weekly gross values⁸

Species	Weekly gross value in Kshs	
	2006	2001
African nightshade	448,736.8	217,299.9
Leafy amaranth	262,946.4	167,752.7
Cowpeas	209,103.3	67,515.5
Spiderplant	173,831.1	109,854.7
Ethiopian kales	87,642.6	24,457.7
Kahurura	57,209.3	16,124.0
Pumpkin leaves	49,027.7	12,918.02
<i>Mitoo</i>	43,053.1	27,744.5
Jute plant	35,589.8	5,750.0
Common comfrey	1,0614	682.5
Vine spinach	4360	
Total for sample	1,382,114	650,099.5
Population totals	6,910,571	3,250,498

Supply is abundant during the rainy season. Yet this is the time when demand is lowest since households with kitchen gardens meet their needs through home supply. Bunches and bundles are much larger during this time and there are more varieties to choose from. During the dry season, only a few producers who have access to water manage to grow these vegetables. Consequently, there is high demand during this period, making vegetables more costly due to their unavailability. NGOs and other partners have been encouraging farmers to engage in staggered and scheduled production, where possible, to ensure that they have ALVs all year round. However this is practically impossible or is being done on a very limited scale due to scarcity of irrigation water. There have even been cases, e.g., in Githunguri, where farmers fetch water manually from a stream in order to water the vegetables.

4.5.3 Price and profit trends among producers, middlemen and consumers

As mentioned in section 4.4.1, ALVs are usually sold in bunches and bundles, both in the council markets and in the supermarkets. The council market wholesalers who buy directly from the farms do so either in bunches or in priced heaps. In most cases, the wholesalers buy four market-size bunches for Kshs 10, meaning that each bunch is sold at Kshs 2.50. Wholesalers then sell three such bunches at Kshs 10, each therefore costing Kshs 3.33. The retailers then resell the bunches to the customers for Kshs. 5 each. In the council markets there is room for middlemen and consumers to negotiate the price and a 'regular customer' or any person buying many bunches at a time may get an additional one or two free but this is purely at the seller's discretion. Without such bargaining, the price differential between farm gate price and wholesale price is 33%, while that between the wholesale price and the retail price is 50%.

The supermarkets buy good quality ALVs, without any bargaining, at Kshs 10 per bunch. When the quality is not as good as expected, the price drops to Kshs 8 per bunch. The supermarkets then retail bunches at Kshs 12 - 20 depending on quality and availability. For the supermarkets, the difference between the supply price and the retail price is between 50-100%, depending on demand and quality. This

⁸ Quantities in bunches per week * prices provided.

implies that the producers supplying supermarkets get better prices than all the other traders in the council markets.

On average, the reported net profits from ALVs were highest for the trader-wholesalers and lowest for the retailers (Table 7). The mean percentage of the net profit contributed by ALVs alone, in cases where traders were selling other types of farm produce, ranged between 73-86% for different categories, for traders. This shows that the traders depended mainly on ALVs for their daily profit and that the other products were sold mainly as accompaniments. For instance, most consumers were reported to be mixing the ALVs with mainly Swiss chard (locally called spinach). Kales were another common accompaniment since they are much cheaper. They are normally the obvious choice for those consumers who cannot afford to buy ALVs.

The means in Table 7 were further subjected to statistical tests to assess whether or not there is a significant difference between the mean net profits of the different trader categories. The results of these tests showed that there was a significant difference, at the 10% confidence level, for the means of the first level wholesalers and retailers and also for those of producer wholesalers and retailers. There were no significant differences for all other comparisons. This implies that from the traders' perspective regarding daily net returns (figures in Table 7 are not from records but rather from traders' perceptions or self-claimed profits), wholesaling is more profitable than retailing.

Table 7. Daily traders' net profits and proportions contributed by ALVs

Profit description	Sample n = 97	Producer- wholesalers n = 37	Trader- wholesalers 1 st level n = 20	Trader- retailers n = 36
Mean daily net profit (Ksh) from all produce	764.64	912.16	914.00	547.78
Mean daily net profit (Ksh) from ALVs alone	593.97	661.90	783.80	421.50
% profit contributed by ALVs	77.68	72.57	85.75	76.94

4.5.5 Transaction costs and other costs in ALV trade

ALV market traders incur various types of costs, ranging from direct market fees to indirect costs, such as the opportunity cost of time for gathering information. Both the market and transaction costs incurred by the respondents were analysed and are summarized in Table 8 below.

Table 8. Transaction costs and other marketing costs for different traders

Cost categories	Sample (n=97)	Producer wholesalers N=37	1st level Wholesalers n=20	Retailers n=36
Daily market fee (DM1)	47.55	35.00	60.53	53.34
Other daily costs (DM2)	39.62	42.69	48.31	33.21
Average total daily market costs (mean of DM1+DM2)	71.40	58.06	103.39	69.41
Transaction costs of establishing ALV market (for an individual supplier)	483.64	595.47	679.12	172.39
Recurrent transaction costs of maintaining or increasing ALV sales	151.50	219.72	124.86	97.70

The market fee for producers is lower than that of wholesalers and retailers. This is likely due to the marketing arrangements with the supermarkets whereby producers do not have to pay any market fees. It could also be due to the fact that trading takes place very early in the morning in most of the council markets, making it difficult for council workers to charge any market levies.

The daily costs comprise losses due to perishability, payment for security, theft, water for sprinkling, transport costs within the markets, packaging materials and market clean-ups. Most of these costs arise due to the asset-specificity of ALVs. Thus, with the exception of the cost for packaging materials and transport within markets (production costs), all the other costs can be treated as transaction costs. It was not possible, however, to specify the magnitude of costs for these different sources during the survey. Surprisingly, the retailers have the lowest costs in this category, although they are the last in the chain. This might be because they normally trade during the day and wait for the vegetables in the market places. Since they do not transport the ALVs, they are also able to minimize perishability, incidences of theft, and other costs.

Transaction costs for establishing an ALV market for individual traders included the cost of acquiring the necessary information on the ALV market, and negotiation costs to arrive at the initial buying or selling prices. The two types of costs were valued in terms of cash money spent and the opportunity cost of time⁹ spent in the activities leading to the establishment of an ALV market. These costs arise due to information asymmetry in the ALV trade (see also Section 4.2.2). They are lowest for the retailers who remain in one market place and do not need to move to look for market information or for markets themselves. Many of them were also trading in other vegetables and therefore got the information without much effort, as the customers kept asking for ALVs. The transaction costs of the producer and 1st level wholesalers are relatively higher than those of retailers since farmers spend more time in group formation and establishing trader networks. In addition, most of the wholesalers live far away from other traders and consumers and therefore have difficulty in establishing initial selling prices.

The recurrent transaction costs comprise monitoring costs - meaning the costs incurred in obtaining market information for better prices or to increase the sales. The costs include expenses incurred in making it possible to get clean, good quality, fresh vegetables (e.g. hiring security during the early morning hours) either in the wholesale markets (for retailers) or in farmers' fields (for 1st level wholesalers). In order to sell more and at better prices, strategies used include making calls to contact prospective producers or consumers and spending time to analyse (with other traders) both market trends and types of customers. In addition to information asymmetry, these recurrent transaction costs arise due to price uncertainty. Such costs are highest for the producers, probably because they have the least interaction with other market traders and consumers. They are also faced with other types of risk and uncertainty (such as risk of rainfall, diseases, etc.) and are therefore forced to incur relatively higher costs in looking for better markets. For the producer wholesalers in the farmer groups, the issue of ensuring quality is a group responsibility and so they are forced to supervise one another to ensure that their crops are healthy.

4.5.6 Constraints at the market traders' level

The most significant problems faced by the traders are infra-structural problems related to losses due to handling and storage, and transportation. Table 9 below summarises the main problems reported by the

⁹ The daily net profit was used as the proxy for the opportunity cost of time spent as opposed to shadow wage rate. This is because the daily net profits reported during the survey were much higher than the actual wage rate for unskilled and semi-skilled labour in Kenya. Conventionally, the shadow wage rate would have been calculated by reducing the actual wage rate by about 30%, given the high level of unemployment in the country. This would not have reflected correctly on the actual cost of the traders' time.

traders. Each was asked to indicate the three main problems faced. Using a multiple response analysis, the problems were as presented in Table 9.

The major constraint cited by the traders was losses due to perishability and improper storage. The ALVs are delicate and highly perishable. Farm handling, transportation, improper display and storage in the market places can all lead to heavy losses. Consumers want to purchase fresh-looking vegetables and therefore the day's leftovers are either consumed by the traders or lost. In some cases, the left-overs would be sold at a lower price so that one does not lose customers. Even in the supermarkets, only small amounts are displayed at any given time, while the rest is stored away in the cold rooms. It appeared that most traders in the informal market frequently sprinkled water on the ALVs, to make them look fresh and sturdy. There are no storage facilities (neither individual nor group-owned) in the council markets. As a result of this limitation, traders stock only enough supplies for a single day. They rely on past experience to know how much they should stock.

Table 9. Different problems experienced by traders

Constraint	Count	% responses
Losses (perishability/improper storage)	37	20.3
Transportation (poor infrastructure)	32	17.6
Lack of physical space	14	7.7
High city council/stall fees	12	6.6
Competition	12	6.6
Oversupply at certain times	10	5.5
Lack of enough supply	10	5.5
Lack of quality and quantity measures	10	5.5
Lack of credit facilities	8	4.4
Pests, poor quality, low prices	7	3.8
Lack of marketing information	3	1.6
Early trading otherwise miss customers	3	1.6
Lack of reliable supply outlets	3	1.6
Other	21	11.5
Total responses (6 missing cases; 91 valid cases)	182	100

The second main problem was transportation. This constraint encompasses lack of regular, reliable and fair-priced transportation options. The vegetables are both bulky and delicate and this calls for specialised transportation. Due to poor infra-structure in most growing areas the transport costs were prohibitive. In some cases, transportation would be an issue as the traders have to reach the wholesale markets extremely early in the morning. Porters are used to transport the ALVs from the farm to the nearest road or bus-stop. They usually carry the vegetables in sacks placed on the head or backs. Some of the traders, especially the retailers who buy direct from the farmers, carry for themselves since they deal in small quantities. Buses are then used for longer-distance areas like Kisii, and Makueni whereas minibuses suffice for the shorter distances. Traders who have a large supply use pickup vehicles. In some cases, groups of farmers can organize the hire of a pickup. This is done in cases where farmers do not have their own means of transport. It was found that most of the produce for wholesale is taken to the markets in pickups.

The third problem is that due to the relative newness of the ALV market, there are very few designated trading areas for ALVs, even in large Nairobi City Council markets. For example, in Gikomba, the main wholesale market, ALV traders use the same space that is taken during the day by the second-hand clothes dealers. Thus, they have to conduct and finish their business before the others arrive. In other markets, traders are often found near the roads (e.g., Kangemi and Githurai), on privately-owned plots belonging to other people (e.g., Korogocho), and in some cases ALV traders are mixed with other

vegetable traders (e.g., Ngara, City park, Toi and Kawangware). This lack of physical space is limiting ALV market growth in that additional traders find it hard to get selling space.

In addition to market fees being high, many traders felt that the manner in which the fees are collected amounted to intimidation by the city council ‘askaris’. Those who do not own stalls pay fees daily while the rest pay weekly or monthly. The rest of the problems included competition due to too many people entering the trade too quickly; seasonality of the crop - leading to over supply at times and low supply at other times; lack of measures to control quality and quantity; lack of credit; and infestation of the vegetables by pests and disease. A few traders felt that the wholesale trade takes place too early in the day and one is forced to participate otherwise there is the risk of missing the daily supplies. This problem arises due to the fact that there is no regulation or coordination in the ALV trade. It is also due to other problems, such as risk of incurring losses, lack of transportation and insufficient space in the market places.

5 THE ROLE OF PUBLIC AND PRIVATE SECTORS AND THEIR POLICIES IN MARKET DEVELOPMENT

5.1 Introduction to different organizations and their roles

As indicated in Section 4, the ALV market in Nairobi has developed significantly during the last decade. This section discusses the main stakeholders in market development. The question addressed is: who was involved in this sudden upsurge, and what did they do? As much as possible, attempts have been made to discuss the different stakeholders in chronological order and thereafter provide a synthesis of the roles of both the private and public sectors. The stakeholders involved in ALV market development can be categorised as follows: market traders (producers, middlemen and retailer); consumers; the public sector (national institutions); the private sector (non-governmental organisations, large private business, small ALV private outlets and individuals); and international organizations. The non-public sector is included in the analysis, since the government recognizes its importance in the sustainable growth of the agricultural sector (MoA, 2004), especially in production, processing and marketing, and in the delivery of support services. On the other hand, the public sector is important for its regulatory role and in the provision of support services that have not been taken up by the private sector, e.g., research and extension services.

As far back as 1995, interest in marketing ALVs was already developing in the policy arena. Although work on research, production and marketing of ALVs has been going on for some time, the beginning of ALV market development in Nairobi has been traced back to the 1995 Nairobi workshop on Traditional African Vegetables organised by Bioversity International (formerly IPGRI) and the Institute of Plant Genetics and Crop Plant Research, Gatersleben (IPK). The workshop recommended, among other things, the promotion of ALVs, beyond the rural setting, to the urban and peri-urban people (Guarino, 1997). From then on there was momentum to promote ALVs, the primary objective being conservation of biodiversity through enhanced cultivation and marketing. The institutions and organisations that have been involved include the following¹⁰:

5.1.1 International Organisations (Bioversity International, AVRDC-The World Vegetable Centre)

Within this decade, the international community, through the various research institutions, has developed an interest in the ‘neglected and under-utilised species’. These institutions include Bioversity International and others within the CGIAR group. The main Bioversity International partners include national institutions such as the National Museums of Kenya (NMK), the Kenya Agricultural Research Institute (KARI), the National

¹⁰ In this section the authors do not intend to document all the work done on ALVs in Kenya. This has been done by IPGRI. The intention is to mention those aspects that are related to market development.

Gene-bank of Kenya (GBK), the Kenyatta National Hospital, Ministries of Health and Agriculture, the University of Nairobi (UoN), Kenyatta University, Maseno University and NGOs such as Farm Concern International (FC), Rural Outreach Program (ROP), and Nairobi Friends Club International (NFCI). As part of an initiative to promote dietary diversity in Sub-Saharan Africa, Bioversity International and its partners have collaborated with the others in the promotion of the knowledge base and consumption of ALVs. This has contributed to the creation of an effective demand for the vegetables. Through these concerted efforts, ALVs have gradually received a higher status and their demand has increased significantly, as is supported by the figures in Section 4.

Bioversity International Sub-Saharan office has been involved in the promotion of ALVs since 1995. In the earlier years, Bioversity International and its partners were involved mainly in the inventory of ALVs, and in the identification of factors hindering their cultivation, conservation and marketing. A total of 210 species were identified in Kenya but only 10 were found to be traded (Maundu, 2004). At that time, trading of ALVs was frequently undertaken in council markets, usually under unhygienic conditions and with only a few consumers. During the second phase, which began in 2001, research activities were carried out, such as collection and analysis of samples for nutritive value, evaluation of agronomic and nutritional aspects, and distribution of seeds to farmers as well as compilation and dissemination of recipes. In addition, Bioversity International and its partners have been involved in strong public awareness campaigns as well as in the marketing of ALVs within Nairobi and the surrounding areas. This has resulted in a high public awareness profile for these vegetables and consequently in high consumer demand. Between 2004 and 2005, Bioversity International, the National Museums of Kenya (NMK) and other partners successfully held two African food fairs. Each had an attendance of over 2,500 people and a considerable amount of information was disseminated in various forms. The local TV and Radio stations broadcast these events prior to, during, and after the fairs, to an even a greater audience. With its strategic plan rolled out in 2002, Bioversity International expanded its mandate not only to conserve but also to harness the potential of the neglected and under-utilised species for the wellbeing of the poor. This means research on these species for food security and better nutrition, income source, ecosystem stability and cultural diversity (IPGRI, 2002).

The AVRDC-World Vegetable Centre (hereafter only referred to as AVRDC), whose regional centre for Africa is based in Arusha, Tanzania, is involved in research on the improvement of ALV consumption, as well as utilisation practices and the sustainable production of select ALVs. The organization is also involved in supplying quality seed to target farmers as part of the promotion strategy. During the period 2004 and 2006, AVRDC partnered with Farm Concern International in a Maendeleo Agricultural Technology Fund (MATF) funded project to promote the production, seed supply and marketing of ALVs in the Nairobi and Arusha areas. Under this project, selected farmers and marketing personnel from Uchumi supermarkets were trained for a two-week period in Arusha. The farmers were mainly from Githunguri, Juja and Kikuyu divisions of Kiambu district, Kiserian region of Kajiando district, as well as other areas around Nairobi. It is estimated that this venture reached some 500 farmers directly and 600 others indirectly with information on appropriate technology concerning the production of ALVs (AVRDC and Family Concern, 2006). The project also reached a wider audience through media presentations (talk shows) on two FM radio stations, Kameme FM and KBC.

5.1.2 Public Institutions

The University of Nairobi, as well as Kenyatta and Maseno Universities have been involved in research leading to a better understanding of ALVs, particularly with regard to their agronomic attributes and their nutritive value. The contribution of this research on ALVs has been compiled in brochures and used in promotion campaigns for these vegetables. However, except for their collaboration with Bioversity International and other stakeholders, these universities have made little contribution to market promotion in terms of market research and publications.

National Institutions and organisations such as KENRIK-NMK, KARI, GBK, MOA and MOH have been collaborating with Bioversity International in the promotion of ALVs. KENRIK-NMK has been involved in ethno-botanical research and documentation. In 2004 and 2005, NMK hosted the two national food fairs which included a display of African dishes, preparation demonstrations, a cooking competition and also sampling of the different ALV dishes. In addition, KENRIK-NMK has been involved in research and has documented the various foods consumed in Nairobi. The collection is quite informative and was used extensively at the beginning of this study to match the vegetables found in the markets with their local and scientific names.

The Kenya Agricultural Research Institute (KARI) has been involved mainly with the production and conservation aspects through the National Horticultural Research Centre at Thika and the GBK, respectively. The former, together with AVRDC, has been actively involved in training and advising farmers on how to produce ALVs. Both the Ministry of Agriculture and the Ministry of health have participated in the food fairs organised by Bioversity International and NMK but they have achieved little else in the area of market development. Although the MoA is responsible for the country's agricultural activities, it has no explicit policy on the promotion of ALVs.

5.1.3 The private sector (NGOs, Business sector and Individuals)

The major NGO involved in the marketing of ALVs is Farm Concern International. ROP, NFCI, and other smaller NGOs are involved more or less indirectly through the support of seed availability, conservation, production and utilisation. Since 2003, Farm Concern International has been actively involved in the production and marketing of ALVs. During the period 2003/4, in partnership with Bioversity International, it was involved in a market study of these vegetables and later in 2004/6 in a MATF-funded project on the promotion of ALVs in collaboration with AVRDC. It has also been involved in general public awareness creation through exhibitions, walks, indoor exhibitions in supermarkets, farmers' field days, the electronic media and through written material distributed at various fora including the annual Nairobi International Trade fairs. Farm Concern International is credited with organising farmers' groups, introducing them to the growing ALV market and, in particular, linking them to the Uchumi supermarkets. One important aspect that enabled farmers to continue selling ALVs to Uchumi supermarkets was the introduction of the 'factoring facility' whereby Farm Concern International pays the farmers directly upon receipt of delivery notes from Uchumi, and then waits for the 60 day pay period that Uchumi requires before making payment. Without this facility, many groups would have opted to sell to the council markets where the system is 'cash on delivery'.

ROP has been bulking and supplying ALV seeds to farmers. This NGO is more active in the rural areas of Western Kenya, from where some of the vegetables traded in Nairobi originate. ROP has established a village gene bank to conserve the valuable seed of ALVs and to provide a steady supply of seeds to farmers, including those in the urban and peri-urban areas. In addition, ROP tried to influence the serving of ALV dishes in the cafeteria of the National Assembly, as a means of drawing the attention of Kenyan lawmakers to the importance of ALVs. The attempt was not fully successful since there were problems with regular supply. Other private organisations concerned with ALV seed handling and marketing include Simlaw Seeds, a subsidiary of the Kenya Seed Company which stocks ALV seeds, and SACRED Africa which is mainly concerned with dissemination of information on the procurement and marketing of ALV seeds, particularly in Western Kenya.

Although NFCI has been in existence since 1995, its involvement in the market development of ALVs in Nairobi dates from 2003 when, in collaboration with Bioversity International, it was involved in farmer group capacity building in Kiambu, with regard to seed production, processing and marketing. It also actively participated in the still-to-be-completed review of seed policies and legislation issues in

partnership with the African Centre for Technology Studies (ACTs), an international intergovernmental science and policy think-tank, based in Nairobi.

The Forum for Organic Resource Management and Agricultural Technologies (FORMAT) held an exhibition forum for organic resource management and agricultural technologies in 2001, which included the first cook-off contest for ALVs. This resulted in the publication of a book that gives information and recipes for ALVs. FORMAT also was an active partner in the 2004 event at the NMK. Both the cook-off and the book have reached a significant audience.

As mentioned earlier in Section 4.3.2, the stocking of ALVs in Uchumi supermarkets, other supermarkets and upmarket grocery shops has greatly boosted the ALV market in terms of raising their status and increasing their availability. The NGO-supermarket-small-scale-farmers marketing arrangement has enabled the inclusion of small-scale farmers in the main supply chains, thus effectively integrating them in the wider national economy.

5.2 The role of the public sector in ALV market development

5.2.1 The National Agricultural Policies and ALV market development

The public sector works with long-term strategies and policies. It is funded for more main stream activities (Fowler, 1997); thus, it is more bureaucratic and rigid when acting on short-term decisions. The policy framework guiding the research and promotion of food crops in Kenya combines ALVs with other traditional, exotic and medicinal crops, without specific strategies for the indigenous vegetables (Mburu and Wale, 2006). ALVs may be covered under the traditional crops but the specific interpretation of what should be done to enhance their production, marketing and general commercialization, is left to the officers on the ground. The lack of emphasis can be traced back to the Agriculture Act whose schedule of crops recognizes only pumpkin and cowpea leaves under the vegetables category (Republic of Kenya, 1986). The Ministry of Agriculture (MoA) and related ministries and institutions are guided by the 'Strategy for the Revitalization of Agriculture' paper and the 'Food Security' policy (MoA, 2004). The conservation of ALVs on-farm is under KARI which is also mandated to promote the production of exotic leafy vegetables, especially kales and cabbages. Guided by the food security policy of enhanced production for alleviation of poverty and hunger, KARI lacks an incentive to promote ALVs.

The coordination of crop production and marketing is guided by the Department of Extension Services of the MoA. The department is working towards the commercialization of agriculture through supporting subsistence small-scale farmers to become market-oriented producers (MoA, 2004). The demand-driven delivery system of agricultural services has not helped the introduction and promotion of ALVs as they are not officially recognized as marketable crops.

The production of ALVs has increased, to match the consumption trend. With the increased demand for ALVs, commercialized production is also increasing and this trend is expected to be sustained. Formal seed production and trade will be a prerequisite for sustaining the production trend already noted. The Kenya Seed Company is already processing and selling limited quantities of the traditional varieties of the unimproved varieties of African nightshade, leafy amaranths, pumpkin and cowpeas. The Seeds and Plant Varieties Act lists only pumpkin and the leafy amaranths in the schedule of horticultural crops (Republic of Kenya, 1991). Consequently, there are no guidelines for ALV seed improvement, bulking, quality control and distribution systems as ALVs are not recognized as 'crops'. The Kenya Plant Health Inspectorate Service (KEPHIS) in collaboration with other interested parties is currently reviewing the Seed and Plant Varieties Act. The fact that production has been increasing in the absence of a formal seed trade highlights the existence of an informal seed trade. In recognition of this, the Nairobi Friends Club International is representing the interests of small-holder farmers, pushing for recognition of the informal

seed preservation and trade for traditional crops, including ALVs. The Seed and Plant Varieties Act is still under review.

5.2.2 Other National Policies

Agricultural development is interlinked with other sectors of the economy. The marketing of ALVs, which are highly perishable, depends on the development of a functional rural infrastructure. Inadequate markets and marketing infrastructure, accompanied by poorly-organized and institutionalized marketing strategies, have been blamed for slowing down the growth of the agricultural sector (MoA, 2004). Infrastructural developments are, however, likely to benefit from the current government policy on rehabilitation of the physical infrastructure. The focus on the constituency as the centre for rural road network construction and maintenance will improve the transportation of agricultural produce to the markets in the future. The transformation of small-holder agriculture from subsistence to a commercial and profitable business enterprise presupposes the availability and dissemination of adequate market information and an educated farming community. The current policy on free primary education will benefit this initiative and may enhance ALV production and marketing.

Agricultural activities are highly dependent on the nutrition and health status of the workforce. The incidence of disease, especially malaria, HIV/AIDS and nutrition-related diseases, has had a strong impact on production. ALVs have been implicated in the prevention of diseases (Imungi, 2002), among other nutritional benefits. Their production and consumption have therefore been enhanced by education on their dietary benefits. This has been facilitated by the health policies. Thus, the Nutrition Department of the Ministry of Health, Kenyatta National Hospital and other stakeholders, have been advocating on the role of ALVs in fighting micronutrient deficiencies.

At the time of this research, there is notably no government policies governing the production and marketing of ALVs. However, a Food Nutrition Policy is being worked on by the relevant ministries and it incorporates the promotion of traditional foods of which ALVs are a part. The Nutritionists and Dieticians bill has also been introduced in parliament and although it does not directly deal with promotion of ALVs, it does have an influence in that it seeks among other things to introduce the vetting of nutritionists, which is a positive aspect in ensuring that people get the correct nutrition advice.

5.3 The role of the private sector and its comparative advantage

From the discussion in Section 5.1, it seems that the non-public sector is largely responsible for the current market development of ALVs in Nairobi. The sector seems to have invested a lot and taken better advantage of the general situation and mood of the population than the public sector. Several factors could explain the latter, chief among them being the inherent nature of this sector.

As mentioned earlier, the private sector comprises the not-for-profit and business sub-sectors. The not-for-profit sub-sector can be further subdivided into membership and non-membership organisations. This sub-sector has got some inherent comparative advantages over the public sector - such as altruism, voluntarism, value-driven objectives, a committed and motivated workforce and non-profit principles that enable them to gain the trust of donors and the civilian population (Irungu, 2002). The business sub-sector, on the other hand, has inherent qualities such as zeal for profit maximization, greater control of costs, and sound financial management. In general, the not-for-profit sub-sector operates on a smaller scale compared to the public sector. It covers only a few specific aspects intensively at a time. It is, thus, more issue-specific and its staff more focused on issues and work within shorter-term objectives which makes them more flexible (Fowler, 1997). They are usually funded for specific projects within short time horizons as they usually work on contract for a few years. They are generally well-funded, hence more mobile and are thus able to reach their target groups more easily than public sector workers.

Based on the above attributes, the private sector had a clear comparative advantage over the public sector in the development of the ALV market. The sector has been working on the concept of farming as a business within the national policy of transforming subsistence production systems into more commercial ones. When the market started to emerge, the private sector speeded it up by taking up the opportunities at hand. Bioversity International, the front runner in this endeavour, worked from time to time with relevant NGOs and very little with the mainstream ministry. Even though the general public became gradually enlightened on the value of ALVs, the public sector has yet to come up with any initiative to promote market development. The NGOs, however, took the challenge in a seemingly competitive and repetitive manner but delivered all the same. Farm Concern International, for example, encouraged production assuring farmers that it would source for market, which it successfully did by linking them with supermarkets and helping them overcome the logistical issues of transportation and delivery of the produce on time. The business sector took advantage of the general awareness and started stocking these vegetables in increasing quantities. The individual business people in the markets also took note of the increased demand and many adapted accordingly.

The private sector is much better at mobilizing and organizing the community for action. This was demonstrated when farmers in Central Kenya got organized and started growing ALVs, taking advantage of economies-of-scale for training, accessibility to inputs, information, transportation, negotiation, and produce marketing. This was achieved through the formation of farmer groups to take advantage of market opportunities by harnessing the economies of scale. Unlike government institutions, farmer groups have clear targets and objectives. They are also endowed with collective action and social capital. Thus, the importance of producers' capacity to organize themselves cannot be ignored in the promotion of ALV markets.

The opening up of market outlets for ALVs in supermarkets and groceries has been achieved through training of farmers in modern production techniques, quality control and standardization of selling units, and then linking the farmers to the markets. The council markets have also benefited from the improved quality and commercialization of production, as the presentation of ALVs in the supermarkets has given credibility to their dietary value. This has increased consumption and sales turnover, even in the council markets.

6. THE ROLE OF PHYSICAL AND INFRA-STRUCTURAL ENVIRONMENT IN MARKET DEVELOPMENT

As discussed in Section 4.5.5, physical and infrastructural conditions in ALV production and marketing areas have been identified as key constraints to successful ALV market development. This is mainly because ALVs are highly perishable, and so require specialised transportation and handling. There is still a lot to be desired, therefore, in the sphere of market infrastructure for ALVs. As can be deduced from the problems cited by the traders, issues concerning transportation, space and losses due to improper transportation and storage are directly related to the need for infrastructural developments in Nairobi and the surrounding areas. In addition to the constraints mentioned by traders, this section extends the discussion to cover infrastructure beyond production and marketing areas since this too has both direct and indirect effects on marketing activities.

Roads in Kenya are quite poor - particularly in the interior, rural areas. Transportation of vegetables and other farm produce, especially during the rainy season, is very difficult as many of the rural feeder roads are not 'all-weather' roads. Furthermore, the main grid is not as would be expected, as many parts of the main roads are filled with potholes and worn patches. All this adds to delays in delivery, as well as to increased ALV spoilage, loss of quality and increased costs. Most ALVs are transported by public

transport, buses and the *matatus* (14-seater vans). This means that there is no specialised treatment in transit. When transported by bus, the vegetables are put in luggage cabins with all types of goods, while in the *matatus* they are put at the back or on the roof and in some cases the trader is forced to pay for a few seats in order to have the goods transported. Although Uchumi insists on the ALV supplies being transported by pick-up trucks, this has only been possible with large-scale farmers and farmer groups but is beyond the possibilities of individual, small-scale farmers.

The market structures in Nairobi are lacking in space and most of them are congested (see also Section 4.5.5). Consequently, they do not have sufficient capacity to support not only the growing ALV market but also other forms of trade. It would also be difficult to expand them, due to lack of space in the areas where they are located. With the increased marketing of ALVs, vendors can only occupy areas along the roads and next to market entry points, where there is no protection against hot sun and rainy weather conditions. In most of the council markets, such areas are not paved and are often muddy and unhygienic during the rainy seasons.

Lack of water is a problem in many parts of the city, especially close to where low-income earners live. ALVs require constant sprinkling to remain or to appear fresh. The cleanliness of the water which is sometimes sold in the market, may be questionable. Many markets lack basic hygiene - even public toilets - and this, too, could be a health risk in certain areas.

Modern technology, especially in the form of mobile phones, has also been a godsend in this market development. Some of the market actors mentioned using mobile phones to contact either their suppliers or customers. The farmer groups and farmers who sell to the supermarkets usually confirm their orders by mobile phone. This development has helped considerably, as people can source for ALVs with some foreknowledge and thus avoid many would-be losses.

Although the country has some big irrigation schemes, e.g. in Mwea, Ahero, etc., the irrigation infrastructure is inadequate as far as production of ALVs is concerned. Hence, only those farmers who are in water catchment areas can manage to grow ALVs through irrigation during the dry spells when supply is limited. Other techniques, such as use of piped water from water companies or buying one's own water-pumps, are rarely used since they are very expensive for small-scale farmers.

7. QUANTITATIVE ANALYSIS OF FACTORS AFFECTING MARKET DEVELOPMENT

7.1 Description of econometric model and hypotheses

Based on the conceptual framework presented in Section 2, market development is considered to be influenced by a number of factors. In this section, an econometric model is developed to test empirically the relevance of these factors. However, not all of the factors in the conceptual framework are included in the econometric model, due to specification problems. One key issue in such an analysis is how to come up with a dependent variable that will proxy market development correctly. As is true for any commodity, the quantity of ALVs traded in the market determines both quantity demand and supply. The quantities of commodities supplied to the markets are often used as a proxy for market development (Ball and Johnson, 1996). As price influences also have to be captured, quantities multiplied by prices, i.e., the gross value, traded in the markets would be a better proxy for the dependent variable. In this study, data for the gross value of traded ALVs was available for two time periods (2001 and 2006). Thus, taking the increase in gross value of traded ALVs during this period better reflected market development than considering values for 2006 alone. Unfortunately, explanatory variables only were available for 2006, making it difficult to adopt a model for panel data. Thus, as the proxy for market development, the gross value of ALVs traded weekly in 2006 minus the gross value of ALVs traded weekly in 2001 was used as the dependent variable. The econometric model is therefore conducted only for those traders who had been

involved in ALV business since 2001. In order to focus on a uniform direction for market development, only positive differences in the gross value are included in the model, after dropping a few negative cases.

Selected variables conceptualized in Section 2 were postulated to influence market development. These include traders' level of human capital as proxied by traders' level of education (EDULEVEL), age (AGE), experience in trade (EXPERIEN), social capital (SOCCAP), physical infrastructural (INFRASTR), distance from the market outlets (DISTANCE) and promotional aspects by other market actors or stakeholders (SUPPORT). Furthermore, two dummy variables to take care of market characteristics (MKTYPE) and role of gender (GENDER) are included in the model. The descriptions of these explanatory variables are shown in Table 10. The resulting model is estimated using ordinary least squares procedures. In a generalized form, it can be presented as:

$$\text{GROSS_INCR} = f(\text{AGE}, \text{GENDER}, \text{EXPERIEN}, \text{INFRASTR}, \text{SOCCAP}, \text{SUPPORT}, \text{EDULEVEL}, \text{MKTYPE}, \text{DISTANCE})$$

Table 10. Descriptive statistics and explanations of the model variables

Variables' names	Meaning	Mean	Std. Deviation
GROSS_INCR	Increase of gross value in Ksh of traded vegetables from 2001 to 2006	5829.43	4674.28
MKTYPE	Dummy for the type of market (wholesale=1; retail=0)	0.64	0.49
EXPERIEN	Experience of trading in ALVs in years	10.42	7.37
SOCCAP	Dummy for membership in any associations (=1, if member; otherwise =0)	0.61	0.49
SUPPORT	Dummy for receiving support from outside to market ALVs? (=1 if support received; otherwise =0)	0.41	0.49
INFRASTR	Dummy for experiencing any infra-structure-related problem (=1 if experienced; otherwise =0)	0.68	0.47
GENDER	Dummy for sex of the respondent (=1 if male and 0 if female)	0.34	0.48
AGE	Age of the trader in years	44.07	11.55
EDULEVEL	Education level of the trader in years	8.16	3.34
DISTANCE	Distance in Kms from the source of ALVs to market	35.06	58.99

The influence of the above variables (Table 10) is not expected to be the same a priori in terms of direction. It is anticipated that human and social forms of capital (EDULEVE, EXPERIEN, AGE and SOCCAP) will have a positive influence on market development since these are key variables that drive economic development in most developing countries (Cohen and Uphoff, 1997). As Nairobi is home to farm produce consumers, retailing was expected to favour market development more than wholesale business. The same case applies to GENDER (negative sign expected due to coding format) since retailing vegetables is commonly associated with women (see Section 4.4.2). The two external environment influences being tested in this model (SUPPORT and INFRASTR) would be expected to favour ALV market growth since they are a form of additional effort on the part of government and NGOs to improve marketing. Thus, for INFRASTR a negative sign would be expected because of the coding format. In most market studies, distance (DISTANCE) is a proxy for market access (Mburu and Wale, 2006) and the nearer the markets the more accessible they are to farmers. It was expected, therefore, that longer distances will not favour market development in Nairobi.

7.2 Model results

The results of the econometric model are shown in Table 11. Due to small sample size (n= 44) the model has a low R-squared statistic. This implies that the nine variables used in the model can explain only 11.5% of the variability of GROSS_INCR. INFRASTR and DISTANCE are the only factors that are significant (at 10% and 5% probability levels, respectively). INFRASTR has the expected sign confirming the qualitative results in Section 6 that investments in physical infrastructure could drive the development of the ALV market positively. However, the positive sign of DISTANCE was not expected.

Table 11. Determinants of ALV market development in Nairobi

Explanatory variables	Coefficients	t-statistic
CONSTANT	7773.908	25.214***
AGE	5.552	1.216
GENDER	-1573.536	-1.074
EXPERIEN	2.694	1.068
INFRASTR	-2832.271	-1.806*
SOCCAP	-1713.64	-1.099
INFLUENC	1028.468	.667
EDUCLEVE	7.5802	1.607
MKTYPE	766.988	.493
DISTANCE	25.210	2.095**
Adjusted R ² = 0.115		
Log-Likelihood = - 425.862		
Durbin-Watson Statistic = 1.5943		

*, **, ***: significant at 10%, 5% and 1% respectively

This particular result implies that ALV market development in Nairobi is favoured by reaching out to far-away markets. In this case, the analysis does not support the thesis that producers and traders living nearer Nairobi will sell more because key production areas, such as Kisii, Matuu, etc., are far from the city.

The latter result is supported by the descriptive data which showed that the main ALV markets, such as Gikomba, Kisii Stage and Kangemi, are fed by traders who bring their ALVs during the night (in night buses) from upcountry production areas beyond Nakuru town. This result also implies that in order to promote the ALV market, further production in these far-off areas have to be sustained or enhanced. This does not mean, however, that growing of ALVs within the peri-urban areas should not be promoted, but rather that better market growth will be obtained by increasing production from distant areas.

Another factor that had an unexpected sign is SOCCAP. In interpreting this result, it is important to note that the variable SOCCAP did not include farmers' groups¹¹ formed to sell ALVs but rather focused on participation in other associations. Although this result is not significant, it implies that ALV market development is positively related to traders who do not aspire to being members of formal associations. It is most likely that traders, because of the demanding nature of the ALV trade, do not get time to invest in other time-demanding activities, such as participation in associations and groups. The positive sign of the

¹¹ The importance of the farmers groups could not be included in the model since this correlates highly with the variable SUPPORT. As indicated elsewhere in the study, the groups were formed through external support or influence.

MKTYPE was also not expected, a priori. It seems that ALV market development in Nairobi is positively related to wholesale operations and not to retailing.

All other variables, although not significant, gave the expected signs. For example, AGE, EDULEVEL and EXPERIEN were found to be positively related to ALV market development alluding to the influence of human capital and development in understanding market dynamics. Similarly, GENDER and SUPPORT had the expected negative and positive signs, respectively. The directions of these variables support the qualitative results (Section 4) that involvement of women and external support from NGOs and other actors are positively related to ALV market development.

As was mentioned above, the explanatory power of the econometric model is a bit low. Consequently, there are other factors likely to influence ALV market development but that could not be tested in the modelling conducted in this section. Thus, results of the qualitative analysis on influences of market development conducted in the other sections cannot be ignored. In fact, this section served to confirm most of the qualitative results and to indicate the directions of influences where it was not easy to guess (e.g. retail vs. wholesale business and distant vs. nearby producing areas). All these factors (both quantitative and qualitative) are summarized together in Section 9.

8. FACTORS INFLUENCING ON-FARM BIODIVERSITY OF TRADED ALVs

8.1 Developing an appropriate econometric model and hypotheses

In the conceptual framework it is hypothesised that as the market for and commercialisation of ALVs progresses, there is bound to be a selective production of the popular species and subspecies, to the neglect of the others. Following this, an econometric model was developed to identify the factors that influence on farm bio-diversity of traded ALVs. The dependent variable in this case is on-farm diversity of ALVs. Several types of diversity indicators that can be used as a dependent variable in such an economic analysis have been suggested in the literature. They include a count of species or count index, Margalef richness index of richness of species, Berger–Parker index of relative abundance, and the Shannon index which combines the richness of species with a measure of their relative abundance (Smale, et al. 2003). The use of each of these indices has its own advantages and disadvantages which are not discussed in this study.

The count index is chosen in this study for two reasons: first, it is the simplest form of diversity to apply since it has the simplest data requirement. Thus, it was easy to generate the data required for this index, given that the study did not have sufficient time or financial resources to do otherwise. Second, data collection was not done at the farm level and therefore it was difficult to estimate underlying population distributions which can enable the derivation of other indices. As van Dusen (2000) argues, the use of count index in economic analysis has an advantage in that it is relatively closely linked to the behavioural model. This is particularly so when dealing with traders whose behaviour in relation to on-farm biodiversity is dictated mainly by market forces. A count species index, however, assumes that all species or subspecies at a site or in a region contribute equally to biodiversity (Hawksworth, 1995), which may not always be the case.

Irrespective of the nature of the diversity index, it is generally argued in literature that diversity outcome is dependent on farm, household and market characteristics (Wale, 2004). Thus, a generalised regression equation would be:

$$\text{Diversity} = f(\text{Farm characteristics, household characteristics and market characteristics})$$

Since the dependent variable in the above equation is a count variable, Poisson regression for a count choice model is used (Cameron and Trivedi, 1998). The detailed theoretical aspects of this model are not explained in this study.

Two regression models are conducted: one with a count of species (inter diversity) and the other with a count of subspecies (intra diversity). Both models are run with producers only, since the focus is on determinants of on-farm biodiversity. Consequently, there is sample selection bias since farmers from ALV-producing areas who do not participate in the trade in Nairobi and the surrounding areas are not included in the analysis. The concern for this bias is minimized by the fact that the analysis is conducted from the perspective of trading ALVs and not conservation of biodiversity. In other words, the study is concerned with the diversity of traded ALVs and not with that of all cultivated ALVs.

For the explanatory variables, farm characteristics are represented by total farm acreage (TOT_ACRE) of the producers. The expected sign for this variable would be positive since farmers with more land find space for cultivating more species and subspecies. The household characteristics are represented by the sex of the producer (GENDER), level of education (EDULEVEL) and experience in trade (EXPERIEN).

Table 12. Descriptive statistics and explanations of the model variables

Variables' names	Meaning	Mean	Std. deviation
SPECIES	Number of ALV species grown by the producer	3.45	1.78
SUBSPECI	Number of ALV subspecies grown by the producer	3.83	2.308
GENDER	Dummy for sex of the respondent (=1 if male and 0 if female)	0.38	0.490
EXPERIEN	Experience of trading in ALVs in years	6.74	5.92
TOT_ACRE	Total farm size in acres	1.43	1.847
SUPPORT	Dummy for receiving support from outside to market ALVs? (=1 if support received; otherwise =0)	0.6	0.496
EDULEVEL	Education level of the trader in years	9.95	3.396
DISTANCE	Distance in Kms from the source of ALVs to market	27.20	23.48
GROSS_INCR	Increase of gross value in Ksh of traded vegetables from 2001 to 2006	6569.46	5326.71

The two latter variables also proxy the human capital development of the respondents. It is expected that all the variables will be positively related to on-farm conservation of ALVs. Since with GENDER the interest is to capture the role of women, the expected sign will be negative due to the coding format. The market characteristics in the model include DISTANCE to the market (a measure for market access), external SUPPORT granted to respondents to trade in ALVs, and the positive difference in gross value for the periods 2006 and 2001 (GROSS_INCR). The latter is a proxy for ALV market development, as is explained in Section 7. It is postulated that all market characteristics, and particularly market development, will have a negative impact on the conservation of on-farm biodiversity.

8.2 Model results

According to the model results in Table 13, the household characteristic showed the expected signs. In particular, the negative influence on on-farm of intra and inter biodiversity by GENDER is significant, implying that women's involvement in ALV production and trade favours conservation. This would also imply that women have a higher and significant likelihood of diversifying the species they grow, compared to their male counterparts. The other important household characteristic is EDULEVEL which had a positive and significant influence on the number of species and subspecies grown. It is most likely that this factor, by contributing to the producers' human capital, enhances the ability to grasp new production techniques more rapidly, to seek any new information on ALV varieties, and generally to better coordinate farm activities even when more species and subspecies are grown. For the farm characteristics, the negative sign of the TOT_ACRE was unexpected. Although this result is not significant, it provides an indication that diversity of traded ALVs is positively correlated to small farms. Most likely, traders with small farms are motivated to grow different inter and intra ALV species in their efforts to avoid risk.

Except for distance, the results of market characteristics, including market development, have the expected negative signs. Thus, market development in Nairobi and the surrounding areas negatively impacts on efforts to conserve both inter- and intra-species on-farm. It is important to note that this result is not significant, implying that at the moment it is not a problem of relevance policy-wise. However, considering that this factor has been found to affect on-farm conservation of crop genetic resources negatively in many other areas (Smale and Bellon, 1999; Abrefa, 2004), this result cannot be ignored.

Table 13. Determinants of on-farm biodiversity of ALVs traded in Nairobi

SPECIES			SUBSPECI	
Explanatory variables	Coefficients	t-statistic	Coefficients	t-statistic
Constant	0.7851	2.408**	0.9455	3.066***
GENDER	-0.4715	-2.003**	-0.4728	-2.485**
EXPERIEN	0.00002289	0.048	0.0001215	0.7974
TOT_ACRE	-0.009093	-0.197	-0.009266	0.8342
SUPPORT	-0.06452	-0.332	-0.1814	-0.992
EDUC	0.05112	1.717*	0.05244	1.864*
DISTANCE	0.005772	1.513	0.005954	1.663*
GV06_01	-0.00000165	-0.494	-0.000009626	-0.611
No. of observations	= 40		No. of observations	= 40
Wald Chi ²	= 27.80		Wald Chi ²	= 42.28
Pseudo R ²	= 0.2257		Pseudo R ²	= 0.2216
Log pseudo-likelihood	= -78.77		Log pseudo-likelihood	= -86.819

*, **, *** significant at 10%, 5% and 1% respectively

Although the negative sign of the factor SUPPORT is not significant, it deserves mention since it shows the likely implications of activities of other stakeholders in ALV trade. As SUPPORT to market vegetables increases, both inter and intra-species diversity decreases. Although this is not a concern at the moment, the result implies that marketing support provided by NGOs and other partners is leading to reduced biodiversity on-farm. The result is relevant since, as discussed in the previous sections, supermarkets, to where most of the supported traders take their supplies, do not demand all varieties. Hence, the result also implies that trading in the council markets favours on-farm biodiversity conservation of traded ALVs.

The unexpected sign for the DISTANCE factor was significant for the subspecies but not for the species. However, even for the species, the t-statistics of this variable is larger, to grant a significant result if probability levels were relaxed to 15%. The result suggests that producers trading further from the market outlets tend to keep more species in their farms, probably as a diversification strategy. Those closer to Nairobi and the surrounding areas are probably assured of a market and hence tend to concentrate on those species that are in demand, in order to capture higher profit margins. As this result has also a significant and positive influence on market development, promotion of ALV trade from distanced areas would meet the goals of on-farm conservation and market provision.

9. SUMMARY OF FACTORS FACILITATING AND/OR HINDERING ALV MARKET DEVELOPMENT

This Section summarises the key factors that have been driving and/or hindering ALV market development in Nairobi and surrounding areas. Most of these factors may have been discussed in detail in the other results' sections while others probably did not emerge clearly since several intertwine. In this Section, all factors are mentioned in a summary form.

9.1 Factors that have positively affected ALV market development

a) Consumer promotion activities by NGOs, International organisations and other interest groups

Promotion activities through different fora (walks, shows, trade fairs, media interactive sessions, cooking contests, etc.) have resulted in the creation of awareness of the nutritive value of ALVs, leading to expansion of consumer demand. This is demonstrated by the fact that although there has always been some marketing of these vegetables since 1960, a drastic increase has been recorded within the last six years. Awareness creation, coupled with the development of brochures on how to prepare ALVs - as well as informing the potential consumers of where to find them - has helped to extend demand even to those who did not know much about these vegetables. The demonstrations of proper cooking methods have resulted in increased trade in ALV species, some of which have an unpleasant taste (e.g., African night shade) - a factor which had been detrimental to acceptance by some people.

It is important to note that these promotional activities only served to some extent as an impetus to market development since, as stated in section 4.1, most of the people in Nairobi knew about and had eaten ALVs, and ALVs were already being sold in the council markets - only on a smaller scale.

b) Increased general health awareness and consciousness in the population

The various promotional activities indicated in a) above have been boosted by the association of some diseases of the middle and upper classes with poor feeding. This has led many potential consumers to change their attitudes and start valuing traditional foods, such as ALVs. The role of HIV/AIDS cannot be ignored either. In the search for a cure and treatment for this scourge, ALVs have been highlighted as health boosters and this has led to increased demand. Herbalists and even doctors in hospitals recommend these vegetables to their patients. Thus, besides ethno-knowledge on the medicinal value of some of these vegetables, their popularity has been reinforced by increased health consciousness and the coincidental presence of the HIV/AIDS scourge.

c) Production promotion initiatives in far producing areas

The work of Bioversity International, in collaboration with AVRDC, local NGOs, KARI and other national partners in the promotion of ALV production is a key driving force behind the increased production of ALVs in areas that are far from Nairobi. As demonstrated by the econometric results, production of ALVs in these production areas far from the capital has a positive and significant influence on market development in Nairobi. These organisations have combined research with public education

and dissemination of information, in an effort to enhance production among small-scale producers. The compilation of important literature on the production of different ALVs and subsequent distribution to upcountry producing areas not only enhances on-farm conservation but also production for local and Nairobi markets.

d) *Inherent positive agronomic characteristics of ALVs*

Most ALVs are fast maturing. This means that where there is the necessary will to produce, accompanied by the necessary conditions, it is possible to match supply with demand within a relatively short period of time. Immediately after the rains, before other vegetables are ready, the ALV farmers are able to get better prices - before the markets are flooded with kales and cabbages. Farmers have also been introduced to scheduled production, whereby they grow ALVs at different stages, so that at any given time they have some ready for sale. This has helped not only to steady the supply but also to ensure continuous income for the farmers. Furthermore, most ALVs require little external inputs while some require minimal pest and disease control due their inherent characteristics that repel most pests and disease vectors. This encourages farmers with few resources to produce them profitably.

e) *Improved presentation and increased supply through improvement of market chains*

The perceived quality of ALVs has been increased by their presence in supermarkets and upmarket groceries. There is no longer the fear that these vegetables could have been grown with dirty water in the urban and peri-urban areas since sources of produce can easily be confirmed in these markets. Consequently, the stocking of ALVs in supermarkets has greatly contributed to their increased consumption. This is not only as a result of increased availability but also - and more importantly - because of their elevated status among the Nairobi community. Now the upper and middle class consumers who have little time to go to informal markets can easily and conveniently find their supply in clean, hygienic, and somewhat prestigious environments. ALVs are no longer associated with the poor in rural areas. Their status has not only been elevated but those who are already consuming these vegetables have increased their demand for same, due to improved presentation and availability from steady and reliable sources.

f) *Provision of external marketing support to producers*

This factor is closely related to d) above. Although there is some indication of farmers supplying the supermarkets and groceries directly, the local NGOs and international organisations have played a part in promoting the marketing of ALVs. The promotion and subsequent linking of small-scale farmers to market chains has been instrumental in increasing the supply of these vegetables, not only in the supermarkets but also in other market outlets. Vertical integration has been achieved through institutional linkages between the producers and the supply outlets. The contractual arrangements between producers and supermarkets ensure continued supply, since it is already matched to demand. In addition, the risk of rapid price fluctuation is greatly reduced. Thus, the promotion, support and linking up of the various market actors by some local NGOs and international organisations has led to increased supply as well as increased efficiency in the chains.

g) *Capacity for self-organization within producer groups*

Although, initially, farmers were organised into groups by NGOs and other actors, they have survived in the trade even during times of difficulty. Their good leadership and collective capacity has enhanced their efficiency and strengthened their capacity to seek external support. Collective capacity has also ensured the enforcement of quality standards and the continued and timely supply of ALVs. Farmer groups have now better bargaining power and enjoy other benefits of social capital derived from being in an association. By bulking ALVs harvested from different farms, the producers benefit from economies of scale in respect of reduced marketing and transaction costs, and access to marketing information.

h) Improvement in communication technologies

The introduction and widespread use of mobile phones, which started in the country about seven years ago, has also contributed to ALV market development although this impact may be difficult to measure. Such communication technology has aided traders and other actors in avoiding loss of vegetables, containing cost and in better planning, generally.

9.2 Factors inhibiting ALV market development

a) Lack of adequate road and market infrastructure

Insufficient provision of physical infrastructure, including roads, transportation, market space and storage facilities, is a key constraint to market development, as derived from both qualitative and quantitative (econometric) analyses. This factor leads to elevated production, marketing and transaction costs. In particular, high transportation costs are incurred by traders since road infrastructure is very poor in most rural areas. Cold storage facilities are virtually absent in the sector, leading to high spoilage losses. Physical space is also an issue as most of the council markets are already overcrowded.

b) Lack of policy guidelines and goodwill from the government

The current food security policy guiding research, production and marketing of agricultural produce in Kenya is quite broad and lacks specific direction for the promotion of ALVs. The extension service of the Ministry of Agriculture and related government agencies operates in vast areas. They do not treat ALVs any differently from other crops, and so often combine the promotion of these vegetables with other agricultural activities, with no specialization. There is no policy on ALVs, as such, and everything gets lumped together as 'traditional crops' for food security. Except in the case of specific projects, extension funding is generally intended for all crops and activities. In addition, under the current policy, ALVs do not qualify for specific funding like certain commercial crops. On the one hand, the extension service is not well facilitated to work properly and, on the other, even if it were, there would be a need for some basic training since training college curricula do not cover ALVs.

c) Lack of capacity to regulate supply

The Nairobi market suffers from seasonality of ALV supplies. This is mainly due to two key factors: lack of irrigation capacity and absence of preservation techniques. Most of the ALVs traded in Nairobi are grown during the rainy seasons. During the dry season, production is limited to areas near rivers, wells and water catchment and very few producers can afford any form of irrigation. The shortage of ALVs during the dry periods is exacerbated by increases in infestation from disease and pests (e.g., red spider mites), which lowers quality. Thus, there is an over-supply during the rainy season and shortage during dry seasons. Since there are no preservation techniques such as drying, surplus ALVs (common in the case of Leafy Amaranths) during the rainy seasons are lost, due to their perishability. In addition to these two problems, there are no institutional arrangements in council markets to regulate supply.

d) Lack of product differentiation and value adding aspects

There is no processing, branding or packaging of any sort for ALVs in the Kenyan market. ALVs are simply uprooted or cut at the stems, sometimes washed, then tied into bunches and presented in the market. The produce would fetch better prices if there were innovative ways of presenting it in the markets, and especially in the council markets. There are no pre-cut or packaged ALVs as yet. Packaging, and instructions on how to prepare the ALVs would assist potential customers who do not know yet how to cook them.

e) Lack of credit and other support services to council market traders

Many market actors who would have liked to enter the market or to increase their business are limited by lack of credit and information services. Most were relying on group advances to meet their immediate

needs. Moreover, there is no market information on ALVs in the local daily papers, or radio broadcasts, etc. on which traders could rely to coordinate their marketing activities.

10. CONCLUSIONS AND POLICY IMPLICATIONS

This study provided a detailed analysis of the ALV market in Nairobi and the neighbouring areas and identified factors favouring and /or hindering its successful development. In addition, the study analysed factors influencing intra- and inter-specific on-farm biodiversity of traded ALVs, with the focus on determining the role of market development. It was found that ALV marketing in Nairobi started a long time ago - in the 1960s, but there has been a rapid growth in terms of sold volume since the late 1990s, attracting ALVs from all over the country. A number of factors positively influencing this growth have been identified. These include expansion of consumer demand, as a result of the promotional strategies of local NGOs and international organizations such as Bioversity International, increased health awareness and consciousness on the part of the people in Nairobi, and improved presentation of ALVs in supermarkets and upmarket groceries. On the other hand, supply has been on the increase due to the promotion of production in upcountry key production areas, through international organizations and local NGOs, provision of external marketing support by NGOs, farmers' capacity for collective action, and an improvement in telecommunications technology. Thus, policy makers and other stakeholders can continue investing or invest more in the above factors in order to maintain the steady development of Nairobi's ALV market.

Over the last decade, the species and sub-species traded have also continued to increase, albeit at a slow rate. The most popular species are African nightshade, leafy amaranth, cowpea and spiderplant. Despite this remarkable growth in volume and number of species, there are some key factors that hinder the desired growth of the ALV market. These include inadequate physical infra-structure, unfavourable policies for production and marketing of ALVs, lack of capacity to regulate drastic supply oscillations, lack of product differentiation and value addition, and lack of credit and other forms of support to council market traders. In order to promote the market further, there is need for policy makers to put favourable policies for production and marketing of ALVs in place and provide means of overcoming the other hindering factors. In particular, the issue of infra-structure will need to be addressed urgently, as it is already a constraint to current market growth.

Looking at the results of this study and, in particular, the nature of the factors hindering market development, one cannot fail to see that the government has an important role to play. The question is: what will the government do to improve current ALV market development in Nairobi? As has also emerged from the study, supplies in Nairobi are mainly from upcountry key production areas. Thus, in order to have an impact on ALV marketing in the capital, most government strategies would target the whole country. This goes well for strategies such as inclusion of ALVs as a scheduled crop in the Agriculture Act and the development of training guidelines on production and consumption of ALVs. These strategies could also be included in the curricula at all levels of agricultural training. However, strategies such as improvement and provision of relevant physical infra-structure would be better implemented initially in Nairobi and the key production areas, due to the huge costs involved in covering the whole country.

Considering the results of the factors influencing intra and inter-specific on-farm diversity of ALVs, a number of policy implications can be derived in relation to gender, education of farmers and distance from the Nairobi market. To spur-on ALV trade and at the same time conserve on-farm diversity, policy makers and other stakeholders will be required to encourage greater participation on the part of women, increased investment in education and strengthen promotional campaigns on production in some key areas far from the city. Notably, the main aim in analysing these factors was to test whether ALV market development had a significant effect on on-farm biodiversity. It was found that it had none - probably

because the market started growing rapidly only about ten years ago. Nevertheless, the negative effect of this factor on the level of biodiversity is something to watch as the market progresses. Similarly, the strategy to support producers externally in order to increase sales through supermarkets may have negative effects on biodiversity in the long-run since, contrary to the requirements of council markets, only a few varieties are demanded through the supermarket chain.

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APPENDICES

APPENDIX 1. Wholesale and retail markets and their trading times and number of suppliers

Physical venue	Wholesale market		Retail market	
	Time (day and hours)	Approx . no. of traders	Retail market and its time (day and hours)	Approx. no. of traders
1. City Park			Every day, 6 am – 6 pm	21
2. Dagoretti	Thursday, Saturday, 6-10 am	18		
3. Gikomba	Every day, 11 pm – 5 am	58	Every day, 6 am – 7 pm	13
4. Gitaru	Wednesday, Saturday, 6-10 am	16		
5. Githurai 45	Every day, 5-11 am	45		
6. Kangemi	Monday, Thursday 6 am – 11 am	13	Every day, 6 am – 7 pm	29
7. Kawangware	Monday, Friday, 6 – 11 am	30	Every day, 6 am – 7 pm	7
8. Kenyatta Market			Every day, 6 am – 6 pm	7
9. Kiambu			Wednesday, Saturday, 9 am – 7 pm	3
10. Kiserian			Monday, Thursday, 9 am – 7pm	6
11. Kisii Stage	Every day, 11 pm – 5 am	8	Every day, 6 am – 7 pm	14
12. Korogocho	Wednesday, Thursday, 6 – 11 am	21		21
13. Mutindwa			Every day, 9 am – 7 pm	6
14. Ngara			Every day, 6 am – 6 pm	18
15. Ngong			Wednesday, Saturday, 9 am – 7 pm	5
16. Ongata Rongai			Every day, 9 am – 7 pm	5
17. Savannah			Every day, 6 – 11 am	7
18. Toi	Every day, 5-9 am	10	Every day, 6 am – 6 pm	16
19. Uchumi			Every day, 8.30 am – 8.30 pm	59
20. Wakulima	Every day, 6 – 11 am	12	Every day, 6 – 11 am	17
21. Wangige	Monday, Thursday, 6-10 am	45	Every day, 6 am – 6 pm	5
22. Westlands			Every day, 6 am – 6 pm	4
Total	No. of wholesale markets = 11	276	No. of retail markets = 18	263

APPENDIX 2. The importance of the various subspecies in the Nairobi market in terms of daily market share

Species	Subspecies	Within the species (%)	Within the entire ALV market (%)	Popularity Ranking
African nightshade	Broad leaf	65.11	20.83	1
African Nightshade	Small leaf	34.89	11.16	2
Amaranth	Green-stem broad leaf	53.33	10.28	3
Amaranth	Green-stem small leaf	18.46	3.56	10
Amaranth	Red-stem broad leaf	15.99	3.08	13
Amaranth	Red-stem small leaf	12.22	2.35	15
Spiderplant	Purple stem	89.52	9.25	4
Spiderplant	Green stem	10.48	1.08	19
Cowpeas	Broad leaf	76.50	6.61	5
Cowpeas	Narrow leaf	23.50	2.03	17
<i>Mitoo</i>	Small leaf	60.55	4.92	6
<i>Mitoo</i>	Broad leaf	39.45	3.21	11
Ethiopian Kale	Green stem	64.78	4.51	7
Ethiopian kale	Purple leaf	35.22	2.45	14
Jute plant	Broad leaf	97.72	3.18	12
Jute plant	Small leaf	2.28	0.07	21
Vine spinach			3.87	8
<i>Kahurura</i>			3.80	9
Pumpkin leaves			2.17	16
Common comfrey			1.21	18
Stinging Nettle			0.38	20

APPENDIX 3. Detailed descriptive analysis of the specific markets

Gikomba market is the main wholesale market for ALVs in Nairobi. This market started in the early 1970s as a small market operating near the 'Kwa Cucu' site. Over the years, it has developed to be the main wholesale market for ALVs catering for Nairobi and the surrounding areas. With the expansion of the wholesale market, the site has stretched along the road from the main bus park (the Machakos Country Bus Park). The site for the ALV wholesale business is used as a second-hand clothes market during the day. Therefore, the wholesale market operates from about midnight to 7 am as the produce arrives from the producer areas of Western, Eastern and Central Kenya. Some retailing of ALVs goes on through out the day at two sites within the market. All species consumed in Nairobi and the neighbouring areas are sold here, although not all species are available on a day-to-day basis.

Kangemi market is found on the Nairobi-Nakuru highway, the city road route to Western Kenya. It has market days on Mondays and Thursdays. On market days, the special aspect is that about 20 women from Kisii arrive there with supplies of various ALVs. They sell in wholesale in the morning but keep some to retail directly to consumers for the rest of the day, in order to maximise profit. These traders are not able to retailer all the produce due to perishability hence the partial wholesaling. On the other days, supplies are sourced mostly from the farming peri-urban areas of Kikuyu, Gitaru, Limuru, Zambesi, and Muguga, where they are either bought at wholesale prices in the market places (on respective market days) or directly from the farms. The same species sold in Gikomba are found here.

Kawangware is not much different from Kangemi except for the fact that traders from Kisii are not among the actors. Korogocho market gets its supplies mainly from Central and Eastern Kenya and in particular from Mwea area. It has specific market days and the traders in ALVs have a special area in a plot owned by Scout Boys. Toi and Githurai markets do not have specific market days. The normal trend is that suppliers (producer wholesalers and other wholesalers) bring the produce early in the morning. The traders buy to retail later. The Githurai market gets hardly any of its supplies from Gikomba, principally due to its strategic position on the main Thika-Nairobi highway. Most of its supplies come from Central and Eastern Kenya. The main growing areas include Ruiru, Githunguri, Makutano and Matuu. The supplies in Toi market usually come from Kikuyu, Gitaru, Limuru, Zambesi, Muguga and Wangige farming areas, as well as from Gikomba wholesale market.

As mentioned earlier, the Kisii bus-stage is a peculiar but an important a *de facto* formal market for ALVs. Its positioning in the city centre makes it difficult to be licensed. The market has developed as a convenience for the wholesalers who sell their supplies at the stage instead of carrying them to the main wholesale markets of Gikomba and Wakulima. The main species traded include African nightshade, cowpea leaves, spiderplant, leafy amaranth, *kahurura*, vine spinach (*Bacella alba*) and stinging nettle (*Urtica massaica*). An important destination for these ALVs is Korogocho market on the Eastern side of the city.

Ngara market is mainly a retail market for fruits and vegetables, including ALVs. The trade in ALVs started in the early 1980s but is growing in terms of traders selling these ALVs either with other vegetables or on their own. The traders buy their supplies either from the Gikomba wholesale market or directly from the farmers in the Ruiru, Wangige, Kikuyu and Gitaru producer regions in Central Kenya. Usually no producers come to sell in this market - neither as wholesalers nor retailers. This market has about eight active traders dealing only in ALVs and another twelve who sell one or two species together with other vegetables, especially kales and spinach. Most of the ALV species are found here. The number of traders dealing exclusively in ALVs has increased from three to the current eight in the last two years. The volumes traded have also been increasing. One trader said now she buys bundles worth Ksh 600 daily and retails all, as opposed to Ksh 300 about a year ago.

Wakulima market is the main wholesale market for agricultural produce in Nairobi. The market for ALVs here has been developing slowly and is still very small relative to the other leafy vegetables. The ALVs were first traded in this market in the early 1960s, mainly to satisfy the demand from consumers coming for fruits and the other vegetables in this market. About 12 wholesalers trade at this market from 5 am to about 6 am. These include both producers and professional traders. There are about 17 retailers on a day-to-day basis with five permanent in this market while the others are occasional traders. Retail business ends at 1pm, when the gates close. Most of the common species are found here.

City park market is a specialised market targeting the Asian community that live around the area. It has a wide variety of fruits and vegetables. Around 21 traders were found to be selling ALVs amongst their other commodities. Like the Ngara market, selling of ALVs is only beginning to take off. The main species sold include cowpea, leafy amaranth, African nightshade and *mitoo* (*Crotalaria spp*).

The rest of the estate markets including Mutindwa, Savannah and Kenyatta had similar characteristics that include, relatively few traders (around ten), predominantly retail business, and usually in built-up, temporary structures. Kenyatta market got its supplies mainly from Ngong-Kiserian area as well as from Gikomba and Kisii stage.

The Wangige, Gitaru, Kiambu, Ruiru, Dagorreti, Kiserian, Ngong, Ongata and Rongai peri-urban markets usually have similar characteristics. They had each two market days, well spread out during the week - that is, Monday/Thursday, Tuesday/Friday and Wednesday/Saturday. The producers from the areas and mobile wholesalers would bring their produce very early in the morning, sell and then leave for other duties. The retailers would then sit and retail for the rest of the day. A few producers would also come and retail their farm produce but these were relatively few

APPENDIX 4. Study Questionnaire

Market Development for African Leafy Vegetables (ALVs) within Nairobi and its Environs

Market Place: _____

Market Type Code:

(1= Wholesale, 2= Retail)

Location Code

(1=Urban, 2 = Peri-urban)

Date of interview: _____

Time Start: _____

Time End: _____

Enumerator's Name: _____

Enumerator's Code:

Questionnaire checked: _____

Date: _____

Name of Respondent: _____

(Sampling is to be done on the spot. The enumerator is to do a physical count with an informer.

Should include those who are always there but may be absent at the moment)

Total traders: _____

Sample size: _____

Introduction

B1. Do you know when ALVs were introduced in this market?

1 = Yes, 2 = No

B2. If yes, which year? _____

B3. Which ALVs were the first to be traded in this market? _____

B4. When did YOU yourself start trading in ALVs? ----- (Year)

B5. What made you start?-----

B6. What specific role do you play in the market? []

1= Producer wholesaler 2= Producer retailer

3= Wholesaler only [1st Level] 4= Wholesaler only [2nd Level]

5= Retailer only

B7. How would you describe your mode of operation? _____

1= Mobile trader (State markets) _____

2= Permanent in this market

3=Occasional trader (**specify**)_____

B8. Where did you get most of your supplies of ALVs?

Species of ALV	Type (within the species)	Source (code and name)	Distance to the market

Code for source

- 1= from own farm
- 2= from other farms (including harvesting)
- 3= from collection centres in the farming area (farmer groups)
- 4= from same market (wholesalers)
- 5= from different market(s) (specify _____)

If B8 for source is from own farm, ask the following, otherwise skip to D1

Producer traders

- C1. Do you grow other ALVs that you do not sell? 1 = Yes, 2 = No
- C2. What is the total acreage of your farm? _____ Acres
- C21 Acreage under crops _____
- C22 Acreage under ALVs _____
- C3 When did you start growing ALVs? _____ (Year)
- C4 Changes in ALV production. ***Include all from B8 (own farm) and C1***

Species Grown	Type within the species	2006	2001	1996
		Area in acres	Area in acres	Area in acres

C5 Do you have visits from extension officers or advisory persons? 1=Yes__2=No_____

C51 If yes, where do they come from? _____

C52 If yes, how many times in a year?. _____

C6 Has extension services provided you with any information concerning **MARKETING** of ALVs ?
1=Yes__2= No_____

Market and Transaction costs

D1. Do you pay any fee to be allowed to trade in this market? 1= Yes, 2= No

D2 How much and at what interval? _____daily, _____per week,
_____monthly _____Annual

D3 Apart from the fees, did you incur any other costs as a trader in ALVs for the last three (3) months? 1=Yes, 2=No

D4 If yes, which ones? _____

(Examples: **cleanup, losses due to perishability, theft, etc**)

D5 Estimate the total costs in D3, -----Ksh per week ____

D6 On average PER DAY, which species of ALVs have you been trading in (state the quantities and selling prices in Kshs over time?)

Species	Type within species	2006		2001		1996	
		Total Quantity/day (specify unit of measure)	Price /unit	Quantity (specify unit of measure)	Price	Quantity (specify unit of measure)	Price

D7 If the species traded are more than one, why do you deal with the combination?

D8 Which of your ALV types sell fast? (**Rank them, from the fastest to the slowest**)

D9 How did you know that there was a market for the ALVs?

.....

D10. What did you do initially in order to arrive at the initial buying and/or selling prices?

When buying

When selling

D11. Did you spend any cash money for activities D9 and D10? 1= Yes, 2= No

D111 If yes how much? Ksh-----

D112 How much time did you spent on activities D9 and D10? _____ hrs

D113 Any other cost you incurred on the activities D9 and D10? _____

D12 What have you done or do you do when you want to get market information for better prices of ALVs or increase your sales? _____

D121 Did you spend any cash money for activity D12? 1= Yes, 2= No

- D122 If yes how much? Ksh _____
- D123 How much time did you spend on activity D12? _____ hrs
- D124 Any other cost you incurred on the activity D12? _____

Social Capital

- E1 Are you a member of local traders/producers association? Yes____ No_____
- E2 If yes, what is the name of the association (s)? _____

- E3 What benefit do you get because of your membership?

Income share

- F1. Do you market other farm produce apart from the ALVs? [] 1= Yes; 2= No
(If yes, CONTINUE, if no skip to F14)
- F11. Which ones? LIST _____
- F12. What are the reasons for combining different produce the way you do? _____

- F13. Which of your produce (ALVs, exotic vegetables and other farm produce) sell fast? **(Rank them, from the fastest to the slowest)**

- F14 What is the daily NET profit from your marketing activities? _____ **(PROMPT for average)**
- F15 What proportion of your net profit do the ALVs contribute? _____ **-(PROMPT 10%, 15%....)**

Help or Influence

G1. Have you been helped or influenced by any institution, organization, or individual in the marketing of ALVs? 1= Yes 2= No

If yes: answer the following, if NO skip to G3

Source of Influence	When (Year)	Form of influence (check codes)

Codes for form of influence

- 1= BDS (Business Development Services) 2= Credit
- 3= Linkup with traders' organization 4= Locating source of supply
- 5= Transportation 6= Market information
- 7= Other (Specify) _____

G2. Which form of support do you consider most beneficial to you?

G3 Do you experience any constraints in marketing ALVs? [] 1= Yes, 2= No

G4. If yes, which ones? (Rank them with the most important first)

- 1-----
- 2-----
- 3-----

H1 Section C: Socio-Economic Data

Code	Sex (1=Male 2=Female)	Age	Marital Status (use codes)	Max. Level of Schooling in years	Current Residence	Home District

Codes for Marital Status:

- 1= Married 2= Divorced/separated
- 3= Widow(er) 4= Single