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Value Chain Analysis of Traditional Vegetables from Malawi and Mozambique

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Abstract

Several studies have shown that traditional vegetables have high market potential and contribute substantially to household incomes and nutrition. Until recently however, the scientific and donor community often give less attention to research on traditional vegetable crop value chains. The resurgence of traditional vegetables' importance in human nutrition is accompanied by a need to understand the interactions among various actors in their value chain to determine ways to add value to produce and improve marketing efficiency. Based on a multistage cross-sectional survey of 240 respondents in Malawi and Mozambique, this study employed participatory evaluation and market research to identify potential outlets and target crops, and define value chain processes, including choice of market outlets and mode of farmer-buyer linkages. Traditional vegetable sales contributed about 35% and 30% of smallholders' income in Malawi and Mozambique respectively. Linkages between value chain actors were found to be weak; mostly based on spot market transactions, except for those between retailers and supermarkets, which were based on relationship marketing.

Keywords: African traditional vegetables, commodity value chains, human nutrition, marketing efficiency, SWOT analysis, value chain mapping.

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Introduction

Despite constituting only a small share of the arable land area, vegetable production in Eastern and Southern Africa has the potential to be highly profitable, provide employment opportunities, generate income and bring about increasing commercialization of the rural sector (Weinberger and Lumpkin 2007). To realize this potential, farmers and other value chain actors must improve the competitiveness of their vegetable production and marketing commodities to increase market share and profits. In addition, diseases related to imbalanced diets from insufficient vegetable and fruit consumption cause 2.7 million deaths annually worldwide, and are among the top 10 mortality risk factors (Ezzati et al. 2002). Malnutrition is rampant in the tropics, where per capita vegetable consumption averages only 43% of the minimum recommended 73 kg/person/year (Ali and Tsou 1997). Re-igniting an interest in — and a taste particularly, for traditional foods can help improve nutrition and also increase incomes, restore biodiversity, and preserve local cultures (Stone et al. 2011).

According to Ambrose-Oji (2009) there are a host of terms describing traditional African vegetables (TAV), including indigenous African vegetables (IAV); African indigenous vegetables (AIV) traditional leafy vegetables (TLV); African leafy vegetables (ALV); traditional African leafy vegetables (TALV or TLV)—and all are subject to contested meanings. In the context of this paper traditional vegetables follows the FAO (1998) definition, and refers to all categories of plants whose leaves, fruits or roots are acceptable and used as vegetables by urban and rural communities through custom, habit and tradition. Traditional vegetables domesticated in Africa, including amaranth (*Amaranthus* spp.) and African eggplant (*Solanum aethiopicum*) have been known to be rich in micronutrients such as iron and vitamin A (Weinberger and Msuya 2004), possess antibiotic, probiotic and prebiotic properties (Park et al. 2002; Erasto, Bojase-Moleta, and Majinda 2004; Veluri et al. 2004), and contain antioxidants and phytochemicals that help protect people against non-communicable diseases (Yang and Keding 2009; Uusiku et al. 2010). African eggplant, a readily cultivated vegetable crop, recently has been found to possess protective properties against ulcers induced experimentally, making it a cheap, natural anti-ulcer remedy (Chioma et al. 2011).

A number of critical bottlenecks hamper the growth of the traditional vegetable sector in Eastern and Southern Africa: lack of access to high quality seeds, including hybrids produced by local seed companies; high on-farm production losses; high perishability and post-harvest losses, particularly, for leafy traditional vegetables such as amaranth; lack of appropriate market infrastructure for handling perishable produce; weak linkages between supply chain actors (i.e., input suppliers, producers and markets); lack of well-structured and organized markets leading to high transaction costs along the supply chain due lack of reliable market information and support systems; lack of mechanisms to set prices (i.e., traditional vegetables are usually sold by farmers mostly on the basis of “cost of living” rather than production costs or supply and demand conditions), resulting in low bargaining power of farmers; and ineffective institutional policies to enhance trade within and between regions and countries (Lenné and Ward 2010; Lyatuu et al. 2009).

Value chain analysis of the traditional vegetable supply chain offers the opportunity to assess the efficiency of value-added operations/services as well as systemic competitiveness along the

supply chain to increase production, trade and the income-generating potential of farmers and other actors. A value chain describes the full range of activities required to bring a product or service from conception through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use (Kaplinsky and Morris 2001). The connection between producers and buyers may be reinforced at the level of customer loyalty, and perhaps to the point of establishing a partnership. Food value chain research has developed significantly in recent years as a response to major shifts in the agribusiness sector, including significant change in international trade patterns; advances in retailing, notably with the emergence of supermarket chains in developing countries; growing urbanization and related change in consumer behavior (Dolan and Humphrey 2000; Ahumada and Villalobos 2009; Gereffi and Christian 2010; Lee, Gereffi, and Beauvais 2010). Many development interventions now use a value chain approach as an entry point to engage smallholders, individually or collectively, in local and high value export markets (GTZ 2007). To this end, the value chain approach involves addressing the major constraints and opportunities faced by businesses at multiple levels of the value chain through a wide range of activities such as ensuring access to the full range of necessary inputs, facilitating access to cheaper or better inputs, strengthening the delivery of business and financial services or increasing access to higher-value markets or value-added products.

Several studies have outlined the strengths and weaknesses of the qualitative nature of generic value chain analysis and the need to improve analytical rigor by complementing it with quantitative analytical approaches (Rich et al. 2011; Trienekens 2011; Bair and Werner 2011). While this study combines both qualitative and quantitative approaches, it does not address the strengths and weaknesses of the underlying methodological approach. For an exposition of the strengths, weaknesses and extensions and options to improve the analytical rigor of the value chain methodology see for example, Rich et al. 2011; Trienekens 2011.

Relatively few studies have been conducted on traditional vegetable value chains and related subjects in Southern Africa (Hichaambwa and Tschirley 2006; Odhav et al. 2007; Lyatuu et al. 2009; Lenné and Ward 2010; Shackleton et al. 2010; Weinberger et al. 2011). These studies have mostly targeted specific segments of the supply chain, such as characteristics of production systems, nutritional attributes, nature of marketing outlets, and participation of women, but have hardly looked at the entire supply chain, particularly from seed production and distribution through to produce marketing. To the best of our knowledge, very little research has been done to assess the interaction of the structure, conduct and relationships among value chain actors along the traditional vegetable value chains, and evaluate the impact of farmers' social capital and networks on household production and consumption decisions for traditional African vegetables in Southern Africa.

The objective of the study was to carry out participatory evaluations and market research on a range of traditional vegetable value chains to select actual and potential target crops, establish modes and types of farmer-buyer linkages and their corresponding marketing outlets, identify value chain constraints and opportunities and draw agribusiness policy-related recommendations for Malawi and Mozambique. The rest of the paper is organized as follows. First, given the peculiarity of the spatial and time gaps in seed distribution systems, we give a brief overview of traditional vegetable seed systems in the study area. Section 3 outlines the choice of value chain

approach used, describes the study area, field survey methods and techniques of data analysis. This is followed by a presentation of the study findings with a highlight of the value chain mapping, opportunities and constraints following a SWOT analysis. Finally, a summary of the major findings and conclusions out of the empirical analysis is drawn along with outlined associated agribusiness investment and policy implications, and recommendations.

Overview of Traditional Vegetable Seed Systems in Malawi and Mozambique

Traditional vegetables are produced and consumed by many households in most countries in Southern Africa including Malawi and Mozambique (Ambrose-Oji 2010). Despite the popularity of these crops, public sector breeding activities to produce good quality seeds are almost non-existent and are limited by a lack of funding and private sector involvement (Afari-Sefa et al. 2012). Malawi has made significant strides in developing and embracing vegetable research and breeding in its national policies in comparison to Mozambique, which does not have a well-structured vegetable research program (Chadha et al. 2007). Nevertheless, the Instituto de Investigação Agrária de Moçambique (IIAM) is in the process of building the necessary infrastructure and institutional mechanisms to improve vegetable research and development. The IIAM is a public entity that has the mandate for carrying out action research, development and dissemination of agricultural technology in Mozambique. Current research thrusts in Mozambique include varietal trials; cropping season trials to determine vegetable crops adapted to particular agro-climatic zones; and studies on the improvement of agronomic practices such as plant spacing, plant density and optimum time for harvesting (Chadha et al. 2007).

Vegetable cultivar and breeding research has a significant national priority in Malawi. The country's major research objectives in the horticulture sector are to address increased availability of high yielding cultivars, adaptability of improved cultivars to both biotic (pest and disease resistance) and abiotic stresses (heat tolerance), improvement of soil fertility, good on-farm agricultural practices, and minimization of postharvest losses (Chadha et al. 2008). To date, neither Mozambique nor Malawi has officially released any traditional vegetable varieties. Research on traditional vegetables was initiated in 1983 at Bunda College of Agriculture in Malawi, emphasizing germplasm collection, documentation, seed multiplication and agronomic studies. The Bvumbwe Research Station in Malawi and IIAM in Mozambique (public research institutions) in collaboration with AVRDC – The World Vegetable Center and Bioversity International under the Sub-Saharan Africa Challenge Program (a CGIAR program led by the Forum for Agricultural Research in Africa (FARA) in 2008 identified, characterized and popularized a few traditional vegetables such as amaranth and African eggplant.

In most African countries seed laws have been updated, with recent efforts to undertake regional harmonization of laws and policies to enhance the growth of the seed industry in terms of certification and commercialization (Rohrbach et al. 2003; Setimela et al. 2009). Nevertheless, most laws give little legal room for use of farmer-saved seeds, although in some cases there is a small legal opening through the use of Quality Declared Seed, seed for disaster response projects, or seed of species not covered by laws. Mozambique's Seed Law of 2001 for example openly welcomes the registration of 'traditional' and 'local' varieties for commercialization, but only if they satisfy the industrial Distinctiveness, Uniformity and Stability (DUS) criteria (Setimela et al. 2009; GRAIN. 2005). Up until the 1990s, seed regulations in most African

countries were mostly organized around public seed programs, with seed laws limited to import and export restrictions. There was little coordination between countries, with regulations often heavily influenced by the respective donors and very little enforcement on the ground (GRAIN. 2005; Waithaka et al. 2011).

Consequently, most exotic vegetable seed is imported from Europe (mainly, the Netherlands) to South Africa, Zimbabwe, Malawi and Mozambique. Local seed companies produce small quantities of seed of tomato (*Solanum lycopersicum*), kale (*Brassica oleracea*), watermelon (*Citrus lanatus*) and other vegetables. Some seed companies are involved in importing, repacking and marketing vegetable seeds in Mozambique and Malawi. Seed of most traditional vegetables like African eggplant and nightshade (*Solanum villosum*) are imported from Tanzania; while little seed is produced locally, such as amaranth, is mainly done by community based seed producer groups. Imported seed is usually packed in perforated plastic bags or plastic coated paper to enhance the viability and storage life of the seeds under ambient temperature conditions. Some of the input suppliers in the study villages re-pack seeds in smaller plastic bags for sale to meet the demand of small producers. Thus in both Mozambique and Malawi most traditional vegetable farmers use farmer-saved seeds.

Study Methods and Analytical Framework

Justification for choice of value chain approach used for study

As a descriptive tool, value chain analysis forces the analyst to consider both the micro and macro aspects involved in production and exchange between different actors. A number of methodologies and their contributions to commodity value chain analyses have been proposed for economic processes at global and national level studies (see for example, Kaplinsky and Morris 2001; Kaplinsky 2000; Keyser and Tchale 2010; Bellù and Guilbert 2008). In the context of sub-Saharan Africa, a number of studies have been undertaken to examine vegetable commodity value chains from different perspectives. Such studies include: the role of research institutions in vegetable value chains (Ojiewo et al. 2010; Afari-Sefa et al. 2012), theoretical concepts for socioeconomic research on vegetables (Waibel 2011), approaches to strengthen vegetable value chains for increasing food and nutritional security and income under both sole crop and integrated farming systems (Ngugi et al. 2007, Lenné and Ward 2011; Sounkoura et al. 2011, Afari-Sefa and Beed 2012), institutionalization and agribusiness innovations in value chains (Eaton et al. 2008; Kibwika et al. 2009). Results from southern Africa specific value chain related studies (see for example, Lyatuu et al. 2009; Hichaambwa and Tschirley 2006) also show that with growing demand, consumers are becoming more sensitive on sanitary and phytosanitary aspects, whereby existing and emerging high value markets for traditional vegetables impose stringent conditions on quality of the produce they purchase. Retail outlets consequently demand consistency in supply and prefer to deal with groups rather than individual farmers so as to cut on transaction cost.

For the microeconomic analysis employed in this study, the commodity-based approach provides a better insight into the organizational structures and strategies of different actors engaged in

traditional vegetable chains, do not typically have well-structured markets to exhibit global commodity value chains characteristics.

A similar methodology with modifications to what was earlier applied by Kaplinsky and Morris (2001) and Van den Berge et al. (2005) to quantitative value chains is described by Henning and Donahue (2008). This methodology deals with upgrading value chain competitiveness with informed choice as a tool for end-market research. This approach was found to be a consistent fit for the objectives of this study and was adapted to reflect the situation of the study area. A value chain map that provided alternative actor linkages from the producer to the final consumer via mapping out flow relationships between actors was developed. Figure 1 illustrates the analytical approach applied to measure the objectives of the study. A four-step approach to determine criteria for selecting sub-sectors, products or commodities for analysis was devised, including weighting the relative importance of those criteria to value chain actors, determining the potential sub-sectors, products or commodities that could be considered, and then constructing a matrix to enable ranking of the products according to the criteria. Finally, priorities were selected on the basis of the ranking obtained.

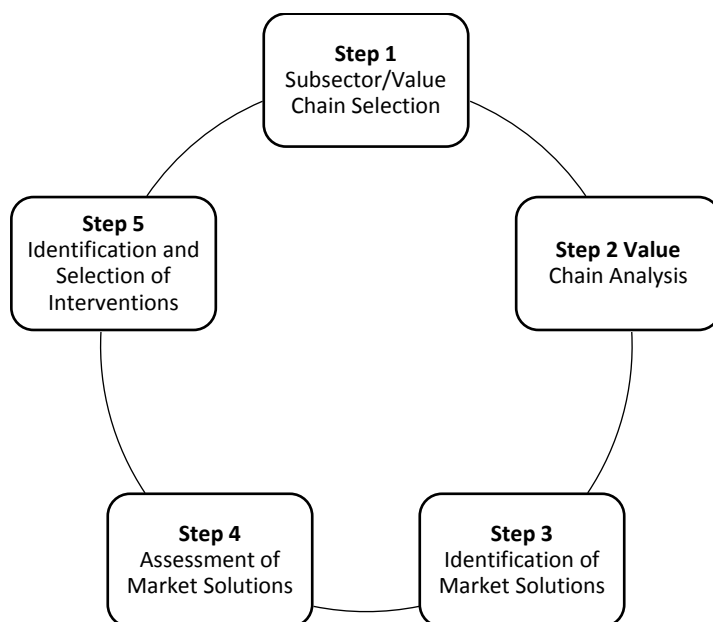


Figure 1. Source: Adapted from Action for Enterprise (2006)

Characteristics of Study Sites

The study was carried out in four districts: Barue (Manica province) and Milange (Zambezia province) in Mozambique, and Thyolo and Zomba in the Southern region of Malawi. The Mozambique study sites are characterized by a poor resource base, low levels of literacy and high levels of malnutrition. Few households have regular cash income and most practice subsistence agriculture. In some cases supplemented by fishing and other activities. Much of the area is drought and/or flood-prone, although some areas have a relatively higher elevation. Maize (*Zea mays*) and, to a lesser extent, cassava (*Manihot esculenta*) are the primary staples; both are

cooked as a paste and served with simple sauces, usually of beans (*Phaseolus vulgaris*), dark green leaves, and/or dried or fresh fish. Tempe (2007) reiterates that traditional crops have always been part of the Mozambican diet even in urban areas such as Maputo, a fact which may be attributed to the movement of people from rural areas into cities during the civil war from May 1977 to October 1992.

In the Malawi study sites, field crops, especially maize and tobacco (*Nicotiana tabacum*), have traditionally dominated agricultural production. However, in recent years, high input costs and unfavourable weather conditions have restricted maize and tobacco cultivation. The decline in the tendency of farmers to grow field crops coupled with enhanced horticultural sector development policies has led to increased diversification into hardy crops such as traditional vegetables (Chadha et al. 2008). The authors further note that, although vegetables are grown almost everywhere in the country, the study sites in the two selected districts are major vegetable producing locales for sale to the urban populace.

Study Design and Data Collection

The analyses presented in this paper are based on primary data collected from value chain actors in the study area from June to August, 2010. Multistage stratified random sampling was carried out to select five villages from each district based on availability of information on chain actors. In each village, we conducted one producer focus group and interviews with four middlemen (person who buys goods from producers and sell them to retailers or consumers, also referred to as *collectors*), four retailers, and four seed suppliers. In all, a total of 20 focus groups involving various value chain actors and 240 individual respondent interviews were conducted for the purpose of this study. Both focus group discussion participants and individual interview respondents were randomly selected based on available information.

Specific surveys were designed for four types of identified actors in the study sites: middlemen, producers, input suppliers, and retailers. The focus group interviews were targeted toward the main stakeholders involved in production and marketing of traditional vegetables. Trained enumerators elicited information on the nature and types of traditional vegetables collected, cultivated and marketed, as well as on institutional characteristics of key chain actors. The producer, input, middleman and retailer surveys elicited information on production, consumption and marketing of traditional vegetables, as well as the institutional characteristics of each group (Figure 1 and Table 1).

A priority-setting exercise for 24 commodities was carried out based on data obtained from the respondents (Appendix B). Fourteen of the criteria captured information on production activities, food security coping strategies, marketing structure and potential of the various commodity value chains (Appendix B). Once the criteria were defined, the commodities were ranked against each criterion; a score of 100% meant that the particular commodity best met that criterion based on the proportion of respondents favouring the specific crop, and a score of 0% meant that the commodity did not meet that criterion (ranked against all the other commodities). The evaluation of each criterion was done by estimating the proportion of respondents. Once each criterion was evaluated, a simple average score was calculated; commodities with a higher score were ranked higher.

Value chain analysis involved a sequence of steps, from identification of actors through chain actor mapping, linkages, and quantification of earnings into rewards by various actors using information gathered from observation, rapid appraisals, and the quantitative and qualitative surveys augmented by secondary data (Figure 1 and 2). Constraints and opportunities within the value chains were categorized into appropriate classifications and analysed. The types of market services available along the value chain were described to serve as conduits for outlining constraints and opportunities of identified value chains. Finally, the Strengths, Weaknesses, Opportunities and Threats (SWOT) assessment tool was applied to identify and evaluate the controllable and non-controllable factors that future interventions ought to address to improve the entire traditional vegetable value chain.

Results and Discussion

Value Chain Description

The results of the priority-setting exercise indicated that in the Thyolo and Zomba districts of Malawi, amaranth, Ethiopian mustard (*Brassica carinata*) and blackjack (*Bidens pilosa*) were most important traditional vegetables, whereas pumpkin (*Cucurbita maxima*), okra (*Abelmoschus esculentus*), tomato and cabbage (*Brassica oleracea*) were most important among the exotic vegetables. In Barue and Milange districts of Mozambique, African eggplant, amaranth, jute mallow (*Corchorus olitorius*), Ethiopian mustard, and wild cucumber (*Marah macrocarpus*) were ranked high for the traditional vegetables while pumpkin, kale, onions, tomato, cabbage, and okra were ranked high for exotic vegetables.

Table 1 presents the distribution of identified actors and their respective roles along the traditional vegetable value chain. The table present actors (middleman, retailers and input suppliers) in both Malawi and Mozambique involved in various roles or occupation (grocery shop trader, street vendor, traditional vegetable collector, farmer, grocery store owner, wholesaler, seed dealer, agrochemical dealer and trader in farm tools).

Input suppliers: Given the lack of inputs, particularly seeds for traditional vegetables, some vendors take the onus upon themselves to provide farmers with agro-inputs such as seeds, fertilizers, and farm implements with the option of having the first purchase of produce upon harvest. There are no organized input suppliers with adequate stocks of inputs in visited villages of Zomba and Thyolo. This situation forced farmers to walk on foot to local providers operating in nearby villages within a radius of 5-9 km to buy relevant inputs. Input suppliers in Malawi sell seeds, farm tools and agro-chemical, while in Mozambique, they only sell seeds and farm tools. Production inputs such as agrochemicals, farm implements and seeds for production were mainly supplied by stockist distributors usually located in nearby cities. Most inputs supplied by these providers are imported and delivered through local distributor networks. Some individual farmers also act as input dealers. Government outlets supported by the Ministry of Agriculture provided inputs such as fertilizers in some villages. In addition to offering production assistance, the Bvumbwe Research Station also provided vegetable seed to farmers in some of the surveyed villages. In general, the input providers did not have contractual arrangements with their trading partners. Traditional vegetable seed sales accounted for about 7% of total agricultural seeds sales and 37% of vegetable seed sales of input providers. Among the traditional vegetables produced in Malawi, Ethiopian mustard, and African eggplant seed were the most traded. Ethiopian

mustard seeds contributed the highest turnover, with 'Mostert' noted as the most common variety. Percentage of germination, physical characteristics such as shape and size, quality of packaging material and price, purity and uniformity, yield, size of produce from seed and price were the main determinants of type of seed purchased by farmers.

Table 1. Indigenous vegetable value chain actors and their main activities in Malawi and Mozambique, June-August, 2010.

Main Occupation	Malawi			Mozambique			Test (a)
	Middlemen ⁺	Retailer	Input supplier	Middleman	Retailer	Input supplier	
	A	B	C	D	E	F	
Grocery shop trader	28.6	18.3		25.9	18.5		**A>D
Street vendor	21.4	26.7		25.9	22.2		*A<D **B>E
Traditional vegetable collector	35.7	1.7		3.7			***A>D *B<D
Farmer	14.3	43.3		29.6	48.2		***A<D
Grocery store owner		6.7		3.7			
Wholesaler		1.7		7.4	11.1		***B<E
Seed dealer			50.0			66.7	**C<F
Agrochemical dealer			25.0			33.3	***C<F
Trader in farm tools			25.0				
Others		1.7		3.7			
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	
N	14	91	34	27	27	3	

Notes. Significance of sample T-test comparing actors (A) and (D), (B) and (E); and (C) and (F): * indicates significant difference at 10% level, ** at 5%, and *** at 1%.

⁺ A person who buys goods from producers and sells them to retailers or consumers, also referred to as collectors. The table shows different activities or roles (grocery shop trader, street vendor, traditional vegetable collector, farmer, grocery store owner, wholesaler, seed dealer, agrochemical dealer and trader in farm tools) engaged by various value chain actors (middleman, retailers and input suppliers).

Farmers: These are persons involved in crop production, including traditional vegetables. In the four districts surveyed, traditional vegetables were produced mainly by small-scale farmers, on less than one hectare of land. The main traditional vegetables grown and or sometimes collected from the wild include Ethiopian mustard, African eggplant, amaranth, cowpea, spider plant, jute mallow, leafy sweet potatoes and wild cucumber. Traditional vegetable production is based on conventional, traditional production practices; producers did not apply recommended good agricultural practices such as use of high quality improved cultivars, integrated pest management practices and drip irrigation. Only Ethiopian mustard, okra, pumpkin and African eggplant seeds were sold commercially. Other traditional vegetable crops like leafy sweet potatoes and vegetable cowpea, among others, were mainly produced using local landraces. Farmers in both countries are not involved in supplying inputs but in retail and middlemen activities, with 14.3% and 29.6% of farmers involved in middlemen activities in Malawi and Mozambique respectively (Table 1).

Middlemen: These are persons who buy goods from producers and sell them to retailers or consumers, also referred to as collectors and transport contractors. The main activities of these actors in Malawi included collection of traditional vegetables (36%), ownership and management of grocery shops (29%), street vending (21%), and farming (14%) (Table 1). In Mozambique, some middlemen had other responsibilities in addition to those observed in Malawi. Some collectors also managed grocery shops as a secondary occupation, where they sold fast moving consumer goods in the communities where they live. Most transporters vertically integrated their activities by also engaging in the production and selling of vegetables.

Guaranteeing home consumption and generating extra income were the main reasons for cultivating and marketing traditional vegetables among value chains actors. In Malawi, about 21% of traditional vegetables produced were consumed at home, while in Mozambique farm households consumed about 30% of the produced traditional vegetables. Besides household consumption, fresh traditional vegetables were sold in traditional green markets without any value addition. On the whole, the study found that traditional vegetable sales contributed about 35% of smallholders' income in Malawi, and about 30% of household income in Mozambique. In most of the study villages in Malawi, producers were involved with farmers' associations. Although some of the farmers' groups received technical production assistance and seeds from the Bvumbwe Research Station, on-farm yield levels were quite low, reflecting the general lack of improved traditional vegetable cultivars and technologies.

Processing of traditional vegetables in the four survey districts was rudimentary and not commonly practiced. Only 12% of retailers in Malawi and 6% of retailers in Mozambique said they processed their produce in some way prior to selling. In Malawi, amaranth and cowpea were sundried and/or blanched. Most of the preserved traditional vegetables were meant for home consumption, not for sale in the market. In Mozambique, pumpkin, eggplant, cowpea, sweet potatoes, and Ethiopian mustard were cut in smaller pieces before selling. Cowpea was also sundried.

Given the fact that processing is lacking in traditional vegetable marketing chains, the high perishability of traditional vegetables poses major challenges for marketing and distribution. About 20% of traditional vegetables were discarded during the produce marketing process. Simple postharvest handling practices such as a bicarbonate wash could help minimize losses, and enable availability during the periods when vegetables are in short supply (Van den Berge et al. 2005). Improvement of packaging and processing standards is an important step for increased competitiveness of traditional vegetables products along the entire value chain.

Non-structured informal markets are major outlets for traditional vegetables. Most rural vendors and traders purchased their produce from farmers. Farmers also sold their produce along roadsides or at village markets directly to consumers or to middlemen who later sold them in major markets. The traders' market and retailers' market are the same. Some middlemen transported their produce to major village markets. In general, produce was mainly marketed through three channels: (i) farmers produced and sold their own traditional vegetables directly to consumers as market retailers or street vendors; (ii) farmers sold to retailers and; (iii) farmers sold to middlemen (collectors). The type of packaging used varies. In most cases, traditional vegetables were packed in bamboo baskets to the next selling point, where they were repacked

and sold in bundles with no labels. However, in a few cases, traditional vegetables were packed in plastic bags or sacks and unpacked at the next selling point. Most traditional vegetable value chain actors transported their products to rural markets on foot by carrying them on heads/shoulders or by using their own or hired bicycles. Value addition through packaging and branding to maintain high quality standards is required if produce is to reach high value formal markets such as supermarkets in urban areas and export markets, and ultimately increase farmers' profit margins. Traditional vegetable marketing channels in the two visited districts were constrained by diverse factors such as small production quantities and heterogeneous quality due to limited access to input supplies, lack of capital and market information, poor infrastructure, and lack of sound farm management skills. As a consequence, several value chain actors including input supplies, farmers, and middlemen were confronted with limited economies of scale.

Relationships among Value Chain Actors in Malawi and Mozambique

Relationships existing among the various value chain actors were established based on three marketing transaction typologies: spot markets (actors make a transaction including negotiations on price, volume and other requirements directly at the market without prior discussion); persistent network relations (buyer and seller meet to discuss transaction, come to an agreement and continue relationship when there is a preference for repeated transactions with each other based on trust or other factors), and horizontal integration along value chain (typically goes beyond the definition of a relationship, because both actors share the same legal ownership). A summary of the value chain actor linkages in the study locales is shown in Figure 2. Most linkages were based on spot market relationships, except for the linkages between supermarket retailer, which was better coordinated and based on persistent relationships.

Tables 2 and 3 depict type of relationships existing between various value chain actors in Malawi and Mozambique. Input suppliers in Malawi took the lead in terms of collaboration with other partners in the traditional vegetable chain, with 71% participation, followed by retailers with 54% and middlemen with 40% (Table 2). In Mozambique, input suppliers led with 100%, followed by middlemen at 50% and retailers constituting 38%. Although input suppliers had a higher level of collaboration with other business partners, in Malawi this collaboration was not made on the basis of written contracts, as was the case with most other actors along the value chain.

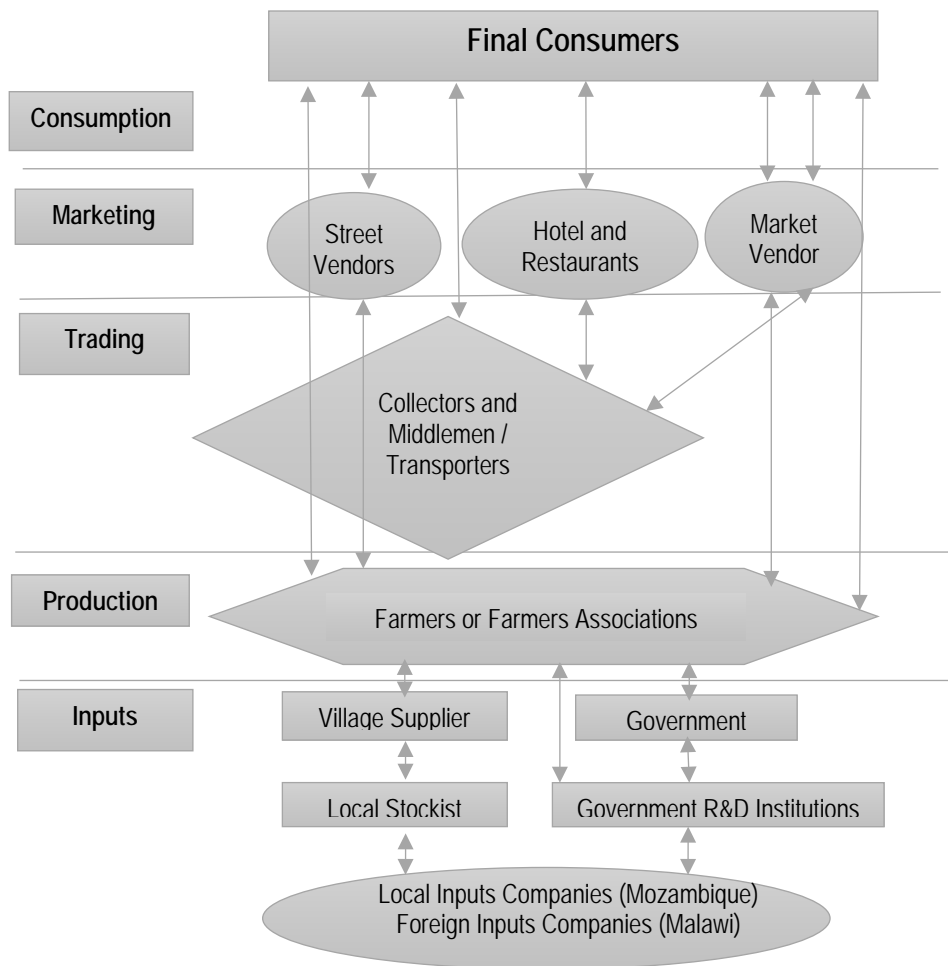


Figure 2. Summary of linkages of value chain actors in Malawi and Mozambique

Table 2. Relationships existing between various value chain actors

Item	Malawi			Mozambique			Test (a)		
	Input supplier	Middleman	Retailer	Input supplier	Middleman	Retailer			
	A	B	C	D	E	F			
Collaborate with others (%)	71	40	54	100	50	38	**A<D	*B<E	**C>F
Sample size (n)	14	91	34	27	27	3			
Type of collaboration %									
Share price/market information	40	50	43	29	44	38			*C>F
Share storage facilities	20	50	14		6	8		***B>E	**C>F
Supply vegetable inputs to others when supply is lacking	20	0	36	14	6	8		***B<E	***C>F
Purchase vegetable inputs together	20	0	0	29	28	15		***B<E	***C<F
Lend/borrow money	0	0	7		11	23		***B<E	***C<F
Have contract arrangement (%)	0	80	20	29	6	8	***A<D	***B>E	***C>F
Contract based in written agreement (%)	N/A	0	0	100	7	13		***B<E	***C<F
Number of trading partners you collaborate with									
	1.3	3.5	4.7	50	N/A	50	***A<D		
Have more than one supplier (%)	43	80	46	5	4	5	***A>D	***B>E	***C>F

Note. Significance of Sample T-test comparing (A) and (D), (B) and (E); and (C) and (F): * indicates statistically significant difference at 10% level, ** at 5%, and *** at 1%.

Table 3. Relationships existing between various value chain actors

Item	Malawi			Mozambique			Test (a)
	Input supplier	Middleman	Retailer	Input supplier	Middleman	Retailer	
	A	B	C	D	E	F	
Sample size (n)	14	91	34	27	27	3	
Number of supplier by type		N/A		100	0	31	
Foreign seed company	2.3						
Local stockiest	1.0			2	N/A	N/A	
Farmers			6	N/A	N/A	N/A	
Collectors			6	N/A	N/A	1	
Wholesalers			2	N/A	N/A	5	
Main supplier (%)	N/A			N/A	N/A	4	
Farmer		92	96	N/A			
Wholesaler		8			27	46	***B<E
Other			4		63	44	***C<F
Sold to more than one partner (%)	N/A	100			10	11	****B>E
Main customer (%)	N/A			N/A	N/A	N/A	
Household		100	79	N/A			
Transporter			18		17	13	
Supermarket			1		21	12	***C<F
Wet market			3		26	37	***C<F
Collector					29	26	
Retailer					1	3	

Note. Significance of Sample T-test comparing (A) and (D), (B) and (E); and (C) and (F): * indicates significant difference at 10% level, ** at 5%, and *** at 1%.

All of the actors in the chain had more than one business partner. Input suppliers usually purchase their seeds and, where applicable, other inputs from foreign private companies, while local stockists, farmers and middlemen based in the cities (collectors and transporters) usually obtain their traditional vegetable produce from local farmers and local wholesalers. The retailers, also include wholesalers who sometimes directly retail part of their produce that they source from farmers, other wholesalers and collectors. In the course of our interaction with respondents, we noted that there was no clear identification of the main clients of input suppliers; we assumed them to be farmers. These clients did not consider extension services, advice provided by the input suppliers, or the proximity of the supplier as important factors to improve efficiency. This may be because some input suppliers are also known to occasionally sell their inputs to farmers directly at the farm gate by providing a kind of “door to door” service. On the other hand, farmers with no access to technical advisory services on how to handle seeds or those already experienced in seed handling may have ignored the messages provided by extension agents and decided to explore alternative applications. To investigate the real reasons behind this occurrence, it is important to analyse the structure and performance of both input and supply markets.

The major determining attributes of consumers in purchasing traditional vegetable produce include: price, freshness, shape, size, the origin of culture, food safety (i.e., residual effect of pesticides) and product grading in Thyolo and Zomba (Table 4). In Barue and Milange, the middlemen’s customers considered physical attributes of the produce, produce size, and freshness (including colour) as the most important features of traditional vegetables. Retailers’ customers shared the same preference for the first five features as the middlemen’s clients in Thyolo and Zomba, but were unconcerned about other important factors (Table 4). In Barue and Milange, retailers’ customers were generally not concerned with residual effects of agro-inputs like insecticide/fertilizers that could endanger their health (Table 4). Against our expectations, the survey results showed that product classification is not an important attribute for modern

retailers such as supermarkets. Quality attributes, such as absence of pests and pathogens, and packaging would be expected to be top priorities. This may reveal a low level of knowledge about food quality standards and human health effects caused by ingestion of contaminated food. Thus, awareness creation on quality and food safety standards for fresh produce would be an important area of future intervention to reduce public health hazards and promote efficiencies along the value chain. The fact that supermarkets do not care much about produce quality results in two contradicting issues: it allows the supermarket to obtain large volumes of produce from different suppliers, and leads to decreased motivation to establish contracts specifying quality standards with specific producers.

Table 4. Consumer preference information on most important traits of traditional vegetables and their seeds

Traits	Input supplier buyers	Input supplier buyers	Traits	Middlemen buyers Malawi	Middlemen buyers Mozambique	Retailer buyers	Retailer buyers Mozambique
Germination	Yes	Yes	Colour	Yes	Yes	Yes	Yes
Physical qualities: shape, size	Yes	n/a	Price	Yes	Yes	Yes	Yes
Price	Yes	n/a	Shape	Yes	No	Yes	No
Packaging	Yes	No	Size	Yes	No	Yes	No
Analytical qualities: purity, uniformity	Yes	n/a	Freshness	Yes	Yes	Yes	Yes
Wide variety	No	n/a	Origin of crop	Yes	No	No	No
Proximity of the seller to the farm	No	n/a	Food safety	No	No	No	No
Advices given by seller	No	n/a	Fertilizer residues	Yes	No	No	No
Seed company extension services	No	n/a	Pesticide residues	No	No	No	No
Produce yield	Yes	n/a	Presence of food-	No	No	No	No
Produce price	Yes	n/a	Certification schemes	No	No	No	No
Produce size	Yes	n/a	Sorting	No	Yes	No	Yes
Produce colour	No	n/a	Grading	Yes	Yes	No	Yes
Produce taste	No	n/a	Packaging	No	No	No	No

Analysis and Quantification of Value Chains

The marketing of traditional vegetables generated significant income (Figure 3). In Malawi, average monthly sales of traditional vegetables by middlemen were approximately US \$50, while the mean monthly sale for retailers was US \$37. Traditional vegetable sales accounted for 51-75% of the total income of 60% of middlemen in Thyolo and Zomba, while it accounted for 50% of the income of 70% of retailers (Table 5). The peak sale of traditional vegetables by middlemen was observed in November, with a minimum of US \$20 observed in February and March. A similar pattern was observed for traditional vegetable retailers.

In Mozambique, both middlemen and retailers generated lower monthly incomes compared with their Malawian counterparts. On average, monthly sales of middlemen from Barue and Milange amounted to US \$28, while mean monthly sales for retailers was about US \$26. Peak sales of traditional vegetables by middlemen was observed in April (US \$49.86) with minimum values of US \$15.14 and US \$12.74 in September and August, respectively. A different pattern was noted for retailers, with peak sales observed in August (US \$92.74) and the minimum sale in October (US \$13). The flow of capital was approximately US \$337 per year for middlemen while that for the retailers amounted to US \$315 per year. The contribution from the sale of traditional vegetables to the total income was more important for middlemen than for retailers.

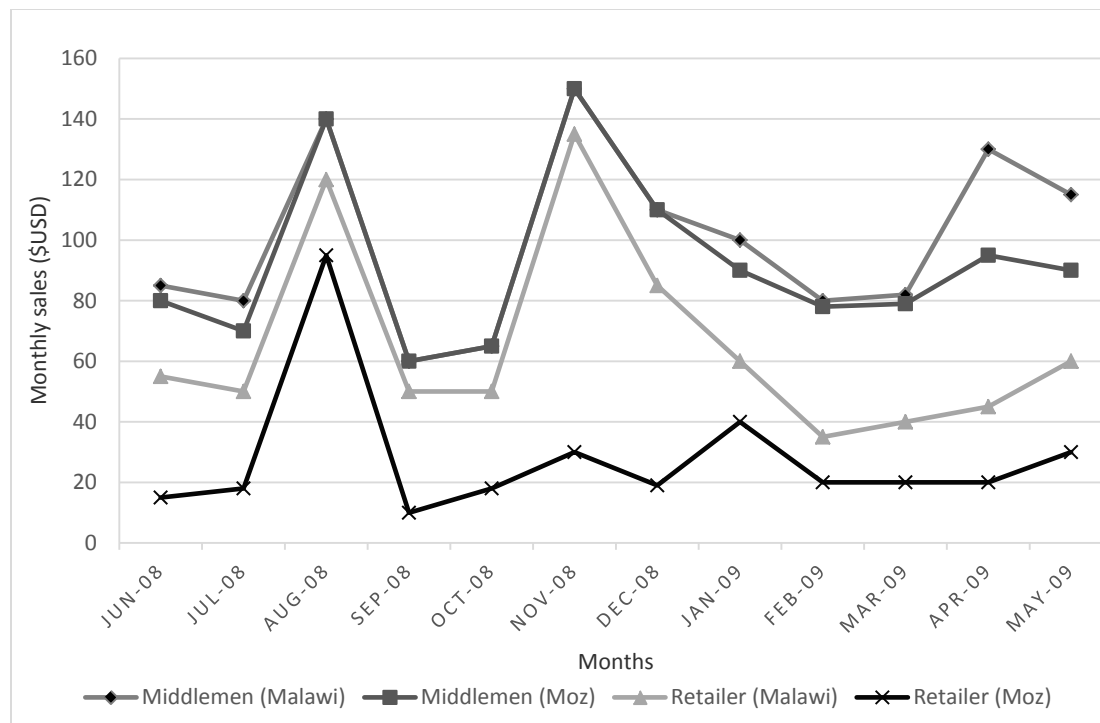


Figure 3. Monthly traditional vegetable sales for amaranth, Ethiopian mustard and African eggplant in Malawi and Mozambique

In Barue and Milange, traditional vegetables accounted for at least 50% of the income, with middlemen recording the highest (86%) followed by retailers (84%). Given the high proportion of total income from these actors, future intervention to boost the commercialization of traditional vegetables in Malawi should focus on producers as well as on market support and information services for both middlemen and retailers. In Mozambique, both actors deserve attention. Services targeted toward value chain actors in the study area are not well developed. The production, collection, and marketing of produce provide economic benefits to practitioners, and also make a major contribution to household nutrition. Results from the field survey showed that in Thyolo and Zomba, 20% of the traditional vegetables produced or marketed by both middlemen and retailers were used for home consumption, while in Barue and Milange, about 30% of produce traded by both agents were used for home consumption, contributing to food biodiversity and balanced diets (FAO 2010; Grivetti and Ogle 2000). Similarly, farmers were found to consume about 30% of their produce, for example out of an average of 30 bundles (60kg) of amaranths 9 bundles (18kg) were consumed in Barue and Milange which further underscores the importance of traditional vegetables in meeting household nutritional needs in the study area (Grivetti and Ogle 2000).

Table 5. Proportion of income derived from the sale of traditional vegetable to total income

Actors	10% or less	10-25%	26-50%	51-75%	76-100%	Did not respond	Total	N
Malawi								
Retailer (%)	4	35	35	12	8	8	100	91
Middlemen (%)		20	20	60			100	14
Mozambique								
Retailer (%)	6	44	31	19			100	27
Middlemen (%)		36	50	7		7	100	27

Value Chain Constraints

Constraints expressed by key informants and the respondents in the course of the field survey for Malawi and Mozambique are summarized in Table 6, see Appendix A. Interestingly, the two countries experienced similar constraints, although the degree slightly differs in some cases. On the production side, the main constraints expressed are: high susceptibility to diseases for exotic vegetables, limited knowledge of seed quality features, and limited technical knowledge. Similar production constraints were reported in previous studies in Malawi (Chadha et al. 2008). These constraints suggest two types of interventions: technical education/training of end users of seeds and other inputs, and provision of plant protection inputs for farmers.

The main constraints regarding input supply were low input demand, lack of access to farm inputs, and lack of good quality seed. These constraints offer opportunity for various interventions such as: alternatives for development of input markets (input fairs, input vouchers, etc.), provision of good quality seed, and input price regulation and control to guarantee fair prices for quality seed. Lack of marketing services such as processing and packaging were also seen as major constraints in the chain. The provision of training and adequate equipment seems to be a desirable alternative, which was also noted in Zambia (Nenguwo 2004). Although there is a significant movement toward growing and trading commercial produce in the study area, farmers complained of some losses on the quantity harvested. According to the focus group interviews in Malawi, more than three-quarters of the participants usually throw away their produce at the end of the market day because they were unable to sell about one-third of their stock (approximately the same amount that was diverted for home consumption). In Mozambique, the majority of the interviewed farmers indicated that less than 20% of the vegetables were thrown away at the close of the day's market sale. The observed results are consistent with those of other authors found elsewhere in sub-Saharan Africa (see for example, Ngugi et. al, 2007) where it has been noted that, the supply of traditional vegetables has not matched the growing demand in terms of quantity and most importantly, quality of produce. Most farmers are semi commercially oriented poor farmers, are not organized, and lack inputs and skills to enable them to satisfy the dynamic market requirements. They are not able to access high value markets such as supermarkets and are often exploited by middlemen. These present promising opportunities for agribusiness practitioners to upgrade existing value chains.

SWOT Analysis of Traditional Vegetable Value Chains

The SWOT analysis presented in Table 7 provides a framework for understanding the controllable and non-controllable factors that future interventions should address for the entire value chain and was extracted from survey results and analysis of value chain constraints. In designing possible interventions, it is suggested that development practitioners and policy makers place emphasis on exploiting the outlined strengths rather than simply addressing weaknesses. Similarly, the opportunities and threats—the external trends that influence the subsector—are also analysed. External opportunities and threats have typically been categorized into political, economic, social, technological, demographic and legal forces. These external forces, such as providing the sector with improved cultivars, can change business trends, increase competition, and change regulations, among others. However, opportunities that are ignored can become threats; threats that are dealt with appropriately can be turned into opportunities. The non-controllable factors can best be dealt with through advocacy and networking to bring about changes in the policy framework.

Table 7. Summary of SWOT Analysis of traditional vegetable value chains

Strengths	Weaknesses
<ul style="list-style-type: none"> ▪ Willingness to sell more traditional vegetables in future ▪ Indigenous vegetables as an important source of income ▪ Input supplier selling seeds and other inputs at farmstead ▪ Strong collaboration among actors 	<ul style="list-style-type: none"> ▪ Lack of contract arrangements ▪ Low demand for inputs ▪ Lack of capital ▪ Poor infrastructure ▪ Low producer and market prices ▪ Lack of processing services ▪ Poor packaging materials and services ▪ Poor seed quality
Opportunities	Threats
<ul style="list-style-type: none"> ▪ Creation of strong farmer associations ▪ Training in production and marketing of produce ▪ Introduction of elite varieties 	<ul style="list-style-type: none"> ▪ Introduction of other high value crops ▪ Changing weather patterns (climate change) ▪ Changes in government policy favouring cultivation of major field crops

Agribusiness Investment and Policy Implications

The underlying value chain mapping SWOT analysis entails the following agribusiness implications for practitioners and policy makers in terms of investment and marketing decision making;

- i. Lack of good quality seed – agribusiness may decide to start up small to medium traditional seeds business to supply quality customized seeds to farmers and home gardeners. These businesses may take the model of contract farming as discussed in Afari-Sefa et al. (2013).
- ii. Low input demand and lack of access to adequate farm inputs – agribusiness such as seed companies, may need to partner with research institutions to engage in cost effective demand creation activities, like farmer field days where demonstrations will be mounted, seed fairs and agricultural shows to induce behavioural change of farmers to see the

benefits of using improved and good quality inputs such as quality seeds and recommended agrochemicals. In-depth market research is required to ensure profitable supply of customized inputs at minimal investment cost.

- iii. Given the growing demand for traditional vegetables in general due to the increasing awareness on the nutritional importance of traditional vegetables in general vis-à-vis the weak linkages among their value chain actors affords the opportunity for agribusiness practitioners in the wholesale, retail sector (e.g., modern super market chains) and processing sector to mobilize farmers into groups for direct marketing relationships while reducing transaction costs through brokers to increase their profit margins. Agribusiness practitioners can also take advantage of the underlying consumer preference attributes for specific quality traits such as freshness, shape, size, the origin of culture, food safety (i.e., residual effect of pesticides) to upgrade existing value chains by targeting specific market segments such as convenience packaging for urban working class populations. This may require vertical integration of smallholders into their existing retail or processing business at the farm level to ensure standards are complied with right from the field.

Conclusions and Recommendations

Amaranth, Ethiopian mustard, and blackjack were the most important traditional vegetables while pumpkin, okra, tomato and cabbage were the most important exotic vegetables in Malawi. In Mozambique, African eggplant, amaranth, jute mallow, Ethiopian mustard, and wild cucumber were ranked high for traditional vegetables while pumpkin, cowpea, kale, onions, tomato, cabbage, and okra were ranked high for the exotic vegetables. The observed dynamics over time and the current performance of vegetables along the value chain in Malawi indicate that although amaranth, pumpkin, and okra are seen as the most preferred crops for commercial trade, cabbage and rape, grown by 18% and 12% of farmers respectively, are actually the most popular crops compared with the situation 10-15 years ago. In Mozambique, kale (17%), pumpkin (13%) and cabbage (13%) are the current popular crops grown by the sampled respondents. Although amaranth is not widely grown compared to 10-15 years ago, it was found to be the most collected from the wild.

A significant level of collaboration occurred among partners along the value chain. The input suppliers took the lead, followed by retailers, and finally the middlemen in collaborating with other middlemen partners. Although the input suppliers had higher levels of collaboration with other business partners, this collaboration was not made on the basis of written contracts, as it was for other types of agents along the value chain. Results of this study indicated that most linkages were spot market relationships, except for the linkage between retailers and supermarkets, which is an ongoing relationship.

To address the classic value chain problems for traditional vegetables discussed in this paper, the following recommendations are offered:

First, the successful introduction and producer accessibility of quality improved vegetable cultivars may require new management practices, which in turn require smallholders to make an investment in seed acquisition and supplies. This activity can be partially centralized by targeting

common initiative farmer groups or community seed production groups whose capacity will be built to produce and market quality seeds in their respective localities.

Second, smallholders should also be encouraged to engage in value-added institutional arrangements required for providing them with market opportunities for increased household income while also ensuring reduction in postharvest losses. An example could involve minimal processing of vegetables in large volumes from contracted traditional vegetable farmers for high value supermarkets retail outlets chains and possibilities for producing solar dried vegetables for both domestic market and export markets. One way to achieve this can be through a “One Village One Product” approach, a business development strategy from Oita Prefecture in Japan (One village one product 2003). The approach involves zoning production, processing and marketing of goods and services so that communities direct their efforts in areas in which they have comparative advantages over other communities. Such a program has been launched by the Malawian government, in which small-to-medium-size processing factories are set up in villages (Chidumu 2007) and groups like Zakudimba Producers Cooperation (ZAPCO) in Blantyre have started at a small scale to dry and market locally traditional vegetable like amaranths.

In addition, further market research is required in crop and market information systems in the study area. In the absence of the current realistic projections of crop size, competitive market conditions, harvest schedules and packing shed activity, farmers base their harvesting decisions on speculation as to potential moves in distant markets. In Kenya and Uganda for example, the use of mobile phones to convey market information has been a huge success. In Uganda, Muto and Yamano (2009) reported that, the mobile phone coverage expansion seems to induce the market participation of farmers in remote areas who produce perishable crops. Several opportunities exist for agribusiness practitioners to invest in the upgrading of traditional vegetable value chains, particularly in the formal seed sector and other agricultural input supply sector as well as integrating smallholders into emerging and restructured markets such as supermarkets through contracting arrangements for produce synchronization and assurance of quality standards through appropriate technology transfer. Finally, options for increasing value addition and improving produce quality (e.g., produce grading and convenience packaging by supermarket retailers and convenience retail shops) for targeted niche high-value market segments can also be explored by agribusiness practitioners.

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Appendix A

Table 6. Summary of constraints of traditional vegetable value chains in Malawi and Mozambique

Constraints	Who is/are affected	Existing service provider	Potential /Opportunities for interventions
Limited knowledge of seed quality features	Farmers	Existing but weak	Awareness campaigns on issues of product quality
Limited technical advice for production	Farmers	Existing but weak	Promote and disseminate messages on production techniques
High susceptibility to diseases in standard vegetables	Collectors, retailers, middlemen	Existing but weak	Help farmers with materials for protection of plants.
Low demand for inputs	Input suppliers	Existing but weak	Align seed prices and respective quality. Opt for packages accessible to producers
Lack of access to inputs	Farmers/households	Existing but weak	Align seed prices and respective quality. Opt for packages accessible to producers
No available good quality seeds	Collector, retailers, middlemen	Existing but weak	Restricting the sale of seed to only the best quality seed
Absence of contractual arrangements for marketing	All	Existing but weak	Training on business management and negotiation of contracts
Lack of packaging services	All	Existing but weak	Encourage the processing and packaging of traditional vegetables
No processing of traditional vegetables before trading	Middlemen	Existing but weak	Encourage the processing and packaging of traditional vegetables
Lack of capital	Wholesaler, transporters, collectors, input suppliers, retailers, middlemen	None	Promote alternative access to capital, such as formal or informal credit
Poor infrastructure	Collector, input supplier, Retailers, middlemen	Existing but weak	Invest in the improvement of access routes for disposal of products
Market price is relatively low	Collector wholesaler, Retailers, middlemen	None	Promote methods of increasing value to traditional vegetables such as processing, branding. Market research and market information is important. Promotion of producer and trader associations can help get better prices on the market.
Too many sellers and very few buyers	Retailers, middlemen,	Existing but weak	Promote methods of processing to increase shelf life of traditional vegetables and sell when supply is low. Market research and market information is important. Promotion of producer and trader associations can help manage low cost of market transactions and product transfer.
Climate	Retailers, middlemen	Existing but weak	Training on natural resources management

Appendix B.

List of 24 commodities and 14 criteria used in the study

24 Vegetable Commodities	14 Criteria Used
1. Amaranths	1. Grown/traded commercially
2. Black Jack	2. Grown/traded commercially
3. Cabbage	3. Good prices
4. Carrots	4. Production experience
5. Hot pepper	5. Available market
6. Kale	6. Home consumption
7. Chinese	7. Opportunity to earn extra income
8. Corchorus (Jute Mellow)	8. Cultural reasons
9. Cowpea	9. Grown now that was not collected before
10. Bean leaves	10. Collected now that was not collected before
11. Okra	11. Traded commercially by middleman
12. Pumpkin	12. Traded commercially by input supplier
13. Rape	13. Traded commercially by retailer
14. Nightshades	14. Other reasons
15. Spider plant	
16. Pumpkin leaves	
17. Wild cucumber	
18. Sweet potato (including leaves)	
19. African eggplant	
20. Onions	
21. Lettuce	
22. Tomato	
23. Ethiopian mustard	
24. Wild Sesame	

