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Mapping Market Prospects for Grain Legumes in Malawi

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Global Center for
Food Systems Innovation

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EXECUTIVE SUMMARY

This work was conducted by Michael Dolislager and David Tschirley in collaboration with the team from LUANAR: Joseph Dzanja (head of department of agribusiness), Mirriam Matita from agricultural extension, and Henry Kankwamba from agricultural economics. LUANAR graduate students assisted with enumeration. Domenico Dentoni, Felix Krussmann, and Jacqueline Halbrecht from Wageningen University collaborated in the company interviews, focusing on policy issues, while the MSU/LUANAR team focused on structural and market issues.

The broad question that guided the full set of research carried out by MSU and LUANAR in Malawi was, where and how can multipurpose legumes be scaled for sustainable intensification of maize systems and what would the potential impacts be, in the medium-term, across the food system in Malawi? The research reported in this paper focused on one key aspect of the scaling question: will markets support broad uptake (scaling) of multipurpose legume cropping systems by providing robust growth in demand over the near-term future for these legumes? It used expenditure elasticities from the 2010/11 Integrated Household Survey (IHS) together with population (current and projected) data from the United Nations (UN) and scenarios on per capita income growth to evaluate alternative scenarios for future growth in demand for these products.

Our clear answer is that market demand is very likely to support such uptake; indeed, Malawi faces a major challenge achieving the total production growth that will be needed to keep up with projected growth in demand. Based on scenarios of 1% and 4.5% annual growth in real per capita incomes, total direct demand for legumes is projected to rise between 3.5% and 6.3% per year. Demand for all meats, which over time will drive demand, especially for soybeans, is projected to rise between 4% and 9% per year. In order, we consider growth prospects strongest for soybean, followed by either pigeon pea or groundnut, depending primarily on export performance. Cowpea's longer-term growth prospects are limited unless new food processing strategies are developed to make intensive use of this crop.

We focus on three implications of this work for meeting this challenge:

1. Continued efforts at farm and post-farm levels to reduce aflatoxin contamination in groundnut:
2. Assistance packages for small and medium food processors
3. Identification and testing of small-scale food processing technology

Women already play an important role in Malawi's post-farm agrifood system, but are mostly confined to small-scale retail trade that likely generates low daily returns for most. Therefore, special attention needs to be given to promoting the entrepreneurial capacities of women so that they can grow their businesses, add more value to their products, and increase their own earnings while providing more jobs to other Malawians.

The highest priority for GCFSI in this area should be on funding the local team to (a) carry out an inventory of the food processing sector serving at least two cities, and (b) design and conduct a more focused and detailed programmatic design study that would result in proposals for concrete programmatic initiatives for piloting, adaptation, and eventual scaling.

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ACRONYMS AND ABBREVIATIONS

GCFSI	Global Center for Food Systems Innovation
Gn	Groundnut
ICRISAT	International Crops Research Institute for the Semi-arid Tropics
IHS	Integrated Household Survey
LUANAR	Lilongwe University of Agriculture and Natural Resources
MAPAC	Malawi Programme for Aflatoxin Control
MSU	Michigan State University
Pp	Pigeon pea
prodn	production
Sb	Soybean
SSA	Sub-Saharan Africa
UN	United Nations
USD	United States Dollar

1. INTRODUCTION

Research on grain legume cropping systems has demonstrated that these systems are capable of substantially improving the agronomic sustainability and long-term productivity of agriculture in Malawi (Snapp et al. 2002; Mhango, Snapp, and Phiri 2013). However, doing so requires that these systems and their constituent crops be widely adopted. The broad purpose of this report is to assess the market growth prospects for these grain legumes in Malawi over the next 15 years, as one crucial element in assessing the likelihood and challenges of ensuring widespread adoption of these cropping systems by Malawian farmers.

The report does three things. First, it characterizes national and regional patterns of production, marketing, and consumption of soybean, pigeon pea, cowpea, and groundnut, using data from Malawi's 2010/11 Integrated Household Survey. Second, using data collected under this project, it quantifies the structure of the marketing system for grain legumes serving the local consumer market in Lilongwe City, estimating market shares for key supplying regions, key wholesale/assembly markets where retail traders obtain these products, and key retail markets in the city. Third, the report quantitatively and qualitatively assesses growth prospects for soybean, pigeon pea, cowpea, groundnut, and the meats that drive *derived demand* for some of these products. This section includes a discussion of the range of grain legume processing that occurs in Malawi; we focus on processing based on research showing very high growth prospects for processed foods in Africa over the coming decades (T'schirley, Haggblade, and Reardon 2013; T'schirley et al. 2014). Before turning to study results, the next section briefly reviews data and methods used.

1.1. Data and Methods

Key data used in this report, and methods applied are:

1.1.1. The 2010/11 Integrated Household Survey (IHS)

This is the latest nationally representative household expenditure survey in Malawi, and allows estimation of total production, sales, and consumption (separately for consumption from own production and from purchases) of these crops. All analysis is done using population weights as developed by Malawi's national statistical agency for this survey.

1.1.2. Market-mapping Data Collected by the LUANAR/MSU Research Team during July and August 2014

A list of markets surveyed with number of interviews and percent female traders is in Annex A, and questionnaires in Annex B. This technique involves the following: (a) identifying as many retail markets as possible in the urban center using an iterative approach crossing municipality data, local researcher knowledge, and selected market visits; (b) visiting each market and doing a rapid count of the number of traders of each of the target crops; and (c) listing markets in descending order of total number of traders of the target crops, and conducting a rapid, questionnaire-based survey in enough markets (starting with the largest and working down) to cover at least two-thirds of the number of counted traders across all markets. The questionnaire identifies the gender of the trader, then identifies the first, second, and third most important supply sources used by that trader over the past 12 months for the target crops, and finally asks what share of total supply came from the most important supply source. Interviews typically take 7-10 minutes.

The retail data is then used to identify wholesale or assembly markets used as supply sources by the retailers, and the relative size of each. The top two or three of these markets are then surveyed with a similar questionnaire, which serves to identify and estimate the market size of rural areas and markets where the traders selling in these markets obtain their product.

Based on an assumption of equal average size of daily transactions per trader across markets within a market level,¹ the technique allows estimation, with minimal time invested in data collection and processing, of the relative sizes (market shares) of (a) the various retail markets in the urban center; (b) procurement by retail traders directly at farm versus in wholesale/assembly markets; (c) the various identified wholesale/assembly markets; and (d) production areas and rural markets supplying the wholesale/assembly markets frequented by retailers.

Error in the method could come from (a) meaningful variation in average transaction quantities per trader across markets within a market level, and (b) a large share of traders having more than two important supply sources and obtaining meaningful shares of their total supply from sources other than the top two. We argue that our assumption of equal mean daily transactions per trader across markets is justified based on the very low barriers to entry into retail trade in countries such as Malawi, which would tend to drive convergence of daily returns (and thus daily volumes) across traders. Regarding the second source of error, we note that, of the 576 fully completed interviews at retail level, only 85 (15%) listed three supply sources—all others listed one (52%) or two (33%). Thus, in 85% of cases this approach yielded definitive answers to the share of total supply coming from the each source (100% in the 301 cases listing only one source, and 100% minus the indicated share from the top source in all cases listing only two supply sources). In the 15% of cases indicating three supply sources, shares were calculated as follows:

- Top supply source: as indicated by trader
- Second supply source: 67% of (100% - percent from top source)
- Third supply source: 33% of (100% - percent from top source)

Of the 85 cases (15%) listing three supply sources at retail, 24 (29%) indicated that *all or nearly all* of their supply came from the top source, and 42 (50%) indicated that *more than half* came from this source; either response leaves a relatively small share coming from the third supply source. The amount of potential error from the computation method shown above, which involves an admittedly arbitrary assumption of a 2:1 ratio of size of secondary versus tertiary supply source, thus introduces very little error into the calculation of relative market sizes.

Of the 155 completed questionnaires at wholesale/assembly level, 29 (19%) indicated three supply sources. Of these 29, 17 indicated that the top source provided all or nearly all of their supply, and nine indicated the top source provided more than half. Again, potential errors from our simplifying assumption above are thus very low at wholesale/assembly level.

¹ In other words, we assume that average volume per trader in retail market A is the same as average volume per trader in retail market B and all other retail markets; the same assumption is made for wholesale/assembly markets. Volumes across traders can vary and average volumes can vary between retail and wholesale; only average volumes per trader across markets at a given level of the system need be the same.

1.1.3. IHS Data Together with Various Other Data Sources for the Model Projecting Future Demand for Grain Legumes

See Tschirley, Haggblade, and Reardon (2013), and Tschirley et al. (2014) for a description of the general modeling approach. For this paper, comparable methods were applied to the Malawi 2010/11 IHS data for derivation of demand elasticities and budget shares and projection of demand under two scenarios from 2010 to 2025.

1.1.4. Qualitative Data from Interviews with Grain Legume Traders and Processors

Nine companies were interviewed in Lilongwe and Blantyre. The focus of the interviews was on the grain legumes they trade; the share of each going into processing, direct local sale, or exports; growth over past 3-5 years; and level and source of anticipated growth over the next 3-5 years. Key policy issues affecting their business were also discussed. Table 1 provides information on each interview.

Table 1. Grain Legume Trading and Processing Company Interviews

Company Name (person interviewed and location)	Legumes Bought	Processed Legume Based Products	Notes
Export Trading Group (ETG): Shakil Shaikh, Marketing Manager (Blantyre) and Vijay Kumar, Procurement Team Member (Lilongwe)	Pigeon pea, (Pp) Soybean, (Sb) Groundnut, (Gn) Cowpea, Common Beans	Pp: dal, animal feed Sb: likuni phala, soya pieces	Major African multinational. Increasing capacity for expected growth in markets for soya pieces, peanut butter, soya cooking oil, and animal feed.
RAB Processors: Sai Kiran Josyabhartla, Managing Director (Blantyre)	Soybean, Pigeon pea, Groundnut, Cowpea, Common Beans	Sb: likuni phala, animal feed Pp: dal Gn: peanut butter, roasted nuts	Large local company involved in all aspects of the legume industry. Adding production lines for soya pieces for local market and graded/blanched groundnuts for export market potential.
Universal Industries: Jean Pankuku, Group Food Technologist (Blantyre)	Soybean, Groundnut	Sb: instant porridge, soya pieces, cooking oil, biscuits Gn: biscuits, peanut butter	Highly diversified local food processing company. Instant soybean based porridge is demanded in rural areas for many reasons, including energy cost savings
Sunseed Limited: Manoj Kumar-Vats, Managing Director (Lilongwe)	Soybean, Groundnut	Sb: cooking oil, animal feed Gn: cooking oil, animal feed	A local cooking oil company that views oil as the byproduct of animal feed, because animal feed has the greater profit potential.

Company Name (person interviewed and location)	Legumes Bought	Processed Legume Based Products	Notes
Transglobe: Fred Kaima, Warehouse/ Logistics Manager (Blantyre)	Pigeon pea, Soybean, Cowpea, Groundnut, Common Beans	Pp: dal Sb: likuni phala, animal feed	The agriculture trade and exporting arm of locally based Tayub Corporation. Will be adding production lines for soya pieces to other processing activities
Demeter Agriculture Limited / Farmer's World: Jignesh Patel, Administration Manager (Lilongwe)	Groundnut, Soybean, Pigeon pea, Cowpea, Common Beans	None	Local company that owns multiple Malawian companies, including Demeter Agriculture Limited. They do not currently process legumes, nor expect to. Business focus is on selling inputs and trading unprocessed production.
Agricultural Commodity Exchange (ACE): Sally-Ann Pauw, Trade Specialist (Lilongwe)	Soybean, Pigeon pea	None	Local, donor subsidized, non-profit that facilitates the trade of maize and legumes. They do not engage in processing.
ADMARC Limited: Noora Miteche, Marketing Manager (Blantyre)	Groundnut, Soybean, Cowpea, Common Beans	Gn: grading Pp: dal	Malawian parastatal. Primary processing activities are cotton ginning and rice milling. Considered industry leader in groundnut grading. Anticipate growth in production of dal, and intend to enter growing markets of peanut butter and animal feed.
Afri-Nut: Lisbon Qoma, Operations Manager (Lilongwe)	Groundnut	Gn: grading, ready use paste, cooking oil, animal feed	Local company involved in trading, grading, storing, and early stage processing of groundnuts to be sold to other processors for final processing.

Source: Authors.

2. CURRENT PRODUCTION, MARKETING, AND CONSUMPTION PATTERNS

Tables 2 and 3 summarize basic information on the production, marketing, and direct human consumption of grain legumes in the country. All results are based on data from the IHS 2010/11.² Three points stand out in Table 2. First, groundnut and pigeon pea dominate production, but groundnut alone dominates local consumption. This pattern reflects the strong export market for pigeon pea, while groundnut is primarily consumed locally. Second, soybean is the most intensively marketed crop, with nearly twice the marketed share of production of any other crop. This pattern is not surprising, given that soybean was not traditionally produced in Malawi and that its rapid recent expansion was driven almost entirely by demand for animal feed, complemented more recently by an emerging market for human consumption (see below). Third, cowpea production and sales are tiny compared to the other crops, with production only one-sixth that of soybeans and sales less than one-tenth.

Three points can be highlighted in Table 3. First is the high regional specialization in production and sales of soybean (83% of production and 93% of sales come from the Central), pigeon pea (97% of production and 98% of sales in the Southern), and groundnut (77% and 86% in the Central). Pigeon pea, in fact, is a crop entirely of the Southern Region, which accounts for 97-98% of production, sales, and consumption out of own production, and 89% of consumption out of purchases. Second, markets lead to more spatially dispersed consumption of soybean and groundnut but not of pigeon pea.

Table 2. Production, Marketing, and Direct Consumption of Grain Legumes in Malawi

	Production (MT)	Sales (MT)	% Sold	Sales ('000 USD)	Price (USD/MT at farm)	Direct Consumption ('000 USD)
----- Levels -----						
Soybean	28,094	19,371	69%	8,194	423	20,288
Pigeon pea	77,487	20,773	27%	8,716	420	68,806
Cowpea	4,929	1,738	35%	812	467	28,920
Groundnut	102,574	28,204	27%	22,878	811	171,158
Other legumes	32,612	9,530	29%	6,679	701	213,548
----- National Shares -----						
Soybean	11%	24%		17%		4%
Pigeon pea	32%	26%		18%		14%
Cowpea	2%	2%		2%		6%
Groundnut	42%	35%		48%		34%
Other legumes	13%	12%		14%		42%

Source: Author calculations from IHS 2010/11 dataset. Notes: sales are valued at prices received by farmers at farm gate or in rural markets; consumption is valued at consumer purchase prices.

² Note that the production figures are lower than those provided in FAO, which are based primarily on official data.

This pattern is shown by the lower maximums across regions on consumption shares from purchases compared to production shares (e.g., in the Central Region, groundnut's production share is 77% but only 43% for consumption from purchases; the figures are 83% and 57% for soybean), and by the correlations that show production driving consumption from purchases much less than it drives consumption from own production (for all but cowpea). The impact of markets on this redistribution is greatest for groundnut. Finally, cowpea production in the Central Region appears to be far more commercialized than in other areas—this region accounts for only 24% of national production but 51% of national sales value.

Table 3. Regional Dimensions of Grain Legume Production, Sales, and Consumption in Malawi

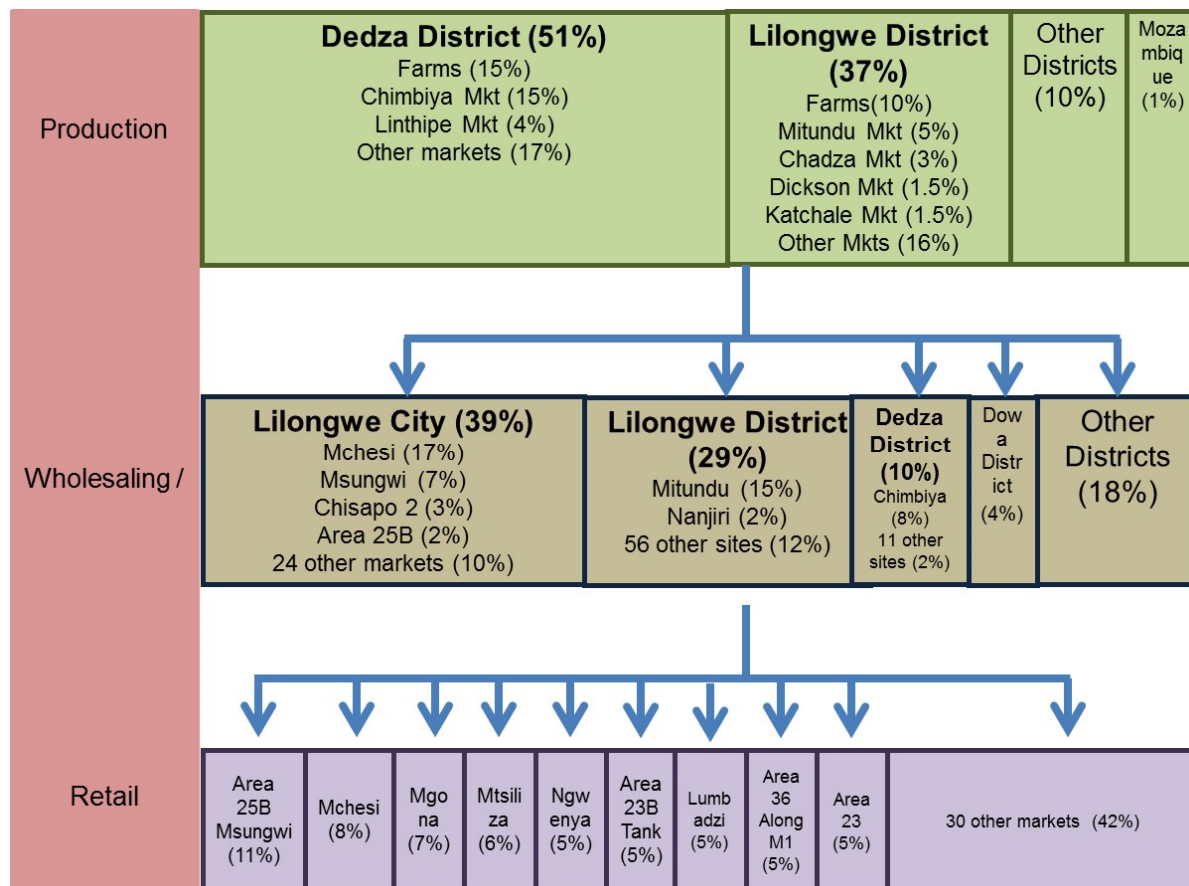
	Production share	Sales value share	Consumption share from:		Correlations, production share with:	
			Own production	Purchases	Consumption from own production	Consumption from purchases
Soybean						
Northern	13%	6%	18%	14%		
Central	83%	93%	78%	57%	1.00	0.90
Southern	4%	1%	4%	29%		
Pigeon pea						
Northern	0%	0%	0%	2%		
Central	3%	2%	2%	9%	1.00	1.00
Southern	97%	98%	98%	89%		
Cowpea						
Northern	23%	5%	12%	6%		
Central	24%	51%	47%	43%	0.52	0.78
Southern	53%	45%	41%	51%		
Groundnut						
Northern	6%	3%	13%	15%		
Central	77%	84%	65%	43%	1.00	0.64
Southern	17%	13%	22%	42%		

Source: Author calculations from HIS 2010-11 dataset. Note: correlation is between production share and consumption share from purchases.

3. STRUCTURE AND FLOWS IN THE LOCAL CONSUMER MARKET

Figure 1 shows the structure of the local consumer market supplying Lilongwe City with grain legumes, derived from the retail and wholesale market mapping data. Percentages in the figure refer to all legumes included in the study—soybean, cowpea, pigeon pea, and groundnut. Several results stand out. First, Dedza and Lilongwe districts of the Central Region dominate supplies for the city, providing 52% and 37%, respectively, of the city’s total supply. This pattern is consistent with the Central being the dominant producer of groundnuts and soybean combined with the minimal consumption of pigeon pea outside of the Southern Region, where almost all its production takes place. Second, in rural areas, purchases by traders in rural assembly markets dominate, with about three-quarters of all purchases at this level, compared to about one-quarter (26%) that is purchased directly at farms. Malawi appears to have a dense system of rural assembly markets, something not always seen in less densely populated neighboring countries. Third, Lilongwe has no dominant wholesale market and in fact has a highly dispersed system of small assembly markets feeding into retail markets; the system is best not even referred to as wholesaling, due to its dispersed structure and the likely very small scale of operation of nearly all traders. No single market accounts for more than 17% of total supply to retail markets (Mchesi is the top market for supplying retailers), and a total of over 100 separate

Figure 1. Structure and Flows in the Local Consumer Market Serving Lilongwe City with Grain Legumes



Source: Authors’ calculations from market mapping data collected in Lilongwe City.

locations were identified by retail traders as places where they regularly purchased product. This is an extremely high number, reflecting great dispersion of trade, compared to other countries in the region such as Mozambique and Zambia. As an additional indicator of this highly dispersed structure, retail traders purchased over 60% of their supplies in markets outside of Lilongwe City. This pattern is also unusual when compared to neighboring countries, where urban retail traders primarily purchase either in their own market or in a dominant wholesale market located elsewhere within the city or in its near outskirts. Finally, retailing itself is highly dispersed, with nearly 40 identified markets and the largest, Area 25B Msungwi, holding only an 11% market share.

This pattern of trade differs very little by-product: Mitundu and Mchesi are first and second, respectively, in supplying groundnuts and soya bean to retailers, and Mchesi is first in pigeon pea and cowpea. The only slight difference is found in pigeon pea, where two markets in the Southern region—Lizulu in Ntcheu District and Kubanda in Balaka District—rank third and fifth with 7% and 6%, respectively, of the supply to retailers. This of course is not surprising given the heavy dominance of the Southern Region in pigeon pea production.

4. GENDER BALANCE

Wholesale trade is dominated by males, with 82% of all traders at this level. At retail level, female traders make up about half of all traders: the market-counting exercise, conducted across all identified markets prior to the market-mapping survey, showed that 477 out of 974 traders (49%) were female, while the market-mapping exercise itself resulted in a 51% female share at retail. This share varies widely across markets, however, from 86% in Chisapo 1 down to 16% in Chisapo 2. There is no evidence that the gender balance at retail varies systematically across crops, ranging only from 47% female for pigeon pea to 53% female for cowpea. The dominance of males at wholesale and the slight dominance of females at retail is a common pattern throughout east and southern Africa, likely reflecting more limited access to capital for females that prevents most of them from entering the wholesale trade.

5. GROWTH PROSPECTS

Based both on company interviews and on simple modeling of future demand scenarios, we conclude that as long as income growth remains positive, market growth prospects are strong for grain legumes in Malawi. In order, we consider growth prospects strongest for soybean, followed by either pigeon pea or groundnut, depending on factors discussed below. Cowpea's longer-term growth prospects are limited unless new food processing strategies are developed to make intensive use of this crop.

This positive assessment is based on two factors: the country's rapid population growth, which is projected to remain near 3% per year for the near future, and, paradoxically, its very low average incomes, which lead consumers to devote a large share of additional income to food expenditures. Any positive per capita income growth will thus lead to impressive growth in total market demand within the country. Regarding this latter factor, we note that most interviewed companies see strong growth in an urban middle class in Malawi, and consider this a major reason for optimism regarding market prospects.

Export demand could also contribute to growth. Company interviews indicated that exports of both processed and unprocessed foods are a major component in many companies' businesses. Dal—processed pigeon pea—is currently the main export, destined primarily for India and United Arab Emirates. Growth has been very strong in recent years and companies involved—Export Trading

Group (ETG), RAB, Transglobe, and ADMARC—expect it to continue. A key fact in this market is that government does not consider it a strategic crop and therefore does not intervene with trade bans, tariffs, or any controls on local trade. The major dynamic in the market is that good pigeon pea harvests in India lead local companies to process their pigeon pea for export both to India (which remains deficit) and the United Arab Emirates, while a poor pigeon pea harvest in India makes it more profitable to export unprocessed pigeon pea. In either case, trade proceeds unhindered by government policy.

Soybean is also exported, both in raw and processed form. Whole soybean, meal, and even soya pieces move at least to Botswana (which has a large livestock sector but poor conditions for crop production) and South Africa. Unlike pigeon pea, trade policy both in Malawi and its neighbors is a major consideration in this market. At the time of our interviews (June and July of 2014), an export ban was either still in effect or had recently been lifted; some companies thought it was still in place while others indicated that it was not. Policy in this regard is influenced by competing interests of different players in the food system: trading firms and processors for human consumption wish to keep borders open to maximize their flexibility and take advantage of what is seen as the lucrative export market in Botswana. Other companies, whose interests are primarily in animal feed or soybean oil, would prefer to see export bans on whole soybean, to increase availability and lower prices in Malawi.

Groundnut exports are primarily informal, likely to Mozambique and perhaps Zambia, due to concerns in formal markets about aflatoxin. Three large companies did indicate, however, that they export about 20% of their groundnut purchases, presumably through formal channels. Additionally, at least two companies are entering the value-added export market with blanched and sorted groundnuts for the confectionary market; they believe their procedures will allow them to cost-effectively reduce aflatoxin contamination below permitted levels. ADMARC is considered a leader in groundnut grading, while Afri-Nut does early-stage processing of groundnuts for sale to processors. Formal export growth for groundnuts will depend heavily on concerted action among the main players to ensure low aflatoxin contamination.

Much of the future growth of this sector will be tied to the market for processed foods and animal feed. Firms in Malawi produce a large number of processed items with grain legumes. Estimating the size of each of these markets, and the total size of the processed food market in the country, is not possible due to lack of data and the fact that companies do not typically reveal quantities produced. Interviews with companies and visits to multiple markets in Lilongwe suggest that the main processed items are soya pieces; soybean oil and other vegetable oils; graded groundnuts; peanut butter; breakfast foods including Likuni Phala, which started as a product for the emergency response market but has now entered the commercial market; animal feed, especially for poultry; and dal, processed pigeon pea destined primarily for the export market. Toasted soybean flour and groundnut flour are also found in markets, and interviews suggest that they are relatively new. See Table 1 above for further information on processing products found in the market.

Soya Pieces are an extruded, flavored soybean product typically sold in 90-gram packages at MWK70/package, and marketed as a meat substitute to the emerging middle class. This product is produced by Seba Foods, a subsidiary of Export Trading Group; by Universal Industries; and by perhaps two small companies. RAB Processors and Transglobe plan to enter the market in coming months. All firms are strongly optimistic about prospects for growth; ETG indicates that it has tripled its production over the past two years, that its current weekly production is sold out in half a

week, and that they are planning to expand their production capacity, currently located in Lilongwe, into Blantyre.

Quantitatively assessing growth prospects requires estimation of consumer expenditure elasticities and budget shares for the crops in question and for foods for which they serve as an input. Table 4 provides this information for consumption of each legume, and for livestock products, in rural and urban areas. We include livestock products because they use soybean (and sometimes pigeon pea) in their production and thus, drive additional *derived demand* for those crops—demand that stems from final consumer demand for the livestock products (and those products’ demand for the legumes as a production input), not for the legumes themselves. Six patterns stand out.

- First, demand elasticities are lower in urban than in rural areas for both direct consumption of legumes and for meats.
- Second, budget shares are lower in urban than in rural areas for direct legume consumption but are *higher* in urban areas for meats. Both patterns reflect the much higher average incomes seen in urban areas—about \$3.10 USD per person per day compared to only \$1.15 USD.³ Higher incomes always push demand elasticities for food down (based on Engel’s Law) and nearly always drive budget shares for meats higher.
- Third, demand elasticities for direct consumption are very high for soybean, groundnut, and other legumes in rural areas, and very high for soybean and groundnut in urban areas. Indeed, soybeans and groundnuts are clearly luxury goods in rural areas, as shown by elasticities above 1.0. This means that the budget share for these products will rise with income, rather than falling as for most food items. Elasticities for these two are near 1.0 in urban areas, meaning that their budget share will remain nearly constant as incomes rise. Elasticities this high for basic grains are unusual, and reflect the current very low incomes in Malawi, which mean that households still spend large shares of any additional income on food. These elasticities will fall over time as incomes rise, but will likely remain high for many years. Thus, demand for direct consumption of these two crops is likely to grow very rapidly in both areas.
- Fourth, cowpea has the lowest rural elasticity and a *negative* urban elasticity, meaning that urban residents buy less of this product as their incomes grow. This quantitative result is consistent with statements by companies, one indicating that it was *a dying crop* and another saying that they buy it only inadvertently because farmers tend to mix it with common beans.
- Fifth, demand elasticities for meat, dairy, and eggs are exceptionally high, above 2.0 for all but eggs in rural areas, and well above 1.0 in all cases in urban areas. It was expected that demand elasticities for these products would be substantially higher than for the legumes themselves, as with few exceptions consumers throughout the world increase these products’ shares in their diets as incomes rise.

³ All expenditure figures are in real purchasing power parity terms with a base of 2005.

Based on the elasticities and budget shares in Table 4 and two scenarios on growth in incomes,⁴ Table 5 projects possible growth between 2010 and 2025 in demand for legumes and for livestock products.

Table 4. Expenditure Elasticities and Food Budget Shares for Direct Consumer Demand for Grain Legumes, and for Meat, Dairy, and Eggs in Malawi

Food Item	Elasticities		Food Budget Shares	
	Rural	Urban	Rural	Urban
Legumes				
Soybeans	1.29	0.99	0.31%	0.22%
Pigeon pea	0.67	0.43	1.70%	0.38%
Cowpea	0.58	-0.42	0.75%	0.26%
Groundnuts	1.11	0.98	2.89%	1.57%
Other Legumes	1.00	0.42	3.88%	4.11%
Meat, dairy, eggs				
Beef	2.22	2.12	0.94%	3.24%
Other Meat	2.07	1.54	3.65%	3.25%
Dairy	2.55	1.56	0.65%	2.35%
Poultry	2.25	1.70	3.73%	5.31%
Eggs	1.76	1.36	1.59%	2.61%

Source: Author computations from IHS 2010/11 survey data.

⁴ The scenarios are differentiated only by their average annual rate of per capita income growth: 4.5% (the mean growth in east and southern Africa over the past 10 years according to PovcalNet data from World Bank) and 1.0%. The latter figure is chosen both to put a likely lower bound on growth and to recognize Malawi's relatively poor growth performance over the past five years compared to its neighbors in ESA. Each scenario demonstrates inequality-increasing growth (higher income households enjoy slightly higher percentage growth in their incomes) and urban bias (urban households enjoy slightly higher percentage income growth than rural households). Both these characteristics typified growth in eastern and southern Africa over the past decade. 2010 elasticities are adjusted down appropriately as incomes rise. See Tschirley et al. 2014 for more detail.

Table 5. Projected Growth in Local Demand for Direct Human Consumption of Grain Legumes in Malawi from 2010 to 2025, under Two Alternative Scenarios

Food items	4.5% per capita growth per annum				1.0% per capita growth per annum			
	Total value (’000,000 USD/yr.)		% change		Total value (’000,000 USD/yr.)		% change	
	2010	2025	Total	Annualized	2010	2025	Total	Annualized
Legumes								
Soybeans	16	48	206%	7.7%	16	27	74%	3.8%
Pigeon pea	72	153	113%	5.2%	72	114	59%	3.1%
Cowpea	33	64	93%	4.5%	33	52	57%	3.0%
Groundnuts	136	382	180%	7.1%	136	232	70%	3.6%
Other Legumes	213	527	147%	6.2%	213	362	70%	3.6%
All Legumes	470	1173	150%	6.3%	470	786	67%	3.5%
Meat, dairy, eggs								
Beef	120	522	334%	10.3%	120	240	99%	4.7%
Other Meat	231	843	265%	9.0%	231	416	80%	4.0%
Dairy	91	356	293%	9.5%	91	178	96%	4.6%
Poultry	293	1030	251%	8.7%	293	540	84%	4.1%
Eggs	118	372	214%	7.9%	118	214	81%	4.0%
Total	854	3123	266%	9.0%	854	1586	86%	4.2%

Source: Author calculations from IHS 2010/11 data.

Even under the low growth scenario, total growth in direct demand for legumes by consumers increases by at least 3% per year. This result is driven by the high demand elasticities associated with poverty and by the nearly 3% population growth that Malawi is forecast to maintain over the projection period. The 4.5% growth scenario delivers projected growth rates in demand as high as nearly 8% for direct consumption of soybeans and 8% to 10% for the various meats.

Further analysis would have to be conducted to quantify the likely impact on legume demand of the rise in demand for livestock products. This would require quantifying current *feeding ratios* in Malawi—the amount of different grains and legumes used per kg of animal production—and projecting them into future as production processes intensify and use more balanced feed instead of grazing and foraging. Such analysis is beyond the scope of this work.

Soybean’s strong growth prospects are based on its high direct demand elasticity, its established role as a source of protein and fat in animal feed, and the very high demand elasticities for livestock products. Note that soybean’s derived demand (through livestock products) will be driven by two factors: very rapid growth in demand for livestock (as long as incomes rise) and a likely move over time towards intensified animal production featuring more use of balanced feeds (and less use of pasture). These factors will combine multiplicatively to drive demand growth for soybean. This transition is already being seen in poultry production; production of other meats in the country is dominated by pasture systems and the transition to widespread use of balanced feeds will take longer to occur. Rising energy prices could slow the transition but are unlikely to stop it.

Growth in demand for pigeon pea and groundnuts may be subject to more uncertainty. Positive growth factors for groundnuts are its robust and broad-based local demand and high demand elasticity, together with strong emerging demand in local markets for processed products such as peanut butter and roasted peanuts. On the negative side, exports of groundnut and its processed products are often limited to informal trade due to the prevalence of aflatoxin, which leads to import bans in neighboring South Africa and other developed economies. If Malawi were to succeed in keeping aflatoxin levels in its groundnut to internationally accepted levels, it could potentially see substantial export growth. The main positive growth factor for pigeon pea is its strong export market, which can absorb far more product than Malawi can produce. This market is, however, both competitive and potentially unstable, depending on policy and production trends in India. A second potentially positive factor for pigeon pea relates to the fact that its consumption in Malawi is currently limited almost entirely to the south where it is produced (see Table 3 above). Demand growth in other regions of the country, if it could be achieved (especially the Central due to its population), could fuel strong overall growth in local demand. Achieving such growth in the near-term, however, would typically require organized action to promote the crop and is often difficult to achieve even in the presence of such action.

6. CONCLUSIONS AND IMPLICATIONS

The broad question that guided the full set of research carried out by MSU and LUANAR in Malawi was, Where and how can multipurpose legumes be scaled for sustainable intensification of maize systems and what would the potential impacts be, in the medium-term, across the food system in Malawi? The research reported in this paper focused on one key aspect of the scaling question: will markets support broad uptake (scaling) of multipurpose legume cropping systems by providing robust growth in demand over the near-term future for these legumes? Our clear answer is that market demand is very likely to support such uptake; indeed, Malawi faces a major challenge achieving the total production growth that will be needed to keep up with projected growth in demand.

We focus on three implications of this work for meeting this challenge:

6.1. Continued Efforts at Farm and Post-Farm Levels to Reduce Aflatoxin Contamination in Groundnut

Unless it is effectively controlled, aflatoxin contamination in groundnuts will exact an increasing toll on human health within the country and will reduce the growth of the sector by closing off formal exports (Waliyar et al. 2013). ICRISAT has for many years focused on this issue, and funding for programs to promote aflatoxin control has increased in recent years. The Malawi Programme for Aflatoxin Control (MAPAC) launched in late 2013 in an attempt to bring an integrated, nation-wide approach to the problem. It is beyond the scope of this paper to assess these efforts and recommend where additional or different focus is needed. The one point we can make is that export market demand for peanut butter and nuts for the confectionary trade could be a key tool for engendering the price differentials that are needed—along with increased knowledge at farm and post-farm levels—to drive down aflatoxin contamination. The implication is that a coordinated approach featuring active collaboration between processor/exporters, traders, and farmers (especially farmer associations) is needed.

6.2. Assistance Packages for Small and Medium Food Processors

The well-known demographic bulge in Sub-Saharan Africa (SSA) means that jobs need to be created for as many as 15 million people each year on the continent if youth are to find remunerative employment. With a population growth rate within the upper third of SSA countries, this problem is especially challenging in Malawi. While growth across the entire economy is needed to create these jobs, the large share of the agrifood system⁵ in African economies means that growth in that system will be especially important to job creation. In Malawi, we calculate that 91% of all jobs in the country, and 60% of all non-farming jobs, are in the agrifood system.⁶

When these facts are combined with the rapid growth of demand for processed foods in the country, food processing becomes a natural focus for promotion of job creation. The key question in this regard is what the labor intensity—the number of jobs per unit of output—of the food processing sector will be. Labor intensity is a function of the scale and, relatedly, the capital intensity of production: larger firms tend to be more capital intensive and thus generate fewer jobs per unit of output. It follows that, if large numbers of small and medium-size local food processing firms can be competitive in the market, the job intensity and total job footprint of the sector can be increased. An important ancillary benefit of such a job-intensive approach is likely to be a more equal distribution of income as small entrepreneurs make solid profits themselves and provide living wages to more people.

We know that many large players are already in the Malawian food processing market: the multinational company ETG, local firms such as RAB Processors, Universal Industries, Transglobe and others. OLAM, another very large multi-national, is also set to enter the sector. Smaller processors are also clearly in the market, although we are aware of no systematic assessment of their size and activities.

Therefore, we suggest a two-pronged approach to promoting the labor intensity of food processing in Malawi. First, the micro-, small-, and medium-scale food processing sector needs to be better understood. Inventories of firms, what they produce, how long they have been in business, and how many people they employ are a first step in generating this understanding. Follow-up work would need to focus in more depth on the constraints to expansion that these firms face and on possible approaches to relieving those constraints.

In a second step, alternative packages of assistance can be designed for local micro and small entrepreneurs attempting to anticipate and exploit the growing market for processed and perishable foods. These packages of assistance might include some combination of (a) training in finance/accounting, technical management of a given technology, and business strategy; (b) direct assistance in market identification and market access including information on product characteristics demanded by the end consumer; (c) training in safe food practices to meet the safety/quality requirements of the targeted markets; and (d) mediated access to affordable and timely credit, whether for investment or operations.

⁵ We define the agrifood system as the set of players and processes involved in producing, processing, distributing, and consuming food and non-food agricultural products in a country, and the economic, social, environmental, and political outcomes of these processes. Jobs in the food system are defined to include own farming activities, household enterprises many of which are informal, and wage jobs whether formal or informal.

⁶ Author calculations from IHS 2010/11. Jobs are a simple count of all economic activities individuals indicate they are involved in. These include farming, all types of wage work, and self-employment.

Women already play an important role in Malawi's post-farm agrifood system but are primarily confined to small-scale retail trade that likely generates low daily returns for most of them. Therefore, special attention needs to be given to promoting the entrepreneurial capacities of women so that they can grow their businesses, add more value to their products, and increase their own earnings while providing more jobs to other Malawians.

6.3. Identification and Testing of Small-Scale Food Processing Technology

Technology that may allow micro and small entrepreneurs to increase scale of operation, reduce unit costs, and/or improve product safety and quality to compete more effectively in end-user markets could have high payoff. Practical, energy-efficient technologies for food processing and cold chain maintenance could be one important element in reducing unit costs to spur competitiveness.

7. NEXT STEPS

The highest priority for GCFSI in this area in Malawi should be on funding the local team to (a) carry out an inventory of the food processing sector serving at least two cities, and (b) design and conduct a more focused and detailed programmatic design study. This design study would, among other things, identify the key constraints faced by micro-, small-, and medium-scale processors in one or two promising sectors, the existing and missing capacities among these firms, and the range of services they have accessed and their assessment of those services. Concrete programmatic initiatives would then be proposed for piloting, adaptation, and eventual scaling.

ANNEX A. LIST OF MARKETS SURVEYED IN MARKET MAPPING EXERCISE

Level	Market	N	% Female	
Retail	Ngwenya	60	37%	
Retail	Msungwi	58	69%	
Retail	Mchesi	57	44%	
Retail	Area 23	53	62%	
Retail	Area 36 (St Johns)	44	80%	
Retail	Central/Main Market	39	74%	
Retail	Chisapo 2	37	16%	
Retail	Lumbadzi	31	48%	
Retail	Mtsiliza	31	55%	
Retail	Area 24	30	57%	
Retail	Mtandire	27	44%	
Retail	Cent	23	26%	
Retail	Kawale 1	17	41%	
Retail	Chilinde 1	17	41%	
Retail	Chisapo 1	14	86%	
Retail	Biwi	12	17%	
Retail	Tsoka/Lizulu	11	73%	
Retail	Area 22	11	27%	
Retail	Area 25B	11	27%	
Retail	Area 25A	5	60%	
Retail	Area 18A	1	0%	
Wholesale/assembly		102	91	20%
Wholesale/assembly		100	63	10%
Wholesale/assembly	Central/Main Market	4	100%	

Source: Authors.

ANNEX B. MARKET MAPPING QUESTIONNAIRES

MALAWI GRAIN LEGUME RETAIL MARKET MAPPING -- TRADER LEVEL

Lilongwe University of Agriculture and Natural Resources / Michigan State University

This survey is part of a research program at LUANAR, aimed at better understanding grain legume production and marketing. Your help in answering these questions is very much appreciated. You will not directly benefit from participating in this study, but the results of the study will provide information on ways to improve real incomes and food security for producers and consumers of these products.

The interview will take about 5 minutes to complete.

There are no known risks associated with this study. If you choose to participate, you may refuse to answer any questions, or you may stop participating at any time.

Your responses will be kept CONFIDENTIAL to the maximum extent allowable by law. Your responses will be summed together with those of several dozen other traders in Malawi and only general averages from analysis will be reported.

You indicate your voluntary consent by participating in this interview: may we begin?

If you have questions about this survey, you may contact Dr. David Mkwambisi at Lilongwe University of Agriculture and Natural Resources (LUANAR). If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program in the USA at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

MARKET CODES				DISTRICT CODES	
1=in this market LILONGWE CITY MARKETS 10=Central/Main market 11= 12= 13=			MARKETS OUTSIDE LILONGWE 100= 101=		1=Lilongwe 2= 3=

INSTRUCTIONS FOR SELECTING TRADERS IN ALL CROPS

- *If there are fewer than 20 traders of _____ in the market, interview all of them*

1. Divide the number of traders of _____, from the trader count just completed, by 20 (e.g., $36/20=1.8$)
2. Round this number to the nearest whole number (e.g., $1.8 \rightarrow 2$). This is your selection interval (SI)
4. Start with any number less than the SI, interview that trader, then use the SI to continue selection of new traders until you have 20 interviews.

A. PROCUREMENT SOURCES FOR PIGEON PEA

Trader #	Is this seller male or female? 1=male 2=female	Is this seller a farmer or a trader? 1=farmer only 2=trader only 3=both	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your PIGEON PEA? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your PIGEON PEA over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your PIGEON PEA did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) SEE CODES BELOW
				In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
MOST IMPORTANT SOURCE				SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE						
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16			1										
17			1										
18			1										

CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

B. PROCUREMENT SOURCES FOR COWPEA

Tr ad er #	Is this seller male or female? 1-male 2=female	Is this seller a farmer or a trader? 1=farmer only 2=trader only 3=farmer who also trades	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your COWPEA? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your COWPEA over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your COWPEA did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) SEE CODES BELOW
				In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
				MOST IMPORTANT SOURCE			SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE			
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
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CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

C. PROCUREMENT SOURCES FOR SOYABEAN

Tr ad er #	Is this seller male or female? 1-male 2=fema le	Is this seller a farmer or a trader? 1=farme r only 2=trader only 3=farme r who also trades	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your SOYABEAN? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your SOYABEAN over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your SOYABEAN did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) SEE CODES BELOW
				In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=mark et 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
				MOST IMPORTANT SOURCE			SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE			
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
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17			1										
18			1										

CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

D. PROCUREMENT SOURCES FOR GROUNDNUT

Tr ad er #	Is this seller male or female? 1-male 2=female	Is this seller a farmer or a trader? 1=farmer only 2=trader only 3=farmer who also trades	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your GROUNDNUT? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your GROUNDNUT over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your GROUNDN UT did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) <i>SEE CODES BELOW</i>
				In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=mark et 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
				MOST IMPORTANT SOURCE			SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE			
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
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CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

MALAWI GRAIN LEGUME WHOLESALE MARKET MAPPING -- TRADER LEVEL
Lilongwe University of Agriculture and Natural Resources / Michigan State University

This survey is part of a research program at LUANAR, aimed at better understanding grain legume production and marketing. Your help in answering these questions is very much appreciated. You will not directly benefit from participating in this study, but the results of the study will provide information on ways to improve real incomes and food security for producers and consumers of these products.

The interview will take about 5 minutes to complete.

There are no known risks associated with this study. If you choose to participate, you may refuse to answer any questions, or you may stop participating at any time.

Your responses will be kept CONFIDENTIAL to the maximum extent allowable by law. Your responses will be summed together with those of several dozen other traders in Malawi and only general averages from analysis will be reported.

You indicate your voluntary consent by participating in this interview: may we begin?

If you have questions about this survey, you may contact Dr. David Mkwambisi at Lilongwe University of Agriculture and Natural Resources (LUANAR). If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program in the USA at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

MARKET CODES				DISTRICT CODES	
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INSTRUCTIONS FOR SELECTING TRADERS IN ALL CROPS

- *If there are fewer than 20 traders of _____ in the market, interview all of them*

1. Divide the number of traders of _____, from the trader count just completed, by 20 (e.g., $85/20=4.25$)
2. Round this number to the nearest whole number (e.g., $4.25 \rightarrow 4$). This is your selection interval (SI)
4. Start with any number less than the SI, interview that trader, then use the SI to continue selection of new traders until you have 20 interviews.

A. PROCUREMENT SOURCES FOR PIGEON PEA

Trader #	Is this seller male or female? 1=male 2=female	Is this seller a farmer or a trader? 1=farmer only 2=trader only 3=both	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your PIGEON PEA? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your PIGEON PEA over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your PIGEON PEA did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) SEE CODES BELOW
				In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
MOST IMPORTANT SOURCE				SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE						
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
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18			1										
19			1										

CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

B. PROCUREMENT SOURCES FOR COWPEA

Tr ad er #	Is this seller male or female? 1-male 2=fema le	Is this seller a farmer or a trader? 1=farme r only 2=trader only 3=farme r who also trades	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your COWPEA? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your COWPEA over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your COWPEA did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) SEE CODES BELOW
				In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=mark et 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
				MOST IMPORTANT SOURCE			SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE			
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
1			1										
2			1										
3			1										
4			1										
5			1										
6			1										
7			1										
8			1										
10			1										
11			1										
12			1										
13			1										
14			1										
15			1										
16			1										
17			1										
18			1										
19			1										

CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none a

C. PROCUREMENT SOURCES FOR SOYABEAN

Tr ad er #	Is this seller male or female? 1-male 2=fema le	Is this seller a farmer or a trader? 1=farme r only 2=trader only 3=farme r who also trades	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your SOYABEAN? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your SOYABEAN over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your SOYABEAN did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) <i>SEE CODES BELOW</i>
				In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=marke t 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=mark et 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
				MOST IMPORTANT SOURCE			SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE			
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
1			1										
2			1										
3			1										
4			1										
5			1										
6			1										
7			1										
8			1										
9			1										
10			1										
11			1										
12			1										
13			1										
14			1										
15			1										
16			1										
17			1										
18			1										

CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

D. PROCUREMENT SOURCES FOR GROUNDNUT

Trader #	Is this seller male or female? 1-male 2=female	Is this seller a farmer or a trader? 1=farmer only 2=trader only 3=farmer who also trades	Grain Legume Item	Over the past 12 months, IN WHAT LOCATION have you purchased most of your GROUNDNUT? <i>SEE MARKET CODES ON SEPARATE PAGE</i>			Please indicate any other locations where you have purchased your GROUNDNUT over the past 12 months, in order of importance <i>SEE MARKET CODES ON SEPARATE PAGE</i>						Over the past 12 months, how much of your GROUNDNUT did you purchase in the MOST IMPORTANT purchase location (FIRST COLUMN) SEE CODES BELOW
				In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	In a market or at farm level? 1=market 2=farm	If a market, what is the NAME of the market?	In either case, WHERE have you purchased? 1=Lilongwe city 2=Lilongwe district OR Name of other district	
MOST IMPORTANT SOURCE				SECOND MOST IMPORTANT SOURCE			THIRD MOST IMPORTANT SOURCE						
ID	FEM	FARM	LEG	MKT1	NAME1	WHERE1	MKT2	NAME2	WHERE2	MKT3	NAME3	WHERE3	CODE_MI
1			1										
2			1										
3			1										
4			1										
5			1										
6			1										
7			1										
8			1										
9			1										
10			1										
11			1										
12			1										
13			1										
14			1										
15			1										
16			1										
17			1										
18			1										

CODE_MI: 1=all or nearly all (≥90%); 2=more than half; 3=about half; 4=less than half; 5=None or almost none

ANNEX C. CONTACT INFORMATION OF INTERVIEWED PRIVATE SECTOR CONTACTS

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13. Qoma, Lisbon. Operations Manager. Afrinut. Lilongwe.

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