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Market and Value Chain Analysis (MVCA) of the Action's Commodities and a Regional Market Assessment of Input/Output Market Actors Report

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Market and Value Chain Analysis (MVCA) of the Action's Commodities and a Regional Market Assessment of Input/Output Market Actors Report

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We are grateful to the farmers, traders, processors, transporters, and consumers of groundnuts, beans, soybeans, Irish potatoes, onions, tomatoes, local chickens and apiary products in Omoro, Amuru, Agago, Zombo, Nebbi and Pakwach districts for their time and cooperation in voluntarily providing information for this study.

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We finally thank the committed team of enumerators and supervisors from Knowledge Wells Agricultural Consult Ltd that traversed the districts to collect the data, analyze it and write to enable the production of this report.

ABBREVIATIONS AND ACRONYMS

AFARD	Agency for Accelerated Regional Development
ALENU	Action for Livelihood Enhancement in Northern Uganda
COVID-19	Coronavirus Disease 2019
DINU	Development Initiative for Northern Uganda
DLG	District Local Government
DRC	Democratic Republic of Congo
FGDs	Focus Group Discussion
FHH	Female-Headed Household
GoU	Government of Uganda
GWED-G	Gulu Women Economic Development and Globalisation
KII	Key Informant Interview
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MHH	Male-Headed Household
MVCA	Market and Value Chain Analysis
NARO	National Agricultural Research Organisation
NGO	Non-Governmental Organisation
NURI	Northern Uganda Resilience Initiative
OPM	Office of the Prime Minister
PRELNOR	Project for the Restoration of Livelihoods in Northern Uganda Region
SPSS	Statistical Package for Social Sciences
TOR	Terms of Reference
UBOS	Uganda Bureau of Statistics

1. EXECUTIVE SUMMARY

Under the Development Initiative for Northern Uganda (DINU), a Government of Uganda programme supported by the European Union (EU) and supervised by the Office of the Prime Minister, Caritas Switzerland received a grant to implement the Action for Livelihood Enhancement in Northern Uganda (ALENU). ALENU is implemented by a consortium of four NGOs that include Caritas Switzerland, Advance Afrika, Agency for Accelerated Regional Development (AFARD) and Gulu Women Economic Development and Globalisation (GWED-G) in the Northern Uganda districts of Zombo, Nebbi, Pakwach, Amuru, Omoro and Agago.

ALENU aims at consolidating stability in Northern Uganda, eradicating poverty and under-nutrition and strengthening the foundations for sustainable and inclusive socio-economic development. The project is driven by the desire to increase food security, improve maternal and child nutrition, and enhance household incomes through providing support to diversified food production and commercial agriculture and through improving household resilience (notably to climate change) and women's empowerment through building sustainable enterprises.

To achieve the goals and objectives, ALENU sought to understand the level of performance, productivity and profitability of the supported value chains that include apiary, groundnuts, moringa, local poultry (chickens), vegetables/fruits, Irish potatoes, tomatoes, onions, beans and soybeans. To achieve this, Knowledge Wells Agricultural Consult Ltd (KWACL) was hired to conduct a market and value chain analysis (MVCA) of the target commodities and a regional market assessment of input/output market actors. The MVCA study was conducted in Zombo, Nebbi, Pakwach, Amuru, Omoro and Agago districts where ALENU is implementing the interventions.

The objectives of this MVCA study included:

i. Examining the value chain (VC) ecosystem and identifying the market demand for the action commodities, comprising apiary, groundnuts, moringa, local poultry, vegetables/fruits, Irish potatoes, tomatoes, onions, beans and soybeans (in terms of quality, quantity, price and seasonality), the opportunities for value creation and associated distribution channels and market potential, as well as the bottlenecks and weak points within the VC.

ii. Documenting both on- and off- farm opportunities along the selected value chains for creating potential employment for the youth and prioritising the "entry points" for youth engagement.

iii. Evaluating the quantity and quality of production in the given value chains, the resources needed to participate in the various entry points identified, and the productivity of these segments.

iv. Conducting a detailed analysis of the value added at each stage in each of the six districts where the project operates in order to facilitate the targeted youth involvement in the most viable and sustainable on-farm agriculture enterprises and access to markets for improved productivity, profitability, incomes and livelihoods.

v. Prioritisation of the "entry points" for youth by the different project target districts.

vi. Examining concrete partnerships/relationships and soft factors such as the reasons for a lack of cooperation or trust between the VC actors.

Using both a qualitative and quantitative approach, the consultant collected data through a farmer survey, focus group discussions (FGD) and key informant interviews (KIIs) in which data was collected from the key actors in the target commodity value chains in the six ALENU districts of Northern Uganda and West Nile. A farmer questionnaire, FGD guide and key informant guides were used to carry out the interviews. A total of 198 farmers across seven crops as well as 27 apiary farmers and 33 local chicken farmers were interviewed in the farmer survey.

On the other hand, 104 value chain actors were interviewed across the value chains, including traders, processors and transporters. In addition, KIIs were held with the District Local Government (DLG) line officers who included commercial and agricultural officers with permission from the district Chief Administrative Officers (CAOs) after a courtesy call and introduction were made by the consultant team. The district personnel also shared insights on the plans they have for the ALENU target commodities in their annual district development plans (DDPs) which helped to assess the level of partnership and support that ALENU beneficiaries can expect from their districts.

Key findings from the MVCA study include:

1. All the 10 value chains analysed are generally profitable on and off the farm and have the potential to create value and employment along the value chains.

2. There is a big profitability gap between farmers and other value chain actors. Farmers earn less compared to what other actors earn. This gap is an indicator that farmers are ripped off owing to information asymmetry and lack of organisation.

3. There are still infrastructural and information bottlenecks such as poor roads, long distances, high transport costs, limited access to inputs, lack of access to market information, and fluctuation facing both farmers and other value chain actors. Other bottlenecks, including knowledge-related ones, are pests and diseases, seasonality and limited choice of buyers.

4. The demand for the products is high but the supply is low and, in lean seasons, unreliable. Farmers cannot produce what the market demands in terms of quantity and quality.

5. The level of cooperation and trust at all levels of the value chains is still low. Farmer-to-farmer, farmer-trader and farmer-processor cooperation and trust levels as well as partnerships are still weak and, in many cases, non-existent.

6. The value chains have a huge capacity for on-farm and off-farm employment creation for farmers in general and for the youth to earn a living from the rural agricultural market economy.

Recommendations

We make the following recommendations from the MVCA study findings:

i. *Farmer organisation strengthening/institutional development:* As ALENU beneficiaries start harvesting from the inputs given during the last season, there will be increased production as seen from the results, and this will call for organised farmers with a voice to bargain for the best terms in the market.

ii. *Strengthening trust and collective action among farmers:* It is well known and documented that collective action is more commonly expressed through producer organisations such as farmer groups and cooperatives, although individual farmers can also engage in collective action (Shiferaw et al., 2011). It is also documented that best practices can only be promoted where there are trust and reputation.[1] Trust must be nurtured within the farmer groups – among its members and leaders and between farmer groups and the partners they trade with, such as traders, institutions etc. We, therefore, recommend that through farmer group training, ALENU can incorporate elements of trust into the training curriculum. Additionally, trust with partners can be strengthened through multi-stakeholder platforms where the farmers, traders, processors and other value chain actors are brought together to discuss the issues that are hindering the efficiency of the value chains in which they participate.

iii. *Streamlining input supply from reliable sources:* Input supply can be localised in that improved seed is produced and supplied by organised and trained producer groups such as local seed businesses (LSBs). In addition, other inputs can be supplied under the organised farmer groups/cooperatives. This will solve the problem of input supply to ensure sustainable production.

iv. *Market linkage promotion:* Partnerships should be forged by the project to link

1 Lucas, L. M. (2005). The impact of trust and reputation on the transfer of best practices. Journal of Knowledge Management.

farmers to large-scale buyers and other value chain actors to engage in formal supply contracts/arrangements. For example, soybean farmers can engage with oil millers to supply large quantities directly.

v. *Promoting value addition and processing initiatives:* Cottage industries should be promoted, and these can be primarily manned by the youth to add value to the produce, brand and package the value-added products and marketing them to better markets.

vi. *ALENU can leverage other programmes going on in Northern Uganda:* In Northern Uganda, there are a number of projects and programmes that are going on that are implemented by a number of ministries and donor agencies. Among them are PRELNOR (2017-2022) that operates in nine districts of the Acholi region, Northern Uganda Resilience Initiative (NURI), NUSAF, which is implemented by the Office of the Prime Minister, and the National Oil Seeds Project (NOSP), which is yet to start but is a successor project to VODP II, implemented by MAAIF and funded by IFAD. The findings indicated that over 90% of the farmers in the MVCA study were receiving crop-related extension training, although 92% of them indicated that they get this training from the ALENU Project and 5% get the training from NGOs/CBOs (see Annex 9). This shows that there is little multiple participation by one farmer benefiting from a number of other projects in the area. We recommend that ALENU leverage other projects and programmes in the area through building collaborations with projects that could provide complementary services such as market access training, institution-building services as well as other benefits that would lead to farmers selling more into the market.

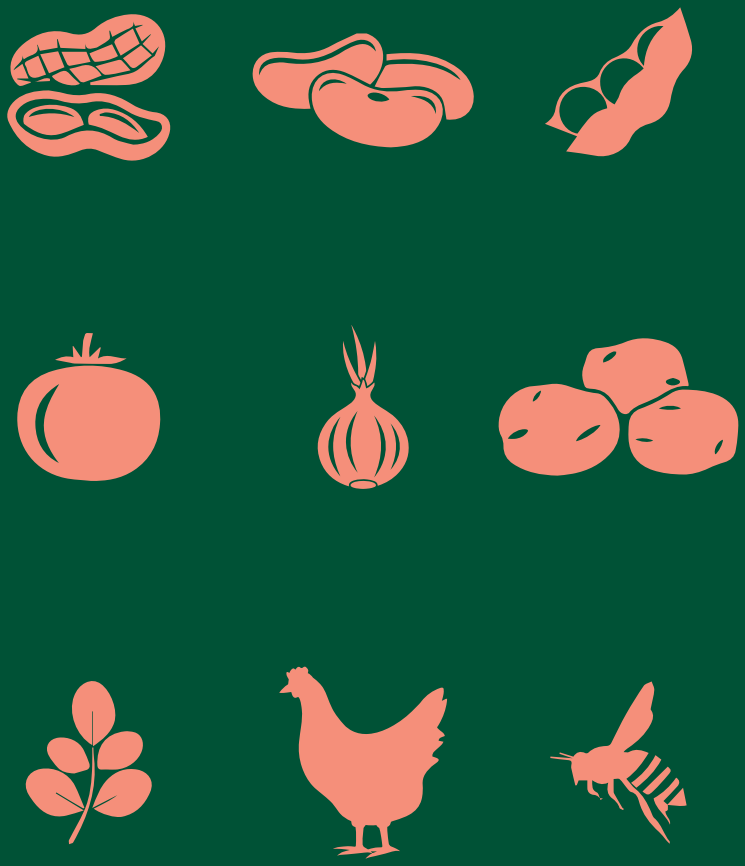
vii. *Operationalisation of processing and value addition*

- For crops such as beans, soybeans and vegetables (onions, tomatoes etc.), value addition is only possible through improving the quality of the produce through the use of good post-harvest practices such as drying on tarpaulins, good packaging to avoid damage and good storage to avoid damage caused by storage pests. This is value addition since it would raise the value because of the quality. It is, therefore, recommended that ALENU focuses on the post-harvest side to ensure that quality produce that will fetch higher prices in the market is supplied by farmers.

- For groundnuts, value addition will be possible through assisting farmers or processors in accessing quality threshers and grinders that do not break the seeds and also that have the capacity to handle large volumes. The processing machinery may also come with string engines/generators because of lack of electricity in many of the project areas.

- For the apiary enterprise, value addition is also possible at household level as well as group level through ensuring access to value addition equipment, personal protective gear for harvesting honey, machinery such as centrifuges, cans as well as branding materials such as packaging bottles/tins that are clearly branded. This would help the farmers not only to get higher incomes but also to produce other products such as propolis, candle wax etc. that come as by-products of value addition.

- For local poultry, value can be added through training a team of vaccinators in the community so that routine vaccination is done to reduce the high mortality rate of young birds as indicated in the results. This will increase the quality of the chickens sold but also increase supply to attract large buyers for increased incomes.



1. INTRODUCTION

1.1 Background to the Project – ALENU

Under the Development Initiative for Northern Uganda (DINU), a Government of Uganda programme supported by the European Union (EU) and supervised by the Office of the Prime Minister, Caritas Switzerland has received a grant to implement the Action for Livelihood Enhancement in Northern Uganda (ALENU). ALENU is implemented by a consortium consisting of four NGOs including Caritas Switzerland, Advance Afrika, Agency for Accelerated Regional Development (AFARD) and Gulu Women Economic Development and Globalisation (GWED-G) in the districts of Zombo, Nebbi, Pakwach, Amuru, Omoro and Agago.

The purpose of ALENU is "to consolidate stability in Northern Uganda, eradicate poverty and under-nutrition and strengthen the foundations for sustainable and inclusive socio-economic development" and its specific objective is "to increase food security, improve maternal and child nutrition, and enhance household incomes through support to diversified food production and commercial agriculture and through improving household resilience (notably to climate change) and women empowerment" through sustainable enterprises.

1.2 Objectives of the Assignment

The MVCA objectives were to:

1. Examine the VC ecosystem and identify the market demand for the action commodities, i.e. apiary, groundnuts, moringa, local poultry, vegetables/fruits, Irish potatoes, tomatoes, onions, beans and soybeans (in terms of quality, quantity, price and seasonality), the opportunities for value creation and associated distribution channels and market potential, as well as the bottlenecks and weak points within the VC.
2. Document both on- and off-farm opportunities along the selected value chains for creating potential employment for the youth and prioritise the "entry points" for youth engagement.
3. Evaluate the quantity and quality of production in the given value chains, the resources needed to participate in the various entry points identified, and the productivity of these segments.
4. Conduct a detailed analysis of the value added at each stage in each of the six districts where the project operates in order to facilitate the targeted youth involvement in the most viable and sustainable on-farm agriculture enterprises and access to markets for improved productivity, profitability, incomes and livelihoods.
5. Prioritise the "entry points" for youth by the different project target districts. This would be done by the consultant.
6. Examine concrete partnerships/relationships and soft factors, such as the reasons for a lack of cooperation or trust between the VC actors.

2. METHODOLOGY

2.1 Research Design

This study employed both qualitative and quantitative methods-making it a mixed methods design. Much of the information on value chains was both quantitative and qualitative. Qualitative data was collected using focus group discussions and key informant interviews with key actors along the value chain including male and female youth. Information was also collected on actor involvement in the selected value chains, strengths, weaknesses opportunities and constraints (SWOC) of the selected value chains. To gain understanding of viability of the chains through an economic/profitability analysis information was also collected on costs and sales to enable the calculation of gross margin and profitability metrics.

2.2 Data Collection Methods

The consultant and team also employed the rapid assessment procedures by utilising triangulation of both qualitative and quantitative data to supplement and compliment the findings from both methods. The qualitative findings were mainly used to explain the quantitative findings.

2.2.1 Participatory Rapid Appraisal (PRA)

PRA methods were used to collect some of the data, especially with busy categories of actors such as mobile traders, processors and aggregators. The participatory approach is known for giving participants a voice and allows information to emerge in the process. It also ensures that there is involvement and participation of the participants in the study. The following specific PRA methods were therefore used:

2.2.2 Individual interviews at household level

For quantitative data collection, the selection of respondents was carried out using the multi-stage random sampling technique to ensure objectivity. A representative sample of the targeted households were interviewed. This number ranged between 15 and 20 households and these were identified with support from the ALENU Project team. The individual interviews were intended to, among others, generate:

a. The average net income of smallholder supported farmers (SHFs) across the different enterprises.

b. The average revenue per farmer.

c. An understanding of the sources of input cost per farmer.

d. Labour usage in the different value chains.

e. The marketing channels used by SHFs.

A semi-structured questionnaire was designed for this purpose. The semi-structured interviews helped to assess, among others, the economic benefits of engaging in apiary, the gender equality issues involved, the challenges faced and the respondents' advice on what needs to be changed.

2.2.3 Key informant interviews (KIIs)

KIIs were held with the ALENU Project staff, key market actors, e.g., traders, processors, input dealers etc., support service businesses, such as transporters, and local leaders in the project areas.

The KIIs helped to generate information on the production and marketing constraints, current business trends, e.g., current prices, income, productivity and production levels, attitudes and knowledge, and information on gender equality issues. KIIs were also used to identify areas for future improvement in the form of recommendations for better project implementation.

2.2.4 Focus group discussions (FGDs)

Group interviews were conducted using a pre-determined checklist of questions on relevant topics with purposively selected participants across the target project-supported value chains. Focus group discussions with enterprise farmer marketing groups were aimed at gaining a deeper understanding of the project issues and the

project's importance to the target population. Appropriate production and marketing gender questions were also embedded into the tool to better understand women's and youth roles, gaps and opportunities.

2.2.5 Review of key documents

Key documents related to the assignment were reviewed and the major issues summarised. Among the reviewed documents were the draft baseline report and the annual district development plans. The team also obtained information from other sources such as Ministry of Agriculture and Animal Industry, Uganda National Apiculture Organisation (TUNADO), UBOS, various libraries and the internet, among others.

2.3 Study Areas, Sample Selection and Size Determination

2.3.1 Study area

The research team visited all the six project districts – Zombo, Nebbi, Pakwach, Amuru, Omoro and Agago. In each district, the team also worked in all the sub-counties where the project has been rolled out. Selection of the number of parishes for the study in each sub-county was done jointly by the ALENU Project team staff, who were guiding the research team in the field, and the team leaders.

2.3.2 Research participants

The research participants in this MVCA study included participating youth, relevant government officials from the district production and marketing departments, actors in the private agribusiness sector, including related produce traders (buyers/traders, processors and exporters). Private sector actors, including produce buyers, transporters, financial institutions, and any other actors identified in the course of our work, were interviewed. For interviews at individual household level with the youth and other farmers participating in the selected value chains, 128 were sampled in the West Nile districts and 123 sampled in the Acholi districts across the ALENU Project value chains. A total of 251 farmers were interviewed across the nine value chains (Table 1). The basis for the selection of respondents was their involvement in the DINU ALENU Project as well as their knowledge of the sub-sector/value chain dynamics and performance in the project areas of study. The sampling frame was derived from ALENU's list of project participants in the selected districts for the enterprises under study.

The selection of the individuals was done through stratified systematic random sampling. Stratification was also based on gender, and took into account male and female farmers. After stratification, systematic random sampling was done to select an equal number of female and of male farmers.

Table 1: Farmers sampled by district

District	Enterprises /value chains	Number of enterprises	Target farmer respondents/ interviews	Target value chain actors
Nebbi	Apiary, groundnuts, local poultry, Irish potato, tomatoes,	5	67	25
Zombo	Irish potatoes, onions	2	25	26
Pakwach	Local poultry, groundnuts, soya beans, moringa	4	42	20
Sub-total			**134**	**71**
Agago	Local poultry, groundnuts, soya beans, apiary, onion, beans	6	66	30
Amuru	Groundnuts, onions, moringa	2	21	11
Omoro	Local poultry, groundnuts, soya beans, apiary	4	29	20
Sub-total			**123**	**61**

We held two FGDs for each selected value chain with a combination of male and female participants. This generated a total of 12 FGDs across the six districts. Eight KIIs with different actor categories in each sub-county were also held, particularly with personnel of district local governments, who included district production coordinators, planners, ALENU/DINU focal persons and commercial officers in the six districts. On the agribusiness side, KIIs were also done with at least two traders (small and medium), two processors and two agro-input dealers and two consumers per value chain. Some of those interviewed were dealing with one, two or all the target value chains and their products. Transporters and exporter/importers – especially cross-border traders – were also interviewed. We interviewed financial institutions that finance the selected value chains. For the moringa value chain, we were able to consult with Roots of the Nile Company. It is the only commercial producer and processor in Northern Uganda. The other project farmers had just planted the seedlings a few months prior to the survey, hence they could not provide much information on the costs and revenues.

A detailed list of sampled key stakeholders interviewed across the nine enterprises under study is provided as Annex 2.

2.3.3 Data Management and Quality Control

The completed questionnaires were cross-checked for consistency and validity while still in the field. Any gaps identified in the questionnaires were accordingly addressed. Responses to questions that were open-ended were coded. This was followed by data entry using SPSS computer software for each of the value chains under study. The crop value chains were entered into a single data set while the local poultry and apiary data was also entered separately. Other data sets included the traders/processors, the consumers, FGDs and KIIs. Further data cleaning and editing were done to get a clean data set for storage and analysis. STATA computer software was mainly used for the analysis.

2.3.4 Data Analysis

Different statistical methods of analysis were used to address the study objectives. These included descriptive and qualitative methods. Descriptive analysis involved the generation means, t-test, F-test, chi-square test, correlations, percentages and gross margins. The value chain concept, as developed by Michael Porter in 1985 (Feller *et al.*, 2006), was adopted. Porter defined value as the amount that the buyers are willing to pay for what a firm provides. In this regard, therefore, the primary focus in the value chain was on the benefits that accrue to the chain actors, the interdependent processes that generate value and the resulting demand and funds flow that are created (Devaux *et al.*, 2009; Horton *et al.*, 2010; Kaplinsky and Morris, 2001). At each stage of the value chains, the value created was estimated using a value addition approach (Tallec and Bockel, 2005). The value added () by each actor in the chain was determined as the difference between the value of output and the value of inputs that the actor used.

2.3.5 Limitations of the MVCA Study

The study was conducted at a time when many of the ALENU Project beneficiaries had not harvested or sold any of their produce because they had just received the inputs from the project yet many of them had just been introduced to the new enterprises. This meant that much of the information was either collected on beneficiaries that had earlier produced or non-beneficiaries who were already engaged in the enterprises promoted by the project. With regard to traders, at the time of the survey, many of the crops were off season, hence some traders' records could not be traced, or they had to use recall and institutional memory to respond to some questions that required numbers. Finally, there was very little information available on cross-border trade because much of the trade in the project crops is informal. However, through traders and farmers that sell to known cross-border "exporters", sufficient information for the study was generated. Nonetheless, the information and data collected were adequate to address the study objectives.

2.3.6 Ethical Considerations

Before field data collection was undertaken, the research team, led by the ALENU staff paid courtesy calls on various local government authorities. The visits were intended to create an opportunity to inform the authorities about the purpose and design of the study and to seek their consent, guidance and support. At household and trader levels, the team also first explained to the potential respondents the objectives of the study and sought their consent to be interviewed, assuring them of confidentiality of their identities and the information provided. No respondent was forced to participate in the interviews. Each respondent and focus group participant was also given the opportunity to ask questions and/or seek further clarification at the end of each interview.

3. STUDY FINDINGS

This section presents the findings from the MVCA study done on nine value chains, i.e., groundnuts, soybeans, common beans, tomatoes, onions, Irish potatoes, moringa, local poultry and apiary. The value chains are presented separately to ensure clarity of each, since they are of a unique and peculiar nature, which requires a separate and detailed analysis and synthesis.

3.1 THE GROUNDNUT VALUE CHAIN

3.1.1 Introduction

Groundnut (*Arachis hypogea* L.), also known as peanut, is an oilseed crop grown for food and cash in over 96 countries across the tropical, sub-tropical and warm temperate regions of the world (Watanabe and Pehu, 1997). Global groundnut production is estimated to be 36.45 million tonnes from 23.95 million hectares and an average yield of 1,520 kg/ha, with Asia contributing 64% of the production followed by Africa (28%) (Upadhyaya *et al*., 2000; FAOSTAT, 2011).

The Ugandan peanut value chain activates a wide range of individual and institutional actors – input suppliers, seed dealers, producers, market sellers, rural/urban traders, processors, exporters and consumers (Okello *et al*., 2010; ICRISAT, 2014)). The Uganda Census of Agriculture 2008/2009 showed that the groundnut is one of the 17 major crops grown by farmers in Uganda (UBOS and MAAIF, 2010). The crop is the second most widely grown legume crop after beans (*Phaseolus vulgaris* L.) and the most widely grown oilseed in Uganda, with the Northern region being the leading producer, followed by the Eastern region (Busolo-Bulafu and Nalyongo, 2001; UBOS and MAAIF, 2010). In 2008, Uganda produced about 244,000 metric tonnes of groundnuts from 250,000 hectares (FAOSTAT, 2008). However, the average yield of groundnuts in Uganda is 800 kg/ha of dry pods, which is far below the world average and the 3,000 kg/ha that has been recorded at research stations (Okello and Deom, 2008).

3.1.2 Socio-economic characteristics of groundnut value chain actors

3.1.2.1 Farmers

The majority of the sampled groundnut farmers were females (57%) and older than 35 years (73%). However, Nebbi and Omoro districts had more male than female farmers. Pakwach and Agago districts, on the other hand, had a higher percentage of youth growing groundnuts compared to other districts (Table **2**).

Table 2: Gender distribution of groundnut farmers by sex and age group

	Percentage of farmers by gender			
	Sex of farmer		Farmer age group	
District	Male (n=35)	Female (n=46)	Youth<= 35 years (n=22)	Old>35 years (n=59)
Omoro	53.33	46.67	20.00	80.00
Amuru	25.00	75.00	25.00	75.00
Zombo	50.00	50.00	25.00	75.00
Nebbi	51.72	48.28	27.59	72.41
Pakwach	20.00	80.00	30.00	70.00
Agago	45.45	54.55	36.36	63.64
Overall	43.21	56.79	27.16	72.84

Overall, over 70% of all groundnut farmers were of primary education level. However, a higher percentage of youth (27%) than the older farmers (15%) had attained secondary education, although Nebbi and Zombo districts had more educated farmers in the secondary education level category than any other district (Table 3).

The average household size of a rural homestead in most cases determines the size of labour force available for farm work. Based on this assumption, the results indicated that there was no big difference between male- and female-headed household sizes. The average size was about eight persons, with a maximum size of 17 household members, half of whom (four) were dependants, such as children and the elderly (Table 4). This means that an average groundnut-growing household has four members who are productively engaged in farm work.

Percentage using local and improved groundnut seed

Generally, the proportion of groundnut farmers using improved seed has been increasing over the last three seasons while those using local seeds was decreasing. In the 2019B season, 15% of farmers were using improved seed while 73% were using local (farmer saved) seeds (Figure 1). More use of improved groundnut seed was reported in Omoro, Amuru and Pakwach districts. By 2020B in November when this study was done, farmers had already planted and 44% had used improved seed compared to 53% who had used local seeds, indicating good progress towards the adoption of improved technologies that will translate into increased productivity and production volumes as targeted by the ALENU Project.

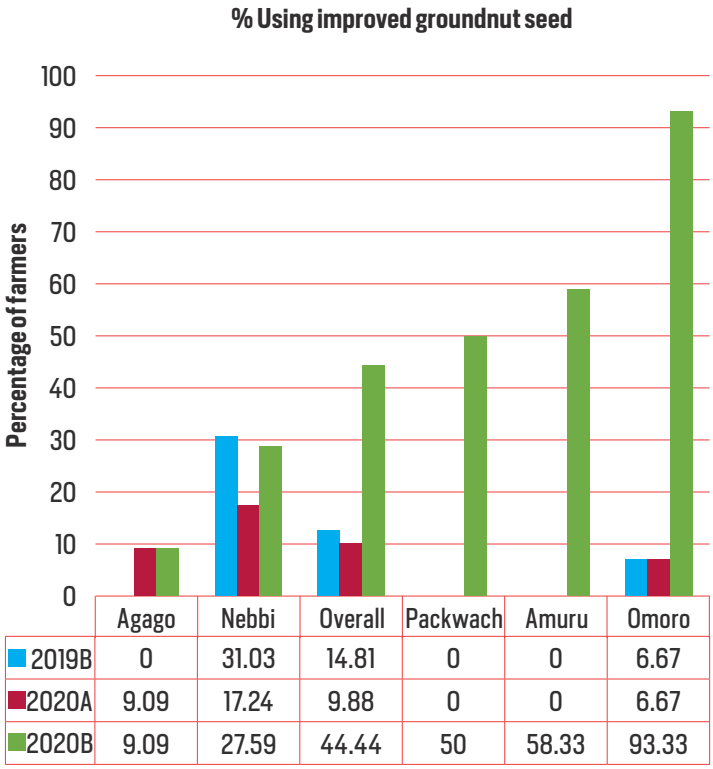
Table 3: Education levels of groundnut farmers by age group

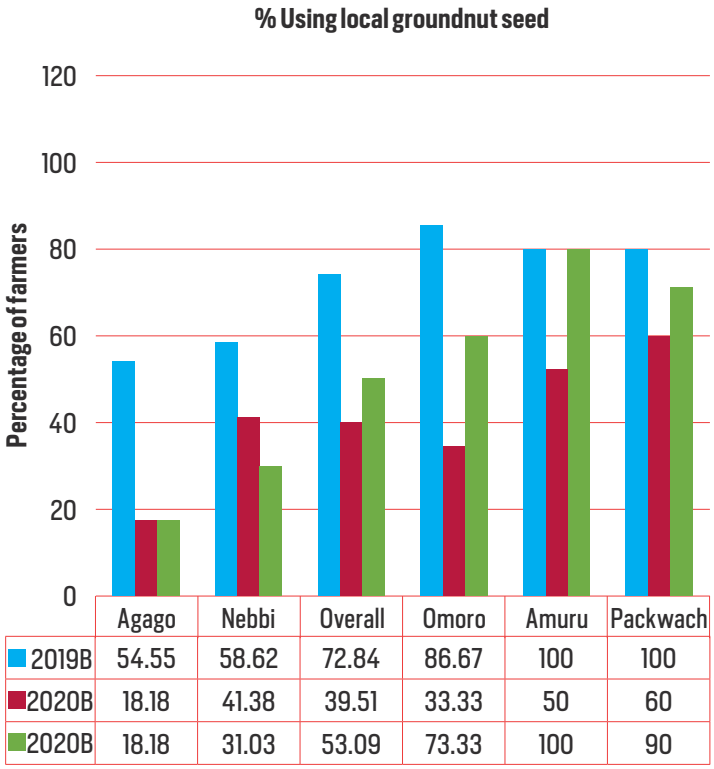
	Percentage of farmers by age group										
	Youth			Old				Overall			
District	Primary	Secondary (O level)	Secondary (A level)	None	Primary	Secondary (O level)	Secondary (A level)	None	Primary	Secondary (O level)	Secondary (A level)
Omoro	100.00	0.00	0.00	25.00	75.00	0.00	0.00	20	80	0.00	0.00
Agago	75.00	25.00	0.00	14.29	71.43	14.29	0.00	9.09	72.73	18.18	0.00
Nebbi	75.00	25.00	0.00	9.52	66.67	19.05	4.76	6.9	68.97	20.69	3.45
Amuru	66.67	33.33	0.00	11.11	77.78	11.11	0.00	8.33	75	16.67	0.00
Pakwach	66.67	0.00	33.33	0.00	100.00	0.00	0.00	0.00	90	0.00	10
Zombo	0.00	0.00	100.00	0.00	33.33	33.33	33.33	0.00	25	25	50
Overall	72.73	18.18	9.09	11.86	72.88	11.86	3.39	8.64	72.84	13.58	4.94

Table 4: Size of groundnut farmers' households

	Household size			Number of dependants
Type of household	Mean	Min	Max	
Male HH	7.54	2	17	3.76
Female HH	7.88	3	15	4.00
Overall	7.64	2	17	3.84

Figure 1: Percentage of farmers by type of groundnut seed planted in 2019B, 2020A and 2020 B





3.1.2.2 Traders

The majority of groundnut traders are females (58%) and youth (77%) although 100% of the old traders were male. The traders have families with seven members each on average and the majority (58%) have a primary level of education (Table 5).

3.1.2.3 Processors

Groundnut processors are mainly male (9/9) with average household sizes of about six people. The only old processor sampled had a primary level of education while the youth processors were evenly distributed across education levels although about 38% had a primary-level education and 50% a secondary education (Table 6).

Table 5: Groundnut traders by sex, education and household size

	Trader age group		
Trader characteristics	**Youth (<=35 years) (n=24)**	**Old (>35 years) (n=7)**	**Overall (n=31)**
Household size	7	8	7
Sex of trader			
Male	12.50	100	41.67
Female	87.50	0.00	58.33
Overall	77.42	22.58	100.00
Education level			
Primary	62.50	50.00	58.33
O' level	25.00	0.00	16.67
A' level	0.00	50.00	16.67
University	12.5	0.00	8.33

Table 6: Groundnut processor by sex, education and size of household

Processor characteristics	Youth (<=35 years) (n=8)	Old (>35 years) (n=1)	Overall (n=9)
Household size	6	5	6
Sex (frequency)			
Male	8	1	9
Female	0	0	0
Education level %			
Primary	37.50	100	44.44
O' level	25.00	0.00	22.22
A' level	25.00	0.00	22.22
Diploma/college	12.50	0.00	11.11

3.1.2.4 Consumers

The older people aged above 35 years constituted 85% of the groundnut consumers sampled while the youth made up 70%. The majority of the consumers (63%) came from male-headed households (MHH). Groundnut consumers are generally educated, with about 40% of them having education levels above primary (Table 7).

About 52% of the consumers of groundnuts get their products from own production, 55% buy from weekly and main markets, while about 27% buy from shops and supermarkets (Table 8). These findings show that many consumers in the ALENU Project areas, especially urban areas, also produce their own groundnuts, although not enough to take them through the season[2]; but also that markets are key trading areas for groundnuts.

Table 7: Groundnut consumer by sex, education and size of household

	Percentage of consumers		
	MHH (n=26)	FHH (n=15)	Overall (n=41)
Sex	63.41	36.59	100
Youth (<=35 years)	68.97	71.43	69.77
Old (>35 years)	100.00	71.43	84.62
Education level			
Primary	11.54	46.67	24.39
None	34.62	26.67	31.71
O' level	42.31	20.00	34.15
A' level	7.69	6.67	7.32
Degree	3.85	0.00	2.44

Table 8: Groundnut consumers' source of products

Source (where obtained)	Percentage of consumers by source of groundnuts products
Home harvest	51.79
Weekly markets	33.93
Main markets	21.43
Shops	19.64
Supermarkets	7.14
OPM (food aid)	1.79

2 There are higher percentages of consumers buying from other sources.

While buying groundnuts, consumers indicated that they look out for certain attributes. These include uniformity of grains, colour and type; low priced products; clean groundnuts; tasty product; nutritious and pest-free products; as well as bigger-sized grains (Table 9). These attributes are key in marketing groundnut products because they affect consumer acceptability, prices given and trust for the products and their sellers to the consumer.

Groundnut consumers indicated that while buying products, they were always put off by high and fluctuating prices, especially during the lean seasons, scarcity of products when they need them – indicating seasonality – and low supply, which some blamed-on climate change, which leads to crop failure, and poor quality of products where they contain stones, mixed types and other foreign matter. Other constraints mentioned were walking long distances to the markets and shops (Table 10). The percentage of consumers complaining about quality (24%) signifies the level of quality of groundnut as perceived by the consumer.

3.1.3 Commodity market demand

3.1.3.1 Quantity of groundnuts produced and sold

Overall, the seasonal production of groundnut is between 567 kg and 900 kg and sales range between 477 kg and 155 kg. Amuru district is the leading producer of groundnuts among the ALENU Project districts, where farmers produced about 1,720 kg in the second season of 2019(2019B) and 2,250 kg in the first season of 2020 (2020A). It is also worth noting that since the project did not promote groundnuts in Zombo district, no data was collected on the crop there.

Table 9: Attributes that groundnut consumers desire in products

Attributes	Percentage of consumers by attribute and enterprise
Uniformity	57.14
Low price	37.50
Cleanliness	30.36
Taste	28.57
Nutritional values	28.57
Pest and disease-free	26.79
Bigger grain size	17.86
Colour	12.50
Shorter cooking period	3.57
Smaller grain size	1.79

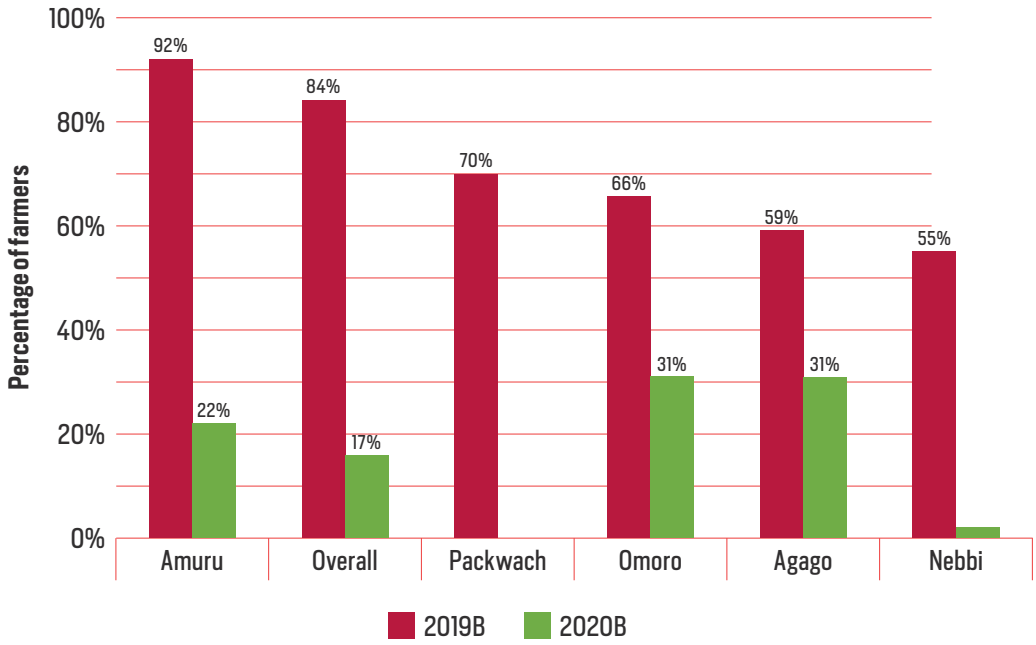
Table 10: Constraints that groundnut consumers face in accessing products

Constraints	Percentage of consumers by constraint
High prices	63.4
Scarcity of products	53.7
Poor quality products	24.4
Few sellers	12.2
Consumer exploitation	7.3
Price fluctuations	22.0
Long distances	17.1
Climate change	12.2

Table 11: Quantity of groundnuts produced and sold by farmers

	Mean (SD)			
District	Quantity produced (kg) in 2019B	Quantity sold (kg) in 2019B	Quantity produced (kg) in 2020A	Quantity sold (kg) in 2020A
Omoro	174.00 (155.12)	115.00 (160.39)	145.00 (79.84)	45.45 (82.02)
Agago	375.63 (195.80)	220.00 (142.03)	297.50 (146.37)	92.50 (138.13)
Amuru	1,715.60 (1392.14)	1,581.00 (1364.78)	2,245.00 (3461.70)	501.00 (858.89)
Nebbi	79.11 (56.76)	43.56 (26.03)	200.00 (260.58)	6.11 (12.69)
Pakwach	154.67(120.36)	108.67 (85.70)	.	-
Overall	567.10 (946.62)	476.90 (914.30)	888.06(2125.01)	153.78(460.25)

Figure 2: Proportion of groundnut harvest sold



In terms of groundnut commercialisation, still Amuru, Pakwach and Omoro districts are leading, where farmers sold over 60% of their groundnut harvests in 2019B (Figure 2). However, we must note that the 2020A season was affected by the outbreak of COVID-19, which denied farmers the opportunity to sell their produce and, by the time of the survey, some still had their produce in their storage units and houses. This explains the low levels of sales in the first season of 2020.

3.1.3.2 Quantity of groundnuts traded and processed

Groundnut traders mainly aggregate groundnuts from farmers, wholesalers and retailers, especially in the peak season. Across four ALENU districts, traders aggregated about 175,900 MT in the peak season and 105,300 MT in the lean season from farmers. Wholesalers contributed about 33,500 MT and 4,680 MT in the peak and lean seasons respectively (Table 12). Although Agago traders aggregated the largest volumes, they did so from only farmers, hence operating a shorter value chain. However, traders in Nebbi district aggregated groundnuts from the entire value chain, hence operating a longer value chain. One aspect of longer value chains is increased transaction costs that result in lower farm-level prices. True to this theory, Table 15 shows that Nebbi district farmers get the lowest prices for their groundnut.

Table 12: Estimated volume of groundnuts aggregated by traders at district level by channel

	Quantity (metric tonnes)							
District	Farmers		Wholesalers		Brokers/agents		Retail traders	
	Peak	Lean	Peak	Lean	Peak	Lean	Peak	Lean
Agago	143,000	86,100			108	-		
Nebbi	30,300	15,200	33,500	4,682.2	12.36	5.4	2,019.2	1,007.2
Omoro	240	120	-	-	-	-	-	-
Pakwach	2,340	3,888	-	-	-	-	-	-
Total	**175,880**	**105,308**	**33,500**	**4,682.2**	**120.4**	**5.4**	**2,019.2**	**1,007.2**

Source: Trader survey data, November 2020
Assumptions: All district traders aggregated based on key informant information; a district has about 280 groundnut traders on average.[3]

The groundnut processors interviewed aggregated their processing materials only from farmers. It is counterintuitive that processors aggregate the largest volumes in the lean season, unlike traders. The six processors aggregated about 1,000 MT of raw groundnuts in the lean season and for the one year from September 2019 to October 2020 when this study was done, they had processed about 1,340 MT (Table 13). Although about 90% of the processors indicated that they operated throughout the year and almost seven days a week, they were operating below full installed mill capacity. Although the sampled processors had the capacity to process 9,724 MT, they were able to process only 1,342 MT (Table 14). This is an indication that there is a supply gap in groundnuts to the mills.

3.1.3.3 Prices and seasonality

In the 2019B season the average price was about 3,200 Uganda shillings per kilogram of groundnuts while in 2020A, the price was slightly lower at 3,100 Uganda shillings per kilogram. Farmers in Agago and Amuru districts received relatively higher prices for their groundnuts in both seasons compared to other districts (Table 15). These results tally well with the seasons that traders indicated that they have peak and lean purchases. For instance, season B, which runs from August to January of a production year, is a peak season where the prices are lower compared to season A (Figure 3).

Table 13: Estimated volumes of groundnuts aggregated and processed by processors at district level

	Farmer's supply (metric tonnes)		Processed product (metric tonnes) (September 2019-October 2020)
District	Peak	Lean	Annual processed groundnuts
Amuru	453.6	540	1,000
Nebbi	-	480	280
Pakwach	-	-	62
Total	**453.6**	**1,020**	**1,342**

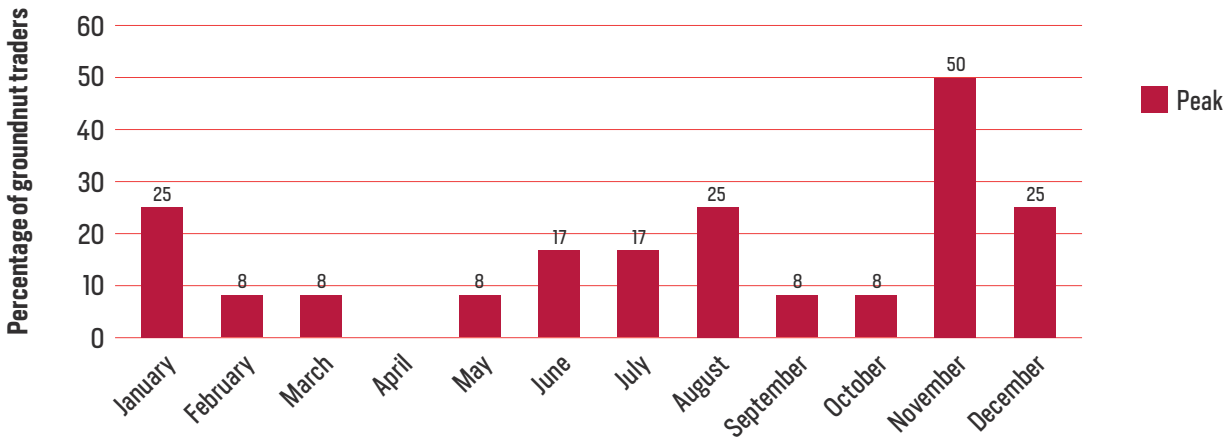
Table 14: Processor capacity

Variable	Overall
Annual installed mill capacity (MT)	9,724
Days operated weekly	6.75
Mill operates throughout year (%)	89%

Table 15: Average groundnut prices received by farmers

	Mean groundnut price (UGX/kg)	
District	**2019B**	**2020A**
Omoro	2,971	3,250
Agago	4,281	3,333
Amuru	3,570	3,583
Nebbi	2,063	2,180
Pakwach	2,500	.
Overall	**3,188**	**3,078**

Figure 3: Peak season months for groundnuts



Source: Trader data, 2020

3.1.4 Value creation and associated distribution channels

This section contains the results of groundnut marketing channels, the costs, revenues and gross margins involved.

3.1.4.1 Groundnut marketing channels

The groundnut marketing channels are mainly dominated by local/village traders, to whom 56% of the farmers sold their groundnuts in 2019B, and urban traders who come from neighbouring towns, to whom 23% of the farmers sold their groundnuts. Some of the groundnuts are sold through brokers and to local consumers in the rural communities and a few farmers sell to restaurants (Table 16). Farmers in Omoro and Nebbi districts have more diversified marketing channels for groundnuts in that they are exposed to 3-4 channels.

Table 16: Percentage of groundnut farmers by marketing channel

	Percentage of farmers selling to channel					
District	**Local traders**	**Urban traders**	**Broker**	**Local consumer**	**Urban consumer**	**Restaurant**
Agago	82%	0%	9%	0%	0%	9%
Amuru	75%	8%	0%	17%	0%	0%
Pakwach	70%	10%	0%	20%	0%	0%
Nebbi	62%	21%	0%	3%	0%	3%
Omoro	7%	60%	20%	0%	7%	7%
Overall	**56%**	**23%**	**5%**	**7%**	**1%**	**4%**

Since season 2020A was affected by COVID-19, with farmers making smaller sales, we only captured data for 2019B that had full production and marketing activity. In this season, farmers sold the largest volumes to wholesalers, local traders and brokers/agents. However, the highest prices were offered by urban consumers, local traders and local consumers (Table 17). Retailers offer higher prices owing to competition because they are many in the market while wholesalers take advantage of bulk buying to offer lower prices.

3.1.4.2 Costs and revenues in the groundnut value chain

Generally, groundnut farmers incurred more costs, and earned more revenues and gross margins in the 2019B season. Season 2020A was affected by COVID-19 to a large extent. In 2019B, farmers earned positive margins in all districts, except Nebbi district. A farmer earned an average of about 1.3 million Uganda shillings per hectare in gross margins from the groundnuts sold in 2019B compared to only 0.6 million Uganda shillings per hectare in the 2020A season (Table 18). Groundnut production is more profitable in Agago, Omoro and Amuru districts, all in the Acholi sub-region. Although older farmers earned more gross margins in 2019B, the youth earned more in 2020A (Table 19).

Table 17: Average quantities sold by groundnut farmers in 2019B by marketing channel

Buyer	Quantity sold (kg)	Price (UGX/kg)
Local trader	387.73	2,900
Wholesale trader	450.00	2,560
Brokers/agents	356.50	2,550
Local consumers	253.83	2,830
Urban consumers	100.00	3,000
Restaurant/hotel	256.67	2,166.67

Table 18: Groundnut costs, incomes and gross margins for farmers per hectare by season

	2019B			2020A		
District	Total cost (UGX/ha)	Income (UGX/ha)	Gross margins (UGX/ha)	Total cost (UGX/ha)	Income (UGX/ha)	Gross margins (UGX/ha)
Agago	1,417,874.00	3,968,613.00	2,550,739.00	516,390.60	771,545.00	255,154.40
Omoro	938,015.50	2,931,611.00	1,993,595.00	687,440.20	2,042,383.00	1,584,090.00
Amuru	395,216.90	1,953,817.00	1,558,600.00	339,674	686,274	431,518
Pakwach	287,666.70	397,333.30	109,666.70	-	-	-
Nebbi	48,052.54	1,866.67	-46,185.87	19,638	231,739	134,855
Overall	**610,496.00**	**1,922,165.00**	**1,311,669.00**	**317,054**	**988,983**	**568,555**

Table 19: Groundnut farmer costs, incomes and gross margins per hectare by age group

	Mean			
Season		Youth (<=35 years)	Old (>35 years)	Overall
2019B	Total cost (UGX/ha)	420,082.30	648,578.70	610,496.00
	Income (UGX/ha)	886,387.20	2,129,320.00	1,922,165.00
	Gross margins (UGX/ha)	466,304.90	1,480,742.00	1,311,669.00
2020A	Total cost (UGX/ha)	163,906.10	374,484.80	317,054.20
	Income (UGX/ha)	755,305.40	1,076,612.00	988,983.00
	(UGX/ha) Gross margins	591,399.20	561,701.80	568,555.10

A t-test was run but found no significant differences

A groundnut trader, regardless of district of location, earned positive margins, indicating that the groundnut trade is profitable. In a season, a trader could earn about 30.5 million Uganda shillings from stock worth about 4.8 million shillings and with operational costs of about 0.6 million shillings (Table 20). The results indicated that traders in Nebbi and Agago districts make the highest returns on their investment in groundnut businesses.

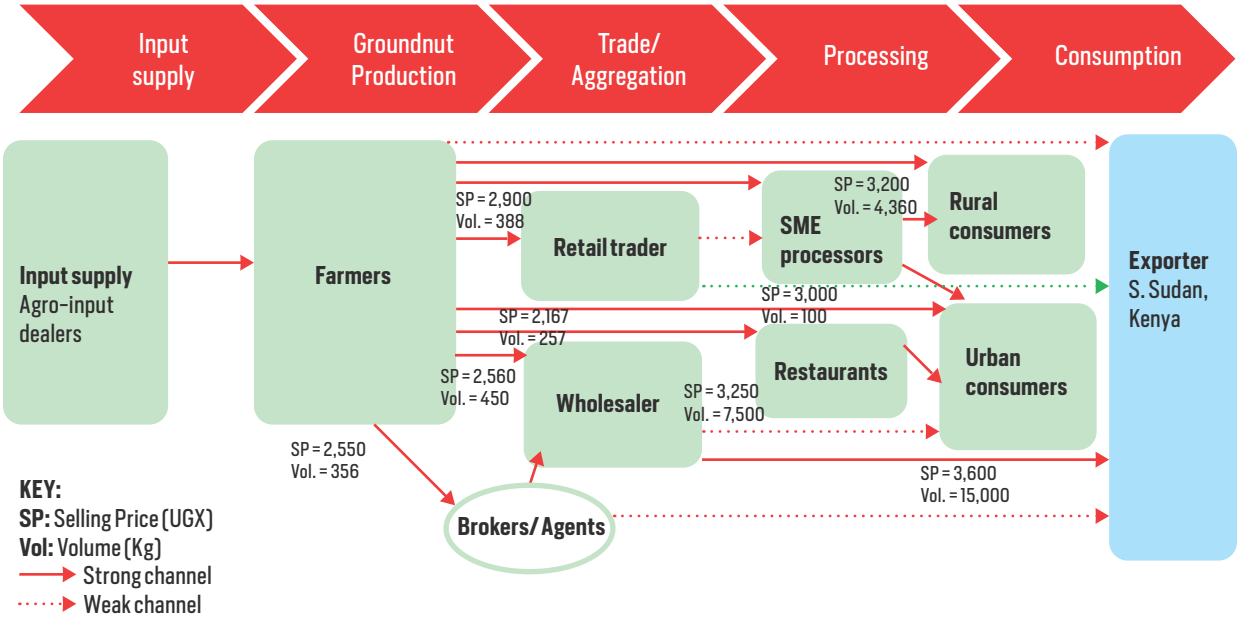
3.1.5 The groundnut value chain map

Figure 4 shows the groundnut value chain actors in the strong and existing channels and other channels that are still weak (potential channels), some existing and others non-existent. Although farmers sell groundnuts to retailers, wholesalers, processors and through agents/brokers, there was no evidence of them selling to exporters even when such a channel exists. This was found to be partly due to weak farmer groups that do not bulk enough volumes to sell to large buyers such as some wholesalers and exporters. This has given rise to brokers/agents, who come in to fill the supply volume gap. Processors are small-scale, with only a few falling in the medium category. The groundnut processors, being small-scale, can only source raw materials from farmers, who mainly sell to them as individuals. So, there is a gap in the capacity of processors to aggregate and add value to larger volumes and create more value along the value chain, given that they sell processed groundnuts at about 3,200 Uganda shillings/kg.

Table 20: Groundnut trader costs, revenues and gross margins per season

	Mean (UGX/season)			
District	Cost of groundnut stock	Other operational costs	Revenue	Gross margins
Nebbi	4,088,000.00	709,800.00	79,200,000.00	74,400,000.00
Omoro	136,680.00	621,600.00	967,500.00	209,220.00
Pakwach	-	549,000.00	982,500.00	433,500.00
Total	**4,768,068.00**	**633,300.00**	**35,900,000.00**	**30,500,000.00**

Figure 4: The groundnut value chain map in the ALENU Project area



3.1.6 Bottlenecks and weak points within the groundnut value chain

In light of the growing global demand and prices for groundnuts/peanuts, the Ugandan peanut industry is thought to contain a latent potential for youth to engage in more productive forms of employment (ITC, 2015). Past research commissioned by USAID's Feed the Future (FTF) initiative and the Peanut Innovation Lab (PIL) have identified solutions to the barriers that inhibit peanut farmers/producers, including youth, from unlocking this potential, such as improved transfer and adoption of knowledge and technology (Peanut CRSP, 2012a), more training to detect and reduce aflatoxin levels (PMIL, 2016), and improved marketing opportunities and development (Peanut CRSP, 2012b).

Discussions with the farmers, including the youth, unearthed a number of bottlenecks that hold back youth participation and employment in the groundnut value chain in the ALENU districts including, but not limited to:

- Limited financial support where farmers fail to finance production activities at the planting time through purchasing good/improved seed[4], hiring labour/equipment including ox-ploughs (or poor farm inputs/equipment and high cost of labour), hiring land[5] and other activities.
- Poor access roads for transporting produce to the market and accessing inputs as well as long distances to gardens, which were also mentioned by farmers during FGDs.
- Limited skills, poor storage facilities and lack of transport to access markets, which were identified as key bottlenecks.

3.1.7 On- and off-farm opportunities along the groundnut value chain for employment creation

Given that groundnut farmers earned positive gross margins, there exist employment opportunities on-farm.

First, farmers complained about poor access to good seed and inputs. Therefore, one of the opportunities lies in input supply, especially of improved seed where one can act as a link between farmers and seed multipliers/research stations like NASARRI in Serere to sell improved-variety seed to farmers. In addition, labour is still a problem, hence engaging in a business of supplying labour (share cropping) or farm management services or labour-saving technologies, such as ox-ploughs, can be an opportunity.

1. Off the farm, providing processing services for farmers to thresh their groundnuts can be a lucrative business. During the field data collection, it emerged that there were few processors and that farmers moved long distances to access processing facilities, which increases transaction costs.
2. Storage and transport services are also less developed and less used by groundnut value chain actors. Organising farmers into bigger bulking units such as cooperatives or Area Cooperative Enterprises (ACEs) can create value and jobs for many people, including the youth.
3. Retail and wholesale trade also constitute profitable options for off-farm employment. These, however, may need some substantial social and financial capital to start. However, there is also an option of acting as an agent/broker to buy for other big traders and processors and make a commission to raise enough capital to buy own stock of groundnut and build a business.

3.1.8 Key "entry points" for youth engagement along the groundnut value chain

3.1.8.1 Resources needed to participate in the various entry points identified

Some resources were mentioned that need attention to make the groundnut value chain easy to penetrate and empower the farmers and other actors to build viable agri-businesses. These include:

4 Poor seed was highlighted as hampering progress at farm level, resulting in low productivity and incomes.
5 High cost of hiring land was mentioned by those youth and farmers who have limited access to enough land.

- Financial support preceded by financial literacy training
- The provision of farm inputs
- Training in modern farming methods
- Collective production and marketing
- Marketing skills
- Improving on the roads

3.1.8.2 Prioritised groundnut value chain "entry points"

The following can be singled out as critical and priority entry points in the groundnut value chain:

a. Farm input supply, including improved-quality seeds, labour-saving technologies, farm and management services for hire (including share cropping).

b. Seed multiplication is another entry point for groundnut farmers and farmer groups. A number of local seed businesses (LSBs) have been established in Northern Uganda that multiply breeder and quality declared seed (QDS) which they supply to fellow farmers, making some profit but also solving the seed scarcity problem.

c. Aggregation and storage services, which could be done by either organising masses of groundnut producers to bulk and sell collectively or for individuals to build the capacity to buy in bulk and store the groundnuts.

d. Processing facilities, which are currently few, and are distant from the farmers. This could provide an opportunity to fill the service gap, especially in threshing and flour/paste production. The flour and paste can be sold to restaurants and household consumers.

e. Groundnut exports are another entry point. However, although Ugandan exports are largely informal, statistics show that Uganda exported about 8,000 MT of groundnut in 2019 and this has not changed since 2014.[6] The District Production & Marketing Officer (DPMO) of Zombo district revealed in the KII that there is cross-border trade going on between Uganda through Zombo and the Democratic Republic of Congo (DRC).

3.1.8.3 Partnerships/ relationships, level of cooperation and trust among the groundnut value chain actors

For the farmers, the main element of building partnerships and trust is engrained in strong and functional farmer groups and cooperatives (95% in farmer groups and 94% in savings groups). What is evident is that almost all groundnut farmers under the ALENU Project belong to a farmer group. What is worrying is the level of collective marketing. Only 17% of the farmers in the groups market collectively (Table 21). What is encouraging is that 27% of the youth market in groups and 55% of them borrow funds for investing in groundnut production (Figure 5).

Other potential partnerships can be forged between farmers and traders, especially bulk buyers of groundnuts such as wholesalers, who, instead of working with agents/brokers, can initiate contract farming with farmers to supply them.

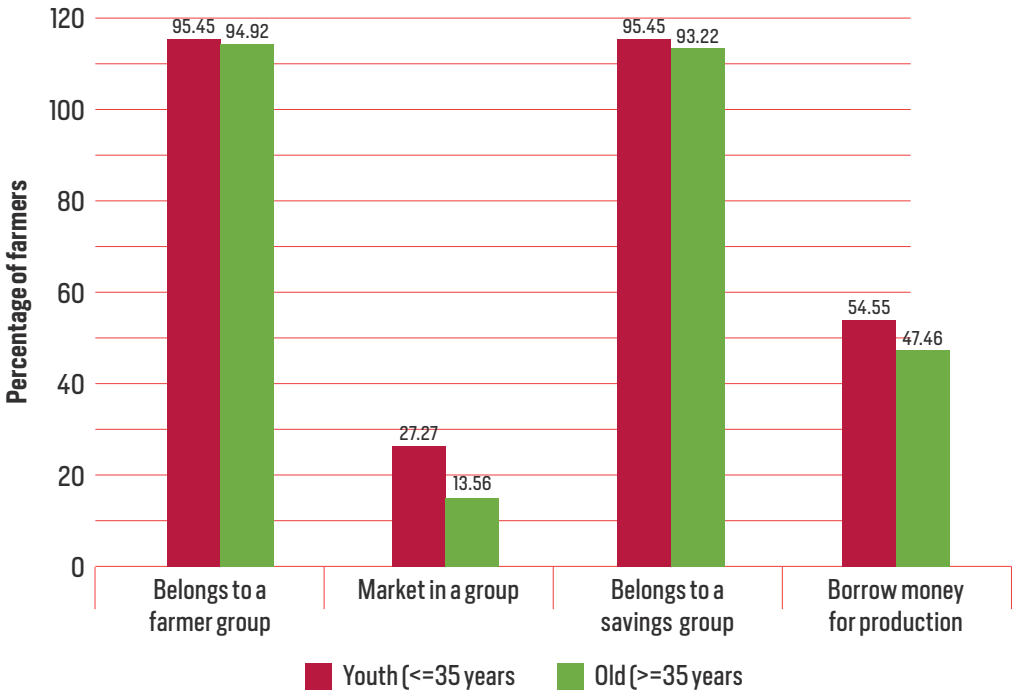
Input supply partnerships also have great potential to ease access to quality improved seed and other inputs. Farmers or farmer groups can partner with research station breeders of seed companies to multiply seed for other farmers and this can be a lucrative business.

6 Available at https://www.agrochart.com/en/usda/section/38/oilseeds/country/211/uganda/commodity/19/oilseed-peanut/attribute/10/exports/

Table 21: Percentage of groundnut farmers in groups and level of collective action

	Percentage of farmers			
District	Belongs to a farmer group	Market in a group	Belongs to a savings group	Borrow money for production
Omoro	100	6.67	93.33	6.67
Agago	100	9.09	100	18.18
Amuru	100	0	100	41.67
Pakwach	100	10	90	70
Nebbi	86.21	31.03	89.66	79.31
Overall	**95.06**	**17.28**	**93.83**	**49.38**

Figure 5: Level of group participation by age group



3.2 THE BEAN VALUE CHAIN

3.2.1 Introduction

The Northern region and West Nile fall under the North-Western Savannah Grasslands (NWSG) agro-ecological zone. Common beans are some of the major crops grown here, in addition to cassava, groundnut, rice, maize, sorghum and millet. Much as most of the land in this agro-ecological zone is under crop cultivation, the zone is constrained primarily by prolonged dry spells, flooding and livestock pests (Browne and Glaeser, 2010).

Table 22 shows that the five mega-environments combined produce 848,891 MT, which accounts for about 77% of the national production. The remaining 23% of the beans are produced by the deficit agro-ecological zones, which include the North-Eastern Savannah, the North-East Drylands, the Pastoral Rangelands, the Highland Ranges and the Para-Savannah. Of the production from the five production zones, the Northern region and West Nile (NWSG) produce about 23% of the beans (UBOS, 2016, 2018). Therefore, the six ALENU districts are located in a key bean production and consumption zone, with about 23 kg of beans consumed per capita.

Table 22: Bean production, consumption and marketable surplus across five main production environments

Agroecological zone	Output (MT) (2008/09)	Yield (MT/ha)	Per capita bean consumption (kg/person/ year)	Estimated Qty consumed annually (MT)*	Estimated Qty sold (MT)*	Percentage production
North-Western Savannah Grasslands	199,121	0.60	22.88	51,771	147,350	23.46%
Western Savannah Grasslands	259,613	0.60	33.87	67,499	192,114	30.58%
Lake Victoria crescent	98,840	0.70	16.12	25,698	73,142	11.64%
Kyoga plains	66,887	0.60	17.98	17,391	49,496	7.88%
South-Western farmlands	224,430	0.60	35.71	58,352	166,078	26.44%
Total /Average	**848,891**	**0.62**	**25.312**	**220,711**	**645,157**	**23.46%**

Source: UBOS (2017). UNPHC, 2014; UBOS (2016): UNPS data 2015/2016; UBOS (2010).

Annual Agricultural Survey, 2018(UBOS, 2018)

Note: *At harvest time, the producers sell approximately 74% of their bean harvests and consume the remaining 26% at home and for seed.[7]

3.2.2 Socio-economic characteristics of bean chain actors

3.2.2.1 Farmers

Beans were promoted only in Agago district by the ALENU project. Although the results presented here show the performance of beans in other districts, emphasis is on Agago district. In Agago district, the majority of the sampled bean farmers (67%) are females, while 17% are youth. Overall, 42% of all bean growers are females and 33% are youth (Table 23). Although about 62% of the bean farmers had attained a primary level of education, indicating a fair level of literacy, in Agago district, where the ALENU Project promoted the bean value chain, 60% of the farmers never went to school (Table 24). This has implications for the comprehension of extension messages and how they should be delivered to such a group of farmers who cannot read or write. The bean farming households in Agago district are relatively larger, with nine members compared to other districts with seven members (Table 25).

Table 23: Gender distribution of bean farmers by sex and age group

	Percentage of bean farmers			
	Sex of farmer		Farmer age group	
District	Male (n=37)	Female (n=27)	Youth (<=35 years) (n=21)	Old (>35 years) (n=43)
Omoro	83.33	16.67	16.67	83.33
Agago	33.33	66.67	16.67	83.33
Nebbi	45.00	55.00	35.00	65.00
Pakwach	66.67	33.33	41.67	58.33
Zombo	65.00	35.00	35.00	65.00
Overall	57.81	42.19	32.81	67.19

7 Kilimo Trust (2012). *Development of Inclusive Markets in Agriculture and Trade (DIMAT): The Nature and Markets of Bean Value Chains in Uganda.*

Table 24: Education of bean farmers

District	None	Primary	Secondary (O'level)	Secondary (A'level)	Diploma/ College
Omoro	16.67	83.33	0.00	0.00	0.00
Agago	60.00	40.00	0.00	0.00	0.00
Nebbi	10.00	65.00	25.00	0.00	0.00
Pakwach	0.00	75.00	16.67	8.33	0.00
Zombo	0.00	50.00	35.00	10.00	5.00
Overall	**9.52**	**61.90**	**22.22**	**4.76**	**1.59**

Table 25: Household size and dependency of bean farmers' households

		Mean		
District	**Household size**	**Max**	**Number of dependants**	**Max**
Omoro	6.50	10	3.67	8
Agago	8.83	13	3.75	6
Nebbi	7.00	13	2.15	7
Pakwach	6.25	11	2.17	6
Zombo	7.10	12	3.00	7
Overall	**7.02**	**13**	**2.66**	**8**

3.2.2.2 Traders

All sampled bean traders were males (50% youth) and 50% were old males. The traders had families with two members on average and the majority (50%) had a diploma (Table 26). Traders came from households with about seven members, although older traders had almost twice the size of the families as that for youth.

3.2.2.3 Consumers

The bean-consuming households headed by older people aged above 35 years constituted 28% of the bean consumers sampled while the youth made up 72%. The majority of the consumers (76%) came from male-headed households (MHH). Bean consumers were generally educated, with about 43% of them with education levels above primary (Table 27).

Table 26: Bean trader by sex, education and size of household

	Trader age group		
Trader characteristics	**Youth (<=35 years) (n=2)**	**Old (>35 years) (n=2)**	**Overall (n=4)**
Household size	5	10	7
Sex of trader			
Male	50.00	50.00	100
Female	0.00	0.00	0.00
Education level			
Primary	0.00	50.00	25.00
O' level	50.00	0.00	25.00
Diploma/college	50.00	50.00	50.00

Table 27: Bean consumer by sex, education and size of household

	Percentage of consumers		
	MHH (n=25)	FHH (n=14)	Overall (n=39)
Sex	64.10	35.90	100.00
Youth (<=35 years)	76.00	64.29	71.79
Old (>35 years)	24.00	35.71	28.21
Education level			
Primary	12.00	42.86	23.08
None	36.00	28.57	33.33
O' level	40.00	21.43	33.33
A'level	8.00	7.14	7.69
Degree	4.00	0.00	2.56

About 62% of the consumers of beans got their products from own production, 33% and 28% bought from weekly and main markets, respectively, while about 28% bought from shops and supermarkets (Table 8). These findings show that a few bean consumers (3%), especially in urban areas, purchased from supermarkets (Table 28). The results also mean that the majority of rural consumers are also producers of beans, hence the bean market and demand are stronger in the urban areas than in the rural parts of the country.

3.2.3 Bean commodity market demand

3.2.3.1 Quantity of beans produced and sold

Bean producers produced about 170 kg and sold about half of that in the 2019B season (second season of 2019). In 2020A, the harvests reduced and sales, too (Table 29). Farmers in Agago, Pakwach and Omoro districts produced more beans than those in the other areas in both seasons.

Table 28: Bean consumers' source of products

Source of beans (where obtained)	Percentage of consumers by source of bean produce
Home harvest	61.54
Weekly markets	33.33
Main markets	28.21
Shops	28.21
Supermarkets	2.56

Table 29: Quantity of beans produced and sold by farmers

	Mean (kg)			
	2019B		2020A	
District	Quantity produced	Quantity sold	Quantity produced	Quantity sold
Agago	410.00	175.00	240.00	40.00
Omoro	226.67	115.00	192.50	200.00
Nebbi	83.33	36.67	70.00	40.00
Pakwach	83.33	60.00	103.33	76.67
Zombo	74.25	51.75	79.75	82.67
Overall	169.19	89.19	137.00	70.62

3.2.3.2 Quantity of beans traded

Across Agago district, we estimated the number of bean traders and subsequently the volumes aggregated. The results show that 1,400 MT of beans were aggregated per season in Agago and 1,872 MT in Omoro district from farmers. Traders also indicated that they aggregated about 1,080 MT and 936 MT of beans from wholesalers and retailers, respectively (Table 30). There was no evidence of traders dealing with agents/brokers in the bean value chain. This could be due to the efficient and sufficient numbers of retailers who aggregate beans at village level.

3.2.3.3 Prices and seasonality

Agago district, where ALENU promotes beans, received the third highest price in the 2019B season and the second highest in the 2020A season. Nebbi, Zombo and Pakwach districts also got some of the highest prices, especially in the 2020A season, where production was earlier indicated to have been lower than in 2019B (Table 31).

Bean traders offered the highest price to wholesalers, especially in the lean season. In Omoro district, if a trader bought beans from a farmer, they offered a higher price than if they bought beans from a retailer (Table 32). Therefore, in the lean season when there is scarcity, traders would rather buy from farmers than from wholesalers who, most likely, would have stored the beans or hoarded them so they could fetch higher prices. Prices of products, including beans, are to a greater extent driven by seasons. The results show that beans in the ALENU districts have diverse peak seasons. For instance, in Agago, where the DPMO indicated that they usually have one production season in a year, the peak season is between August and November. In Omoro district, the peak season is in July to September (Figure 6).

Table 30: Bean volumes aggregated by traders by supply source

	Aggregated volume traded (kg) per season at district level		
District	**Farmers**	**Wholesalers**	**Retailers**
Agago	1,408,000.00	-	-
Omoro	1,872,000.00	1,080,000.00	936,000.00
Overall	**3,280,000.00**	**1,080,000.00**	**936,000.00**

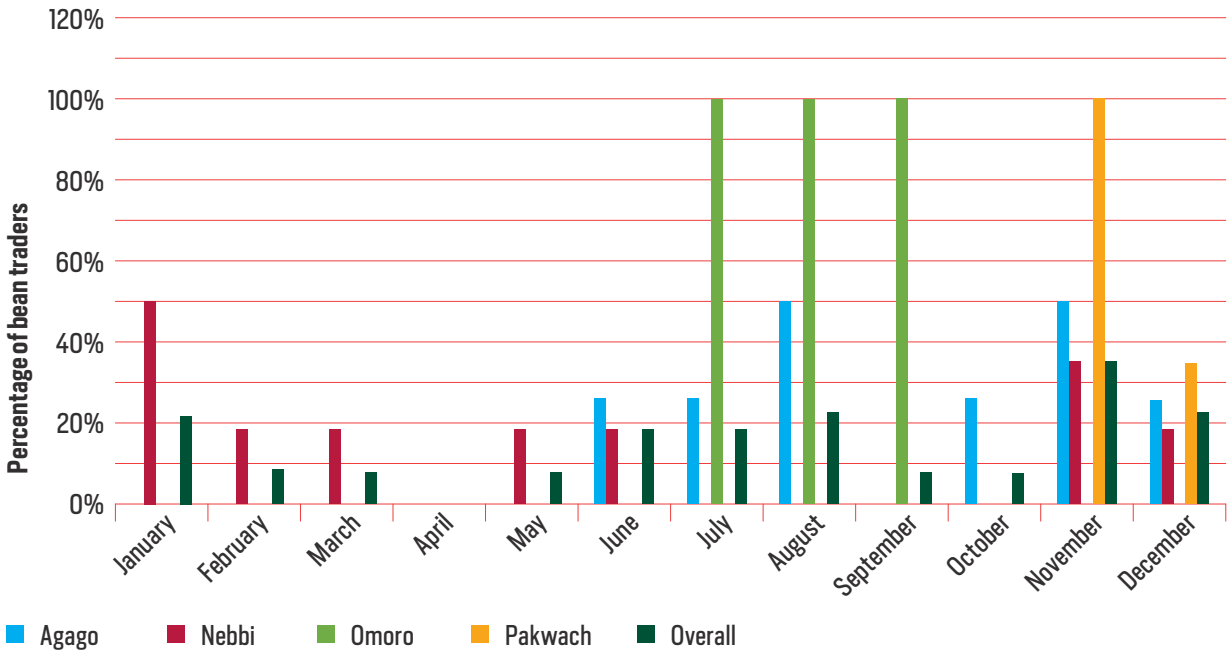
Table 31: Bean prices received by farmers

	Bean prices (UGX/kg) by season	
District	**2019B**	**2020A**
Omoro	1,700.00	1,500.00
Agago	1,775.00	2,400.00
Nebbi	2,200.00	2,200.00
Pakwach	1,700.00	2,000.00
Zombo	2,200.00	2,500.00
Overall	**1,920.00**	**2,210.00**

Table 32: Bean prices given by traders by channel

	Average price (UGX/kg)					
	Farmers		Wholesalers		Retailers	
District	**Peak season**	**Lean season**	**Peak season**	**Lean season**	**Peak season**	**Lean season**
Agago	1,170	1,930	1,000	2,500	.	.
Omoro	1,500	1,300	.	.	1,200	1,250
Overall	**1,250**	**1,775**	**1,000**	**2,500**	**1,200**	**1,250**

Figure 6: Bean peak season months



Source: Trader data, 2020

3.2.4 Value creation and associated distribution channels

3.2.4.1 Costs, revenues and value added

Bean farmers earned the highest incomes and gross margins in the 2019B season (second season of 2019) than in 2020A (first season of 2020). A farmer in Agago district earned about 5.1 million Uganda shillings per hectare in 2019B compared to 3 million in 2020A. Subsequently, they earned about 4.9 million Uganda shillings per hectare in gross margins in 2019B compared to 1.3 million in 2020A (Table 33). Given that season 2020A fell in a COVID-19 outbreak and lockdown period, it has also been observed that in addition to reduced incomes (partly due to lower prices), farmers' costs of production per hectare increased from 0.3 million to 0.4 million Uganda shillings in 2020A.

Bean traders in Agago earned positive gross margins of about 17.1 million shillings per season from a bean stock worth 15 million shillings. Traders in Omoro indicated losses from their bean stock (Table 34). However, it should be noted that much of the stock bought at a high price in 2019B was either held in stores or sold at a lower price in 2020A and 2020B owing to the effects of the COVID-19 Lockdown on the economy.

Table 33: Bean farmers' costs, incomes and gross margins per hectare by season

	Mean (UGX/ha)					
	2019B			2020A		
District	Costs/ha	Income/ha	Gross margin /ha	Costs/ha	Income/ha	Gross margin /ha
Agago	294,384.10	5,181,159.00	4,886,775.00	215,881.60	3,019,324.00	1,293,780.00
Omoro	534,420.30	2,427,536.00	1,893,116.00	769,927.50	4,891,305.00	860,507.30
Nebbi	162,016.90	700,000.00	304,649.80	345,000.00	480,000.00	135,000.00
Pakwach	180,000.00	283,333.30	103,333.30	180,000.00	413,333.30	233,333.30
Zombo	79,921.50	207,578.50	85,104.66	260,459.80	297,619.00	-161,253.40
Overall	259,840.20	1,692,507.00	1,209,440.00	365,609.60	1,301,031.00	435,024.80

Table 34: Bean traders' costs, revenues, and gross margins per season by season

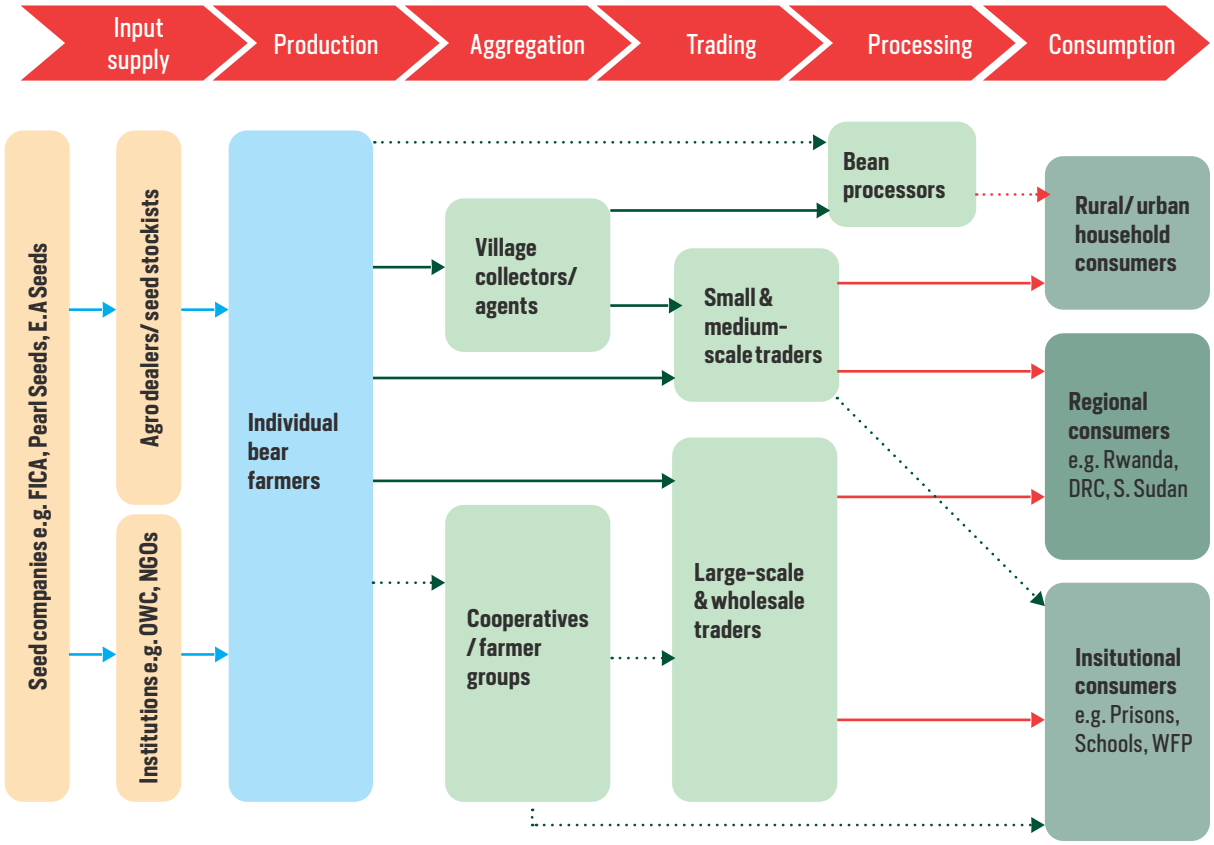
	Mean (UGX/season)			
District	Cost of bean stock	Other operational costs	Revenue	Gross margins
Agago	15,000,000.00	1,118,000.00	33,300,000.00	17,100,000.00
Omoro	113,000,000.00	7,092,000.00	13,600,000.00	-20,000,000.00
Total	**39,600,000.00**	**2,611,500.00**	**28,300,000.00**	**7,856,500.00**

3.2.5 The bean value chain map

Figure 7 shows the interconnectedness of the various functions of the key actors in the common bean value chain.

Generally, a great deal of the bean transactions happens between farmers and retailers (village traders), and small- and medium-scale traders. The cooperatives/farmer groups and processor channels are still less developed in the value chain. The beans are aggregated by small- and medium-scale traders and wholesale (large-scale) traders with stores in the urban centers who sell them to household, regional and institutional consumers. The regional market for beans is in Rwanda, Kenya, DRC and South Sudan through cross-border trade, much of it being informal.

Figure 7: Common bean value chain map for Northern Uganda



3.2.6 Bean market potential

3.2.6.1 Bottlenecks and weak points within the VC

Production

- The main production-level bottlenecks are land-opening capacity, which is still a limiting factor for commercial agriculture since farmers still use the hand hoe, yet they have a lot of land8 and hiring manual labour is expensive (high cost of labour). The availability of tractors and tractor hire services would greatly increase bean production, particularly in Agago district, where ALENU is supporting the bean value chain.

- Access to and adoption of improved bean seed, fertilizer and other inputs. Poor seed quality was highlighted as a key constraint in bean production.

- The level of collective action where farmers access extension and marketing services as a group is still low. Although over 85% of the farmers are organised in farmer groups (see Annex 8), many still sell their produce as individuals. This raises questions on issues of trust within the farmer groups, expectations while joining the groups and bargaining power when selling to the markets.

Marketing

- Market access is still hampered by a bad road network. Physical market access in many areas is still a problem that hampers farmer access to better markets.

- There is also a weak link in market information access.

- Lack of basic business skills on the part of farmers and traders. There was no evidence of contracting between farmers and traders or between traders and agents/brokers. This means that value chain actors have loose transactional relationships that are not sustainable in the longer term.

Processing

The level of bean processing is almost zero. Apart from restaurants that add value through cooking the beans, there was no evidence of processed bean products on the market in Northern Uganda.

3.2.6.2 On- and off-farm opportunities along the bean value chain for employment creation

On-farm opportunities

On the farm, there are several opportunities for employment in the bean value chain that include:

1. Input supplies, including seed, fertilizer, farm care services such as spraying, land opening services etc. Local seed businesses (LSBs) can be established to multiply bean seed from seed companies or bean breeders and supply it to farmers at an affordable price.

2. Group marketing that involves storage, transportation and marketing functions, all of which can create jobs for members.

3. Contract/out-grower farming can also work well with farmers who want to aggregate large quantities of beans and supply institutions, such as the World Food Programme (WFP) and big schools. This needs the farmer groups to be well organised with storage facilities to ensure sustained supplies to the clients.

Off-farm opportunities

The off-farm opportunities include:

1. Bean trading and aggregation, which can be a lucrative business on small, medium and large scales for the individuals and youth with capital to buy beans from farmers, store them and supply them to wholesalers and institutions.

2. Brokerage/agent marketing can offer employment to individuals who are honest and can be trusted by large buyers such as wholesalers to bulk for them using the wholesalers' cash to make a commission.

3. Innovations, which can be innova-

8 *Source: Key informant interview with the Agago District Principal Commercial Officer (DPCO)*

tions for market information or extension access that may include mobile apps that link farmers to markets (some of these already exist but few farmers know about them or use them). Examples of such apps are Jaguza Livestock, EzyFarm, AgroMarketDay, Hello Tractor and others.[9] Other innovations may be in terms of products from beans. New products such as processed beans or pre-cooked beans or branded and packed beans can be introduced to help farmers access niche markets, especially the supermarkets.

3.2.6.3 Key "entry points" for youth engagement along the bean value chain

- Resources needed to participate in the various entry points identified.

3.2.6.4 Prioritised bean value chain "entry points"

The priority entry points for the youth in the bean value chain could include:

- Bean trading and aggregation. This can be easily done by organising youth farmer groups that can aggregate and market the beans.
- Brokerage/agent marketing. This can be done by using medium- to large-scale traders' money to get the capital required to buy and aggregate beans from the villages.
- Innovations. This can be done either through making new innovations or upscaling existing innovations such as VSLAs.

3.2.6.5 Partnerships/relationships, level of cooperation and trust among the bean value chain actors

There is no evidence of farmers having clear trading partnerships with other bean value chain actors. There were no actors offering contracts (verbal or written) to farmers to produce and supply them with beans. What exists is spot buying and selling where farmers sell to whoever is available. In fact, 72% of the farmers indicated that they sell to village/small-scale traders because they are the only available produce buyers. Therefore, we can say that the levels of trust and cooperation among bean value chain actors in the ALENU Project area is still low and needs more efforts to build.

9 The *Daily Monitor*, Smart phone farming. Accessed at https://www.monitor.co.ug/uganda/magazines/farming/smart-phone-farming-apps-every-farmer-must-have-1885832

3.3 THE SOYBEAN VALUE CHAIN

3.3.1 Introduction

Soybeans *(Glycine max)* serve as one of the most valuable crops in the world, not only as an oil seed crop and feed for livestock and aquaculture, but also as a good source of protein for the human diet and as a biofuel feedstock (Masuda and Goldsmith, 2009).[10] Soybean is the most nutritious crop in the world, containing approximately 40% protein and 20% oil, both of which are vital to human and animal diets. With the available technology for processing soybeans at industrial and household levels, soybean has become one of the most promising food crops available to improve the diets of millions of people in the world (Tukamuhabwa and Obua, 2015). Soybean contains at least 100% more proteins, with yields of 5-10 times more protein per unit area than any other crop. The protein in soybean is also balanced with all the essential amino acids which the body cannot manufacture. World production of soybeans is predicted to increase form 311.1 MT in 2020 by 2.2% annually to 371.3 million tonnes by 2030, with the USA leading with about 100 MT.[11]

Global soybean exports totalled US$ 54.8 billion by 2019, a growth of 7.2% from the 2015 levels. Africa only shared 0.2% of this global soybean market. Uganda exported soybean worth US$ 717,000 (International Trade Centre, 2020).[12] Uganda imports 60-70% of its edible and soap needs; yet population growth and rising incomes continue to fuel an annual growth rate of 9% in domestic and regional demand for vegetable oil and its by-products. Through the Vegetable Oil Development Project (VODP2), the Government of Uganda, through four vegetable seeds hubs, i.e. the Eastern Uganda Hub, Northern Uganda Hub, Lira Hub and West Nile Hub, supported farmers to bulk 38,000 MT of soybeans by the end of December 2016 (Tukamuhabwa and Obua, 2015).[13]

Soybean production in Uganda steadily increased from 144,000 hectares in 2004 to 200,000 hectares in 2014 (Tukamuhabwa and Oloka, 2016). Soybean prices increased from 600 Uganda shillings per kilo in 2008 to 1000 Uganda shillings per kilo in 2011 (SNV, 2011). Soybean production in Uganda has been steadily growing. However, production had been previously hampered by the outbreak of the soybean leaf rust disease which was devastating soybean crops throughout the country until a Makerere University project, undertaken in partnership with the Ministry of Agriculture, Animal Industry and Fisheries-Vegetable Oil Development Project (MAAIF-VODP), Alliance for a Green Revolution in Africa (AGRA) and the Regional Universities Forum for Agricultural Development (RUFORUM), led to breeding the six new MAKSOY varieties between 2004 and 2013. The new varieties yield between 2 and 3.5 MT/ha with a protein content of between 36 and 43 MT/ha.

3.3.2 Socio-economic characteristics of soybean chain actors

3.3.2.1 Farmers

The sampled soybean farmers were mainly males (62%) with a good proportion of youth farmers (35%). Pakwach and Agago districts had over 60% of the farmers in the youth age group, while Nebbi and Pakwach had at least 50% of the farmers as females (Table 35). Table 36 shows that about 67% of the soybean farmers had attained a primary level of education and 22% had reached O' level. However, Agago and Zombo districts had more educated soybean farmers who had attained O' level. The farmers came from households with an average of seven persons, four of whom were dependants, meaning that about three people were available for farm labour (Table 37).

10 Masuda and Goldsmith (2009). *World Soybean Production: Area Harvested, Yield, and Long-Term Projections*. Accessed at https://www.ifama.org/resources/Documents/v12i4/Masuda-Goldsmith.pdf

11 Statista.com. Available at https://www.statista.com/statistics/263926/soybean-production-in-selected-countries-since-1980/

12 ITC (2020). Available at https://www.trademap.org/Index.aspx

13 Tukamuhabwa, P. and Obua, T. (2015). *Soybean Production Guide in Uganda*. Accessed at https://soybeanafrica.com/images/docs/Soybean-Growers-Guide-Uganda-Compressed.pdf

Table 35: Gender distribution of soybean farmers by sex and age group

	Percentage of soybean farmers			
	Farmer sex		Farmer age group	
District	Male (n=23)	Female (n=14)	Youth (<=35years) (n=13)	Old (>35 years) (n=24)
Zombo	100.00	0.00	0.00	100.00
Omoro	76.92	23.08	30.77	69.23
Agago	60.00	40.00	60.00	40.00
Nebbi	50.00	50.00	10.00	90.00
Pakwach	50.00	50.00	62.50	37.50
Overall	**62.16**	**37.84**	**35.14**	**64.86**

Table 36: Education level of soybean farmers

	Percentage of soybean farmers			
District	Primary	Secondary (O' level)	Secondary (A' level)	Diploma/ College
Omoro	76.92	7.69	7.69	7.69
Nebbi	66.67	22.22	11.11	0.00
Pakwach	62.50	25.00	12.50	0.00
Agago	60.00	40.00	0.00	0.00
Zombo	0.00	100.00	0.00	0.00
Overall	**66.67**	**22.22**	**8.33**	**2.78**

Table 37: Household sizes and dependency of soybean farmers

District	Household size		Number of dependants	
	Mean	Max	Mean	Max
Omoro	7.15	21.00	4.00	10.00
Pakwach	7.25	12.00	6.00	12.00
Nebbi	7.20	11.00	3.10	7.00
Zombo	9.00	9.00		
Agago	6.20	8.00	3.60	5.00
Overall	**7.11**	**21.00**	**4.03**	**12.00**

3.3.2.2 Traders

Of the five sampled soybean traders, three were males and two were females. Four of the traders had an O' level education although three of the four were males (Table 38).

3.3.2.3 Processors

Of the two sampled soybean processors, one was male and one was female. The male had an O' level of education and the female had a primary-level education (Table 39).

3.3.2.4 Consumers

Over 60% of the sampled soybean consumers came from male-headed households (Table 41). Over 40% of the consumers got their soybean products from shops in their area while 30% got them from weekly markets. About 30% produce their own soybean for household consumption (Table 41).

3.3.3 Commodity market demand

This section presents results that show the demand for soybean in the ALENU intervention districts in terms of quantities produced by farmers and bulked by traders, processors and agents. Soybean was promoted in Pakwach, Agago and Omoro districts.

3.3.3.1 Quantity of soybean produced and sold by farmers

Overall, soybean farmers produced an average of 335 kg and sold almost all of it (323 kg) in 2019B. There was an increase in the production of soybean in 2020A of about 18 kg from what was produced in the earlier season in 2019 (Table 42). Soybean sales also increased by about 7% in 2020A from the 2019B levels.

Table 38: Soybean traders' gender and education level

	Frequency		
Education level	**Male**	**Female**	**Overall**
Primary	0	1	1
O' Level	3	1	4
Total	**3**	**2**	**5**

Table 39: Soybean processors' gender and education level

	Frequency		
Education	**Male**	**Female**	**Male**
Primary	0	1	1
O' level	1	0	1
Total	**1**	**1**	**2**

Table 40: Soybean consumers by gender

	Percentage of consumers by household type		
District	**Male HHH**	**Female HHH**	**Total**
Nebbi	33.33	66.67	100
Pakwach	78.57	21.43	100
Overall	**60.87**	**39.13**	**100**

Table 41: Soybean consumers' sources of products

Source	%
Shops	43.48
Home harvest	30.43
Weekly markets	30.43
Main markets	17.39
Supermarkets	17.39

Table 42: Soybean production and sales by soybean farmers

	Mean (kg)			
	2019B		2020A	
District	**Produced**	**Sold**	**Produced**	**Sold**
Omoro	481.69	469.77	425.00	423.58
Agago	271.33	253.00	256.75	247.25
Pakwach	119.88	110.38	232.50	203.75
Overall	**334.79**	**322.88**	**352.85**	**344.35**

3.3.3.2 Quantity and prices of soybean traded and processed

Aggregated figures at district level indicated that traders aggregate about 30,000 MT from farmers, 1,840 MT from wholesalers and 2.8 MT through agents/brokers in a season. Traders in Agago aggregate from farmers only while in Pakwach, they aggregate from wholesalers and agents (Table 43). The only profiled processors in Pakwach had an aggregated capacity of 72 MT in a season (Table 44).

3.3.3.3 Price and seasonality

Soybean farmers received higher prices in the 2019B season than in 2020A, except in Pakwach. The average prices ranged between 1,640 Uganda shillings/kg and 1,330 Uganda shillings/kg (Table 45). The peak season for soybean happens between August and December according to traders, although Omoro district has a longer peak season than the other districts that runs between May and September (Figure 8). As would be expected, the lean season soybean prices are higher than the peak supply seasons. However, even in a lean season, traders offer higher prices to wholesalers, because these sell in bulk, than they give to farmers. Processors, on the hand, who indicated they buy directly from farmers, offered a higher price than traders in both the lean and peak seasons (Table 46).

Table 43: Seasonal aggregated volumes by soybean traders

	Aggregated soybean volumes (kg) per season		
District	**Farmers**	**Wholesalers**	**Agents/Brokers**
Agago	30,000,000.00	-	-
Pakwach	-	1,840,000.00	2,800.00
Total	**30,000,000.00**	**1,840,000.00**	**2,800.00**

Table 44: Seasonal aggregated volumes and prices by soybean processors

	Aggregated soybean volumes (kg) per season
District	**Retailers**
Pakwach	72,000.00

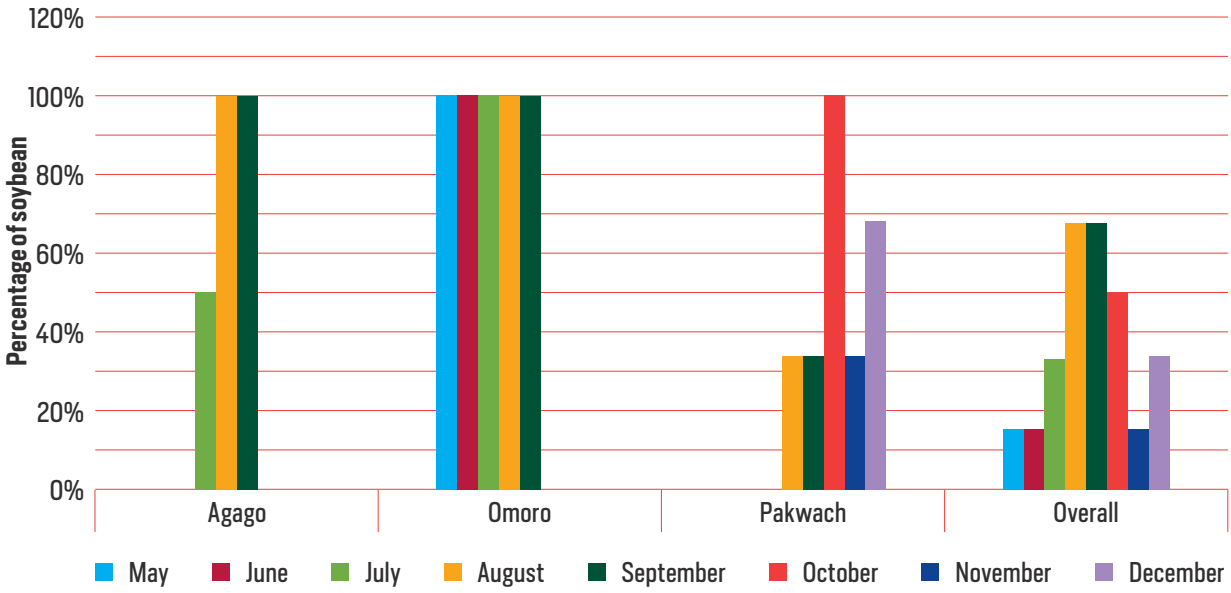
Table 45: Soybean prices received by soybean farmers

	Mean price (UGX/kg)	
District	**2019B**	**2020A**
Pakwach	2,810.00	3,000.00
Agago	1,130.00	950.00
Omoro	1,030.00	900.00
Overall	**1,640.00**	**1,330.00**

Table 46: Soybean prices given by soybean traders and processors by channel

	Season prices by supplier (UGX/kg)					
	Traders				Processors	
	Farmers		Wholesaler		Retail traders	
District	Peak	Lean	Peak	Lean	Peak	Lean
Agago	800.00	1,350.00	-	-	-	-
Pakwach	-	-	1,930	2,230	1,000	1,500

Figure 8: Soybean peak season months



Source: Trader data, 2020

3.3.4 Value creation and associated distribution channels

3.3.4.1 Costs, revenues and value added

In terms of value creation along the soybean value chain, farmers earned about 1.2 million Uganda shillings per hectare in 2019B, which reduced by about half to 0.5million shillings per hectare. In season 2019B, farmers in Omoro earned higher margins than those in other districts while in 2020A, Pakwach farmers earned more. A soybean farmer earned about 1.9 million shillings in incomes in 2019B compared to 1.4 million shillings in 2020A (Table 47). Youth soybean farmers earned twice as much gross margins as older farmers in 2019B although in 2020A, these margins went down drastically, given the COVID-19 effects on markets and prices. A youth farmer earned between 1.6 million and 2.3 million shillings in income from soybean sales (Table 48). This is an indication that soybean is a youth-friendly value chain even at primary production level.

Table 47: Costs, incomes and gross margins earned by soybean farmers

	Mean (UGX/ha)					
	2019B			2020A		
District	Costs/ha	Income/ha	Gross margin/ ha	Costs/ha	Income/ha	Gross margin/ ha
Omoro	791,309.20	2,189,363.00	1,398,054.00	1,979,320.00	1,568,384.00	308,816.90
Agago	214,623.60	1,290,761.00	645,883.60	467,995.20	1,140,172.00	828,175.30
Pakwach	191,500.00	1,170,000.00	978,500.00	163,250.00	1,125,000.00	961,750.00
Overall	**573,978.00**	**1,862,993.00**	**1,190,963.00**	**1,188,018.00**	**1,398,486.00**	**540,472.90**

Table 48: Costs, incomes and gross margins earned by soybean farmer age group

	Age group	
Mean	Youth (<=35 years)	Old (>35 years)
Costs 2019B (UGX/ha)	398,147.50	732,225.40
Income 2019B (UGX/ha)	2,278,580	1,530,524.00
Gross margins 2019B (UGX/ha)	1,627,257	798,298.70
Costs 2020A (UGX/ha)	1,713,201	347,723.80
Income 2020A (UGX/ha)	1,637,674	1,159,297.00
Gross margins 2020A (UGX/ha)	114,828.60	966,117.20

Soybean traders earned about 20.8 million shillings in revenues in a trading season and, subsequently, 11.3 million in gross margins. Agago traders earned higher incomes than the ones in Pakwach. The traders hold a soybean stock of about 187 million shillings per season (Table 49). The soybean processors are operating on a small scale with only 0.5 million shillings in stock and making only 0.18 million in revenues and losses in terms of gross margins (Figure 9).

3.3.5 The soybean value chain map

The soybean value chain is constituted by farmers, small-scale traders, urban traders/ wholesalers, processors who are mainly oil millers, consumers and, in some cases, exporters. Wholesalers and processors offer the highest prices in the chain (Figure 10). The export market for soybeans is not well developed and utilised, although the potential exists for such.

Table 49: Costs, revenues and gross margins earned by soybean traders

UGA/season				
District	Cost of soybean stock	Other operational costs	Revenue	Gross margins
Agago	-	592,500.00	35,400,000.00	34,800,000.00
Pakwach	311,000,000.00	222,000.00	11,200,000.00	-4,360,067.00
Overall	**187,000,000.00**	**370,200.00**	**20,800,000.00**	**11,300,000.00**

Figure 9: Processor costs, revenues and gross margins

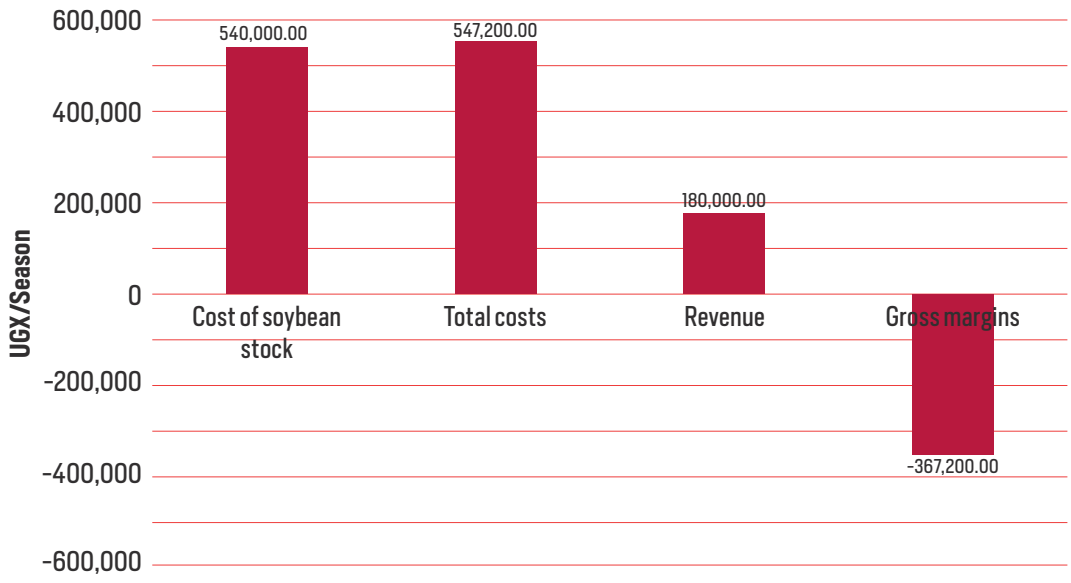
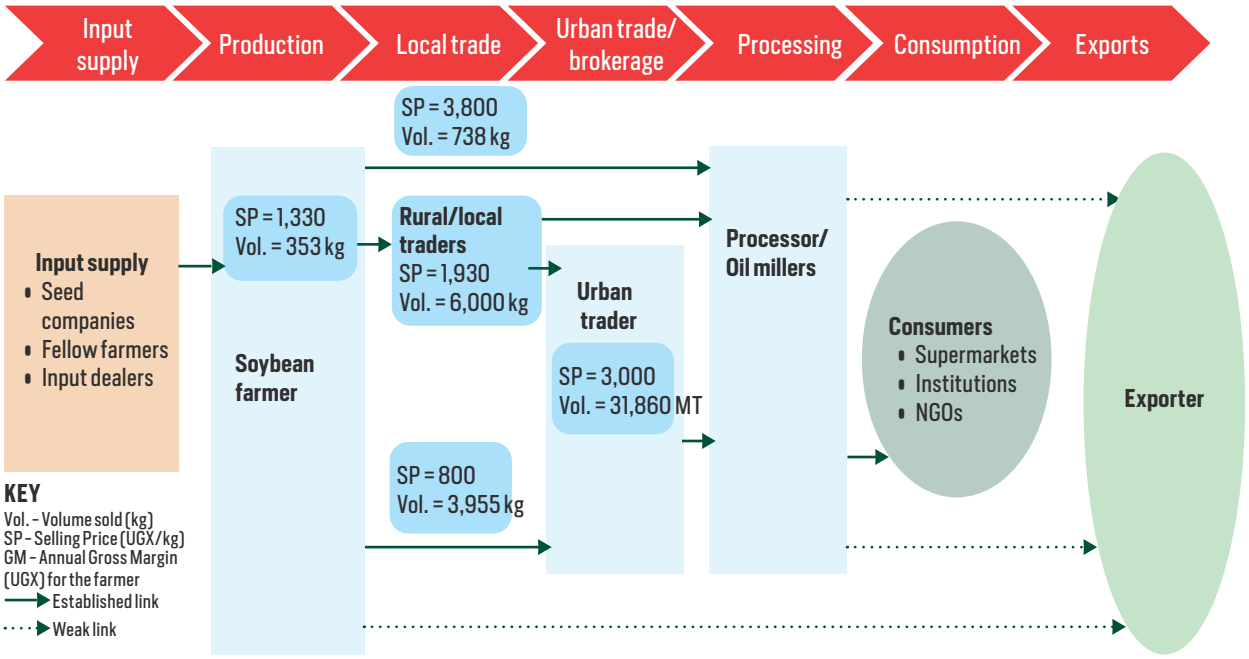


Figure 10: The soybean value chain map



3.3.6 Soybean market potential

3.3.6.1 Bottlenecks and weak points within the soybean value chain

Production

- The main production-level bottlenecks for soybean is availability and access to improved seed. Farmers and key informants indicated that the production of soybean is still low due to lack of improved seed varieties and despite the high potential for increased production with ALENU support. For instance, over 4,000 individual farmers grow soybean in Pakwach sub-county, Pakwach district through ALENU groups of 30 farmers whose production is on average 4 MT per season. The production in the Acholi sub-region ranges between 2-5 bags per household. However, there is opportunity for increased production because of available arable land, support, for example, from ALENU, the favourable climate in the region and the use of ox-ploughs, group formation, and the use of hired labour in the Acholi sub-region.

Other bottlenecks

- The high cost of hiring land, pests and diseases, lack of protective gear (e.g., gumboots).
- The cost of hiring labour is high. In some cases, there is soil exhaustion, hence the need to add fertilizer or other soil fertility enhancing amendments. Owing to the high cost of hiring land, many farmers move long distances to farms (to faraway places where land is cheaper). In addition, climate change, the high cost of hiring ox-ploughs for land opening and lack of a good market are key constraints on soybean production.

Marketing

- Long distances to soybean processors. Many mills that process soybean are located far away from the ALENU districts, yet farmers have no linkages to them. Hence traders are the only available option as a marketing channel.
- There is also a weak link in market information access.

Processing

The level of soybean processing is still low at small-scale level. The main processors are large oil mills such as Mt. Meru and Mukwano Industries (located in Lira).

3.3.6.2 On- and off-farm opportunities along the soybean value chain for employment creation

The soybean value chain is still developing and had its stronghold in the Northern Uganda region. Hence, as a young sub-sector, the soybean value chain has a number of opportunities for job creation, which include:

On-farm opportunities

1. Soybean production presented enormous employment opportunities, given that there is growing demand for soybeans by the oil millers that have been established in the most recent years in the Acholi and Lango sub-regions. There are over five popular soybean varieties, such as MAKSOY1, 2 and 3, that are high-yielding and well adapted to the climate in the region. This gives assurance of high productivity to farmers, yet they are resistant to the common pests and diseases.
2. Cottage soybean value addition at the farm and household levels is another opportunity. A number of confectionary products, such as roasted/fried soybean snacks, soy milk and soy powder (flour), can be made from soybeans on a small-scale with low costs and simple technology at farm level. Such value addition can create jobs for families and the youth in particular. Other soy-based bakery and confectionary products include meat products, functional foods, dairy products and infant foods.
3. Collective action through group marketing has the potential for job creation in areas such as storage, transportation and marketing, all of which can give jobs to group/cooperative members.
4. Contract and or out-grower schemes where large-scale off-takers, such as wholesale traders and oil millers, work with organised farmer groups to produce for them with an assured

market can result in farmers aggregating and supplying large quantities of soybeans and institutions such as WFP and big schools.

Off-farm opportunities

Off-farm employment opportunities in the soybean value chain include:

1. Soybean aggregation on small, medium and large scales where soybean from farmers is bought or bulked and stored and later supplied to wholesalers and large off-takers such as oil millers and food processors, for instance Maganjo Grain Millers and AK Oils.[14]
2. Value addition through small-scale milling for oil and flour can also help farmers create jobs within the soybean value chain. A number of soy products can be made from soybean that are substitutes for milk and milk products such as cheese, flavoured milk, soymilk yoghurts and spreads, among others, or substitutes for meat products, and are best suited for vegan diets. Other soy foods, including soy sauce, tamari, soy nut butter, and other popular soy-based formulas for infants. All these products, once developed, can create a downward spiral effect on prices at the farm and other nodes of the value chain to create thousands of jobs.
3. Animal feed mixing. Soybean has a high protein content, making it a good substitute for silverfish, which is very expensive, in livestock feeds. With good research and skills, farmers and youth can use soybean to create livestock feed businesses that produce cheaper and affordable animal and poultry feeds that are on high demand by poultry and livestock keepers.

3.3.6.3 Prioritised soybean value chain "entry points" and key "entry points" for youth engagement along the soybean value chain

The main soybean entry points with the potential to create employment and engage the youth along the soybean value chain include:

a. Primary production of soybean at the farm using improved seed varieties and technologies such as ox-ploughs and tractors. Large-scale soybean production can generate more incomes for the households and also catalyse the value chain.
b. Confectionary production. At cottage level, farmers can make confectionaries from soybean and other grains and these can be marketed to shops and supermarkets in urban centres.
c. Aggregation. This involves bulking group soybean produce as well as buying and aggregating from other non-members to sell in bulk and have bargaining power over prices because farmers can now sell to large off-takers who offer higher prices.
d. Small-scale milling for oil, flour and other soy-based products such as soymilk and others.

3.3.6.4 Partnerships/relationships, level of cooperation and trust among the soybean value chain actors

Although many farmers are part of a group, few are selling soybean within these groups. This means the level of collective action is still low. Therefore, there is still need to build partnership and trust at farmer level through capacity-building of groups and their leadership to foster collective marketing and aggregation to reap economies of scale advantages.

The Government of Uganda, through MAAIF and with funding from IFAD, has been implementing the Vegetable Oils Project (VODP) since 2010, now succeeded by the National Oil Seed Project (NOSP), which will run for the next 5-10 years. VODP has built infrastructure in terms of oil seed hubs in Eastern and Northern Uganda, which are potential partners with ALENU to promote soybean as one of the key oil seeds.

Farmer-trader partnerships are still weak. There was no evidence of traders supporting farmers with inputs and other marketing services. Such partnerships can be built under out-grower schemes or contract farming arrangements to ensure longer-term trading partnerships.

14 USAID under GAIN project has worked with oil millers and grain millers to do food fortification using soybean as one of the ingredients. Accessed at https://partnerships.usaid.gov/partnership/food-fortification

3.4 THE TOMATO VALUE CHAIN

3.4.1 Introduction

Tomato (*Lycopersicon esculentum*) is the next most important vegetable crop after potato in the world (FAO, 2005). It belongs to the *Solanaceae* family, which includes other well-known species such as round potato, tobacco, peppers and eggplant (Naika *et al*., 2005). Tomato exports globally have been growing since 2015. Globally, the production of tomato is estimated at 161, 793, 834 tonnes per year, with productivity of 33.6 tonnes per hectare (FAO, 2012), having increased by about 300 % in the last four decades (Atherton and Rees, 2005).

World tomato exports increased by about 6% between 2015 and 2019 to US$ 9billion. Africa as a continent shared 9.4% of this global tomato export trade (ITC, 2020).[15] In Uganda, tomato is one of the major horticultural crops with widespread production in peri-urban and rural areas. Most tomato varieties are ready for harvest 75 days from transplanting. An acre can produce around 25 MT of tomatoes.[16] Tomato production in Uganda was estimated at about 255,000 tonnes per year, with yields of 8.5 MT per hectare. In 2017, the tomato crop contributed 4.0% of the total agricultural GDP in Uganda (UBOS, 2017).

3.4.2 Socio-economic characteristics of tomato chain actors

3.4.2.1 Farmers

The sampled tomato farmers were mainly females (66%), with about 24% of them being youth below 35 years. However, in Zombo and Pakwach, many of the farmers were female (Table 50). Over 75% of the tomato farmers had a primary-level education while only 14% had a secondary level (Table 51).

Tomato growing households had about seven family members, with a maximum of 14 members, three of whom were dependants, which means that only four members were available to provide labour in production activities (Table 52).

Table 50: Gender distribution of tomato farmers by sex and age group

	Percentage of farmers			
	Sex		Age group	
District	Male (n=13)	Female (n=25)	Youth (<=35 years) (n=9)	Old (>35 years) (n=29)
Pakwach	0.00	100.00	16.67	83.33
Nebbi	42.86	57.14	25.00	75.00
Zombo	25.00	75.00	25.00	75.00
Overall	**34.21**	**65.79**	**23.68**	**76.32**

Table 51: Education level of tomato farmers

	Percentage of farmers			
District	None	Primary	Secondary (O'level)	Secondary (A'level)
Pakwach	0.00	100.00	0.00	0.00
Zombo	0.00	75.00	0.00	25.00
Nebbi	14.81	70.37	14.81	0.00
Overall	**10.81**	**75.68**	**10.81**	**2.70**

15 Available at http://www.worldstopexports.com/tomatoes-exports-country/

16 New Vison (2021). Accessed at https://www.newvision.co.ug/news/1475240/grow-tomatoes#:~:text=Most%20tomatoes%20varieties%20are%20ready,how%20the%20farm%20was%20maintained.

3.4.2.2 Traders

Tomato traders sampled were mainly youth (3/5) although three of the five were also males and all of them youth below 35 years (Table 53). Traders were fairly educated, with 50% of them having an Ordinary-level education and 25% having attained a certificate (Table 54).

3.4.2.3 Consumers

About 64% of the sampled tomato consumers were from male-headed households, although Agago and Pakwach had the highest percentages of male-headed households consuming tomatoes (Table 55). The majority of the tomato consumers made their purchases from main markets in the main towns (39%) and weekly markets (28%), and 28% got from own harvests (Table 56). These results indicate that tomatoes have a domestic market within the Northern region and West Nile since few farmers get from their own harvest.

Table 52: Household sizes and dependency among tomato farmers

District	Household size		Number of dependants	
	Mean	Max	Mean	Max
Nebbi	7.29	14.00	2.88	9.00
Pakwach	8.33	12.00	4.83	12.00
Zombo	7.25	10.00	5.00	7.00
Overall	**7.45**	**14.00**	**3.44**	**12.00**

Table 53: Gender distribution of tomato traders by sex and age group

	Frequency		
	Age group		
Sex	Youth	Old (>35 years)	Overall
Male	3	0	3
Female	0	2	2
Total	**3**	**2**	**5**

Table 54: Education level of tomato traders

Education level	Frequency	Percent
Primary	1	25
O' level	2	50
Certificate	1	25
Total	**4**	**100**

Table 55: Tomato consumer household head by gender

District	Household type of consumers		
	Male HHH	Female HHH	Total
Agago	100.00	0.00	100.00
Nebbi	60.00	40.00	100.00
Pakwach	76.92	23.08	100.00
Zombo	0.00	100.00	100.00
Total	**63.89**	**36.11**	**100.00**

Table 56: Tomato consumer source of the product

Source	%
Home harvest	27.78
Weekly markets	27.78
Main markets	38.89
Shops	13.89
Supermarkets	8.33

3.4.3 Commodity market demand

3.4.3.1 Quantity of tomato produced and sold

Tomato was only promoted by ALENU in Nebbi district. Framers in Nebbi district harvested about 170 kg of tomato in 2019B and about 130 kg in 2020A. The farmers sell over 80% of the tomato harvest, which means that they are commercially oriented (Table ***57***).

3.4.3.2 Quantity of tomato traded

Tomato traders mainly source their tomato from farmers, aggregating about 474 MT per season and wholesalers (34 MT) and retailers (8 MT), and through brokers/agents, traders aggregated about 17 MT (Figure 11). The tomato peak season in Nebbi district runs from September to December, with 60% of the traders indicating November as the peak-most month (Figure 13). For the two seasons, farmers received about 3,420 Uganda shillings per kilo of tomato and 3,130 shillings (Figure 12).

Table 57: Tomato production and sales by farmers

	Mean (kg)			
	2019B		2020A	
District	Produced	Sold	Produced	Sold
Nebbi	177.30	145.93	129.00	109.50

Figure 11: Seasonal aggregated volumes by tomato traders

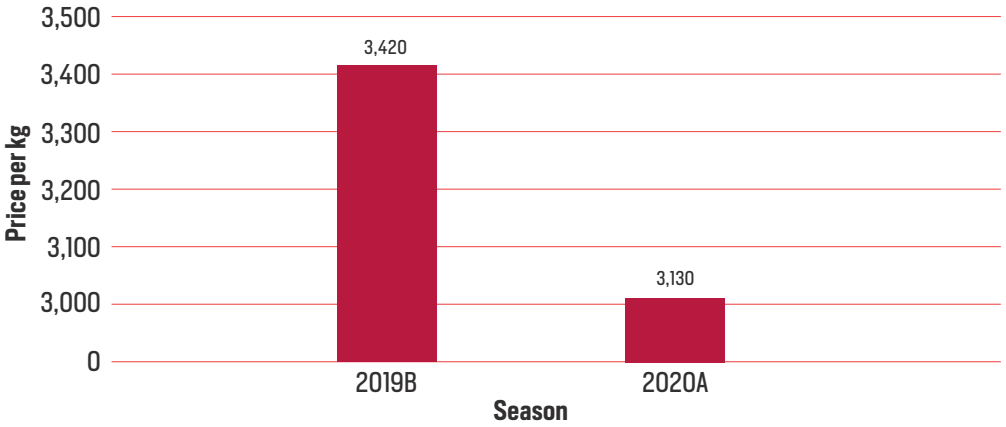


Figure 12: Tomato prices received by farmers in Nebbi district

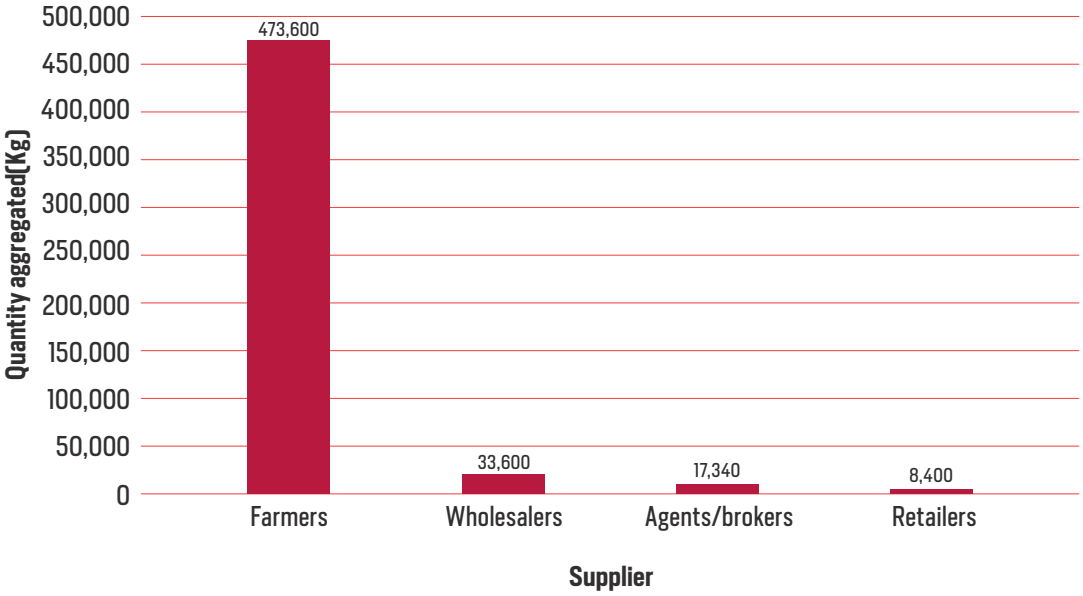
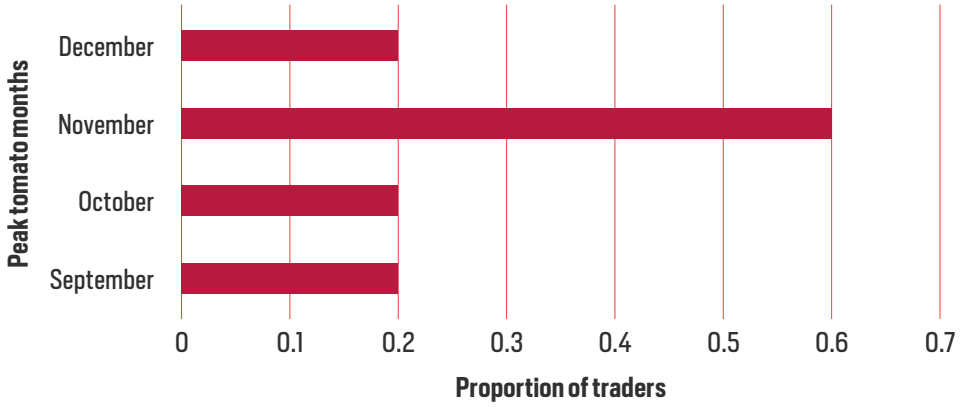


Figure 13: Tomato peak season months in Nebbi district



Source: Trader data, 2020

3.4.3.3 Price and seasonality

3.4.4 Value creation and associated distribution channels

3.4.4.1 Costs, revenues and value added

Tomato farmers in Nebbi district made positive margins (profits) in both the 2019B and 2020A seasons although higher margins were realized in the former season. On average, a farmer earned about 1.3 million shillings in revenues in 2019B and 0.6 million per hectare in 2020A. These results indicate that tomato production is profitable.

Tomato traders earn about 7.6 million shillings per season and make about 1.4 million in profits. They hold a stock of about 5.6 million shilling per season and incur total costs of about 6.3 million shillings (Table 59).

3.4.5 Tomato market potential

3.4.5.1 Bottlenecks and weak points within the tomato value chain

Production level

The major bottlenecks at the tomato production level are:

- The high cost of hiring land
- Pests and diseases
- Seasonality
- No money to hire labour (high cost of labour)

Table 58: Tomato production costs, revenues and gross margins per hectare received by farmers in Nebbi district

	Mean (UGX/ha)				
2019B			2020A		
Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)
949,110.40	1,274,468.00	325,357.40	266,199.92	594,128.5	231,263.78

Table 59: Costs, revenues and gross margins earned by tomato traders per season

District	Cost of stock (UGX)	Total costs (UGX)	Revenues (UGX)	Gross margins (UGX)
Nebbi	5,600,000.00	6,252,000.00	7,650,000	1,398,000.00

- Soil exhaustion
- Bad weather, which favours tomato blight diseases
- Poor seed quality on the market that either makes them not germinate or renders them susceptible to pests and diseases in the field.
- Inability to afford fertilizers and herbicides.

Trader level

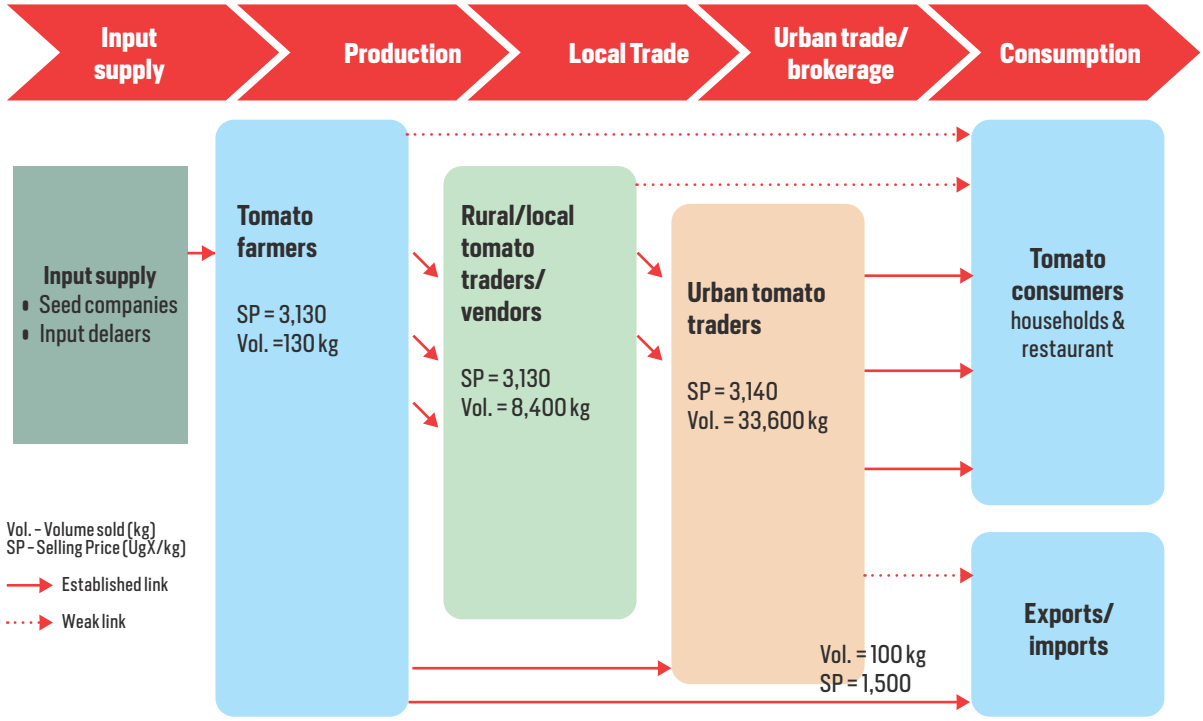
The major bottlenecks at the tomato trader level are:

- Poor weather, which leads to low production due to diseases and pests.
- Poor weather, especially heavy rains, also make roads impassable for traders to access the tomato produce in the villages.
- Lack of proper storage systems for tomatoes that are highly perishable makes the shelf life of tomatoes short and leads to high losses.
- Poor transport systems to transport tomatoes to urban areas is another serious bottleneck.
- Fluctuating prices of tomatoes, especially when in the peak season, also affect the traders' revenues.
- Many times, there are shortages in tomato supply, with farmers not supplying enough quantities to satisfy the market.

3.4.6 The tomato value chain map

The tomato value chain in Nebbi district is a short value chain with farmers, rural traders/vendors and urban traders as the main actors. The bulk of the tomatoes are aggregated by urban traders, followed by the rural traders. There was no evidence of middlemen or agents in the tomato value chain, which means traders directly deal with farmers. This is a unique value chain in that farmers have an opportunity to earn higher margins that would otherwise have been taken by brokers/middlemen. The other feature of the tomato value chain is that there was no mention of exports and/or imports of fresh tomato. The final con-

Figure 14: Tomato value chain map



sumers are mainly rural and urban households as well as restaurants (Figure 14).

3.4.6.1 On- and off-farm opportunities along the tomato value chain for employment creation

On-farm opportunities

- On the farm, the tomato value chain under primary production presents opportunities for increased production and marketing and, hence, earning from the tomatoes. The Northern region and West Nile have an opportunity that ISSD and some seed companies have been promoting drought- and disease-tolerant tomato varieties in the area. In addition, a number of agro-input shops around Gulu have sprung up to supply such good seed varieties and accompanying inputs.
- On the farm, employment potential also lies in the provision of irrigation and spray services to the farmers. Many farmers indicated that they would be willing to produce off-season but they lack irrigation equipment. Use of innovations such as solar water pumps for irrigation could be a big boost in taking advantage of the off-season shortages in tomato supply. In fact, the Nebbi District Production Officer (DPO) indicated that long dry spells coupled with climate change effects are affecting farmers in the district, including tomato and other vegetable farmers.
- Engaging in extension work and training together with agro-input supply through agent marketing for the tomato and vegetable seed importers can create opportunities for some people who want to solve the problem of seed access and fake seed on the market.

Off-farm opportunities

- Off the farm, employment opportunities exist in the aggregation and distribution of the tomato produce (trading). Farmers can create gainful employment from tomatoes by bulking and marketing their tomatoes collectively. Farmers and traders, in interviews and FGDs, indicated that tomatoes are consumed in both the rural and urban areas, hence they enjoy good demand. In fact, some traders indicated that there was still a shortage of tomato supply in many major towns and new cities in the Northern region as well as in Kampala City.
- The world over, tomatoes still face the perishability problem. Close to 30% of all tomatoes consumed in the world are processed in some way or the other, according to the World Processing Tomato Council (WPTC). Value addition to tomatoes in Uganda is still at a low level. Research shows that tomato traders and farmers experience loss of 5%-9% and 10%-29% respectively during storage in the markets before selling (Nasasira, 2019).[17] Tomato sauce is one of the products that are produced by those who add value to tomato. Given a shorter shelf life for tomatoes, adding value and producing longer-lasting products is the way to go. However, other products that farmers and other entrepreneurs can produce through value addition to tomato include fresh-

Figure 15: Some tomato value added products (Courtesy: Internet photos)

Tomato juice

Tomato paste

Tomato powder

17 Nasasira, O. (2019). Assessment of postharvest tomato losses along tomato value chain in Kyabugimbi Sub-County in Bushenyi District. Unpublished undergraduate dissertation, Makerere University, Kampala, Uganda.

cut tomatoes, dried tomatoes, tomato powder, tomato paste and tomato juice.

3.4.6.2 Key "entry points" for youth engagement along the tomato value chain

Within the tomato value chain, the youth can be engaged at mainly three entry points. These are:

a. Primary production (farm-level): Here the youth can be supported through training, access to improved tomato seed and genuine inputs to produce and market tomatoes.

b. The second entry point is in the aggregation of tomatoes, either as individual traders, or bulking through organised producer groups. Collective aggregation empowers the youth to access reliable and large buyers and also offers them bargaining power.

c. Value addition is another entry point where the youth can be engaged and employed along the tomato value chain. A number of innovative products from tomato that do not yet exist can be created/produced and marketed at a higher price, creating more value and solving the issue of perishability of tomatoes.

3.4.6.3 Partnerships/relationships, level of cooperation and trust among the tomato value chain actors

The results indicated that 68% of the tomato farmers in Nebbi district belonged to a farmer group. However, only 25% of them indicated that they market tomato in their groups. Still, there was no evidence of any contractual arrangements between farmers and other value chain actors. The absence of such contracts is a sign of low levels of trust and cooperation among actors. Although farmers cooperate among themselves under their groups, the cooperation between them and traders or vendors to whom they sell tomatoes is still loose.

At a higher project level, ALENU can partner with seed companies such as Home Harvest and House of Seeds (Cycas), which have been working with ISSD, to promote vegetable production in Northern Uganda to improve seed and input access to tomato farmers in the project area. In addition, there is a good number of established agro-dealers with the above seed company vegetable seeds in the Gulu area, such as PurLonyo input suppliers, who would be willing to partner with the project to offer seed and extension services to the project farmers.

3.5 THE ONION VALUE CHAIN

This section presents the findings from the onion value chain. Onions are being promoted in Zombo, Amuru and Agago districts by the ALENU project. Farmers and traders, as the key value chain actors, were interviewed. The results presented in this section are mainly focused on these.

Photo 1: An onion farmer and his family showing their harvested produce in storage[18]

3.5.1 Introduction

The common dry onion *(Allium cepa)*, a member of the Amaryllidaceae family, originated in Central Asia (Afghanistan, Tajikistan and Uzbekistan) where it is widely used.[19] In East Africa, Uganda and Tanzania are the only onion-surplus countries. Uganda produced about 296,200 MT of onions in 2013, making up 47% of total EAC production. By 2013, Uganda was consuming about 206,306 MT of onions, yet this was predicted to increase by over 40%. Onion prices in Uganda are highest during the months of May, June and July (KILIMO Trust, 2017).[20]

18 Photo credit: Sebatta, C.
19 USAID/ACDI VOCA(2018). Accessed at http://www.acdivoca.org/wp-content/uploads/2018/10/Farmer-Handbook-for-Onion-Production-FINAL.pdf
20 Kilimo Trust, 2017. Available at https://www.kilimotrust.org/reacts/files/Onion_markets_X-tisation.pdf

3.5.2 Socio-economic characteristics of onion chain actors

3.5.2.1 Farmers

About 55% of the onion farmers were females and 36% of them were youth aged less than 35 years. Among the project districts where onions are promoted, Agago district had the highest proportion (67%) of sampled female farmers growing onions, followed by Amuru (50%). Agago and Zombo were the most youth-inclusive districts in terms of involving the youth in onion production, with 56% and 42% youth onion farmers, respectively (Table 60).

Onion farmers have a primary-level education to a greater extent, with a few (18%) having attained a secondary-level education. Among the onion-supported districts under ALENU, Agago and Zombo districts farmers are relatively more educated, with 44% in Agago and 25% in Zombo having attained secondary-level education and above (Table 61).The farmers come from households with about eight members, although Amuru district households have an average of 11 members(Table 62).

Table 60: Gender distribution of onion farmers by sex and age group

	Percentage of onion farmers			
	Sex		Age group	
District	Male (n=15)	Female (n=18)	Youth (<=35 years) (n=12)	Old (>35 years) (n=21)
Agago	33.33	66.67	55.56	44.44
Amuru	50.00	50.00	16.67	83.33
Nebbi	33.33	66.67	0.00	100.00
Pakwach	0.00	100.00	33.33	66.67
Zombo	66.67	33.33	41.67	58.33
Overall	**45.45**	**54.55**	**36.36**	**63.64**

Table 61: Education level of onion farmers

	Percentage of onion farmers					
District	None	Primary	Secondary (O' level)	Secondary (A' level)	Diploma/ College	Certificate
Pakwach	0.00	100.00	0.00	0.00	0.00	0.00
Amuru	16.67	83.33	0.00	0.00	0.00	0.00
Nebbi	0.00	66.67	33.33	0.00	0.00	0.00
Zombo	0.00	58.33	16.67	8.33	8.33	8.33
Agago	33.33	22.22	33.33	0.00	11.11	0.00
Overall	**12.12**	**57.58**	**18.18**	**3.03**	**6.06**	**3.03**

Table 62: Household sizes and dependency among onion farmers

District	Household size		Number of dependants	
	Mean	Max	Mean	Max
Agago	6.67	14.00	3.44	8.00
Amuru	10.67	13.00	5.00	10.00
Zombo	6.33	12.00	2.90	5.00
Nebbi	7.67	10.00	2.33	4.00
Pakwach	9.33	10.00	7.00	10.00
Overall	**7.61**	**14.00**	**3.81**	**10.00**

3.5.2.2 Traders

Of the three sampled onion traders, one was a youth male aged below 35 years while the older traders were all females (Table 63).

3.5.2.3 Consumers

The onion consumers sampled were mainly from male-headed households except in Zombo district, where 71% were from female-headed households (Table 64). Over 30% of the sampled consumers got onions from own home harvest, main markets or from weekly markets. A few of them also bought them from shops and supermarkets (Figure 16).

3.5.3 Commodity market demand

This section presents the aspects around the demand for onions in the project area such as prices, quantities traded, and gross margins earned by farmers and traders.

3.5.3.1 Quantity of onions produced, sold and prices

Generally, farmers produced 247 kg, of which 158 kg were sold at 2,360 shillings per kilogram in the 2019B season. Although the prices were higher in 2020A, farmers produced and sold only a quarter of what they had done in the previous season (Table 65). Farmers in Zombo district produced more onions than in Agago district, although in 2019B, they earned lower prices.

Table 63: Gender distribution of onion traders by sex and age group

	Frequency		
	Age group		
Sex	**Youth**	**Old (>35 years)**	**Overall**
Male	1	0	1
Female	0	2	2
Total	**1**	**2**	**3**

Table 64: Gender disaggregation of onion-consuming households

District	Male HHH	Female HHH	Overall
Nebbi	64.29	35.71	46.43
Pakwach	72.73	27.27	32.14
Zombo	28.57	71.43	17.86

Figure 16: Onion consumers' source of the product

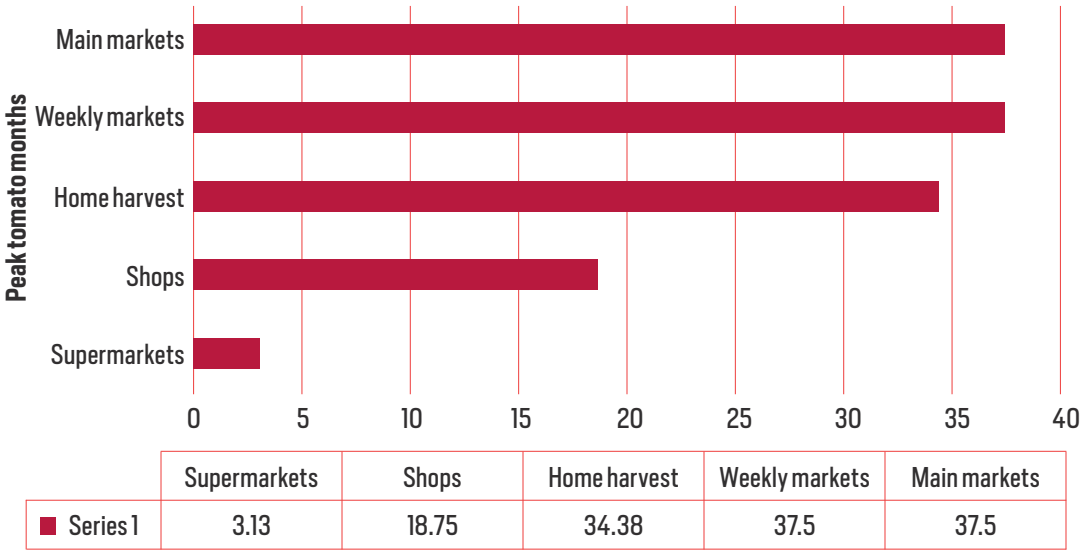


Table 65: Production and sales volumes among onion farmers

	Mean (n=8)			Mean (n=3)		
	2019B			2020A		
District	Produced (kg)	Sold (kg)	Price/kg	Produced (kg)	Sold (kg)	Price/kg
Agago	52.50	35.00	4,000.00	50.00	45.00	3,000.00
Zombo	312.17	198.75	1,810	60.00	45.00	3,750.00
Overall	**247.25**	**157.81**	**2360**	**56.67**	**45.00**	**3500.00**

3.5.3.2 Quantity of onions traded

Data collected from onion traders in Zombo indicated that around the entire districts, they were able to aggregate 322 MT from farmers, 52.8 MT from wholesalers and 48 MT from retailers (Table 66).

3.5.3.3 Onion prices and seasonality

The peak onion season occurs in April mainly and between September and October (Figure 17). Around the peak season, farmers get low prices averaging 900 Uganda shillings while the lean season sees prices almost doubling. Wholesalers, however, earn slightly higher prices for onions in the peak season (Table 67).

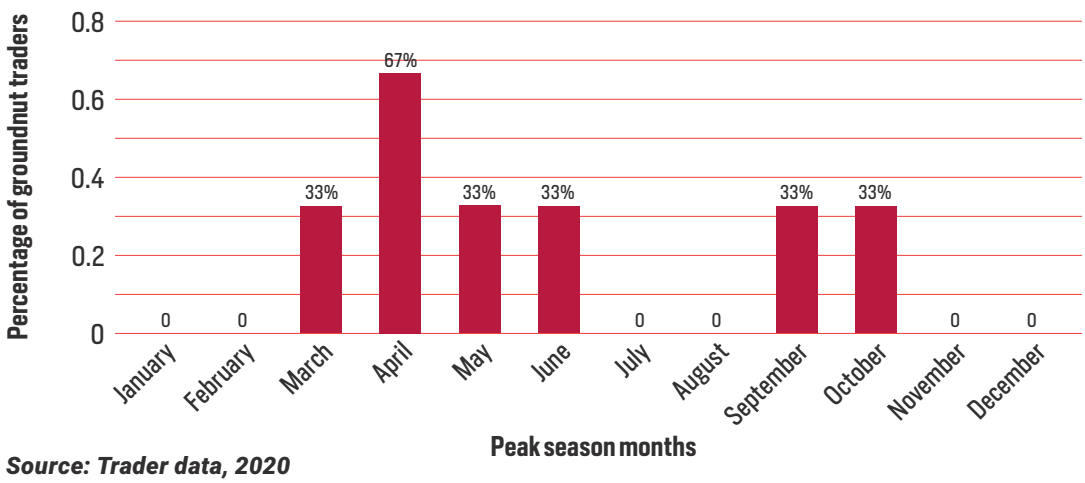
Table 66: Estimated volumes of onions aggregated at district level by onion traders

	Quantity aggregated per season (Kg)		
District	Farmers	Wholesalers	Retailers
Zombo	322,400.00	52,800.00	48,000.00
Total	**322,400.00**	**52,800.00**	**48,000.00**

Table 67: Prices paid by traders to onion farmers

	Prices (UGX/kg)					
	Farmers		Wholesalers		Retailers	
District	Peak	Lean	Peak	Lean	Peak	Lean
Zombo	900	1,700	1,100	1,500	900	1,000
Total	**900**	**1,700**	**1,100**	**1,500**	**900**	**1,000**

Figure 17: Onion peak season



Source: Trader data, 2020

3.5.4 Value creation and associated distribution channels

3.5.4.1 Costs, revenues and value added

Onion farmers earned an average of 3.9 million shillings in revenue in the 2019B season compared to 0.9 million per hectare in 2020A. In 2019B, farmers earned about 1.6 million in gross margins per hectare compared to 0.35million (Table 68). Just like other value chains were affected by COVID-19 and food markets were affected by the lockdown, the onion value chain was clearly not spared, as reflected in the results.

Seasonally, onion traders in Zombo held stock of about 0.6 million shillings and earned about 9.5 million shillings and about 8 million shillings in season gross margins. The onion traders indicated they mainly sell to retail traders and wholesalers. The sampled traders indicated that on average there are 30 onion retail traders and 20 wholesalers in Zombo. This is an indication that onion farming as well as trade are profitable in the ALENU district of Zombo.

3.5.5 The onion value chain map

The onion value chain has farmers, rural traders/vendors and urban traders (wholesalers) as the main actors. The bulk of the onions are aggregated by urban traders, followed by the rural traders, but mainly from farmers.[21] The value chain has agents and FGD participants indicated that the main onion buyers are village agents, retailers, and wholesalers from Kampala markets and along the DRC borders. Mention of DRC border traders indicated some form of cross-border trade of onions as exports and/or imports of fresh onions through Zombo and Agago, the districts that border DRC and South Sudan. The final consumers are mainly rural and urban households to whom onions are sold in fresh form (Figure 18).

The onion value chain in Zombo district holds out positive prospects for upgrading and growth. FGD participants indicated that the current production level is rising with support from the ALENU project. In Kango sub-county, Zombo district, there are100 onion producers. Averagely, one acre produces 24 basins of onions per season. On average, these farmers produce 2,400 basins of onions per season. Opportunities for increased production exist, based on the availability of arable land.

Table 68: Costs, revenues and gross margins among onion farmers

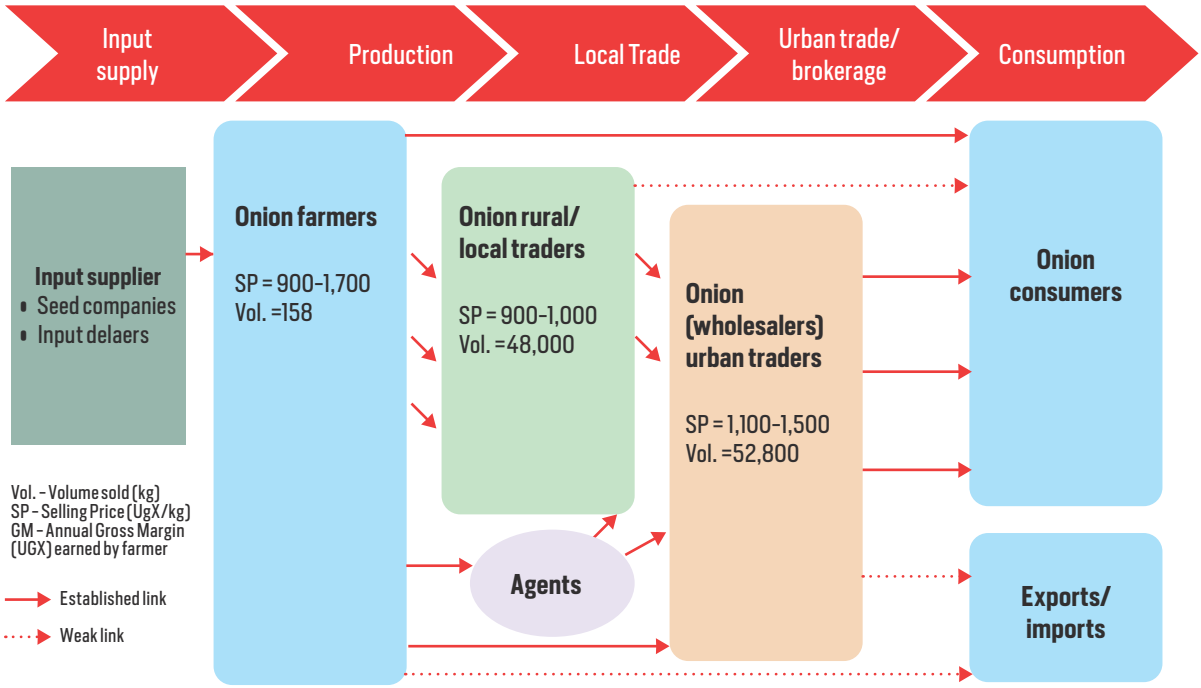
	2019B			2020A		
District	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)
Agago	1,675,725.00	6,793,478.00	1,721,014.00	.	.	.
Zombo	199,654.00	2,900,761.00	1,540,803.00	86,322.47	866,168.50	346,761.80
Total	**621,388.50**	**3,873,940.00**	**1,592,292.00**	**86,322.47**	**866,168.50**	**346,761.80**

Table 69: Costs, revenues and gross margins among onion traders

	UGX/season			
District	Cost of stock	Total costs	Revenues	Gross margins
Zombo	560,000.00	1,510,800.00	9,496,000.00	7,985,200.00
Total	**560,000.00**	**1,510,800.00**	**9,496,000.00**	**7,985,200.00**

21 Zombo FGD. Participants indicated that of the onions produced, 5% are consumed and 95% are sold. The main buyers are village agents, retailers, wholesalers in Kampala markets and markets along the Congo borders.

Figure 18: The onion value chain map



3.5.6 Market potential

3.5.6.1 Bottlenecks and weak points within the onion value chain

Production level

The major bottlenecks at the onion production level are:

- The high cost of hiring land.
- Pests and diseases.
- Seasonality.
- No money to hire labour (high cost of labour).
- Soil exhaustion.
- Long distances to farms.
- Bad weather.
- Poor seed quality.
- Lack of fertilizers and herbicides.

At trader level

The major bottlenecks at the onion trader level are:

- Poor weather, which leads to low production due to diseases and pests.
- Poor weather, especially heavy rains, also makes roads impassable for traders to access the onion produce in the villages.
- Low supply of onion and the resultant price fluctuation are some key bottlenecks for traders.
- Poor storage facilities that can be used to keep the onion longer in storage are a serious challenge.
- Many times, there are shortages in onion supply, with farmers not supplying enough quantities to satisfy the market.

3.5.6.2 On- and off-farm opportunities along the onion value chain for employment creation

On-farm opportunities

- On the farm, the onion value chain presents opportunities for increased production and marketing and primary production. A number of seed companies have been promoting drought- and disease-tolerant onion varieties; hence farmers have the capacity to avert losses caused by pests and diseases and the negative effects of climate change.

- On the farm, employment potential also lies in the provision of irrigation and spray services to the onion farmers to enable them to overcome climate change effects and produce off season and reduce dependence on natural rains.

Off-farm opportunities

- Off the farm, employment opportunities exist in the aggregation and distribution of the onions and marketing

them to large traders. Farmers can create gainful employment from onions by bulking and marketing collectively.

3.5.6.3 Key "entry points" for youth engagement along the onion value chain

Within the onion value chain, the youth can be engaged at mainly three entry points. These are:

a. Primary production at the farm: Here the youth can be supported through training, access to improved onion seed and genuine inputs to produce and market onions.

b. The second entry point is in the aggregation of onions, as individual traders or bulking through organised producer groups. Collective aggregation empowers the youth to access reliable and large buyers and also offers them bargaining power.

3.5.6.4 Partnerships/ relationships, level of cooperation and trust among the onion value chain actors

The results indicated that 91% of the onion farmers belonged to a farmer group. However, only 36% of them indicated that they market onion as a group. Still, there was no evidence of any contractual arrangements between farmers and other value chain actors. The absence of such contracts is a sign of low levels of trust and cooperation among actors. Although farmers cooperate among themselves under their groups, the cooperation between them and traders or vendors to whom they sell onions is still loose.

3.6 THE IRISH POTATO VALUE CHAIN

3.6.1 Introduction

Until the early 1990s, much of the global Irish potato was grown and consumed in Europe, North America and countries of the former Soviet Union. Since then, there has been a dramatic increase in potato production and demand in Asia, Africa and Latin America, where output rose from less than 30 million tonnes in the early 1960s to more than 165 million tonnes in 2007 (Alexandratos and Bruinsma, 2012; Horton, 1988; Scott et al., 2000). FAO data shows that in 2005, for the first time, the developing world's potato production exceeded that of the developed world.[22] China is the biggest potato producer, and almost a third of all potatoes are harvested in China and India. As the United Nations cerebrated the International Year of the Potato (IYP) in 2008 to highlight the important role of the potato in agriculture, the economy and world food security, potato yields in the developing world averaged 10 MT to 15 MT per hectare, less than half of average yields achieved by farmers in Western Europe and North America (FAO,2009).[23]

In Uganda, potatoes are primarily grown in the highland regions. although lowland varieties are now grown in the districts of Rakai, Mubende, Mityana and a few other districts.[24] Uganda is the third largest producer of potatoes in East Africa after Rwanda and Kenya, and its higher altitude areas are well placed to benefit from growing demand for potato products in the region.[25] Owing to its short cropping cycle and high yield potential, when Irish potato is farmed under good agronomic practices, it can be a smallholder cash crop, well suited to the densely populated areas where land is in short supply and farm sizes are small (commonly <0.5 ha). In some areas, potatoes can be cropped throughout the year under rain-fed conditions. Some farmers manage 2-3 crop cycles annually.

In Uganda, potato is a smallholder farmer crop, a source of both food and cash income and the crop plays an important role in the rural livelihood system (Gildemacher et al., 2009). The farmers' average landholding is between 0.5 and 2.5ha, 12 % of which is allocated to potato production (Gildemacher *et al*., 2009; Gollin and Rogerson, 2010; Kaganzi *et al*., 2008; Sebatta *et al*., 2014).

In 2010, over 100,000 ha of potatoes were cropped in Uganda, with average yields of 7 MT/ha (FAO data). Low yields are due primarily to poor quality seed potato, inadequate soil fertility management practices, and diseases, primarily late blight and bacterial wilt.

22 FAOSTAT, 2015.
23 FAO, 2009. Accessed at http://www.fao.org/3/a-i1127e.pdf
24 Kyomugisha, H., Sebatta, C., and Mugisha, J. (2018). Potato market access, marketing efficiency and on-farm value addition in Uganda. *Scientific African*, *1*, e00013.
25 Accessed at http://www.fao.org/in-action/african-roots-and-tubers/countries/uganda/en/

3.6.2 Socio-economic characteristics of Irish potato chain actors

3.6.2.1 Farmers

Irish potato farmers sampled from the ALENU districts of Nebbi and Zombo, where the project promotes potato production, constituted 50% females, although Nebbi district had a higher proportion of female farmers (64%) compared to Zombo (40%). The youth potato farmers made up 26% of the sample, with Nebbi being more inclusive of youth in production, with about 29% of the farmers being youth (Table 70).

The majority of the Irish potato farmers (62%) had a primary-level education and only about 29% had attained secondary-level education (Figure 19).The potato growing households had about eight members each, with half of them dependants, meaning that only about four persons were available to provide family labour on the farm (Table 71).

Table 70: Sex and age disaggregation of Irish potato farmers

Farmer	Male(n=17)	Female(n=17)	Youth (<=35 years) (n=9)	Old (>35 years) (n=25)
Nebbi	35.71	64.29	28.57	71.43
Zombo	60.00	40.00	25.00	75.00
Total	**50.00**	**50.00**	**26.47**	**73.53**

Figure 19: Education level of Irish potato farmers

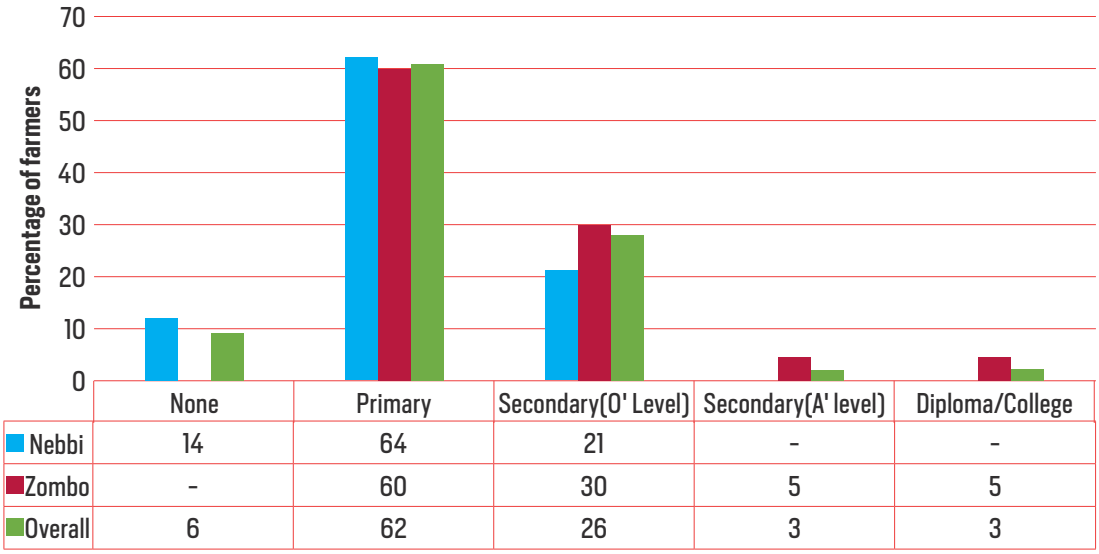


Table 71: Household sizes of Irish potato farmers

	Mean	
District	Household size	Number of dependants
Nebbi	8	3
Zombo	8	4
Overall	**8**	**4**

3.6.2.2 Irish potato traders and processors

A total of 20 traders and processors of Irish potato were sampled, of whom 15 (75%) were youth and seven were female youth (Table 72). Traders and processors were relatively educated, with over 50% having attained a secondary level of education (Table 73).

3.6.2.3 Consumers

Of the sampled consumers, 54% indicated that they consumed Irish potato in the homes. Among the male-headed households (MHH), 57% indicated they consumed Irish potato while among the female-headed ones, 48% did consume the crop (Table 74). The results indicated that in West Nile, where the ALENU Project promotes the production of and trade in Irish potato, there is huge potential for a domestic/local market for the crop, given that a fair proportion of households consume it.

The majority (43%) of the Irish potato consumers have business as a main source of income, followed by farming. Among the female-headed households, 70% indicated that they were engaged in business (Table 75). This is the reason why many of them could afford to buy the Irish potato.

Table 72: Number of Irish potato traders /processors

	Frequency by age group		
Respondent	**Youth**	**Old (>35 years)**	**Overall**
Male	8	5	13
Female	7	0	7
Total	**15**	**5**	**20**

Table 73: Education level of Irish potato traders and processors

	Traders		Processors	
Education level	**Frequency**	**Percent**	**Frequency**	**Percent**
Primary	3	33.33		
O' level	5	55.56	1	50
A' level			1	50
University	1	11.11		
Total	**9**	**100**	**2**	**100**

Table 74: Irish potato consumption among households

	Household type		
Household consumes Irish potato?	**MHH (n=35)**	**FHH (n=21)**	**Overall (n=56)**
Yes	57.14	47.62	53.57
No	42.86	52.38	46.43

Table 75: Income sources of Irish potato consuming households

Source of income	MHH(n=35)	FHH(n=21)	Overall(n=56)
Business	30.00	70.00	43.33
Farming	30.00	10.00	23.33
Restaurant	0.00	10.00	3.33
Salary	5.00	10.00	6.67
Others	10.00	0.00	6.67
Boda-boda	15.00	0.00	10.00
Tailoring	10.00	0.00	6.67

About 47% of the potato consumers got the potatoes from main markets in the main towns while 33% got them from the weekly markets. Only 20% produced the potatoes themselves, which is an indicator of domestic demand for the Irish potato in the ALENU districts of Zombo and Nebbi in West Nile, from where the data on Irish potato was collected. Own production of potato is found only among male-headed households (30%) while 50% of the female-headed households bought the potato from markets (Table 76).

3.6.3 Commodity market demand

3.6.3.1 Quantity of Irish potato produced, sold and price

Irish potato farmers in Nebbi produced about 1,455 kg in the 2019B season as compared to 1,355 kg in Zombo. However, in 2020A, Zombo farmers produced more, with 1,150 kg. Farmers sell off over 80% of the harvested Irish potato, which indicates a high level of market orientation among farmers. In 2019B, farmers in Zombo district received a higher price per kilogram than in Nebbi district, which was the opposite in the 2020A season, with Nebbi district farmers getting even a higher price than in the previous season (Table 77).

3.6.4 Quantity of Irish potato traded and processed

Traders indicated that in Zombo district, they had the capacity to aggregate about 18,500 MT from farmers per season, 29 MT from wholesalers and 1,210 MT through agents. This implies that wholesalers, agents/brokers and retailers (small-scale traders) are the key potato value chain actors, although in Nebbi district it is only farmers and agents who supply traders with Irish potato (Table 78). Processors, on the other hand, aggregate about 1,220 MT overall in a season, mainly from farmers, agents, and retailers (Table 79).

3.6.5 Irish potato prices and seasonality

Irish potato in the West Nile districts of Nebbi and Zombo has two major peak seasons. The first peak is between February and May and the second is between July and December (Figure 20). In the second peak (2019B), prices are higher than in the first peak (2020A) (Table 77).

Table 76: Income sources of Irish potato consuming households

	Percentage of consuming households		
Source of potato	MHH (n=35)	FHH (n=21)	Overall (n=56)
Weekly markets	25%	50%	33%
Main markets	45%	50%	47%
Shops	25%	10%	20%
Supermarkets	5%	10%	7%
Home harvest	30%	0%	20%

Table 77: Irish potato production, sales volumes and prices among farmers

	Mean					
	2019B			2020A		
District	Produced (kg)	Sold (kg)	Price/kg	Produced (kg)	Sold (kg)	Price/kg
Nebbi	1,455.39	1,391.54	636.92	950.00	925.38	916.67
Zombo	1,355.64	1,210.67	735.50	1,150.00	920.00	480.00
Overall	**1,409.67**	**1,317.55**	**679.78**	**1,050.17**	**931.25**	**643.75**

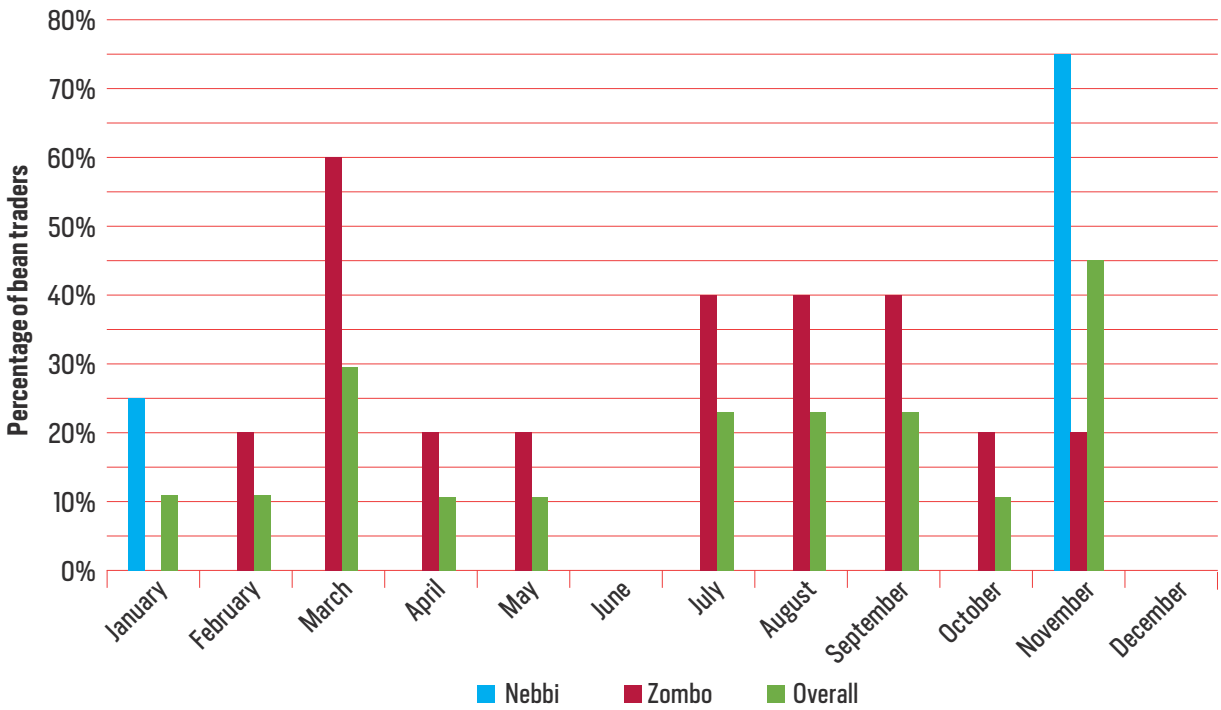
Table 78: Irish potato aggregated at district level by traders

	Volume aggregated per season (MT)			
District	Farmers	Wholesalers	Agents	Retailers
Nebbi	21.60	-	25.20	-
Zombo	18,500.00	28.80	1,209.60	203.04
Overall	**18,521.60**	**28.80**	**1,234.80**	**203.04**

Table 79: Irish potato aggregated at district level by processors

	Volume aggregated per season (MT)			
	Farmers	Wholesalers	Agents	Retailers
Nebbi	-	-	4.08	-
Zombo	1,200.00	-	-	16.63
Overall	**1,200.00**	**-**	**4.08**	**16.63**

Figure 20: Irish potato peak season



Source: Trader data, 2020

3.6.6 Value creation and associated distribution channels

Costs, revenues and value added were analysed for potato farmers. Overall, farmers earned mainly in the 2019B season, with 2020A having been a bad season with the outbreak of COVID-19 and the economic lockdown that followed. In 2019B, farmers in Zombo district earned about 2.3 million shillings compared to 1.9 million earned by farmers in Nebbi district in the same season. In 2020A, farmers in Zombo district registered positive but very low gross margins from their Irish potato (Table 80). The negative margins in 2020A mean that farmers incurred costs, but they did not sell their potato owing to lack of buyers during the lockdown. Although the older farmers earned more from potato, a t-test revealed no significant differences between the two groups (Table 81).

Table 80: Irish potato costs, revenues and gross margins by farmers by district

	2019B			2020A		
District	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)
Nebbi	229,938.40	1,945,660.00	1,869,014.00	2,508,563.00	19,509.80	-2,071,063.00
Zombo	94,964.73	2,279,801.00	2,211,969.00	44,490.07	5,538.46	172,901.20
Overall	**145,579.90**	**2,091,847.00**	**2,019,057.00**	**1,452,531.00**	**6,156.76**	**-1109364.00**

Table 81: Irish potato costs, revenues and gross margins among farmers by age group

	Mean					
	2019B			2020A		
	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)
Age group						
Youth	21,739.13	323,623.20	316,376.80	2,435,779.00	55,022.22	-2,396,558.00
Old>35 years	163,271.40	2,499,898.00	2,411,983.00	4,116,726.00	100,000.00	-594,486.10

Irish potato traders earn about 87 million shillings in a season from a stock worth 21.7 million. Traders earn a seasonal gross margin of about 65 million. Potato traders in Zombo district operate on a larger scale, given that they hold large potato stocks worth 38 million shillings and earn seasonal revenues to the tune of 150 million shillings (Table 82).

3.6.7 The Irish potato value chain map

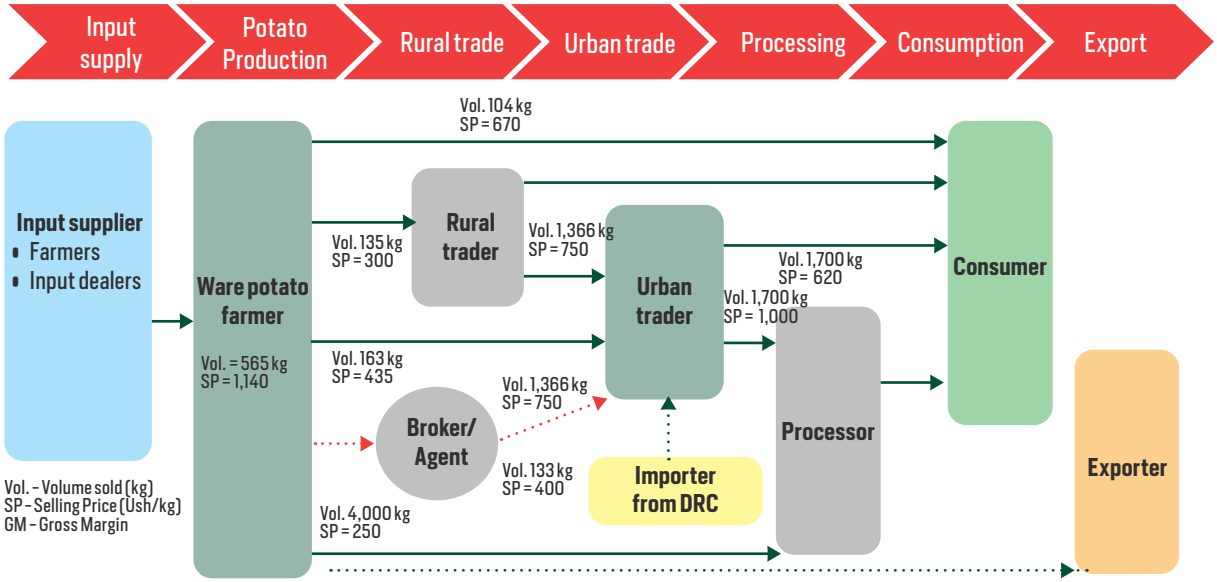
The Irish potato value chain has a number of actors. These include farmers, retail/small-scale traders, urban traders/wholesalers, agents/brokers, exporters, and/or importers, especially at the border districts, processors (mainly chip makers in restaurants and roadside food vendors) and consumers who may be rural or urban. Farmers generally sell directly to all actors.

Farmers sell more of their potato indirectly to urban traders and processors through agents, and directly to rural traders/retailers, consumers and urban traders (Figure 21). Consumers and urban traders offer farmers the highest prices for their potato. Although there is evidence of cross-border trade which involves potato exports, especially to DRC and South Sudan, the traders and farmers did not reveal how much potato is sold through this channel.

Table 82: Irish potato costs, revenues and gross margins among traders

	Traders			
	UGX/Season			
District	Cost of stock	Total costs	Revenues	Gross margins
Nebbi	966,000	1,693,500	8,723,220	7,029,720
Zombo	38,300,000	39,300,000	150,000,000	111,000,000
Total	**21,700,000**	**22,600,000**	**87,300,000**	**64,800,000**

Figure 21: The Irish potato value chain map



3.6.8 Irish potato market potential

There is growing demand for Irish potato in Ugandan urban areas – for wholesale and retail markets and for the food industry (potato chips and crisps). Additionally, regional trade in Irish potatoes is becoming significant. For example, informal statistics from the National Bank of Rwanda and the Rwandan Revenue Authority indicate that in 2011, Uganda exported almost US$ 850,000 of Irish potatoes to Rwanda although formal trade statistics indicated that the value was US$ 150,000.

3.6.9 Bottlenecks and weak points within the VC

3.6.9.1 The major bottlenecks in the potato value chain exist at farm, trader and processor levels

Farm-level bottlenecks

In interviews and FGDs, farmers highlighted a number of bottlenecks that hamper Irish potato production in the ALENU-supported districts of Zombo and Nebbi. These include:

- Pests and diseases.
- Bad weather that exacerbates diseases, especially potato blight.
- Limited capital to invest in potato production.
- Costly labour.
- High transport cost to markets.
- Soil exhaustion.
- Poor quality inputs.
- Poor quality potato seed.

Trader-level bottlenecks

At the trader level, there are also bottlenecks in the value chain which include:

- Stiff competition for the potato among many traders because of low supply from the farmers.
- Fluctuating potato prices caused by unstable supply as a result of seasonality.
- Owing to lack of standards, there is non-uniform pricing, packing and every buyer has their own standards.
- Processor-level bottlenecks
- Many processors, who are mainly chip makers, indicated that their main bottleneck having to use immature potato which does not result in good chips.
- The other challenge was operating in open premises, which makes their business operations hard, especially during the rainy season.

3.6.10 On- and off-farm opportunities along the Irish potato value chain for employment creation

On-farm

On the farm, there are opportunities for employment creation in the Irish potato value chain. These include, but are not limited to:

a. Primary production of the potato on the farm. In Zombo and Nebbi districts, the results indicated that potato does well with good returns if agronomic practices are followed and the right inputs are used. So farmers can earn good incomes from growing Irish potato.

b. Input supply and seed multiplication are two other areas of opportunity with the potential for employment creation. It emerged that farmers do not have good quality potato seed yet this is bred in Uganda by NARO, especially at the Kachwekano ZARDI. The ZARDI has high-yielding varieties that are resistant to the potato blight and well adapted to the highlands, such as those in West Nile.

Off-farm

a. Potato aggregation can be good business, given that traders indicated that they earn good margins from it. If farmers under their groups would bulk the potato, they could access better buyers.

b. Value addition to potato by making chips, crisps and other confectionery products can create jobs for many youth and other persons.

3.6.10.1 Key "entry points" for youth engagement along the Irish potato value chain

The main entry points for youth to get employment in the potato value chain are:

a. Primary production on the farm by supplying ware and seed potato.

b. Input supply to farmers that includes supplying chemicals and fertilizers to potato growers.

c. Aggregation of the potato from farmers as traders, groups or agents of large buyers, such as urban wholesalers.

d. Value addition by making confectionery and supplying it to shops and supermarkets in large towns.

3.6.10.2 Partnerships/relationships, level of cooperation and trust among the Irish potato value chain actors

Given that the Irish potato value chain is a long one with many actors, it presents various opportunities for partnerships and cooperation at various nodes of the chain.

About 88% of the potato farmers belong to a farmer group. Over 90% of these farmers also belong to a savings and credit group such as a VSLA or SACCO. However, only 38% sell potato collectively in their groups, an indicator of low levels of cooperation at farmer level. Although there were no contractual arrangements (either written or verbal) among potato value chain actors, some of the traders and processors indicated that they were willing to enter into such arrangements if the suppliers/farmers were able to ensure quality, timely and constant potato supply.

3.7 THE MORINGA VALUE CHAIN

3.7.1 Introduction

Moringa Oleifera comes in more than 14 species, and it originated in the Himalayan Mountains in Northern India, Asia. Known as a miracle tree among many who use its products, moringa is an excellent source of many vitamins and minerals and a complete plant protein with all nine essential amino acids. The 2019 estimates indicated that according to Advanced Biofuel Center (ABC) studies, the moringa orchard crop area will expand at a yearly rate of 120,000 ha, bringing the world crop area to around 1 million ha up to 2025. India meets more than 80% of the demand for moringa products, thereby enjoying a dominant position on the world moringa scene. The global moringa products market, estimated to be worth over US$ 8 billion, is highly dependent on India.[26] The available moringa varieties yield between 52 MT/ha and 98 MT/ha in good growing conditions.[27] However, if one is producing for moringa oil, the yield can be 250 MT/ha.[28]

3.7.2 Socio-economic characteristics of moringa chain actors

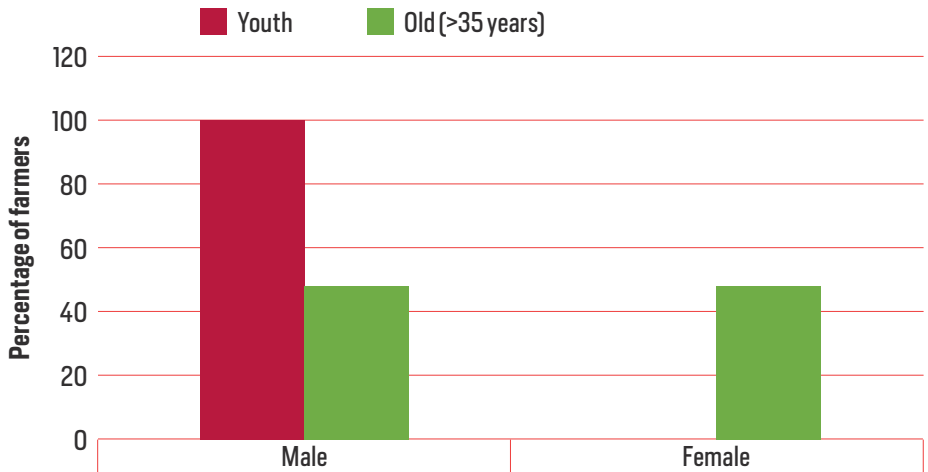
3.7.2.1 Farmers

The sampled moringa farmers were both females and males. Of the youth, 100% were males while among the old 50% were females (Figure 22). Over 80% of the moringa farmers had attained primary-level education, although 20% of the older farmers (>35 years) had not attended any formal school (Table 83).

3.7.3 Moringa traders and processors

There were not many moringa traders in the sampled districts. However, data was captured from two processors. The first was Roots of the Nile, located in Gulu City, which has its own plantation in Awach, Gulu and has no farmers or traders supplying it. Roots of the Nile operates as an industrial processor, producing only a moringa powder product that is packed and sold. The processing unit has a high production capacity of about 7 metric tonnes per year, and works 5 hours daily. However, at the moment, the Roots of the Nile mill

Figure 22: Sex and age group of moringa growers in Pakwach



	Male	Female
Youth	100	0
Old (>35 years)	50	50

26 Accessed at https://jatrophaworld.org/global_moringa_meet_81.html
27 *Advances in production of Moringa*. Accessed at https://agritech.tnau.ac.in/horticulture/pdf/Moringa%20English%20book.pdf
28 Accessed at https://ivtc.avrdc.org/download/Course-Materials/34th-IVTC-2015/34th-IVTC-Module-2/Vegetable-value-chain-mapping-and-analysis/2015_2_Value-chain-of-Moringa_Sundar-Shanmugasundaram.pdf

Table 83: Moringa farmers' education level

	Percentage of farmers		
	Youth (n=2)	Old (>35 Years) (n=10)	Overall (n=12)
Education level			
None	0.00	20	18.18
Primary	100	80	81.82

is underutilized since in the last 12 months it milled only 5.2 metric tonnes. If a farmer wanted to mill their green leaf at a fee, Roots of the Nile can do it at 400 Uganda shillings per kilogram. There is, however, a cottage processor, Mr. Olumu Wanken, who operates from Panyimur market in Pakwach district, and buys the green leaf from farmers. This cottage processor has been handling only 10 kg per season.

3.7.3.1 Consumers

Of the sampled consumers, 13% indicated that their households consumed moringa products. Of these, 14% of the male-headed households compared to 10% of the female-headed households consumed moringa products (Table 84). The results indicated that about 57% of the consumers grew their own moringa and sourced it from their own harvests, while 57% bought it from shops and 43% got the moringa from weekly markets (Table 85).

3.7.4 Commodity market demand

3.7.4.1 Quantity produced, sold and prices

A moringa farmer in Pakwach processed about 52 kg of fresh green moringa leaves in 2019B and 31 kg in 2020A, of which they sold almost all to the market at prices ranging between 8,000 shillings and 8,700 shillings per kilogram (Table 86). The youth, however, produced and sold more moringa than the older farmers in both seasons. This means that the youth can actively be engaged and earn from farm production of moringa.

Table 84: Percentage of moringa consumers

	Household consumes moringa and its products?	
Household type	**Yes**	**No**
MHH (n=5)	14.29	85.71
FHH (n=2)	9.52	90.48
Overall (n=7)	**12.5**	**87.5**

Table 85: Percentage of moringa consumers by source of products

Source	Percentage of consumers
Home harvest	57.14
Weekly markets	42.86
Main markets	14.29
Shops	57.14
Supermarkets	0.00

Table 86: Moringa production, sales and prices among farmers in Pakwach district

	2019B			2020A		
	Produced (kg)	Sold (kg)	Price/kg	Produced (kg)	Sold (kg)	Price/kg
Age group						
Youth	110.00	109.00	7,000.00	80.00	80.00	6,000.00
Old (>35 years)	35.43	35.86	9,280	6.50	6.50	9,000.00
Overall	**52.00**	**52.11**	**8,780**	**31.00**	**31.00**	**8,000.00**

NB: A moringa processor in Pakwach district indicated that they pay 2,000 shillings per kilogram of green leaf in the peak season.

3.7.4.2 Quantity and prices of moringa traded and processed

Moringa traders indicated that they aggregate about 1.7 MT from farmers at 2,000 Uganda shillings. Roots of the Nile in Gulu has its own farms from which they harvest about 6.6 MT of moringa per season (Table 87).

3.7.4.3 Processed volumes sold and prices

For the processed products, Roots of the Nile indicated that they supply about 200 kg of moringa products mainly to poultry and dairy farmers and organic shops. The price of the value-added product was between 50,000 and 75,000 shillings per kilogram (Table 88).

3.7.5 Value creation and associated distribution channels

3.7.5.1 Costs, revenues and value added

Farmers in Pakwach earned about 2.1 million shillings from their moringa sales in 2019B and earned less in 2020A. Gross margins in 2019B were about 1.4 million shillings (Table 89).

Moringa processors indicated that in a typical six-month season, Roots of the Nile earned about 185.4 million shillings while the small-scale processor in Pakwach district earned about 0.7million. The large-scale processor was able to earn gross margins totalling about 152 million shillings in a season (Table 90).

Table 87: Seasonal aggregated volumes of fresh leaf and prices by moringa traders

		Quantity of fresh leaf moringa (kg)		Price (UGX/kg)
District	**Farmers**	**Price (UGX/kg)**	**Processors (Roots of the Nile)**	
Pakwach	1,680	2000	-	
Gulu (Awach) farm			6,600	600
Total	**1,680**	**2000**	**6,600**	

Table 88: Seasonal aggregated processed moringa

Suppliers	Average number of buyers per season	Estimated quantity of processed product supplied per season (kg)	Price per unit (UGX/kg)
Poultry farmers	10	120	75,000
Dairy farmers	2	36	75,000
Organic shops	50	36	50,000

Source: Key informant interview with Roots of the Nile

Table 89: Moringa costs, revenues and gross margins among farmers

	Mean(n=12)					
	2019B			2020A		
District	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)	Costs (UGX/ha)	Revenues (UGX/ha)	Gross margin (UGX/ha)
Pakwach	378,009.50	2,064,754.00	1,428,650.00	52,032.18	157,996.90	53,299.08
Total	**378,009.50**	**2,064,754.00**	**1,428,650.00**	**52,032.18**	**157,996.90**	**53,299.08**

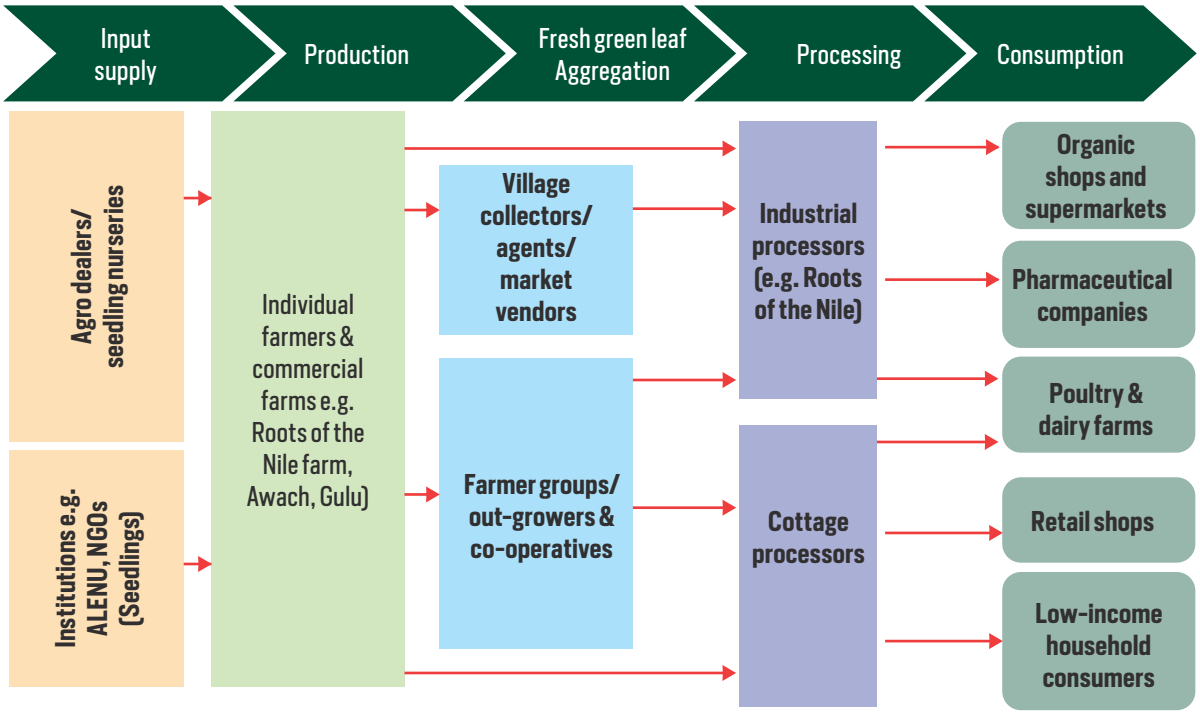
Table 90: Moringa costs, revenues and gross margins among processors

	Seasonal estimate (UGX)		
District	Total costs	Revenue	Gross margins
Pakwach	430,000	720,000	290,000
Gulu (Roots of the Nile)	33,660,000	185,400,000	151,740,000

NB: The other moringa processor after Roots of the Nile was Mr. Olumu Wanken in Panyimur Market in Pakwach

Although the moringa value chain seems short at the moment, it has great potential to elongate with the inclusion of new actors, such as village collectors, vendors and agents. In addition, there is still room for cottage processors to increase in number, given that at the moment there are no such processors in many districts. Overall, the value chain is composed of farmers, processors and consumers. Consumers are diverse, depending on the type of product and level of processing of the products (Figure 23). For instance, organic shops, pharmaceutical companies and supermarkets stock well processed, certified and packaged products, while poultry and dairy farmers, retail shops and low-income households may not need very refined and processed products.

Figure 23: The moringa value chain map



3.7.6 The moringa value chain map

3.7.7 Market potential

Moringa has a good market potential in Uganda and beyond. Although there are still only a few players, especially in Northern Uganda, with mainly Roots of the Nile as a big actor, literature shows that there are big players, such as Raintree Farms, Ltd. Company, that are specializing in the value-added processing of the *Moringa Oleifera* crop. Raintree Farms, established in 2015 by Teddy Ruge, has a 30-acre farm, located in Masindi district in North-Western Uganda, which is supplied by a network of over 150 farmers.

Photo 2: Packed moringa products from Roots of the Nile, Gulu

Photo credit: Roots of the Nile

Photo 3: Packed moringa products, including moringa, oil under the Qwezi Beauty brand from Raintree farms, Masindi

Photo credit: The Daily Monitor newspaper[29] and Howwemadeitin Africa.com[30]

3.7.7.1 Bottlenecks and weak points within the VC

The bottlenecks exist at both the production and processing levels.

Production challenges

The main moringa production challenges include:

- Pests and diseases that attack mainly the leaf.
- Termites and red ants that cut down the trees in the plantations.
- Weather changes that affect leaf quality and growth.
- Bush burning by communities that leads to burning of moringa trees.
- Stray animals from neighbours that eat the leaves. These spread the E. Coli bacteria on the leaves, hence reducing the leaf quality.

Processing challenges

Among the key processing challenges are:

- High moisture during the rains makes processing costly in terms of the energy needed to dry the leaves.
- The UNBS certification process is long, which makes the acquisition of the Q-mark hard and leads to a delay in market spread and penetration by the processed products.
- Poor quality machinery that brushes off metal chips into the processed products, making them not suitable for human consumption.

- The packaging materials are expensive, leading to slightly higher pricing of the final product.

3.7.7.2 On- and off-farm opportunities along the moringa value chain for employment creation

3.7.7.3 Key "entry points" for youth engagement along the moringa value chain

The youth can engage in the moringa value chain as producers of the green leaf, given its high productivity, yet it needs less space to produce more. In addition, aggregation of moringa leaf also presents a good opportunity. However, there are still only a few processors. Hence, aggregation is only viable if the youth mobilise moringa farmers into larger associations that can bulk and add value to the moringa leaf before marketing it as a higher-value product to households, to poultry and dairy farms as a livestock feed supplement and to shops and supermarkets.

The other entry point is to act as marketing agents for the established processors, such as Roots of the Nile Company. During the interview, the manager of Roots of the Nile indicated that they sell products to dairy and poultry farmers in Mbarara and Kampala, which indicates that, with aggressive marketing and advertising, the demand for moringa can be increased and the youth can benefit from this by participating as marketing/commission agents. As indicated in Table 91, moringa has a huge demand and market potential domestically and internationally.

3.7.7.4 Resources needed to participate in the various entry points identified

At processing stage, if moringa fresh leaf is available, the processor incurs some costs. However, before that, the processor needs to acquire a UNBS certificate after inspection of the processing facility. The following are the standards that need to be fulfilled before entry into the processing part of the value chain.

Table 91: Potential markets (opportunities) for moringa products along the value chain

Moringa potential market(s)	Indicators of the market potential
Poultry and dairy farms	• There is increasing demand for poultry and dairy products in Uganda • There is increasing interest in starting poultry and dairy farms in Western and Central Uganda
Organic consumers	• Recently, there has been increasing awareness about human nutrition and the contribution of moringa and its products to improved nutrition • Organic products are being promoted as a healthy alternative yet moringa can be grown organically in Uganda • There is increasing demand for organic products in Europe; this is a huge market that can be tapped into

Table 92: Quality requirements/standards for the moringa processed products

Market standards	Who sets it?
Personal hygiene and sanitation for employees	UNBS
Routine medical check-ups for employees	District Health Officer
Leaf moisture content (<8%)	UNBS
Moulds and yeast (0%)	UNBS
E. Coli bacteria (0%)	UNBS
Total coliform (0%)	UNBS
Heavy metals	UNBS
Proper waste disposal	UNBS

3.7.7.5 Partnerships/relationships, level of cooperation and trust among the moringa value chain actors

There exist a number of opportunities for partnerships along the moringa value chain:

i. An out-grower scheme is one such opportunity where organised farmer groups can produce and sell green leaf moringa to established processors such as Roots of the Nile. Such a partnership can be established as contract farming that also involves farmer skilling through training and support by giving them seedlings and other farming supplies and equipment on credit for payment at harvest time.

ii. Marketing /commission agents. Many youths are already marketing industrial products as commission agents. Hence, they can easily transport and market moringa products across the country while advertising them to new buyers, in the process making a commission and earning a living.

3.8 THE LOCAL CHICKEN VALUE CHAIN

3.8.1 Introduction to local chickens

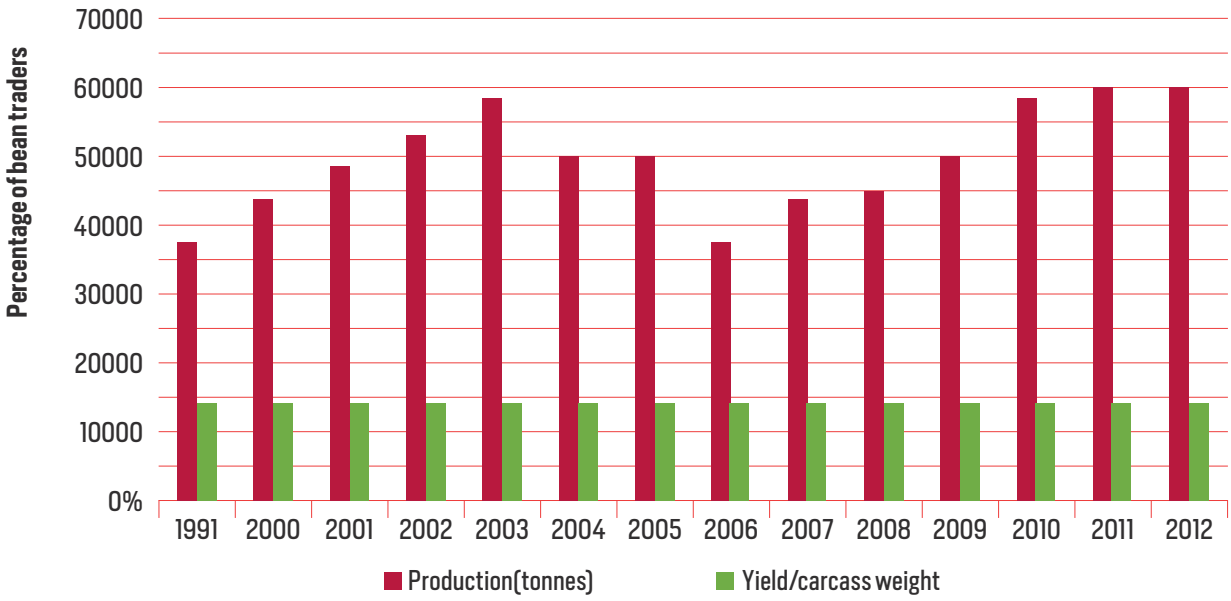
Global chicken meat consumption has increased from 32 million tonnes in 2000 to about 91 million tonnes in 2012. However, the OECD/FAO paper forecasts that poultry meat consumption will be 133 million tonnes by 2029 compared to 111 million tonnes in 2015 and given that chicken meat accounts for around 89% of poultry meat availability, by 2024 chicken uptake could be about 118 million tonnes (FAO, 2017). The average annual consumption has risen from 11.1 to 13.6 kg per person between 2000 and 2009. In Africa, the increase has been closer to 0.5 kg per person. This shows that chicken consumption in most African countries is still extremely low, which presents the potential for considerable expansion of their per capita consumption. Although there is little information about consumption in the individual African countries, the available data shows that chicken meat consumption remains low in most parts of Uganda, where only 7% and 1.7% of young children and adults, respectively, consume it once a week in Western Uganda (Bridge *et al.*, 2006). This is because chicken is considered to be a more expensive source of protein than red meat (Agriterra, 2012).

The Ugandan poultry population was estimated at about 30 million in 2001 (Kyarisiima et al., 2004) and 39 million in 2010 (UBOS 2010). However, poultry consumption in Uganda is projected to grow from 59,000 MT in 2010 to 107,000 MT in 2030 and 184,000 MT by 2050, yet production is at about 33,000MT, indicating a shortage in supply (FAO, 2017).[31] Among the chicken-owning households, the average number of birds was estimated at 12 chickens (MAAIF, 2011). Although poultry contributes 89 and 45 billion Ugandan shillings to the national gross output and value added, respectively, different poultry species make various contributions to the different value chain actors. Chicken plays a big part in the alleviation of poverty among the small-scale farmers mainly through increasing their income, reducing malnutrition through the provision of protein sources, providing manure and being used for some other socio-cultural purposes (Semakula et al., 2011; Ekou, 2013).

Ugandan chicken production is dominated by the rearing of indigenous breeds, which constitute 80% of the total production. The indigenous breeds are mainly reared under the free-range system (extensive production systems), where they move freely to scavenge for food (Nalubwama et al., 2011). However, some farmers use the semi-intensive system where the birds are confined with some restricted freedom area outside the poultry houses. Over the years, the production of indigenous chicken meat has increased but its yield per carcass weight seems to be stagnant (Figure 24). According to FAO (2005), this is not an exception to the chicken meat sub-sector but applies to all types of meat.

31 FAO, 2017. Accessed at http://www.fao.org/3/a-i7503e.pdf

Figure 24: Indigenous/local chicken meat production and yield in Uganda



Source: FAOSTAT http://faostat.fao.org/site/351/default.aspx

3.8.1.1 Production and management of local chickens in Northern Uganda

Local chicken production in Northern Uganda is predominantly a small-scale enterprise. The farmers are categorised either as "small", i.e. those who have up to 20 birds, and "medium", i.e. those with over 20 birds. The farmers rear the chickens under a free-range system, where the birds scavenge, as earlier reported by Kugonza *et al.* (2004) and Kingori *et al.* (2010).

3.8.2 Socio-economic characteristics of local chicken value chain actors

3.8.2.1 Farmers

The majority of the sampled local chicken farmers (58%) were females and 45% were youth aged less than 35 years. Pakwach and Omoro districts, however, had higher percentages of female local chicken farmers than any other district. Pakwach and Agago districts also had a high percentage of youth engaged in local chicken rearing (Table 93).

Table 93: Gender distribution of local chicken farmers by sex and age group

	Percentage of farmers by gender			
	Sex of farmer		Farmer age group	
District	Male (n=14)	Female (n=19)	Youth<=35 years (n=15)	Old>35 years (n=18)
Omoro	30.00	70.00	20.00	80.00
Agago	57.14	42.86	57.14	42.86
Nebbi	50.00	50.00	25.00	75.00
Pakwach	37.50	62.50	87.50	12.50
Overall	**42.42**	**57.58**	**45.45**	**54.55**

Youth local chicken farmers are generally literate, with 40% of them having a primary level of education, and about 40% with secondary and 7% with a certificate. The older farmers are equally educated, with 61% of them having a primary-level education and 39% with a secondary education (Table 94).

The average household size of a local chicken farmer was seven persons, with a minimum number of three members and a maximum of 18 members. This indicates the availability of labour to invest in the local chicken business (Table 95). Farmers mainly use the free-range system for rearing their local chickens (100%). However, a few of the farmers also use the semi-intensive system of poultry rearing (Table 96).

Table 94: Education levels of local chicken farmers by age group

	Percentage of farmers by age group							
	Youth(n=15)					Old(n=18)		
District	None	Primary	Secondary (O' level)	Secondary (A' level)	Certificate	Primary	Secondary (O' level)	Secondary (A' level)
Omoro (n=10)	50.00	50.00	0.00	0.00	0.00	37.50	62.50	0.00
Agago (n=7)	0.00	50.00	50.00	0.00	0.00	66.67	33.33	0.00
Nebbi (n=8)	0.00	50.00	50.00	0.00	0.00	83.33	0.00	16.67
Pakwach (n=8)	14.29	28.57	28.57	14.29	14.29	100.00	0.00	0.00
Overall (n=33)	**13.33**	**40.00**	**33.33**	**6.67**	**6.67**	**61.11**	**33.33**	**5.56**

Table 95: Size of local chicken-rearing households

	Household size		
Type of household	Mean	Min	Max
Male HH	8	3.00	18.00
Female HH	7	3.00	13.00
Overall	**7**	**3.00**	**18.00**

Table 96: Percentage of farmers by rearing system used

	Percentage of farmers		
	Free range system	Semi-intensive system	Intensive system
Omoro	100.00	0.00	0.00
Agago	100.00	14.29	0.00
Nebbi	100.00	37.50	0.00
Pakwach	100.00	37.50	0.00

3.8.2.2 Local chicken traders

Of the 14 local chicken traders, eight were males and six were females. Five of the males and females were youth traders with about five household members. Over 60% of the local chicken traders had attained secondary education and 31% had primary-level education (Table 97).

3.8.3 Commodity market demand

3.8.3.1 Quality and quantity

The type of input used in raising poultry reflects the quality of the production system and the resulting marketable products. The majority of the farmers (100%) use local feeds to feed their local chickens and only 36% provide the local birds with water, indicating that the birds move around in a free-range system to look for water. Only 33% and 30% use troughs to feed and water the birds, while only 12% of the farmers have housing structures – an indication that birds live outside or within the farmers' houses in the night.

What evidently shows a low-cost and high disease-risk local chicken system is that only 12% of the farmers utilise veterinary services while only 9% use drugs for treatment and 6% vaccinate the birds (Figure 25). This highly exposes the birds to killer diseases such as Newcastle and coccidiosis, which cause high mortality rates and deter farmers from managing larger flocks on a semi-commercial scale. This is confirmed by the smaller sizes of local chicken flocks held by farmers.

Table 98 shows that between November 2019 and October 2020 when the data was collected, a farmer had raised about 36 birds at different stages (cocks, hens, pullets and chicks) while at the time of the survey, a farmer had an average of 26 birds.

The results show that in the last 12 months, local chicken farmers sold about 30 birds per household at different stages. Farmers sold seven cocks, five hens and five pullets as well as 13 chicks. What is worrying was the high chick mortality rate, where a farmer lost an average of 14 chicks (Table 99). This means that farmers cannot grow their flocks to commercial sizes, given that they lose many young ones that would replace the sold ones. This could be a sign of disease burden that requires constant vaccination but also poor housing and feeding conditions.

Table 97: Local chicken trader by sex, education, and size of household

	Trader age group		
Trader characteristics	**Youth (<=35 years)**	**Old (>35 years)**	**Overall**
Household size (mean)	**5**	**6**	**5**
Sex of trader (frequency)			
Male	5	3	8
Female	5	1	6
Overall	**10**	**4**	**14**
Education level %			
None	11.11	0.00	7.69
Primary	33.33	25.00	30.77
O' level	33.33	25.00	30.77
A' level	22.22	50.00	30.77

Figure 25: Percentage of local chicken farmers by type of input used

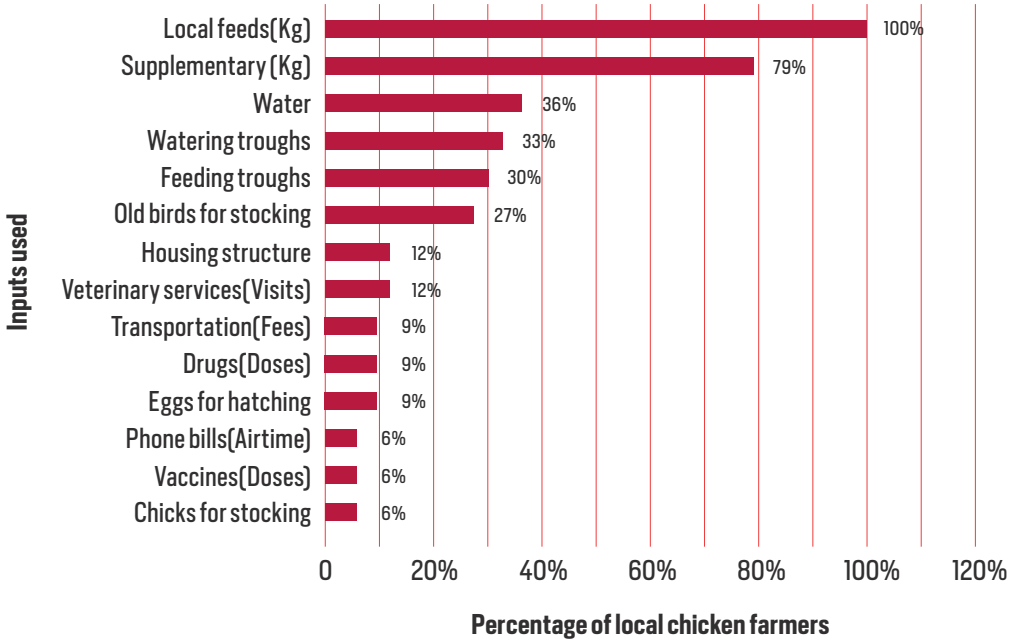


Table 98: Average number of birds by type and stage raised in the last 12 months and currently owned

	Number of birds raised (last 12 months)				Number of birds currently owned			
District	Cocks	Laying hens	Pullets – not yet laying	Chicks<2 months old	Cocks	Laying hens	Pullets – not yet laying	Chicks< 2 months old
Omoro	8	5	10	25	5	5	7	14
Pakwach	5	4	8	20	3	5	4	11
Agago	7	7	7	15	4	5	7	14
Nebbi	4	5	5	8	1	3	3	6
Overall	**6**	**5**	**8**	**17**	**3**	**4**	**6**	**11**

Table 99: Average number of birds by type and stage sold and lost by farmers in the last 12 months

	Number sold (Nov. 2019 – Oct. 2020)						Number lost (Nov. 2019 – Oct. 2020)					
District	Mature cocks	Mature hens	Pullets	Chicks	Kuroilers	Eggs	Mature cocks	Mature hens	Pullets	Chicks	Kuroilers	Eggs
Omoro	8	7	5	30	9	0	9	6	5	22	0	0
Agago	7	4	3	8	0	0	3	4	4	10	0	0
Nebbi	6	5	3	0	2	9	3	2	2	5	1	0
Pakwach	4	4	7	10	0	0	4	4	7	13	0	0
Overall	**7**	**5**	**5**	**13**	**6**	**9**	**5**	**4**	**5**	**14**	**1**	**0**

3.8.3.2 Number of local chickens traded

Local chicken traders indicated that within a season of 6 months, they were able to aggregate 1.3 million chickens from farmers in three districts of Agago, Nebbi and Pakwach at district level. The wholesalers/urban traders also supplied about 144,320 and 0.7 million chickens were aggregated through agents/brokers. Although 11 of the 16 (75%) local chicken traders interviewed were retailers/small-scale, they indicated that they also bought from other small-scale traders. Pakwach farmers supplied the largest volume of local chickens (1.2million birds) to traders, followed by those from Agago (76,800 birds) (Table 100).

3.8.3.3 Prices and seasonality

Although local chicken prices varied by size and type of chicken, cocks generally fetched the highest prices for the farmers. Restaurants and urban traders offered the highest prices. Cock prices ranged between 21,000 shillings and 26,000 shillings, while hens fetched about 13,000 and 30,000 shillings each (Table 101).

Cock prices were highest in Pakwach district at 25,000 shillings while hen prices were highest in Omoro and Nebbi districts at 18,000 shillings. Pullets cost about 10,000 shillings on average (Table 102).

The average prices per bird did not vary much by season and supplier. Traders indicated that they bought from farmers at 17,000-22,000 shillings and through agents at 21,000-20,000 and small-scale traders/retailers at 22,000 shillings. However, lean season prices were slightly higher than peak season ones by about 5,000 shillings in several districts (Table 103).

Table 100: Estimated aggregated number of local chickens by traders at district level

	Number of local chickens aggregated in 6 months by district			
District	Farmers	Wholesalers	Agents/brokers	Retailers/rural traders
Agago	76,800	-	-	-
Nebbi	25,800	64,320	630,000	-
Omoro	-	80,000	40,000	40,000
Pakwach	1,182,076	-	-	-
Overall	**1,284,676**	**144,320**	**670,000**	**40,000**

Table 101: Average local chicken prices received by farmers by marketing channel

	Average price (UGX/unit) by local chicken category			
Marketing channel	Cocks	Hens	Pullets	Chicks
Restaurant/hotel	24,000	30,000	10,000	-
Urban trader	26,000	20,000	12,000	-
Local consumers	25,000	17,000	10,200	5,000
Urban consumers	22,500	13,000	-	-
Local trader	21,000	13,000	10,300	4,000

Table 102: Average local chicken prices received by farmers by district

	Average price (UGX/unit) by local chicken category			
District	Cocks	Hens	Pullets	Chicks
Pakwach	25,000	14,000	9,000	7,500
Nebbi	23,300	17,800	12,000	10,000
Omoro	20,700	18,700	11,100	.
Agago	20,500	11,000	8,000	4,000
Overall	**22,000**	**16,100**	**10,400**	**7,250**

Table 103: Average local chicken prices given by traders by district and channel

	Mean prices (UGX/bird)							
District	Farmers		Wholesaler		Agents/Brokers		Retailers	
	Peak	Lean	Peak	Lean	Peak	Lean	Peak	Lean
Agago	20,000	25,000	.	.	.	.	.	.
Nebbi	19,500	20,000	20,000	47,500	20,000	18,000	.	.
Omoro	10,000	.	16,000	22,000	22,000	22,000	22,000	22,000
Pakwach	17,500	22,340	.	.	.	.	.	.
Overall	**17,389**	**22,088**	**18,000**	**39,000**	**21,000**	**20,000**	**22,000**	**22,000**

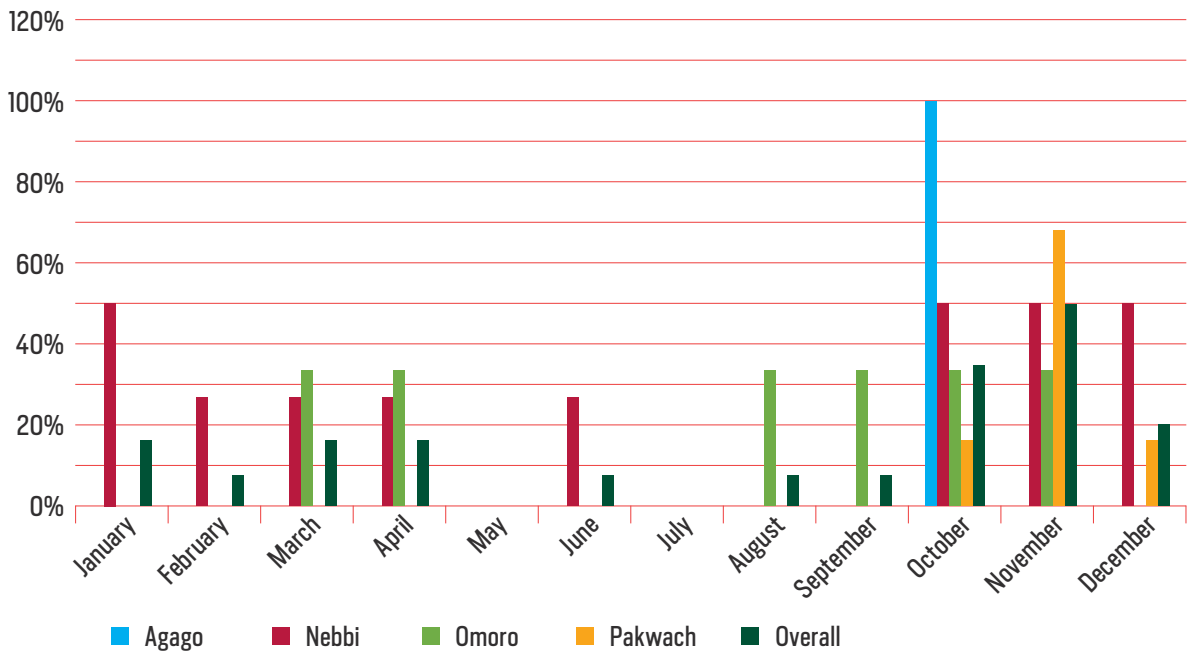
Peak local chicken seasons are mainly two annually, with the first running from January to April and the other from September to December, as indicated in Figure 26. The seasons, though, vary from district to district, with Agago district having its peak in October, Nebbi and Omoro districts having widely spaced peak seasons and Pakwach district experiencing the peak from October to December. This means that traders can access local chickens throughout the year within the ALENU Project area districts.

3.8.4 Value creation along the local chicken value chain and associated distribution channels

3.8.4.1 Costs, revenues and gross margins

A local chicken farmer earns about 0.23 million in revenues annually with a 0.21 gross margin and spends about 22,500 on the flock per year. This means that since the birds are reared free range, there are low costs of production. The gross margin per bird is estimated at about 12,700 shillings although it is highest in Omoro and Agago (Table 104).

Figure 26: Local chicken peak season



Source: Trader data, 2020

Table 104: Average local chicken costs, revenues and gross margins earned by farmers

	Mean			
District	Total input cost (UGX)	Total income (UGX)	Annual gross margins (UGX)	Gross margin per bird (UGX/bird)
Omoro	16,187.50	474,375.00	458,187.50	23,416.89
Nebbi	25,564.38	156,250.00	130,685.60	3,521.00
Pakwach	8,750.00	113,375.00	104,625.00	15,270.32
Agago	68,173.33	109,333.30	41,160.00	5,278.50
Total	**22,538.33**	**232,592.60**	**210,054.30**	**12,713.91**

3.8.5 The local chicken value chain map

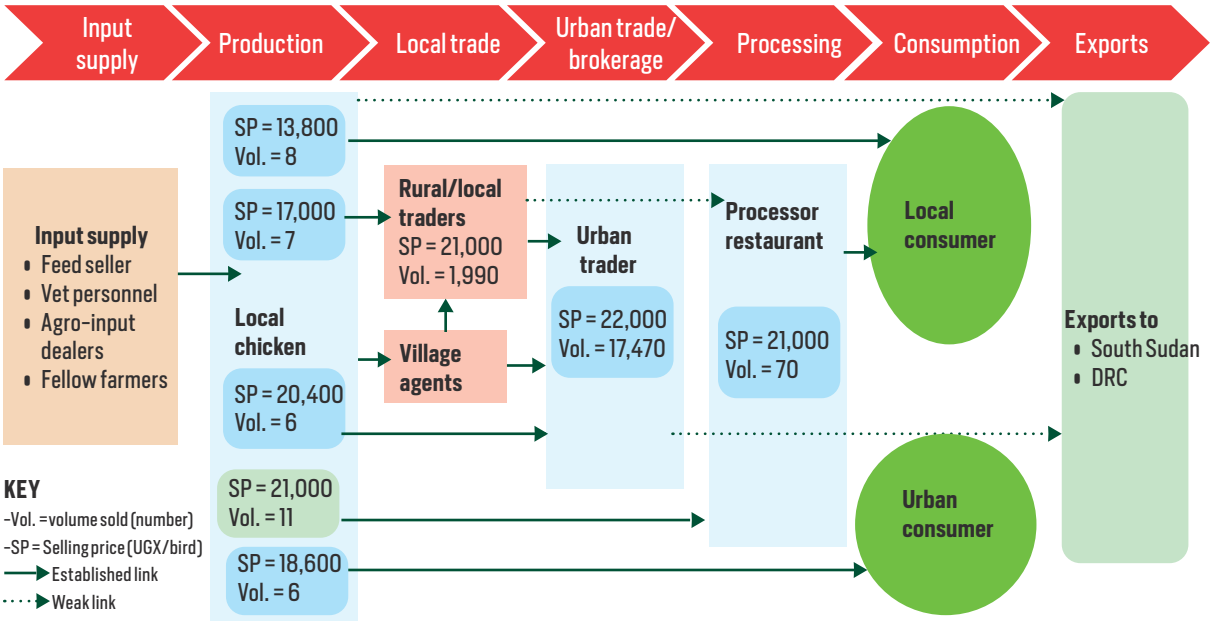
The main actors in the local chicken value chain are the farmers, local traders/retailers, and urban traders/wholesalers, processors who include restaurants and roadside food vendors (roasters) and consumers in the rural and urban areas. Although farmers sell an average of 6-11 birds per season to the various actors. with more being sold to the processors, other value chain actors are able to aggregate more of the chickens and sell them to the consumers, other traders and processors. Retail/rural traders, for instance, aggregate an average of 2,000 birds each per season of 6 months while a wholesaler aggregates about 17,500 birds per season. Wholesalers sell their local chickens at a slightly higher price than the retailers or farmers (Figure 27).

When farmers were asked to compare the different actors, they indicated the characteristics of each (Table 105).Although agents and consumers pay low prices, because of the convenience of not incurring transport costs, farmers sell to them because the retailers and traders stay far away yet transport costs are high.

Table 105: Comparison of buyers of poultry

Retailers/wholesalers	Village agents	Consumers
Better price	Low price	Low price
Large quantities bought	Small quantities bought	Small quantity
Stay very far	No transport needed	No transport needed

Figure 27: The local chicken value chain map



3.8.6 Market potential

3.8.6.1 Bottlenecks and weak points within the local chicken VC

The main bottlenecks within the local chicken value chain are felt at the farm and trader levels.

Farm-level bottlenecks

- Market fees are high for farmers who deliver their chickens to the urban markets.
- Low prices for the chickens.
- High transport costs to markets.
- Inappropriate storage of chickens once they reach the market and are not sold. This leads to some of the chickens dying and causing losses to the farmer.
- Long distances to the market.

Trader-level bottlenecks

Among the trader bottlenecks in the local chicken value chain are:

- Low supply of local chickens from farmers. This makes follow-up of the same farmers hard since they do not have a stable supply.
- Lack of market information, especially on where to find the local chickens. Traders have to keep moving around, door to door, checking if there are any chickens available, or wait at strategic points in the trading centres for farmers to deliver the local chickens.
- Low prices offered in the market to traders.
- Lack of proper storage facilities makes keeping the birds for long a big problem.

3.8.6.2 On- and off-farm opportunities along the local chicken value chain for employment creation

Opportunities include, but are not limited to:

iii. ALENU youth and other farmer groups have opportunities to tap resources from the office of the District Production Officers (DPOs) and Operation Wealth Creation (OWC) in addition to what they get from ALENU and its partners. For Instance, in their five-year district development plan, the Zombo district production department planned to have 100,000 local chickens vaccinated against NCD district-wide between 2015/2016 and 2019/2020 and allocated 30 million shillings to this initiative.

iv. The working relations between ALENU and its partners, such as Caritas Switzerland, Advance Afrika, Agency for Accelerated Regional Development (AFARD) and Gulu Women Economic Development and Globalisation (GWED-G) will facilitate increased access to services in their poultry businesses (affordable individual and group loan products). They may also improve their financial services knowledge through the closer working relations with commercial financial institutions that may include training.

v. There is a ready market for chickens in Gulu, Arua, Lira and Mbale and Kampala Cities.

vi. Keeping local chickens requires smaller plots of land, chicken feeds are available, and the birds are less susceptible to diseases as compared to kuroilers.

vii. Off the farm, youth can engage in poultry aggregation and marketing since many traders from the urban areas want to buy in bulk and save resources expended on looking around for chickens from farmers.

viii. In addition, off the farm, the youth can also participate as community animal health workers (CAHWs) when skilled to provide para-vet services to the local chicken farmers by vaccinating and treating the chickens.

3.8.6.3 Key "entry points" for youth engagement along the local chicken value chain

(a) Increased production

i. Through training youth in poultry management practices. For increased access to quality chicken feeds, youth are trained in feed mixing and production of supplements from locally available produce in their homes (youth

also could be trained to create a side business and engage in feed sales to other poultry farmers).

ii. Through training and skilling teams of CAHWs to provide vaccination and other services to the chicken keepers to curtail the high mortality rates due to diseases and internal parasites.

iii. Through crossing local chickens with high-performing breeds such as kuroilers, which would improve productivity of the local chickens for meat and eggs. This could be through a low-tech approach of acquiring an improved cock to mate with the local hens.

(b) Increased marketability

i. Youth associations could position themselves as suppliers of local chickens through collective marketing of their own chickens and those purchased from other farmers.

(c) Increased access to financial services

i. Continued support for VSLA to meet the costs involved in poultry production such as vaccination and increasing flock size.

ii. Strengthening the individual and organisational capacity of farmers to take advantage of various financial products from financial institutions that target farmers.

(d) Extension and advisory services

i. Increasing access to extension services by using selected trained youth leaders as community-based solution providers (CBSPs) and strengthening the working relations with the local government extension system.

ii. Training of CBSPs to help poultry farmers and groups gain access to appropriate vet services to mitigate disease and proper feed and husbandry practices.

3.8.6.4 Partnerships/relationships, level of cooperation and trust among the local chicken value chain actors

To address some of the limiting factors in poultry production and management, stronger public-private sector partnerships are required. Youth poultry farmers will need to work closely with the district local governments to receive support from ALENU and its partners and other interventions, such as the Youth Livelihoods Programme (YLP) and OWC. The District Veterinary Offices in the respective districts have personnel who strongly support youth in improving animal health, including chickens and other poultry. The private sector agro-vets can help increase access to day-old chicks and drugs. Local animal drug shops can be linked to the farmer groups for increased access to veterinary drugs. In addition, the project has a team of community agents, some of whom can be trained and skilled as CAHWs to provide vaccination and other services to the local chicken keepers.

However, in the current situation, there was no evidence of any contractual relations between farmers and the buyers of their local chickens. The mode of business transaction is “cash and carry”, with traders or agents looking for who has the chickens and buying. Traders mentioned lack of information as a key bottleneck because they cannot know where the birds are at a particular time. The results showed that only 36% of the local chicken farmers accessed information on prices in the market and the location of chicken buyers. Although 90% of the local chicken farmers belong to groups, none of them sells their chickens through a group. This makes access to services, including market information, hard, in addition to being rendered prone to exploitation by buyers at the bargaining stage.

3.9 THE APIARY VALUE CHAIN

This section presents the findings from the beekeeping farmers, bee product traders and processors as well as consumers in the six ALENU Project districts of Northern Uganda. However, the project supported apiary interventions in Nebbi, Agago and Omoro districts and so the analysis focuses on these districts.

3.9.1 Introduction

Uganda has over 1.2 million beekeepers across the country and 2,600 MT of honey is sold annually, with 1,800 MT being exported out of the country (TUNADO, 2016).[32] The majority of beekeepers in Uganda are small-scale producers who mainly use traditional hives and indigenous management practices to maintain their bee colonies. It is estimated that there are about 2 million hives in Uganda, 87% of which are traditional log hives, with about 66% of them getting colonised per season (UNDP, 2012). According to the Programme for Modernisation of Agriculture (PMA), way back in 2005, the demand for honey in Uganda was about 3,600 MT. However, with an estimated annual production of 1,538 MT, there was a deficit of 2,062 MT/pa. Unfortunately, Uganda currently harvests only 1% of a potential 500,000 MT of honey per year. Despite being only one of five countries in sub-Saharan Africa licensed to export honey to the EU, Uganda has failed to meet home-grown demands for honey, let alone export it to this potential market.[33]

The major honey producing areas are Northern and Western Uganda, while the Central region is the least productive area.[34] Most of the honey is organically produced by small-scale beekeepers who use rudimentary methods of production and have failed to meet the country's domestic demand.[35] Owing to the unmet honey demand on the domestic market, Uganda has been importing more comb honey from Sudan and DRC.[36] Additionally, more processed honey is imported from Kenya, United Arab Emirates, Germany, Switzerland, the UK and Dubai. There are 72 honey brands on the Ugandan market, of which 71% are local brands.37 The most common local brands are Bee Natural Honey, Bushenyi Honey, East African Organic Honey, Pure Natural Honey and Pearls Pure Honey.

3.9.2 Socio-economic characteristics of apiary value chain actors

3.9.2.1 Farmers' characteristics

Of the sampled apiary farmers, 335 were females and 52% were youth aged less than 35years. Omoro district, however, had the highest proportion of female farmers (57%), while Agago and Nebbi districts had the highest percentage of youth apiary farmers (>55%) (Table 106). The majority of the apiary farmers (59%) had primary-level education while 30% had never gone to school.

The average household size was seven persons although Omoro district had five as its mean household size (Table 107), indicating the level of household labour available for production in beekeeping and other activities.

3.9.2.2 Types of hives used

The majority of the apiary farmers use the traditional beehives. However, comparing the 2019B season and 2020A shows that there has been an increase in the number of farmers using the Kenya Top Bar Hive (KTB) hives from 4% to 44%. This has been followed by a reduction in the percentage of farmers using the traditional hives from 96% to 63% in 2020A (Figure 28). The type of hive used determines the level of productivity of the apiary farm and, hence, more modern hives, such as the KTB, are likely to increase farm yields of honey and other products.

32 The Beekeeping Landscape in Uganda – guest article by James Propa. Available at https://www.checinternational.org/the-beekeeping-landscape-in-uganda-guest-article-by-james-propa/

33 Untapped potential for Ugandan beekeepers. Available at https://www.sciencedaily.com/releases/2017/03/170306091940.htm

34 Kilimo, T. Development of inclusive markets in agriculture and trade (DIMAT): The nature and markets of honey value chains in Uganda. Unpublished: United Nations Development Programme (Report), 2012.

35 DIMAT project. The nature and markets of honey value chains report in Uganda. 2012.

36 Jackson, M. Honey market in Uganda. Unpublished: Apiculture Development Programme (Report), 2003.

37 TUNADO. A market information report on honey brands sold in selected Ugandan towns 2012 [cited 2016 19/1/2016]. Available at http://www.tunadobees.org/uploads/Market_report_on_honey_brands_sold_in_Uganda_2013.pdf.

Table 106: Gender distribution of apiary farmers by sex and age group

	Percentage of farmers by gender			
	Sex of farmer (n=27)		Farmer age group	
District	Male (n=18)	Female (n=9)	Youth<=35 years (n=14)	Old>35 years (n=13)
Omoro	42.86	57.14	28.57	71.43
Agago	63.64	36.36	63.64	36.36
Nebbi	88.89	11.11	55.56	44.44
Overall	**66.67**	**33.33**	**51.85**	**48.15**

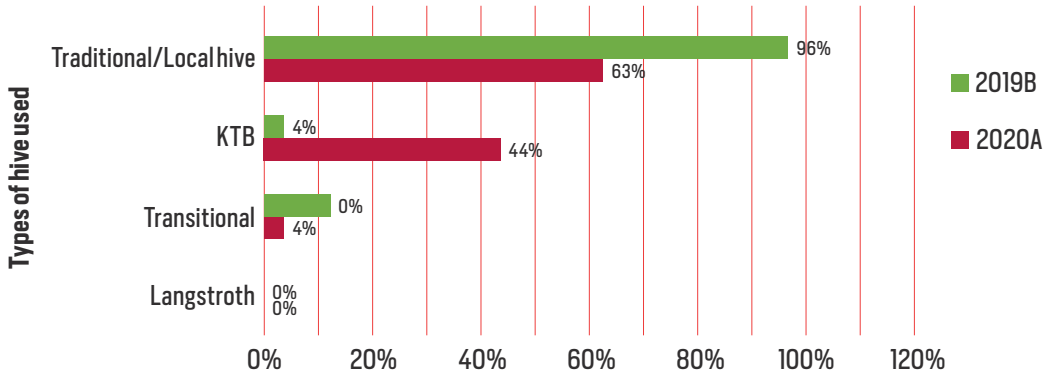
Table 107: Education levels of apiary farmers

	Percentage of farmers			
District	Nebbi (n=9)	Agago (n=11)	Omoro (n=7)	Overall (n=27)
None	11.11	45.45	28.57	29.63
Primary	77.78	36.36	71.43	59.26
O' level	11.11	18.18	0	11.11
Total	**100**	**100**	**100**	**100**

Table 108: Size of apiary farming households

District	Mean	Std. Dev.	Freq.
Nebbi	7	4	9
Agago	7	4	11
Omoro	5	2	7
Overall	**7**	**3**	**27**

Figure 28:Types of hives used by season



Source: Apiary farmer data, 2020

3.9.2.3 Traders' and processors' characteristics

Honey and honey product traders are generally young, with 13 of the sampled 24 being youth traders, of whom three were females. The majority of the traders had a primary or secondary level of education and all both the processors interviewed had completed A' level (Table 109).

3.9.2.4 Consumers

Honey and honey product consumers constituted 18% of all sampled consumers, of whom 19% were from female-headed households (Table 110). Although 30% of the consumers indicated that they consumed honey and honey products from their own production, the majority (60%) bought it from supermarkets and shops (50%) (Table 111). Honey and honey product consumers mainly consider taste, cleanliness, price and nutritional value and colour of the honey while buying the honey and honey products (Figure 29).

Table 109: Gender disaggregation of honey and honey product traders and processors

	Traders			Processors
	Age group (frequency)			Frequency
Sex	**Youth (n=12)**	**Old (>35 years) (n=11)**	**Overall (n=23)**	
Male	10	5	15	2
Female	3	6	9	0
Overall	**13**	**11**	**24**	**2**
Education level%				**%**
Primary	25.00	54.55	39.13	
O' level	33.33	18.18	26.09	-
A' level	8.33	18.18	13.04	100%
Diploma/college	8.33	9.09	8.70	-
University	16.67	0.00	8.70	-

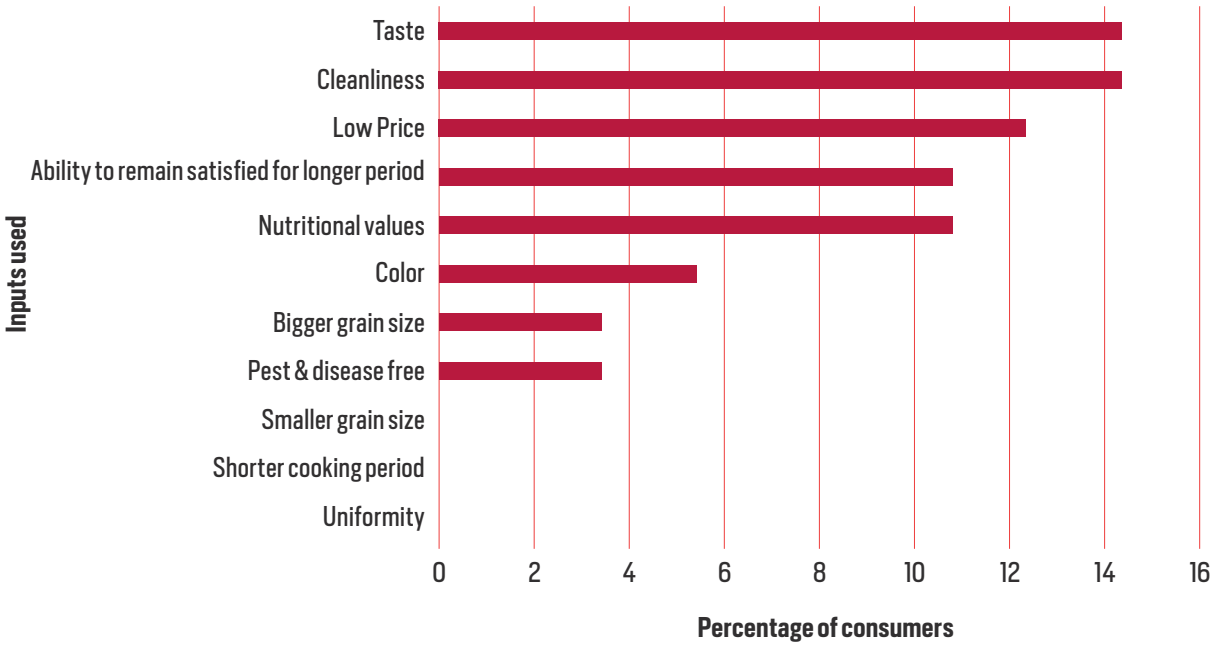
Table 110: Percentage of honey-consuming households

	Household consumes honey/honey products?	
	Yes	**No**
MHH (n=35)	17.14	82.86
FHH (n=21)	19.05	80.95
Overall (n=56)	**17.86**	**82.14**

Table 111: Percentage of honey-consuming households by source of products

	Honey
Home harvest	30.00
Weekly markets	40.00
Main markets	10.00
Shops	50.00
Supermarkets	60.00

Figure 29: Factors that influence consumer demand for honey products



Source: Consumer data, 2020

3.9.3 Commodity market demand

In this section, we explore the supply, demand and price factors around honey and honey products in the three ALENU districts where apiary was promoted.

3.9.3.1 Honey output and sales at farm level

Overall, apiary farmers produced more honey in 2020A than in 2019B. In 2020A, a farmer produced an average of about 49 litres compared to 32 litres in the previous season. Farmers sell over 90% of the harvested honey (Table 112).

3.9.3.2 Quantity and prices of honey and honey products traded and processed

At district level, honey traders aggregate about 550 MT of honey in a season from farmers and 750 MT from fellow traders, who may be wholesalers and retailers. The processors, on the other hand, buy from only farmers and aggregate about 29 MT of honey per season (Table 113).

3.9.3.3 Price and seasonality

Apiary farmers earned the highest prices in the 2020A season rather than in 2019B, with a price gap of about 50,000 shillings per 20 litres. However, in 2019B, farmers in Agago got higher prices than those in other districts (Table 114). Lean season prices differed by about 40,000 shillings per 20 litres at the farm gate, but this gap was narrower at wholesale and retailer levels by about 20,000 shillings per 20 litres (Table 115). Processors, however, offered slightly higher prices compared to other traders. The honey season in the study areas is a short one, starting in January and ending in March (Figure 30).

Table 112: Honey volumes produced and sold by farmers

	2019B		2020A	
District	**Harvested (litres)**	**Sold (litres)**	**Harvested (litres)**	**Sold (litres)**
Omoro	44.40	40.00	60.00	57.50
Agago	36.14	36.00	53.75	44.00
Nebbi	17.86	18.57	6.50	6.50
Overall	**32.80**	**31.52**	**48.79**	**42.69**

Table 113: Estimated aggregated honey volumes by trader and processor at district level

	Quantity of honey (MT) by trader at district level by source		
District	**Farmers**	**Wholesalers**	**Retailers**
Agago	252.00	-	-
Nebbi	294.00	93.20	648.00
Overall	**546.00**	**93.20**	**648.00**
District	**Processor**		**-**
	Farmers		-
Nebbi	28.80		-

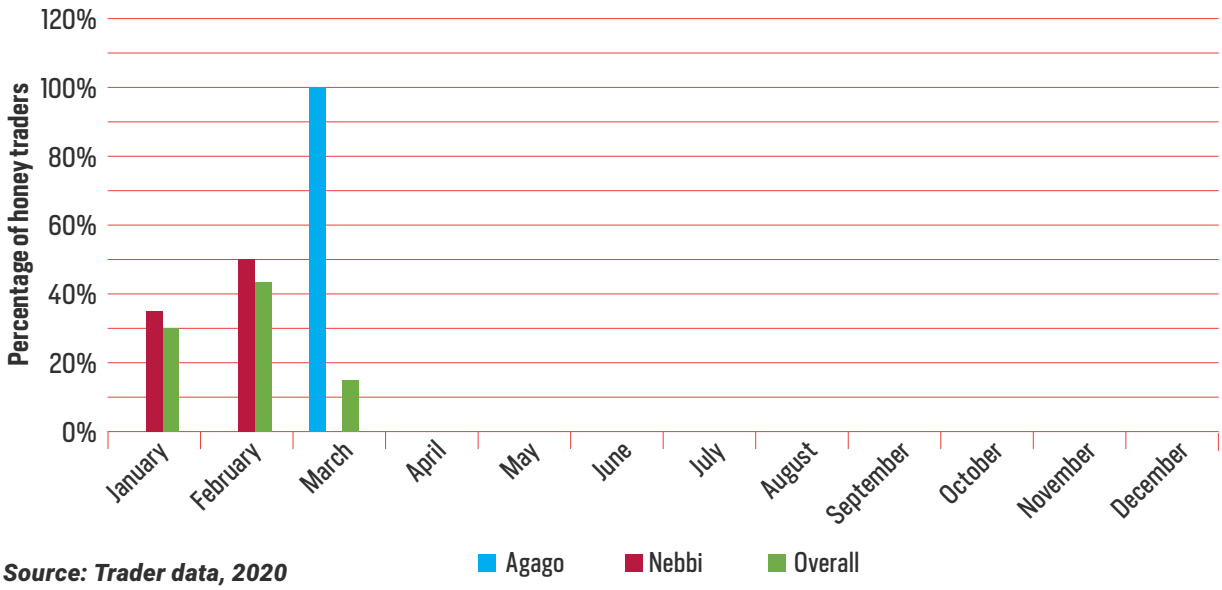
Table 114: Prices received by farmers for honey sold

	Honey price (UGX per 20 litres)	
District	**2019B**	**2020A**
Nebbi	130,000.00	200,000.00
Agago	188,500.00	200,000.00
Omoro	153,300.00	200,000.00
Overall	**158,200.00**	**200,000.00**

Table 115: Prices offered by honey farmers and honey product traders and processors

	Honey price (UGX per 20 litres)					
			Traders			
	Farmers		Wholesalers		Retailers	
District	**Peak**	**Lean**	**Peak**	**Lean**	**Peak**	**Lean**
Agago	150,000	180,000	.	.	.	.
Nebbi	130,000	173,300	190,000	210,000	186,700	203,300
Overall	**135,000**	**175,000**	**190,000**	**210,000**	**186,700**	**203,000**
	Processors (UGX per 20 litres)					
	Farmers					
District	**Peak**	**Lean**	**-**	**-**	**-**	**-**
			-	-	-	-
Nebbi	210,000	210,000	-	-	-	-

Figure 30:Apiary/honey peak season in Nebbi and Agago districts



Source: Trader data, 2020

3.9.4 Value creation and associated distribution channels

3.9.4.1 Costs and revenues and value added

Apiary farmers earn about 0.5 million shillings annually from sales of honey and its products, with a gross margin of about 0.32 million. Omoro and Agago districts' farmers, however, earned the highest incomes and gross margins compared to Nebbi (Table 116). Youth farmers earned significantly lower incomes compared to the older ones, much as in Agago and Omoro districts, the youth earned a positive gross margin (Table 117).

Honey traders generally made huge gross margins of about 213 million in a season. Nebbi district traders earned higher margins. The sampled processors earned about 11.4 million in gross margins per season. The results indicated that honey trading and processing are profitable ventures (Table 118).

Table 116: Annual costs, revenues and gross margins of apiary farmers

	Apiary farmers (annual)		
District	Total costs (UGX)	Revenue (UGX)	Gross margins (UGX)
Omoro	420,000.00	960,000.00	680,000.00
Agago	292,000.00	664,571.40	456,000.00
Nebbi	93,500.00	149,071.40	60,312.50
Overall	**220,076.90**	**504,441.20**	**317,472.20**

Table 117: Annual costs, revenues and gross margins of youth and older apiary farmers

	Youth			Old(>35 years)		
District	Total costs (UGX)	Revenue (UGX)	Gross margins (UGX)	Total costs (UGX)	Revenue (UGX)	Gross margins (UGX)
Nebbi	47,125.00	101,250.00	-43,300.00**	285,000.00	78,000.00	-233,000.00
Agago	275,500.00	203,333.30	123,000.00	1,183,333.00	425,000.00	900,000.00
Omoro	240,000.00	420,000.00	30,000.00	2,400,000.00	420,000.00	1,980,000.00
Overall	**177,050.00**	**179,375.00**	**30,500.00**	**972,142.90**	**285,200.00**	**768,428.60**

Significance: **5%

Table 118: Costs and revenues of honey and honey products by traders and processors

		Traders		
District	Cost of stock	Total costs per season	Revenue per season	Gross margins per season
Agago(n=1)	-	216,000.00	4,260,000.00	4,044,000.00
Nebbi(n=6)	18,000,000.00	18,100,000.00	335,000,000.00	317,000,000.00
Overall (n=7)	**12,000,000.00**	**12,100,000.00**	**225,000,000.00**	**213,000,000.00**
	Processor			
	Cost of stock	Total costs per season	Revenue per season	Gross margins per season
Nebbi (n=2)	-	243,000.00	11,600,000.00	11,400,000.00

3.9.4.2 Types of honey buyers

Farmers indicated that they mainly sell honey to retailers, to whom 76% of the farmers sold honey in 2019B and 63% in 2020A. Between 18% and 25% of the farmers sold to wholesalers while 6%-13% sold to processors in the two seasons under study (Figure 31). There are no variations across districts in terms of honey buyers from farmers.

In terms of apiary products, 70% of the farmers sell honey while 4% sell honey jelly and 4% sell propolis. This shows that the range of honey products is narrow, with mainly honey being sold and, in many cases, it is unprocessed honey (Figure 32).

3.9.5 The apiary/honey value chain map

Apiary farmers sell mainly honey to retailers and wholesalers/urban traders and to processors. The retailers, wholesalers and processors sell to processors and consumers such as retail shops and low-income households, mainly in rural areas. Potential consumers, such as pharmaceutical companies and supermarkets, have not been exploited by the value chain actors (Figure 33).

Figure 31: Honey buyers from farmers

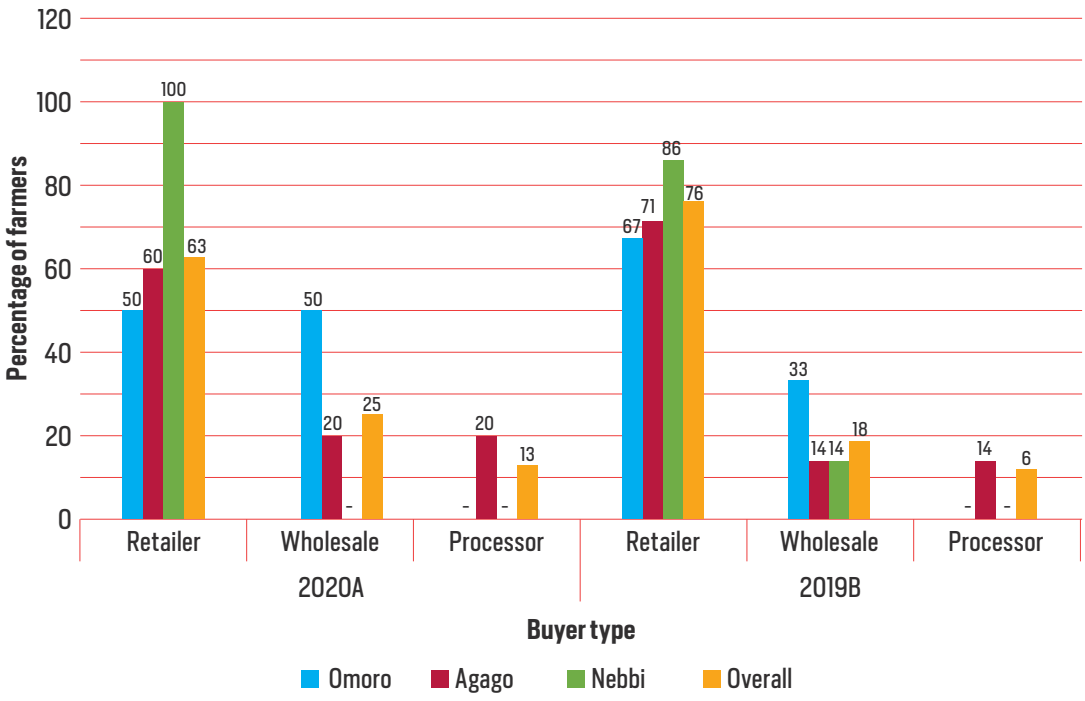


Figure 32: Apiary products sold by farmers

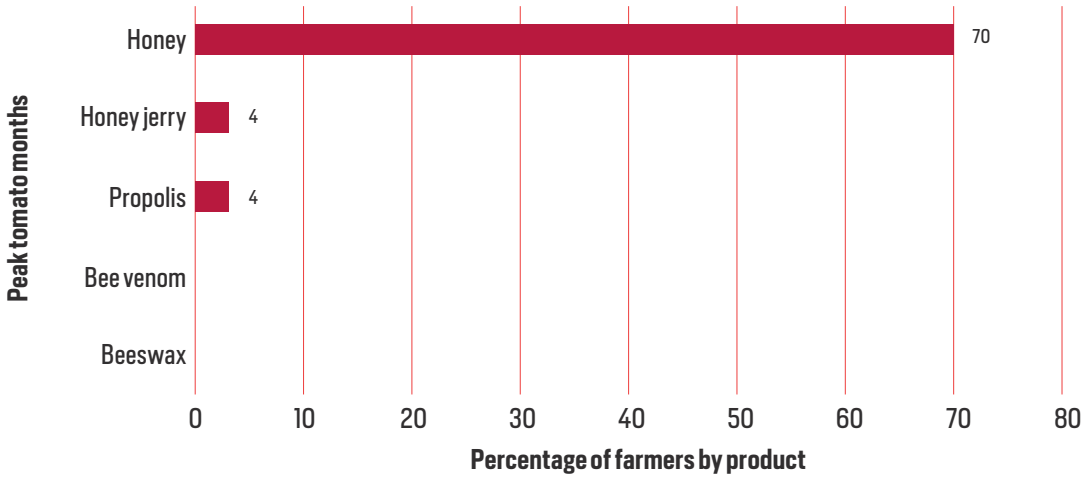
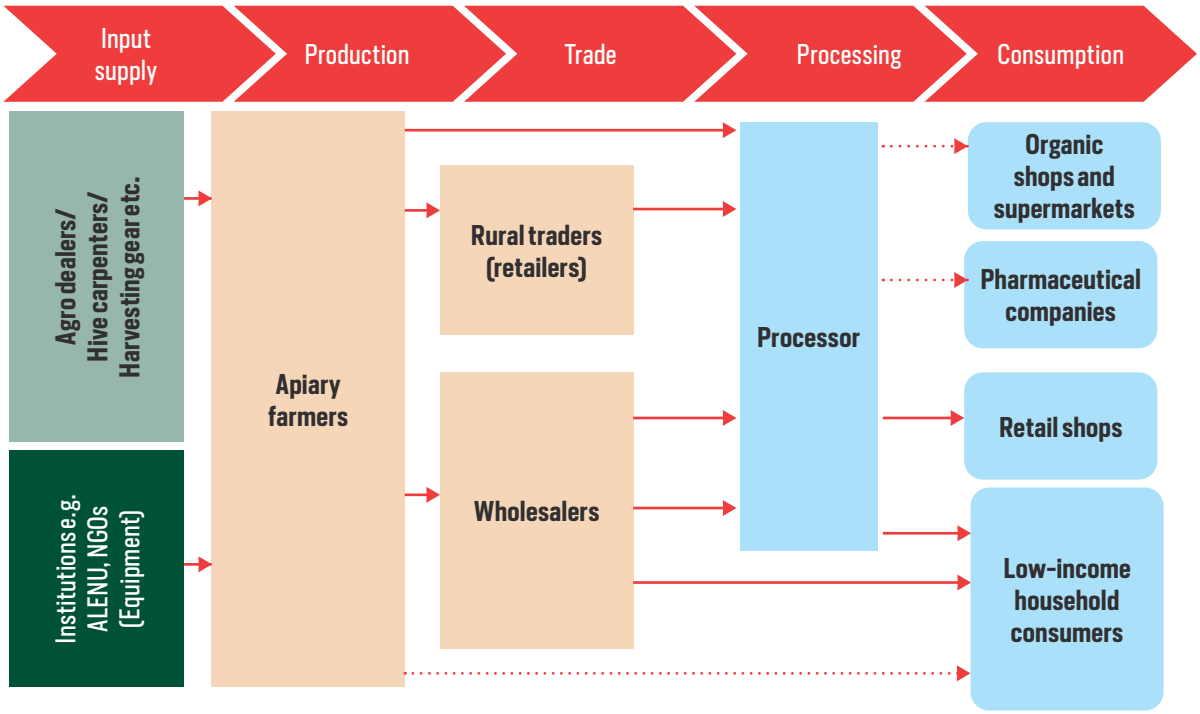


Figure 33: The honey/apiary products value chain map



3.9.6 Market potential

3.9.6.1 Bottlenecks and weak points within the VC

The main challenges in the apiary value chain is also captured at farmer, trader and processor levels. These are outlines as:

Farm-level bottlenecks

- Inadequate skills in beekeeping.
- Limited market for honey.
- A poor transport system.
- Theft of beehives, which affects production.
- Lack of gumboots, gloves, buckets, jerrycans and other post-harvest handling equipment.

Trader-level bottlenecks

Traders indicated the following as key bottlenecks:

- Long distances to find the farmers with honey, adding to the cost of transport and overall cost of transactions.
- The small number of farmers producing

honey is another problem, which means that supply is lower than demand. This creates competition among traders for the honey products.

Processor-level bottlenecks

Processors indicated that seasonality of honey is a serious challenge in that they cannot get supplies throughout the year.

3.9.6.2 On- and off-farm opportunities along the apiary value chain for employment creation

On-farm opportunities

On the farm, the main employment opportunities in apiary include:

a. Primary production through beekeepers producing honey and other bee products.

b. Input supply, especially through carpentry, involving the supply modern beehives since over 70% of farmers still use the less productive traditional hives.

c. Eco-tourism, where farms are organised to attract tourists who pay to visit but also buy the farm apiary products.

Off-farm opportunities

Off the farm, the youth can engage in several activities, such as:

a. Honey processing, branding and packaging and marketing to lucrative markets such as supermarkets and pharmaceutical companies.

b. Honey product manufacturing through cottage industries that use beeswax and other products to make candles, decorations etc.

3.9.6.3 Key "entry points" for youth engagement along the apiary value chain

- The youth can engage in the apiary/honey value chain as producers of honey and other products such as wax and propolis, given that there is still a shortage of supply as indicated by traders and processors.

- Acting as marketing agents and retail traders to aggregate honey from farmers is another entry point. Since traders indicated that they have to move long distances, those youth who are energetic can clearly benefit from this part of the value chain.

- Honey processing, branding and upgrading is another opportunity for youth employment in large numbers.

Photo 4: Well branded and packaged honey products[38]

3.9.6.4 Partnerships/relationships, level of cooperation and trust among the apiary/honey value chain actors

There are a number of opportunities for partnerships along the apiary/honey value chain.

1. Contract beekeeping is one such opportunity where organised farmer groups can produce and sell to processors through contract farming. This would also involve farmer skilling through training and support by giving the farmers inputs such as modern hives and harvesting gear and other farming equipment on credit for payment at harvest time.

ii. Cooperation is also possible at farmer organisation level by farmers working together to aggregate their honey and market it together to access better markets and increase their bargaining power. Although 96% of apiary farmers belong to groups, only about 10% market their honey in those groups. This is an indicator of low levels of cooperation and trust in farmer institutions that hinders them from accessing markets.

38 *Photo credit: Sebatta Christopher*

4. CONCLUSIONS AND RECOMMENDATIONS

This section gives the overall conclusion of the findings of this MVCA study that involved over eight value chains.

4.1 Conclusions

This MVCA study was informed by the ALENU Project aim to increase food security, improve maternal and child nutrition, and enhance household incomes through providing support to diversified food production and commercial agriculture and through improving household resilience (notably to climate change) and women's empowerment. It is worth noting that ALENU started inputs distribution in season 2020B (August-December 2020), hence at the time of data collection, farmers had just started producing. However, much of the data in the study was based on the farmers' previous experiences of producing and traders and processors' experiences in the target enterprises. Information from the ALENU management indicated that some enterprises, e.g., mangoes, oranges, jackfruit, paw paws and moringa were promoted for nutritional purposes, while groundnuts, apiary, tomatoes, onions, soya beans were promoted for commercial purposes. For instance, each household received two poultry birds/chickens for nutrition, but more than five groups received chickens for commercial purposes, with each group getting 125 birds.

In terms of promoting working markets for the promoted value chains, there are market standards that the project has been supporting. For example, ALENU has procured about 26 booklets of market standards (UNBS), for all the 10 enterprises and are promoting them among the value chain actors. These will be simplified for farmers and other VC actors; they will be translated into Acholi, Jonam and Alur languages. The project also plans training in market standards.

Generally, we make the following conclusions based on the findings of these MVCA study findings:

i. All the 10 value chains are generally profitable on and off the farm. Farmers, traders and processors of the enterprises under study earned positive gross margins at various levels of profitability.

ii. There is a big gross margin gap between farmers and other value chain actors. Farmers earn less compared to what other actors earn. This gap is one of the reasons why the youth think it is not profitable to go into primary production of many of the ALENU Project enterprises.

iii. There are still infrastructural, information as well as knowledge bottlenecks facing both farmers and other value chain actors. Poor roads, long distances, high transport costs, limited access to inputs, lack of access to market information, and fluctuating prices are market infrastructural issues while pests and diseases, seasonality, limited choice of buyers, and others are somehow information- and knowledge-related.

iv. The demand for the products in the studied value chains is high although supply is low; and especially in the lean seasons, supply is unreliable. Many traders and processors indicated that they could not get enough supply of the produce they needed all around the year.

v. The levels of cooperation and trust are still low. Cooperation among farmers (farmer-to-farmer) only stops at forming groups to access inputs and extension services but cooperating to aggregate and bulk produce and to market collectively is still low. The level of cooperation and partnership between farmers, traders and processors is very low and almost non-existent. There was no evidence of contract relations or out-grower arrangements within the value chains.

vi. The value chains studied still have a huge potential for on-farm and off-farm employment for farmers generally but also for youth engagement and inclusion in the rural production and market economy.

4.2 Recommendations

The main recommendations emanating from the study findings are:

i. Farmer organisation strengthening/ institutional development

As ALENU beneficiaries start harvesting from the inputs given in the last season, there will be increased production as seen from the results, and this will call for organised farmers with a voice to bargain for the best terms in the market.

ii. Strengthening trust and collective action among farmers

It is well known and documented that collective action is more commonly expressed through producer organisations such as farmer groups and co-operatives, although individual farmers can also engage in collective action (Shiferaw et al., 2011). It is also documented that best practices can only be promoted where there is trust and reputation.[39] Trust must be nurtured within the farmer groups – among its members and leaders and between farmer groups and the partners they trade with such as traders, institutions etc. We, therefore, recommend that through farmer group training, ALENU should incorporate elements of trust into the training curriculum. Additionally, trust with partners can be strengthened through multi-stakeholder platforms where the farmers, traders, processors and other value chain actors are brought together to discuss the issues that are hindering the efficiency of the value chains in which they participate.

iii. Streamlining input supply from reliable sources

Input supply can be localised in that improved seed is produced and supplied by organised and trained producer groups such as local seed businesses (LSBs). In addition, other inputs can also be supplied under the organised farmer groups/cooperatives. This will solve the problem of input supply to ensure sustainable production.

iv. Market linkage promotion

Partnerships should be forged by the project to link farmers to large-scale buyers and other value chain actors to engage in formal supply contracts/ arrangements. For example, soybean farmers can engage with oil millers to supply large quantities directly.

v. Promotion of value addition and processing initiatives

Cottage industries should be promoted, and these can be primarily manned by the youth to add value to the produce, brand and package the value-added products and market them to better markets.

vi. Leveraging by ALENU of other programmes going on in Northern Uganda

In Northern Uganda, there are a number of projects and programmes that are going on that are implemented by a number of ministries and donor agencies. Among them are PRELNOR (2017-2022), which operates in nine districts of the Acholi sub-region, and the Northern Uganda Resilience Initiative (NURI), which is one of eight development engagements under the Denmark-Uganda Country Programme 2018 – 2022.[40] Others are NUSAF, which is implemented by the Office of the Prime Minister, and the National Oil Seeds Project (NOSP), which is yet to start but is a successor project of VODP II, implemented by MAAIF and funded by IFAD.

The findings indicated that over 90% of the farmers in the MVCA study were receiving crop-related extension training, although 92% of them indicated that they get this training from the ALENU Project and 5% get trainings from NGOs/CBOs (see Annex 9). This shows that there is no multiple participation by benefiting from many other projects in the area. We recommend that ALENU should leverage other projects and programmes in the area through building collaborations with projects that could provide comple-

39 Lucas, L. M. (2005). The impact of trust and reputation on the transfer of best practices. *Journal of Knowledge Management*.

40 NURI's objective is to enhance resilience and equitable economic development in supported areas of Northern Uganda, including for refugees and refugee-hosting communities.

mentary services such as market access training, institution-building services as well as other benefits that would lead to farmers selling more into the market.

vii. Operationalising processing and value addition

- For crops such as beans, soybeans and vegetables (onions, tomatoes etc.), value addition is only possible through improving the quality of the produce through the use of good post-harvest practices such as drying on tarpaulins, good packaging to avoid damage and good storage to avoid damage caused by storage pests. This is value addition since it would raise the value because of the quality. It is, therefore, recommended that ALENU focuses on the post-harvest side to ensure that quality produce that will fetch higher prices in the market is supplied by farmers.

- For groundnuts, value addition will be possible through assisting farmers or processors in accessing quality threshers and grinders that do not break the seeds and also that have the capacity to handle large volumes. The processing machinery may also come with string engines/generators because of lack of electricity in many of the project areas.

- For the apiary enterprise, value addition is also possible at household level as well as group level through ensuring access to value addition equipment, personal protective gear for harvesting honey, machinery such as centrifuges, cans as well as branding materials such as packaging bottles/tins that are clearly branded. This would help the farmers not only to get higher incomes but also to produce other products such as propolis, candle wax etc. that come as by-products of value addition.

- For local poultry, we recommend that value can be added through training a team of vaccinators in the community so that routine vaccination is done to reduce the high mortality rate of young birds as indicated in the results. This will not only increase the quality of chickens sold but also the supply so as to attract large buyers for increased incomes.

REFERENCES

Atherton, J., and Rees, A. (2005). *Tomatoes*. Crop Production Science in Horticulture Series.

Busolo-Bulafu, C.M. and Nalyongo, P.W. (2001). *Evaluation of Short Duration Groundnut for Resistance in Uganda*. Serere Agricultural and Animal Production Research Institute. Soroti, Uganda, pp. 2-10.

FAO (2012). *Food and Agriculture Organisation of the United Nations for a World without Hunger*. Accessed at http://faostat.fao.org/default.aspx

FAOSTAT (Food and Agriculture Organisation) (2008). *FAOSTAT: Core Production Data*. Accessed at http://faostat.fao.org/site/567/default.aspx.

ICRISAT (2014). *Value Chain Analysis and Mapping for Groundnuts in Uganda*. ICRISAT, Nairobi.

ITC (2015). *Edible Nuts – Groundnuts*. Retrieved from http://www.intracen.org/uploadedFiles/intracen.org/Content/Exporters/Market_Data_and_Information/Market_information/Market_Insider/Edible_Nuts/Groundnut%20Quarterly%20Bulletin%20June%202015.pdf

Kaganzi, E., Ferris, S., Barham, J., Abenakyo, A., Sanginga, P. and Njuki, J. (2008). *Sustaining Linkages to High Value Markets through Collective Action in Uganda: The Case of Nyabyumba Potato Farmers: CGIAR Systemwide Programme on Collective Action and Property Rights*. International Food Policy Research Institute.

Morris, M., Kaplinsky, R. and Kaplan, D. (2012). One thing leads to another – Commodities, linkages and industrial development. *Resources Policy*, 37(4): 408-416.

Naika, S., de Jeude, J.L., de Goffau, M., Hilmi, M. and van Dam, B. (2005). *Cultivation of Tomato Production. Processing and Marketing*. Accessed at http:// journeyoforever.org/farmlibrary/AD17.pdf

Okello, D., Biruma, M., Deom, C. (2010). Overview of groundnuts research in Uganda: Past, present and future. *African Journal of Biotechnology*, 9 (39): 6448-6459.

Shiferaw, B., Hellin, J., and Muricho, G. (2011). Improving market access and agricultural productivity growth in Africa: What role for producer organisations and collective action institutions? *Food Security*, 3(4): 475-489.

Uganda Bureau of Statistics (UBOS) (2008/2009). *Statistics on Groundnut, Presented at Expert Opinion Workshop on Diva in Uganda*.

Upadhyaya, C.H.D., Nigam, S.N. and Thakur, R.P. (2000). *International Crop Research Institute for Semi-Arid Tropics*, pp. 2-5.

Watanabe, K.N. and Pehu, E. (1997). *Plant Biotechnology and Plant Genetic Resources for Sustainability and Productivity*. Academic Press, pp. 117-131.

ANNEXES

Annex 1: Crop production constraints facing farmers in ALENU Project areas

	Constraints Ranked 1						
Crop production constraints	**Percentage of farmers by district**						
	Omoro	**Agago**	**Amuru**	**Nebbi**	**Pakwach**	**Zombo**	**Overall**
Lack of farm equipment	60.87	21.21	31.58	26.32	40.63	24.24	31.98
Skills difficult to practise	17.39	18.18	5.26	33.33	21.88	36.36	24.87
Pests and diseases	4.35	24.24	31.58	12.28	0.00	0.00	11.17
Lack of labour	0.00	9.09	5.26	10.53	6.25	21.21	9.64
Inputs very expensive	4.35	15.15	0.00	7.02	15.63	6.06	8.63
Climate /weather changes	4.35	3.03	15.79	3.51	12.50	3.03	6.09
Inputs not readily available	4.35	3.03	5.26	3.51	3.13	6.06	4.06
Lack of finance	0.00	0.00	0.00	3.51	0.00	3.03	1.52
Low soil fertility	4.35	3.03	0.00	0.00	0.00	0.00	1.02
None	0.00	0.00	5.26	0.00	0.00	0.00	0.51
Poor seed/input quality	0.00	3.03	0.00	0.00	0.00	0.00	0.51
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
	Constraints Ranked 2						
Crop production constraints	**Percentage of farmers by district**						
	Omoro	**Agago**	**Amuru**	**Nebbi**	**Pakwach**	**Zombo**	**Overall**
Lack of farm equipment	13.64	22.58	0.00	22.81	28.13	28.13	21.93
Inputs very expensive	27.27	9.68	30.77	17.54	12.50	28.13	19.25
Climate /weather changes	18.18	25.81	53.85	14.04	3.13	9.38	16.58
Pests and diseases	9.09	16.13	0.00	19.30	21.88	15.63	16.04
Low soil fertility	27.27	6.45	15.38	10.53	6.25	3.13	10.16
Lack of labour	0.00	3.23	0.00	8.77	9.38	6.25	5.88
Wild animals	0.00	9.68	0.00	7.02	0.00	0.00	3.74
Inputs not readily available	0.00	3.23	0.00	0.00	9.38	6.25	3.21
Poor seed/ input quality	4.55	0.00	0.00	0.00	6.25	0.00	1.60
Lack of finance	0.00	3.23	0.00	0.00	3.13	0.00	1.07
Skills difficult to practise	0.00	0.00	0.00	0.00	0.00	3.13	0.53
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Annex 2: Crop marketing constraints facing farmers in ALENU Project areas

	Constraints Ranked 1						
Crop marketing constraints	**Percentage of farmers by district**						
	Omoro	**Agago**	**Amuru**	**Nebbi**	**Pakwach**	**Zombo**	**Overall**
Low prices	95.24	51.61	80.00	52.63	62.50	75.00	64.67
Fluctuating prices	4.76	29.03	6.67	10.53	9.38	14.29	13.04
Lack of buyers	0.00	3.23	6.67	10.53	9.38	3.57	6.52
High transport costs	0.00	3.23	0.00	8.77	0.00	3.57	3.80
Lack of market information	0.00	3.23	0.00	7.02	0.00	3.57	3.26
Poor access roads	0.00	6.45	0.00	5.26	0.00	0.00	2.72
Lack of storage facilities	0.00	0.00	0.00	1.75	12.50	0.00	2.72
Poor storage facilities	0.00	3.23	0.00	3.51	0.00	0.00	1.63
None	0.00	0.00	6.67	0.00	3.13	0.00	1.09
Poor quality produce	0.00	0.00	0.00	0.00	3.13	0.00	0.54
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
	Constraints Ranked 2						
Crop marketing constraints	**Percentage of farmers by district**						
	Omoro	**Agago**	**Amuru**	**Nebbi**	**Pakwach**	**Zombo**	**Overall**
Lack of buyers	20.00	25.00	7.14	32.69	37.50	42.86	30.34
High transport costs	20.00	28.13	14.29	21.15	21.88	25.00	22.47
Fluctuating prices	25.00	12.50	64.29	9.62	15.63	14.29	17.98
Lack of market information	5.00	6.25	14.29	9.62	12.50	0.00	7.87
Poor access roads	5.00	15.63	0.00	9.62	3.13	3.57	7.30
Poor storage facilities	15.00	3.13	0.00	7.69	6.25	10.71	7.30
Lack of storage facilities	10.00	6.25	0.00	5.77	0.00	3.57	4.49
Poor quality produce	0.00	0.00	0.00	3.85	3.13	0.00	1.69
Low prices	0.00	3.13	0.00	0.00	0.00	0.00	0.56
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Annex 3: Access to crop extension services

		Percentage of farmers by district						
		Omoro	**Agago**	**Amuru**	**Nebbi**	**Pakwach**	**Zombo**	**Overall**
Have you received any training with regard to production of crops?	Yes	95.65	90.91	75.00	87.72	100.00	93.94	90.86
	No	4.35	9.09	25.00	12.28	0.00	6.06	9.14
Who provided the training?								
		Omoro	**Agago**	**Amuru**	**Nebbi**	**Pakwach**	**Zombo**	**Overall**
ALENU Project		95.45	100.00	100.00	92.00	78.13	93.55	92.22
NGO/CBO		0.00	0.00	0.00	4.00	18.75	3.23	5.00
District/Local Government		0.00	0.00	0.00	2.00	3.13	3.23	1.67
Private sector / business		4.55	0.00	0.00	2.00	0.00	0.00	1.11

Annex 4: Collective action, record-keeping and constraints among local chicken farmers

	Percentage of farmers				
	Received training in poultry	**Received ALENU training**	**Farmer keeps poultry mgt records**	**Farmer belongs to a savings group**	**Farmer belongs to a producer group**
District					
Omoro	80	80	10	80	90
Agago	85.71	85.71	0	85.71	100
Nebbi	100	100	25	87.5	100
Pakwach	87.5	87.5	12.5	75	75
Overall	**87.88**	**87.88**	**12.12**	**81.82**	**90.91**
Production constraints you are facing	**Freq.**	**Percent**	**Marketing constraints**	**Freq.**	**Percent**
Skills difficult to practise	2	12.5			
Lack of farm equipment	4	25	Low prices	5	17.86
Poor housing	4	25	Lack of buyers	10	35.71
Lack of labour	2	12.5	Fluctuating prices	8	28.57
Inputs very expensive	2	12.5	High transport costs	3	10.71
Diseases	2	12.5	Poor access to roads	1	3.57
Total	**16**	**100**	**Total**	**28**	**100**

Annex 5: Factors that influence consumer demand of a product

Traits	Percentage of consumers by traits desired in a product							
	Groundnuts	Beans	Soybean	Tomatoes	Onions	Irish potatoes	Moringa	Honey
Uniformity	57.14	12.82	4.35	0.00	6.25	10.00	0.00	0.00
Low Price	51.22	28.21	26.09.	41.67	53.13	56.67	71.43	70.00
Cleanliness	41.46	38.46	34.78	47.22	46.88	46.67	71.43	80.00
Taste	39.02	23.08	34.78	22.22	15.63	30.00	28.57	80.00
Nutritional values	39.02	30.77	34.78	52.78	53.13	46.67	71.43	60.00
Pest and disease-free	36.59	30.77	13.04	22.22	21.88	30.00	71.43	20.00
Bigger grain size	24.39	25.64	21.74	13.89	12.50	16.67	42.86	20.00
Colour	17.07	20.51	26.09	5.56	12.50	13.33	42.86	30.00
Ability to remain satisfied for longer period	7.32	10.26	13.04	5.56	9.38	13.33	57.14	60.00
Shorter cooking period	4.88	25.64	8.70	5.56	6.25	10.00	0.00	0.00
Smaller grain size	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annex 6: Source of products consumed by households

Source (where obtained)	Percentage of consumers by source of various products							
	Groundnuts	Beans	Soybean	Tomatoes	Onions	Irish potatoes	Moringa	Honey
Home harvest	70.73	61.54	30.43	27.78	34.38	20.00	42.86	30.00
Weekly markets	43.90	33.33	30.43	36.11	37.50	33.33	42.86	40.00
Main markets	29.27	28.21	17.39	38.89	37.50	46.67	14.29	10.00
Shops	24.39	28.21	43.48	13.89	18.75	20.00	57.14	50.00
Supermarkets	9.76	2.56	17.39	8.33	3.13	6.67	0.00	60.00
OPM (food aid)	2.44	0.00	4.35	0.00	0.00	0.00	0.00	0.00

Annex 7: Constraints faced by consumer in accessing and utilising the products

Constraints	Percentage of consumers by constraints							
	Groundnuts	Beans	Soybean	Tomatoes	Onions	Irish potatoes	Moringa	Honey
High prices	63.4	64.1	65.2	61.1	62.5	56.7	71.4	80.0
Scarcity of products	53.7	53.8	65.2	55.6	56.3	56.7	85.7	60.0
Poor quality products	24.4	23.1	39.1	30.6	21.9	30.0	42.9	50.0
Few sellers	12.2	10.3	13.0	11.1	9.4	10.0	42.9	20.0
Consumer ex-ploitation	7.3	7.7	4.3	8.3	9.4	10.0	14.3	20.0
Price fluctuations	22.0	23.1	13.0	22.2	28.1	23.3	14.3	20.0
Long distances	17.1	17.9	13.0	19.4	21.9	20.0	28.6	20.0
Climate change	12.2	12.8	13.0	11.1	9.4	10.0	28.6	10.0

Annex 8: Percentage of crop farmers who belong to a farmer group

District of farmer	Farmers who belong to a farmer group		
	Yes%	No%	Total
Omoro	100	0	100
Agago	90.91	9.09	100
Amuru	95	5	100
Nebbi	68.42	31.58	100
Packwach	93.75	6.25	100
Zombo	93.94	6.06	100
Total	**86.87**	**13.13**	**100**

Annex 9: Percentage of crop farmers who received training in crop production and marketing and the extension providers

District of farmer	Did farmer receive any training in crop production		
	Yes%	No%	Total
Omoro	95.65	4.35	100
Agago	90.91	9.09	100
Amuru	75	25	100
Nebbi	87.72	12.28	100
Packwach	100	0	100
Zombo	93.94	6.06	100
Total	**90.86**	**9.14**	**100**
Who provided training	**Frequency**	**Percent%**	**Cum.**
District/Local government staff	3	1.67	1.67
NGO/CBO	9	5	6.67
Private sector /business	2	1.11	7.78
ALENU Project	166	92.22	100
Total	**180**	**100**	

Kampala: Plot No. 4258, Sunday Close, Mulawa,
Kiira Municipality, Wakiso District
Gulu: Plot 29, Acholi Road, Pece Housing Estate
Ibanda: Main Street, Kagongo, Division, Ibanda Minicipality,
Arua: Room A112, KKT Center, Plot 16 - 22 Duka Road
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