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Value chain analysis and mapping for groundnuts in Uganda

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Abstract

Groundnut is grown on about 23.95 million ha worldwide with the total production of 36.45 million tons and an average yield of 1520 kg/ha in 2009 Developing countries in Asia, Africa and South America account for about 97% of world groundnut area and 95% of total production. It is one of the important legumes grown in Uganda, ranking second after beans. Its production is most common in Northern, Eastern and Southern parts of the country with higher volumes being produced in the Eastern part compared to the other two. The value chain for groundnuts in Uganda consist of many actors (individuals and institutions) including input suppliers and seed dealers, producers, market sellers, rural traders, urban traders, processors, exporters and consumers. The general objective of this study was to map the value chain for groundnuts, indicating the opportunities that value chain actors can benefit from and strategies that can be used to upgrade the chain. The specific objectives were to characterize the key actors along the groundnut value chain; determine the costs and value added along the groundnut value chain; determine the level of awareness of health problems associated with groundnuts; and determine the constraints and opportunities in the value chain and suggest ways to upgrade the chain. A cross sectional survey was conducted among the key actors in the value chain in 16 purposively selected districts in Uganda where groundnuts are predominantly produced marketed and/or consumed. The districts are Arua in North western Uganda, Lira in the North, Bugiri, Bukedea, Busia, Iganga, Jinja Kaberamaido, Mbale, Pallisa, Kumi and Tororo in Eastern Uganda; Soroti and Katakwi in the North east, Kampala and Wakiso in Central where a total of 145 wholesale traders, 209 retail traders wand 51 processors were randomly selected and interviewed. In addition, data collected by NARO from a total of 314 randomly selected groundnut farmers were used in this study.The data collected included socio-economic characteristics of the value chain actors, type and varieties of groundnuts handled, sales volumes and prices, trends in demand and supply, aflatoxins awareness and control, challenges, constraints and opportunities in groundnuts and trade policy related issues. Secondary information mainly on value chain aspects was drawn from past research reports and internet. The data were analyzed using descriptive statistics and parameters such as means and percentages were determined and used to interpret the results. These enabled the drawing of groundnut value chain maps illustrating interrelations among chain actors, activities they conduct, volumes handled, costs incurred and prices. Results show that more females (60%) did not attain formal education compared to 40% male farmers. Results further show that the female farmers were order compared to the male farmers. Few farmers were aware of improved technologies, for example only about 46% were aware of existence of improved groundnuts varieties, and only 38.5% used the improved seed. Very few farmers (10.2%) were using inorganic fertilizers, citing high price as the major hindrance. At wholesale level, the chain was dominated by male traders partly attributed to the very versatile nature of the business that requires intensive travels, and also being capital intensive afforded by few females. On the other hand, retail traders were dominated by females. Retailers do deal in small quantities and therefore use less capital compared to other categories of traders. The majority of the processors were males also attributed the capital intensive nature of the processing business. Most of the businesses were located in urban areas because of easier access to the raw materials and markets for the processed groundnuts. The farmers that were using local seeds had on average the same acreage (about 1.1 acres per season) as those using improved seed. However, yields of the improved seed farmers were about 58% higher than those of the local seed users. Farmers produced groundnuts mainly for home

consumption, selling the surplus in different markets at various prices. On average a farmer sold between 66.8 to 110 kg per season. Wholesalers, most of whom were located in urban centres, dealt more in shelled groundnuts. The majority operated as sole proprietors. April was reported as the month of peak availability of groundnuts followed by January, while November and December were months of low supply. During the peak periods, the major varieties that were traded were Rudu white and Serenut 3. Red beauty and Serenut 4 dominated during the lean periods. Similarly, the majority of the groundnut retailers were located in urban areas. This is where most of their customers were concentrated. Most retail businesses were sole proprietorship. They dealt in both unshelled and shelled groundnuts, but the majority (71.2%) were dealing in the shelled. Their most preferred variety was Red beauty because of its taste and readily available marketed. The processors were mainly involved in shelling groundnuts in cases where they bought unshelled, milling into flour, packaging and reselling. Some were involved in roasting and selling the nuts. The majority (96%) reported that they processed groundnuts throughout the year. However, there were months of peak supply and off-peak similar to what was reported by the wholesalers and retailers. Red beauty was the most dominant variety processed in terms of both the number of processors and the volumes processed during the peak periods. This was followed by Serenut 2.The main quality attributes considered by the groundnut value chain actors was grain size, cleanliness of the grains, moisture content and grain colour. The different actors performed different activities along the value chain, and hence incurred different costs. Activities done by the majority of the wholesalers and retailers were sorting, packaging, storing and sometimes shelling. Packaging in small quantities was practiced by many traders, reportedly to cater for differences in customer needs. Processors were involved in sorting, drying, milling and packaging. Some traders and processors were also involved in transporting groundnuts from supplier to their premises and/or further to different selling places. The main costs incurred were for paying brokers, personal travel costs, packaging materials, transport costs, shelling, loading and offloading, among others. Few value chain actors reportedly received different business support services. The service providers included government, non-government organisations and financial institutions. The services were mainly in form of seed (to farmers), loans and training. Local government was providing support to processors for checking and improving their weighing scales. Regarding health related aspects in groundnut value chain, the majority of the wholesalers (77.2%) were not aware of any health problem related to groundnuts. Very few wholesalers (about 15%) had heard about aflatoxins, and reported that it was caused by poor storage and resulted into colour change and rotting of the groundnuts. Similarly 82.8% of the retailers and 71% processors did not know any health problem related to groundnuts. Those who had heard about it got the information from friends, through workshops and seminars, radios and through experience. Change in smell, colour and texture are the ways through which they detect aflatoxins. The study found that there the groundnut value chain had a number of opportunities that could be exploited by the actors. Some of the opportunities reported by wholesalers included: groundnut trade is a profitable venture; demand for groundnuts is high and the market is readily available; supply of the crop is relatively stable; ability to process the groundnuts into a number of products makes it an attractive venture to many traders; groundnuts are not highly perishable; and the business is not labour intensive and there are low risks involved. However, there were reported challenges and constraints in the groundnut value chain. These included poor quality of the produce; price fluctuations; supply fluctuations; high cost of transport; and limited capital that limits volumes handled. Attention needs to be put on these opportunities and constraints in order to improve the efficiency of

the Uganda groundnut value chain. The study therefore recommends that the capacity of value chain actors should be built so that the constraints are turned into opportunities. For instance, they should be sensitized on the advantages of adding value to groundnuts. They should also be provided with simple but efficient equipment such as the mobile sheller at affordable cost. Research activities in developing disease and pest resistant varieties, high yielding varieties and high quality products should be supported. The government and other organizations involved in infrastructure development need to do more in developing the production and market infrastructure. The value chain actors should be sensitized on quality aspects including aflatoxins and the associated causes, effects and prevention/control.

Keywords: Groundnut, Value Chain, Uganda

JEL classification: Q130

Contents

1 Introduction

1.1 State of Agriculture in Uganda

Agriculture remains the main driver to economic development for many countries. For the developed economies, the sector gave way to the rise of the industrial and service sector, while for most developing countries it still contributes substantively to GDP (Todaro, 2008). Its contribution to GDP accounts for about in 30% Sub-Saharan Africa and 23.7% particularly for Uganda (World Bank, 2011). It is the biggest employer, both formally and informally, accounting for about 73% in Uganda. Agriculture has always acted as a fall back in times of financial crises given its portion (47%) of the total value of Uganda's exports (NDP, 2010). According to the 2008 World Development Report (Weber, 2008), for developing countries, GDP growth originating from agriculture is about 4 times more effective in raising incomes of extremely poor people than GDP growth originating outside the sector.

1.2 Introduction to the study of value chains

Understanding the performance of the agricultural enterprises through the value chain frame work has been identified as key in improving the agriculture sector (Weber, 2008). In value chains of commodities, the full range of activities which are required to bring a product or service from conception, through the different phases of production to the final consumer, and final disposal after use are studied (Kaplisky, 2001). Value chain analysis helps in understanding business- business relationships which connect the chain, mechanisms for increasing efficiency and ways to enable the business to increase productivity and add value. The value chain of a commodity does not only illustrate the vertical linkages but the horizontal linkages as well and are usually more links in the chain than often illustrated (Kaplisky, 2001). Most often, intermediary players in the chain may feed into a number of different value chains.

Many studies on value chains of important crops have been done but often, the approaches are too simplistic, and leave a lot of gaps in the analysis (Webber, 2009). Most value chain studies focus excessively on cost efficiency or the breakdown of cost components. Some studies end at describing the chain without adding any value or giving any suggestions for the opportunities to upgrade the chain to benefit all participants in the chain. The environment in which the value chain operates is usually not given the required attention. In limited instances, analysis focuses on improvements within the given value chain, but does not go in detail to explain how the value chains can be shifted to target different, more attractive markets and business strategies. Most value chain analysis is not designed to help businesses and partners weigh choices about delivering product quality, information and service. Analysis of the value chains usually neglects the aspects of benchmarking which limits the analysis on the critical areas for improvement. Because of the named gaps in the analysis, studies in value chains fails to identify potential interventions for improved business and value chain performance and do not tackle key aspects for government, non-governmental and international intervention (SNV,2004).

A comprehensive mapping of the Groundnuts value chain is reviewed in this work. This review gives a deep analysis of the players before the mapping is finally done. The

investigator was guided by a set of key questions of the generally accepTable key areas that value chain analysis should address. The investigator also identified gaps within the analysis of value chains and from the studies carried out; key areas of intervention are suggested. The approach use to contribute to the players to become more competitive and to generate greater value added.

1.3 Groundnut importance and production trends

Groundnut (Arachis hypogaea L.) is from the Papilionaceae family. Groundnut is grown on about 23.95 million ha worldwide with the total production of 36.45 million tons and an average yield of 1520 kg/ha in 2009 (FAOSTAT, 2011). China, India, Nigeria, USA and Myanmar are the major groundnut producers globally. Developing countries in Asia, Africa and South America account for about 97% of world groundnut area and 95% of total production. Production is concentrated in Asia (50% of global area and 64% of global production) and Africa (46% of global area and 28% of global production), where the crop is grown mostly by smallholder farmers under rainfed conditions with limited purchased inputs. Between 2000 and 2009, the annual global production increased marginally by 0.4%, the area by 0.3% and yield by 0.1% (ICRISAT. Yield has not increased that much yet the population is growing fast.

Globally, the foreign earnings from groundnuts according to Okello et al., (2010) are still low since less than 6% of global production is traded internationally. This implies that the biggest percentage of what is produced is sold and consumed domestically, and consumption varies from country to country. About 48% of the world output is for food uses and 52% is crushed, producing groundnut oil and cake (USAID, 2008).

In Africa, unlike in the 1980s, groundnut production showed a good recovery during 2000-2009. Yields increased from 600-800 kg/ha in the 1980s to 900-1050 kg/ha during 2000-2009 (Figure 3). Yields from Africa greatly fluctuate but they have never exceeded 8% of the global exports during the last 10 years (USAID, 2008). This has been attributed to a number of factors and they include; unreliable rains, lack of irrigation, small-scale traditional farming with low mechanization levels, pests and diseases, use of low yielding varieties, political instability and the frequently unsupportive oilseed policies whose effect has been significant (USAID, 2008). DRC, Ghana, Chad, Senegal and Nigeria are the major groundnut producers among the African countries.

Groundnut is one of the important legumes grown in Uganda. It comes in the second position after beans (Apalia et al., 2006; Masette and Candia, 2007). Groundnuts production serves two major purposes; household food and nutrition security and income generation. As food for households, groundnuts form part of the main components of the diet of most Ugandans. Groundnuts are an important source of protein and a raw material for edible oil. They are also used in making confectionaries. The per capita consumption of groundnuts by children and women on a daily basis is 37 and 65 g respectively (Byemaro, 2010). Their leaves are valuable to the farmer as they provide fodder rich in proteins.

Groundnut production is most common in Northern, Eastern and Southern parts of the country with higher volumes being produced in the Eastern part compared to the other two

regions (Okello et al., 2010). Mohamoud et al., (1991) adds that the groundnut production is now part of the Northern and Eastern Uganda people's culture. Production is usually done in pure stands under subsistence farming with popular traditional varieties of red Valencia type which is of a very mixed nature consisting of large seeded 'manyema group' e.g. Roxo and small seeded group e.g. Red Beauty (Okello et al., 2010). Production has been greatly affected by rosette disease which attacks the crop in the field (Okello et al, 2010). Other diseases include early leaf spot and late leaf spot. Pests such as aphids also attack groundnuts in the field. This has partly contributed to the decline in groundnut production over the last two decades according to (Masette and Cadia, 2007). To reverse this declining trend, new and improved varieties are being introduced to increase the cash value of groundnuts (Sikuku and Ogema, 2005).

Groundnuts have a range of products and uses. Roasted groundnuts make good accompaniment to coffee and tea and eaten along even without any beverage. Nearly everywhere in Uganda mainly in urban centres particularly along the streets, there are people vending roasted groundnuts measured out in small quantities sold at prices ranging from Shs 200 to 500 (exchange rate is 1 US Dollar for Shs 2,500) depending on the size of the pack. Shopkeepers grind the groundnuts into powder or into a paste which they sell to customers in measured amounts. Many parents want to provide their boarding school going children with roasted groundnuts and the demand for them increases as school holidays come to an end. Groundnut paste makes quick and tasty sauce normally eaten with cooked bananas, potatoes, yams, cassava, millet, rice, ugali and other foodstuffs. It takes relatively a short time to prepare groundnut sauce and it does not require a lot of fuel. This makes it one of the most handy sauces especially for people in towns who return from work and want to have a quick meal.

In Uganda groundnut production has slowly improved to the level of becoming a cash crop in the Northern and Eastern parts of the country (USAID, 2008; Okello et al., 2010). This trend was, however, disrupted by the civil war as most families lost access to their land. In these parts, almost all households are involved in its cultivation (Okello et al., 2010). From Table 1, the groundnut output has been slightly steady with noticeable decreases in 2003 and 2006 yet the total acreage planted had increased. It is reported in USAID (2008) that Uganda is currently a net importer of groundnuts. In 2004, $10,000 was spent on 74MT of shelled groundnuts.

Table 1: Groundnut production (in shell) and acreage in Uganda, 2002-2010

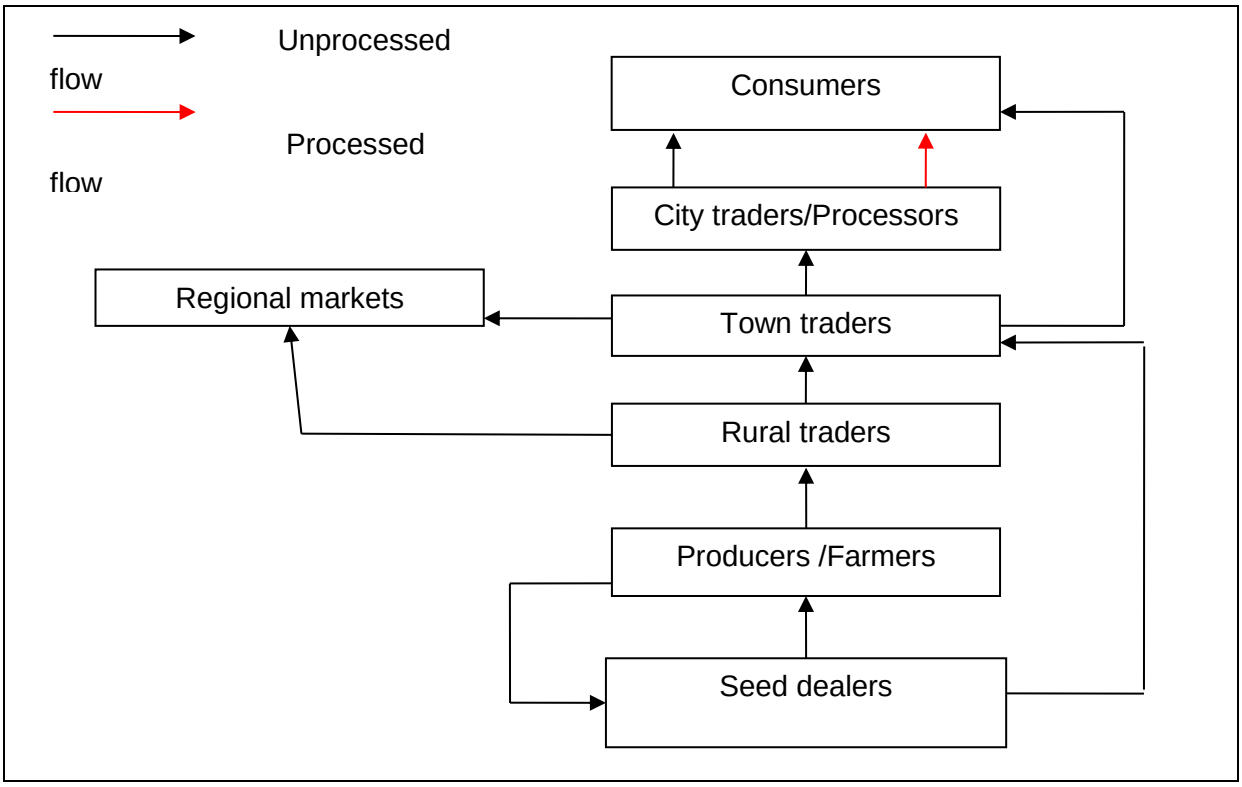
	2002	2003	2004	2005	2006	2007	2008	2009	2010
Production (mil. tons)	148	130	155	159	154	-	237	258	276
Acreage ('000 ha)	211	216	221	225	230	-	345	369	394
Productivity (kg/ha)	702	601	701	706	669	-	687	699	700

Source: USAID (2008); FAOSTAT (2011)

1.4 Studies on groundnut value chain

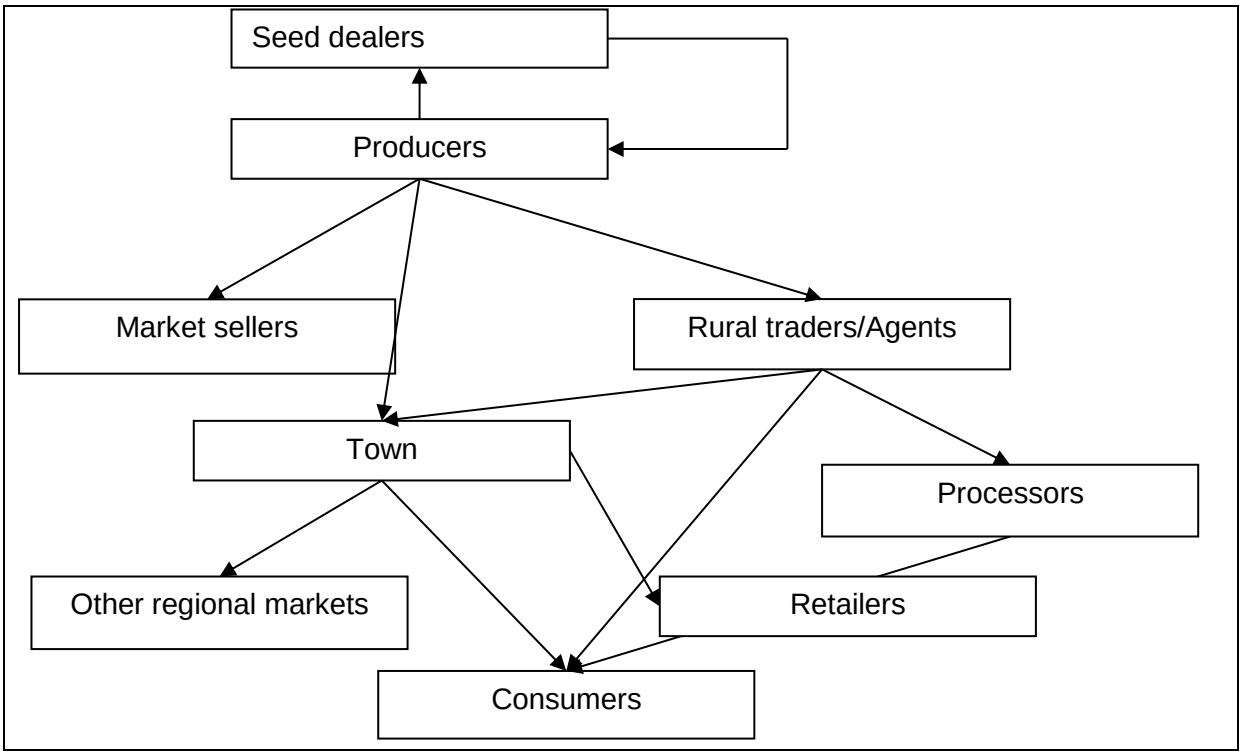
Many empirical studies have been conducted on different aspects and nodes of the groundnut value chain. Some have focused on production, such as Okello et al., (2010), others on marketing (see Byemaro (2010), processing and utilization (SNV, 2008) while others have looked at the entire value chain (such as USAID, 2008; Meyer, 2007; SNV, 2009; SNV, 2011, Mwesige, 2009, Olowe et al., 2009). The different studies have different schematic presentation of groundnut value chain, for example Figure 1(USAID, 2008) and Figure 2 (Sikuku and Ogemah, 2005). However, the presentations are more of market chains than value chain maps.

Figure 1: Value chain map for groundnuts in Uganda



Source: (USAID, 2008).

Figure 2: Groundnut market value chain



Source: Adopted from FIT (2007); Sikuku and Ogemah (2005)

The chains consist of many actors (individuals and institutions) including input suppliers and seed dealers, producers, market sellers, rural traders, urban traders, processors, exporters and consumers. The groundnut form handled is both processed (indicated by the red arrow) and unprocessed form. The studies have documented the roles of the various chain actors as summarized below.

a) Seed dealers: These are categorised as a special category among the players in the groundnuts value chain because they only handle seed (Sikuku and Ogemah, 2005). This group comprises of seed companies and individuals who buy groundnuts from farmers and sell it as seed. Although the individual buyers are supposed to buy seed from farmers whose farms were monitored during the growth period, they buy all pure seed as long as they are satisfied with the quality (Sikuku and Ogemah, 2005). Also involved in providing seed to farmers are NGOs and projects operating in these areas for example AT Uganda, CARITAS and DANIDA among others.

b) Research and extension: In Uganda groundnut research started at Serere in the 1930s first with the collection of landraces and introductions which were later followed by agronomic studies (Okello, et al., 2010). Today, most research in groundnuts is conducted at the National Semi-Arid Research Resources Institute (NaSARRI) at Serere. Varieties that have “high yielding potential, high quality, resistance to major pests and diseases, short to medium term maturity periods and tolerance to drought, together with improved production packages are developed and supplied to clients (Busolo-Bulafu, 2004).

   The extension services are mainly provided by the national body; National Agricultural Advisory Services (NAADS). This is well established and operates using the decentralization structures up to the sub-county level from the ministry of

agriculture (MAAIF). With NAADS phase two that is more focused and result oriented with a twist to moving from the model farmer approach to including farmer group approach is believed to portray significant change (DSIP, 2010). The extension workers acquire different technologies developed by researchers and disseminate them to farmers in addition to advisory services or trainings. Also a number of local and international NGOs provide extension services to farmers.

c) Producers: Small scale farmers are the majority in groundnut value chain. On average, they plant one to two acres of land each (USAID, 2008). Although grown for subsistence needs, farmers are able to produce surplus when seasons are good, which they sell to rural traders in either unshelled or shelled form. The major varieties grown include Red Beauty, Serenut and other traditional Valencia type varieties. Red Beauty, as the name suggests, is a Red Valencia type groundnut, which has a bright attractive colour. However, the major challenge with this variety is the high susceptibility to rosette virus disease. As such, Serenut varieties 1, 2, 3, and 4 have been developed but have low demands due the unattractive colour and taste hence they fetch a lower price (USAID, 2008). According to Sikuku and Ogemah (2005), farmers have large quantities at the peak of harvest and small to nil towards the end of the harvest. They sell the produce to rural market traders, town traders and consumers. Farmers are in most cases influenced to sell their produce because of their pressing needs. The majority report cash needs that require immediate attention as the main reason (Sikuku and Ogemah, 2005).

d) Market sellers: These operate at the rural market level. They comprise of mainly farmers themselves who take their harvests to the market for sale. A small portion of market sellers are not groundnut producers but concentrate on buying produce from farmers and selling to local consumers in the rural markets (FIT, 2007). Market sellers operate all year round unlike farmers who are in business only two times a year. The groundnut product is either in shelled form or unshelled form to retailers who do the shelling themselves. The volume handled ranges 1 to 2 bags per day (FIT, 2007). They do not have stores and sell their produce in the open-air markets. They have a very limited source of market information especially for situations in distant markets. Their adjustment of prices depends on the local demand, number of competitors and the amounts being delivered to them by the farmers.

e) Agents: The agents (rural traders and town traders) serve as a link between farmers and buyers. Most times these agents are farmers or members of the farming community. They normally guide buyers who are not familiar with the location of different farmers. Transport of produce and market information delivery are the major services they provide in the value chain. They sometimes buy farmers' produce and store it in town centres for buyers (urban wholesalers) from the urban centres to access it easily. They are not necessarily brokers because they work under the directives of urban wholesaler buyers and producers. In most cases, urban sellers advance them with the money to purchase produce from famers. (Sikuku and Ogemah; 2005; FIT, 2007).

f) Rural traders: These are found at village or farming community level. They do not specialise in trade of one crop, but they are also involved in other activities including farming. During the typical groundnut season (peak production season), they buy groundnuts and other crops such as maize directly from farmers and sell to town traders. When the season has run out, they buy groundnuts from neighbouring

areas/districts and sell to farmers for seed and/or food. They can also buy from market sellers and normally own stores which where they aggregate stock. They sometimes sell to regional markets such as Southern Sudan and Kenya (FIT, 2004; USAID, 2008; Sikuku and Ogemah, 2005).

g) Urban/town traders: Town traders are those produce traders operating in town councils or municipalities (USAID, 2008). They deal in general produce including groundnut and are involved in either wholesale or retail business. Their major suppliers of groundnut are rural traders. Sometimes they buy directly from farmers and provide them with transport services. Marketing margins obtained by town traders are invariant of the type of groundnut handled. The red type is usually more expensive than the white one but with a close gross margin of approximately 200 Uganda shillings (UGX) per Kilogram.

h) City traders: These traders are generally produce traders operating in Kampala city (USAID, 2008). They obtain groundnut supplies from various places such as Lira, Gulu, Soroti, Masaka and Hoima. The different groundnuts products sold are the unprocessed nuts, groundnut flour and groundnut butter or paste.

i) Processors: There are no large scale processors of groundnuts. Processing is done by the town traders and wholesalers as a means of adding value before selling. According to Tino et al., (2004), less than 10% of the producers add value inform of shelling, powder or paste. Products such as pastes and flour are produced using both manual and motorised grinders. This form of value addition is normally a priority for customers in towns and the city centres rather than those in villages. This is because they are expensive and can only be afforded by town and city dwellers (Sikuku and Ogemah, 2005). Such products are not a priority for villagers since they can produce their own.

j) Retailers: Retailers normally purchase their produce from wholesalers. They sell properly sorted groundnuts to consumers. They handle relatively smaller volumes of groundnuts and usually weigh the produce and package it into packs of ½ kg -5kg. They are known to have the highest prices in the whole chain among unprocessed products. Retailers have limited or no market information apart from the prevailing prices at their own respective markets (FIT, 2004).

k) Consumers: These normally buy already sorted and cleaned groundnuts from retailers (mostly those located in urban centres). Depending on their needs, consumers buy either unprocessed or processed products and have a wide range of retailers they can buy from. St. Balikudembe market is reportedly the largest groundnut market in Kampala receiving 20,000 MT every month with about 50 traders (USAID, 2008) Other markets, for example, Nakawa and Kalerwe receive about 10,000MT (USAID, 2008).

As regards governance of the chain, USAID (2008) reported lack of trust between the buyers and the producers. This is because farmers believe that buyers cheat them by offering low prices and also they use scales that are adjusted to weigh less weight than the actual weight of the commodities. On the other hand, buyers are also unsatisfied with the quality of the produce from farmers which is always contaminated with stones, debris etc. to increase the weight. It is believed that there is truth in from both sides' accusations.

1.5 Objectives of the study

The general objective of this study was to map the value chain for groundnuts, indicating the opportunities that value chain actors can benefit from and strategies that can be used to upgrade the chain. The specific objectives were:

i. To characterize the key actors along the groundnut value chain

ii. To determine the costs and value added along the groundnut value chain

iii. To determine the level of awareness of health problems associated with groundnuts

iv. To determine the constraints and opportunities in the value chain and suggest ways to upgrade the chain.

1.6 Structure of the report

In the first chapter introduction has been made, and the objectives have also been given. In Chapter 2, the methodology is given where the study design, study areas, sampling and sample size, data collection and analysis are provided. In Chapter 3, empirical findings and discussions are given. In this chapter, socio-demographic characteristics, purchases and sales (including volumes and prices), quality attributes and activities carried out and related costs are presented. Further, marketing, constraints and opportunities and possible interventions and legal aspects of the business are also highlighted. The SWOT analysis for the groundnut value chain, institutional support and coordination along the groundnut value chain and the groundnut value chain mapping are provided in detail. The last chapter (Chapter 4) presents conclusions and policy implications.

2 Methodology

2.1 Study design

This study was based on an in-depth cross sectional survey that was supplemented by review of existing literature. The approaches therefore involved: primary data collection, review of literature and analyses of primary data and secondary data.

2.2 Study areas, sampling procedures and sample size

The study was conducted in 16 purposively selected districts in Uganda where groundnut production and trade are predominant. The districts are Arua in North western Uganda, Lira in the North, Bugiri, Bukedea, Busia, Iganga, Jinja, Kaberamaido, Mbale, Pallisa, Kumi and Tororo in Eastern Uganda; Soroti and Katakwi in the North east, Kampala and Wakiso in Central where a total of 145 wholesalers, 209 retail traders and 51 processors were drawn from various districts. In addition, data collected by the National Agriculture Research Organisation (NARO) from 314 randomly selected groundnut farmers were used in this study. These farmers had been drawn from five districts (Table 2.1) distributed in eight sub-counties namely, Abongomola, Atiak, Awac, Ibuje, Lakwana, Ngai, Otwal and Pabo. Gulu district contributed the biggest portion of the farmer.

Table 2: Districts from which groundnut farmers were drawn

	Sub-county								
District	Abongomola	Atiak	Awac	Ibuje	Lakwana	Ngai	Otwal	Pabo	Total
Amuria		7							7
Amuru		39						30	69
Apac	35			45					80
Gulu			46		45				91
Oyam						34	33		67
Total	35	46	46	45	45	34	33	30	314

The districts from which the groundnut wholesalers were drawn are shown in Table 3, while Table 4 and Table 5 show districts from which retail traders and processors were drawn. Most of the male retail traders were drawn from Kampala, Tororo and Busia. Bukedea, Soroti and Kampala are the districts from which most female traders were got. Kampala, Bukedea and Busia contributed the largest number of all retail traders.

Table 3: Districts from which the wholesalers were drawn

District	Male	Female	Total
Arua	8	1	9
Bugiri	1	1	2
Bukedea	2	6	8
Busia	8	8	16
Iganga	8	4	12
Jinja	8	3	11
Kaberamaido	2	3	5
Kampala	2	0	2
Kampala	17	16	33
Katakwi	0	4	4
Kumi	1	0	1
Kumi	3	2	5
Lira	5	5	10
Maracha	1	0	1
Mbale	2	3	5
Soroti	5	6	11
Tororo	3	4	7
Wakiso	1	2	3
Total	76	69	145

Table 4: Districts from which the retail traders were drawn by sex

	Retail Trader's sex		
District	**Male**	**Female**	**Total**
Arua	1	0	1
Bugiri	3	4	7
Bukedea	1	26	27
Busia	7	19	26
Iganga	0	5	5
Jinja	3	6	9
Kaberamaido	4	10	14
Kampala	13	20	33
Katakwi	3	14	17
Kumi	3	4	7
Lira	3	6	9
Mbale	3	7	10
Pallisa	1	0	1
Soroti	1	23	24
Tororo	10	7	17
Wakiso	1	1	2
Total	57	152	209

Table 5: Processors that were interviewed by district

District	Male	Female	Total
Arua	2	0	2
Bugiri	1	0	1
Busia	4	0	4
Iganga	7	6	13
Jinja	1	1	2
Kampala	13	4	17
Lira	0	1	1
Tororo	5	6	11
Total	33	18	51

2.3 Types and sources of data collected

This study was based largely on primary data supplemented by some secondary data. The data included socio-economic characteristics of the value chain actors, type and varieties of groundnuts handled, information about sales volumes and prices, transaction costs, trends in demand and supply, membership to trader associations/farmer groups, market information and usefulness of market information, aflatoxins awareness and control, challenges in groundnuts trade, constraints and opportunities, policy related issues. Secondary information mainly on value chain aspects was drawn from past research reports and internet searches. The data were collected in face to face interviews with the respondents (farmers, wholesalers, retailers and processors).

2.4 Data analysis and presentation

The data were processed with EXCEL (Windows 2010) and SPSS (Version PASW 18) computer software. The data were analysed using descriptive statistics and parameters such as means and percentages were determined and used to interpret the results. Most of the results are summarised in tables and some figures. These enabled the drawing of groundnut value chain maps illustrating interrelations among chain actors, activities they conduct, volumes handled, costs incurred and prices.

3 Findings and discussions

3.1 Socio-demographic characteristics of value chain actors

The groundnut value chain actors identified and interviewed in the study are farmers, wholesale and retail traders, and processors. Input dealers and consumers were not interviewed.

3.1.1 Socio-demographic characteristics of farmers

The selected farmers that were interviewed were dominated by men (86.3%). Results show that more females (60%) did not attain formal education compared to 40% male farmers (Table 6). A similar trend is seen for primary level education (female farmers constitute about 11%) compared to 89% of the males. With secondary level education, very few (4.4%) female farmers had attained it compared to male (95.6%). No female farmer had attained tertiary level education. Results further show that the female farmers were order compared to the male farmers.

Table 6: **Education level of groundnut farmers in the study areas**

Formal education level	Female	Male	Total
None	21	14	35
Primary	17	141	158
Secondary	4	86	90
Tertiary	0	23	23
Total	43	271	314

Few farmers were aware of improved technologies. About 46% of the farmers were aware of existence of improved groundnuts varieties, and only 38.5% used the improved seed. Improved seed is always highly priced which deters farmers from using it, although the yields from such seeds make the technology cost-effective (Kiiza *et al.,* 2011). Many farmers therefore look up to the Government and development partner institutions to access the seed. These results call for more promotion and awareness creation by National Agricultural Research Organisation (NARO), national Agricultural Advisory Services (NAADS) and seed companies. Few farmers used organic fertilizer. This was largely due to lack of technical knowledge about the fertilizers. Many farmers also did not have adequate sources of the raw materials needed for making the organic fertilizers. Very few farmers (10.2%) were using inorganic fertilizers (Table 7). This is in agreement to earlier findings by Mugisha *et al.* (2011). This compromises yields given that soil nutrient mining continues to be a big challenge to production. Harvesting removes nutrients that need to be replenished regularly which is not the case. Many a farmer cite high price as the major hindrance to inorganic fertilizer use.

Table 7: Farmers' responses on the use of fertilizers

Technology awareness	Frequency (n=314)	Percentage
Awareness of improved groundnuts varieties	143	45.5
Use of improved groundnut seed	121	38.5
Use of organic fertilizer	61	19.4
Use of inorganic fertilizer	32	10.2

The few farmers who use improved seed get it from farmer group, fellow farmers, local markets, NGOs and research organisations. Those who use inorganic fertilizers get it from or through farmer groups, NGOs (such as World Vision) and private sector companies such as Mukwano Group of companies. Some of these organisations offer the inputs as credit. These same organisations/firms also help farmers to access fertilizers. With regard to marketing, only 25.8% were marketing their produce through groups. Past empirical results show that marketing individually from the farm leads to getting a lower price compared to bulking and marketing as a group.

3.1.2 Socio-demographic characteristics of groundnut wholesale traders

Results show that there were more male traders in the wholesale trade than the female (Table 8). This can be partly attributed to the pre-requisites for this level of trading. Wholesale trade is very versatile and calls for intensive travel. Further, more capital is required for wholesale trade. Past results show that male traders are more likely to be better off due to education levels and cultural settings. These make it easier for them to have more capital or even access credit. The education level of wholesalers was about 9 years and with their businesses as old as about 9 years on average. Female traders had slightly less (though not significantly different) education (8.5 years). Experience in groundnut trading was also 9 years, an indication that wholesalers were relatively well grounded in the business.

Table 8: Distribution of wholesale traders by sex, education and business experience

Variable	Frequency	Percent
Male	76	52.4
Female	69	47.6
Total	145	100
Education level (years in school)	111	8.8
number of years the business has existed	145	9.2
Years the trader has been trading in groundnuts	145	8.9

3.1.3 Socio-demographic characteristics of groundnut retail traders

The interviewed retail traders were dominated by females (Table 9). Retailers do deal in small quantities and therefore use less capital compared to other categories of traders. Females are more likely to access the kind of money needed for retail trade. With regard to education the male had more years of education (8.6) compared to female (5.8).

Table 9: Sex of interviewed retail traders

Sex	Frequency	Percent
Male	57	27.3
Female	152	72.7
Total	209	100

3.1.4 Socio-demographic characteristics of groundnut processors

The majority of the processors were males. This is attributed the capital intensive nature of the processing business (Table 10). Men are likely to have more money and also to access credit compared to women. Most of the businesses were located in urban areas. This is because of easier access to the raw materials and markets for the processed groundnuts.

Table 10: Distribution of processors by sex, education and business experience

Sex	Frequency	Percent
Male	33	64.7
Female	18	35.3
Total	51	100
Business location	Frequency	Percent
Roadside	1	2.0
Town	34	66.6
City	16	31.4
Total	51	100
Type of Business	Frequency	Percent
Sole Proprietor	44	86.3
Partnership	6	11.8
Private Company	1	2.0
Total	51	100

Although male processors had slightly higher level of education compared to the female ones (Table 11), the latter had spent more years (about 9 compared to 6) processing groundnuts.

Table 11: Level of education and experience in processing groundnuts

Level of formal education in years	n	Mean
Male	33	10.6
Female	18	9.9
Total	51	10.4
Number of years spent processing groundnuts	n	Mean
Male	33	5.8
Female	18	8.9
Total	51	6.9

3.2 Purchases and sales of groundnuts by the chain actors

The different value chain actors handled different volumes of groundnuts. These were priced differently depending on the position of the actor along the chain. Prices also varied according to the variety and the level of processing.

a. Farmers

The farmers that were using local seeds had on average the same acreage as those using improved seed. The area was 1.1 acres per season (Table 12). Results show that yields of the improved seed farmers were about 58% higher than those of the local seed users. Farmers produced groundnuts mainly for home consumption. The surplus was sold in different markets at various prices. On average a farmer sold between 66.8 to 110 kg per season. The structured market prices were higher by about 21%. The income from groundnuts was higher for those who grew improved seed.

Table 12: Production parameters for selected groundnut farmers

Variable	n	Mean
Area under local groundnuts varieties (Acres)	228	1.1
Area under improved varieties (Acres)	91	1.1
Yield of local groundnut seeds(kg/acre)	228	191.5
Yield of improved groundnut seeds (kg/acre)	91	303.0
Production for local seeds (kg)	314	202.7
Production for improved seeds (kg)	91	333.3
Home use (% of total production)	314	67.0%
Amount sold (% of total production)	314	33.0%
Local price (Shs/kg)	314	1,656.1
Structured markets price (Shs/kg)	314	2,014.0
Total income from local seeds groundnuts (Shs) (Using the local market price)	314	335,691.5
Total income from local seeds groundnuts (Shs) (Using structure market price)	314	408,310.5
Total income from improved seed groundnuts (Shs) (Using the local market price)	91	551,978.1
Total income from improved seed groundnuts (Shs) (Using structure market price)	91	671,266.2

b. Wholesale traders

Wholesalers dealt more in shelled groundnuts (Table 13). With regard to business location, the majority of wholesalers were located in urban setting. This is because of easier access to supplies and also presence of a number of customers (consumers and other traders) with capacity to purchase. The majority operated as sole proprietors.

Table 13: Type of groundnuts handled and business location for wholesale traders

Type of groundnuts	n	Mean (%)
Unshelled	58	40.0
Shelled	87	60.0
Location of business	Frequency	Percent
Road side	9	6.2
Town	109	75.2
City	21	14.5
Mobile	6	4.1
Total	145	100
Nature of business entity	Frequency	Percent
Sole proprietor	119	82.1
Partnership	26	17.9
Total	145	100

The majority (83.4%) of wholesalers trade in groundnuts throughout the year although the crop is produced twice a year. This was possible because the nuts can be stored for a long time (across seasons) and the demand is also all year round. When the crop is out of season the traders shift their business to other crops.

Months of peak availability of groundnuts

April was reported as the month of peak availability of groundnuts, followed by January, August and February. These are periods when the harvested groundnuts are available for sale. November and December are months when the second season crop is in the field and therefore low supply in the market.

During the peak periods, the major varieties that were traded were *Rudu white* and *Serenut 3* mainly traded as unshelled, while *Kabonge white* was the least traded. For the shelled type, *Serenut 2* was the dominant variety, followed by *Rudu red* and *Red beauty*. *Tanzania* and *Igola* were the least traded shelled groundnuts. Table 14 shows the months of peak groundnut availability and Table 15 presents the average quantities traded on a monthly basis.

Table 14: Percentage of wholesalers reporting months of peak availability of groundnuts

Month	Frequency (multiple responses; n=656)	Percent
January	77	11.8
February	66	10.0
March	57	8.6
April	83	12.7
May	46	7.0
June	43	6.5
July	44	6.7
August	69	10.5
September	59	8.9
October	46	7.1
November	34	5.2
December	34	5.1

Table 15: Monthly average quantity of groundnuts traded by wholesalers during the peak periods by variety

Variety	Monthly average quantity (kg)	
	Unshelled	Shelled
Etesot		750
Igola	3,250	800
Kabonge red		2,311
Red beauty	5,872	15,156
Rudu red		15,329
Serenut2	4,800	16,708
Serenut4	7,486	3,561
Tanzania		240
Kabonge white	2,000	4,025
Rudu white	15,000	1,667
Serenut 3	13,833	5,913
Ergoromoit		2,100

Off-peak availability of groundnuts

The interviewed wholesalers reported September, October and November as the off-peak months for groundnuts (Table 16). This is actually the second season planting season. During this period, most of the produce that was harvested in the first season would have been sold off or reserved by farmers for their home consumption, hence limited volumes for sale.

Table 16: Percentage of wholesalers reporting off-peak months for groundnuts

Month	Frequency (multiple responses; n=507)	Percentage
January	44	8.7
February	48	9.5
March	49	9.7
April	31	6.1
May	27	5.3
June	23	4.5
July	33	6.5
August	36	7.1
September	73	14.4
October	61	12.0
November	50	9.9
December	32	6.3

During the off-peak period, the volumes are almost one third of what the peak season offers. *Red beauty* and *Serenut 4* were the most highly traded, while *Kabonge* white was the least traded. With regard to the shelled type, the dominant ones during the off-peak were *Serenut 2*, *Red beauty* and *Tanzania*. The least traded were *Etesot* and *Igola*, both local varieties. Table 17 shows the average quantities traded on a monthly basis.

Table 17: Monthly average quantity of groundnuts traded by wholesalers during the peak periods by variety

	Monthly average quantity (kg)	
Variety	Unshelled	Shelled
Ergoromoit		675
Etesot		310
Igola	1,360	433
Kabonge red		783
Kabonge white	900	1,821
Red beauty	3,001	5,454
Rudu red		1,530
Serenut 3	953	1,738
Serenut2	2,058	6,307
Serenut4	3,299	868
Tanzania		4,480

Groundnuts varieties preferred by wholesalers

Wholesalers were asked the varieties that were most preferred in the market. Results (Table 18) show that *Red beauty* was the most preferred and most popular variety of groundnuts among the wholesalers. In order of preference, *Red beauty* was followed by *Serenut 2*, *Kaboge white* and *Serenet 4*. The *Serenut* varieties are a result of NARO research efforts

and are getting popular among the producers and traders. *Igola* and *Rudu red* were reportedly the least preferred.

Table 18: Wholesalers' responses on the preferred groundnut varieties

Variety	Frequency (n=117)	Percent
Red beauty	93	79.5
Serenut 2	15	12.8
Kabonge white	2	1.7
Serenut 4	3	2.6
Serenut 3	1	0.9
Etesot	1	0.9
Igola	1	0.9
Rudu red	1	0.9

The reasons reported for the preference of some varieties included taste and ready market (Table 19). Other attributes given were ability to make good and thick sauce and cooking fast. Being drought resistant, cheaper and having attractive colours were also given. Such attributes are critical for the breeding programs to ensure that varieties that are accepTable by the consumers are promoted.

Table 19: Reasons given by wholesalers for preference of a variety

Reason (multiple responses	Frequency (n=118)	Percent
Has a better taste	68	57.6
Readily marketable	13	11.0
High oil content	7	5.9
Makes thick sauce	6	5.1
Softer and cooks faster	5	4.2
Drought resistant	4	3.4
It is cheaper	4	3.4
Attractive colour	3	2.5
Can be processed into a number of products	3	2.5
High yielding	3	2.5
The only variety available	2	1.7

Suppliers of groundnuts to wholesalers

Wholesalers buy groundnuts from a number of sources. Results show that they mostly sourced the groundnuts from small scale farmers and small scale traders (Table 20). Brokers/agents were the least source. However, the proportions that were procured from large scale traders were highest followed by brokers and agents, and then small scale farmers.

Table 20: Source of groundnuts for the wholesalers

Supplier	Frequency	Percent	Proportion procured
Small scale farmers	63	43.4	61.7
Large scale farmers	24	16.6	44.8
Small scale traders	46	31.7	58.2
Large scale traders	24	16.6	78.0
Brokers and agents	14	9.7	68.3
Processors	0	0	0.0

Most of the wholesalers (58.6%) reported that their suppliers did not provide any services to them. Those who got services from their suppliers mentioned credit, transport, advice (tips), storage and advisory services (Table 21).

Table 21: Wholesalers' responses on services provided by their suppliers

Response	Frequency	Percent
Yes	60	41.4
No	85	58.6
Total	145	100
Service, if provided	Frequency	Percent
Credit	28	43.1
Transport	26	40.0
Tips	8	12.3
Storage	2	3.1
Extension services/training	1	1.5
Total	65	100.0

Buying prices during the peak and off-peak seasons

The prices at which wholesalers bought the groundnuts are presented in Table 22. It is evident that the prices differed by variety and level of processing. The prices for the unshelled were in general lower than those for the shelled. During peak seasons, *Kabonge white* was the most expensive for the unshelled groundnuts followed by *Kabonge red* and *Red beauty*. The least expensive was *Igola*. For the shelled type, the most expensive was *Malawi red*. This was partly due to the costs of importing it. It was followed by *Red beauty*.

During the off-peak season, *Kabonge red* was the most expensive and *Rudu red* the least expensive among the unshelled. For the shelled, *Red beauty* was the most expensive followed by *Kabonge white*. *Kabonge white* and *Kabonge red* were highly priced because they are local varieties which are being promoted among farmers' cycles that advocate for genetic conservation.

Table 22: Average wholesale buying prices during peak and off-peak season by variety

Variety	Peak season (Sh/kg)		Off-Peak season (Sh/kg)	
	Unshelled	Shelled	Unshelled	Shelled
Etesot		2,450		2,625
Igola	1,530	2,422	1,973	2,644
Kabonge red	1,857	2,350	3,200	
Kabonge white	2,050	2,119	2,250	3,172
Red beauty	1,850	2,489	2,652	3,280
Rudu red		2,019	2,143	3,083
Serenut 3	1,833	2,233	1,300	2,300
Serenut 2	1,753	2,220	2,090	2,877
Serenut 4	1,790	2,354	2,297	2,867
Malawi red		2,500		3,200
Rudu white		2,200		
Tanzanian		1,800		2,967
Rudu white			2,500	

Means of transport used by wholesalers

The main means of transport used by groundnut wholesalers was the lorry (> 6 tons) (Table 23). These are trucks that take heavy loads of produce, not necessarily for only one trader at ago but for a number of traders who bulk their produce to reduce the unit cost of transportation. These trucks are appropriate for the long distances that wholesalers usually traverse as they source for produce from farmers and other chain actors to the markets. Smaller trucks of 4-6 tons were also used. These can also handle reasonable bulk cost-effectively. Pickups and bicycles were commonly used by wholesalers who mainly handled relatively smaller volumes and over shorter distances. Most of these transport means are not owned by the wholesalers but simply hired.

Table 23: Means of transport reportedly used by wholesalers to transport groundnuts

Means of transport	Frequency (n=140)	Percent of who use it	Percent of those who own it
Lorry (>6 tons)	48	34.3	0.7
Truck (4-6 tons)	38	27.1	0.7
Pickup	15	10.7	0.7
Bicycle	14	10.0	4.8
Head	12	8.6	4.8
Motorcycle	10	7.1	
Trailers	2	1.4	0.0
Bus	1	0.7	0.0

b. Retail traders

The majority of the groundnut retailers were located in urban areas (Table 24). This was expected given that it is in such places where most customers with effective demand are

located. Most customers in urban centres have relatively high purchasing capacity given that their higher incomes. Besides, the market demand for groundnuts is higher in urban places and hence the preferred locations for many traders.

Table 24: Business location for the interviewed retail traders

Location of business	Frequency	Percent
Rural area	17	8.2
Roadside	30	14.4
Town	142	68.3
City	15	7.2
Mobile	4	1.9
Total	208	100

Most of the retail businesses were of sole proprietors (Table 25). More female traders (90.8%) were operating solely compared to the male traders (84.2%). Traders raise capital and get started with minimum assistance from other individuals and organisations. They are responsible for their decisions and actions, and also enjoy the profits solely. The challenge with sole proprietorship is limited capital and skills which can be addressed through partnerships. Partnerships are still on a limited scale among groundnuts traders. The case of lack of trustworthiness is still one of the limits of potential partnerships. Male traders were more into partnerships (14.0%) compared to their female counterparts (8.5%).

Table 25: Type of business entity at retail level

Nature of business entity	Frequency (n=209)	Percent of retailers
Sole proprietor	186	89
Partnership	21	10
Public company	1	0.5
Private company	1	0.5

In terms of number of years of existence in the business, there was no significant difference between male and female traders. However, female traders had spent slightly more years (7.2) compared to 6.8 years for the male traders.

Type of groundnut traded by retailers

The interviewed retail traders dealt in both unshelled and shelled groundnuts. More traders (71.2%) were dealing in the shelled compared to those who deal in the unshelled (Table 26). They reported that some quality attributes such as grain size, uniformity and moisture level is difficult to ensure with the unshelled type, hence the preference for the shelled. More male traders dealt in the shelled (84.2%) compared to the female (66.4%). The proportion of the unshelled out of the total amount traded by females was almost the same as that traded by the male traders (Table 27).

Table 26: Type of groundnut traded by retailers by sex

	Trader's sex		
Type of groundnuts traded	No. of males	No. of females	Total
Unshelled	5	19	24
Shelled	48	101	149
Both unshelled and shelled	4	32	36
Total	57	152	209

Table 27: Type of Groundnuts traded by sex and proportion for unshelled and shelled

Type of groundnuts	Sex of retailer	Frequency	Proportion
Unshelled	Female	30	48.8
	Male	5	46.0
Shelled	Female	5	34.0
	Male	31	52.7

The majority of retail traders (76%) were able to trade groundnuts throughout the year. This was possible partly due to seasonal variations in different districts in the country. When the groundnuts are off season in one district, the traders source them from other districts. For example, when the wholesale traders from whom the retailers buy groundnuts realize that the season is off in say Arua district, they shift their operations to another area, say Mubende, where they pitch camp and operate from for the next few months. Seasonality and low production were given as the other major reasons by those who never traded throughout the year (Table 28).

Table 28: Reasons for not trading in groundnuts throughout the year by retailers

Reason	Frequency (n=58)	Percent
Seasonality	44	75.9
Low production	7	12.1
High prices	5	8.6
Farmer by occupation and only sells after harvest	1	1.7
Drought	1	1.7

Periods of peak groundnuts supply

Similar to what the wholesalers reported, the months of peak groundnuts supply were reportedly August, July, September and October. These are periods when the first season harvest is ready for sale. Harvests normally take place in June and July and most farmers do not sell their crops immediately but hoard it for a few weeks or months depending on availability of storage facilities. The low supply months on the other hand are November, December and January when farmers have just planted.

Major varieties traded during the peak season

Red beauty was the major variety of groundnuts traded by retailers during the peak season.This result is in agreement with what wholesalers and processors also reportedly trade in mainly. This was followed by *Serenut 2* and *Serenut 4* (Table 29).

Table 29: Retailers' responses on major varieties traded during the peak season

Variety	Frequency (multiple responses; n=350)	Percent of retailers
Red beauty	136	38.9
Serenut 2	89	25.4
Serenut 4	16	4.6
Etesot	15	4.3
Igola	15	4.3
Kabonge red	14	4.0
Kabonge white	14	4.0
Ergoromoit	12	3.4
Rudu red	11	3.1
Tanzania	8	2.3
Serenut 3	5	1.4
Rudu white	4	1.1
Serenut 1	4	1.1
Etila	2	0.6
Mubende red	2	0.6
Emoit	1	0.3
Masaka red	1	0.3
Paidha red	1	0.3

Months of off-peak groundnut supply

The months when the supply of groundnuts was reportedly low were January, February and March (Table 30). These months coincide with the months when the first season planting is completed. September was also mentioned as one of the months of lean supply. This coincides with the second season planting.

Table 30: Retailers' responses on months of off-peak groundnut supply

Month	Frequency (multiple responses; n=732)	Percent of retailers
January	79	10.8
February	111	15.2
March	104	14.2
April	64	8.7
May	23	3.1
June	20	2.7
July	27	3.7
August	50	6.8
September	85	11.6
October	70	9.6
November	54	7.4
December	45	6.1

Varieties traded during the off-peak period

The major varieties traded by retailers during the off-peak season are shown in Table 31. *Red beauty*, *Serenut 2* and *Serenut 4* were the major three varieties reported by the retailers. These are the same varieties reportedly mainly traded during the peak season, which underlines their importance and contribution to the entire value chain.

Table 31: Retailers' responses on the varieties traded during the off-peak period

Variety	Frequency (multiple responses; n=299)	Percent of retailers
Red beauty	120	40.1
Serenut 2	86	28.8
Serenut 4	17	5.7
Kabonge red	13	4.3
Igola	12	4.0
Etesot	10	3.3
Kabonge white	9	3.0
Ergoromoit	8	2.7
Rudu red	5	1.7
Serenut 3	5	1.7
Serenut 1	4	1.3
Rudu white	3	1.0
Tanzania	3	1.0
Emoit	1	0.3
Paidha red	1	0.3
Etila	1	0.3
Masaka red	1	0.3

The main reasons reported by retail traders for preference for *Red beauty* are given in Table 32. Having a better taste was the most dominant reason (62.1% of the total responses). This was followed by being readily marketed, making thick sauce and having high oil content. The reasons for preference for *Serenut 2* differed from those of *Red beauty* (Table 33) and included big seeds and being cheaper. For *Serenut 4*, the main reasons for preference were having a better taste and high oil content. These preferences provide a list of preferred quality attributes that need to be engrained in the breeding process to ensure customer acceptability.

Table 32: Retailers' responses on reasons for preference of Red beauty

Reasons	Frequency (multiple responses; n=84)	Percent of retailers
Has a better taste	54	62.1
Readily marketable	8	9.2
Makes thick sauce	6	6.9
High oil content	6	6.9
Softer and cooks faster	4	4.6
Attractive colour	2	2.3
Drought resistant	1	1.2
Can be processed into a number of products	1	1.2
Big seed	1	1.2
It is cheaper	1	1.2

Table 33: Retailers' responses on reasons for preference of Serenut 2

Reasons	Frequency (multiple responses; n=84)	Percent of retailers
Big seeds	4	15.4
It is cheaper	4	15.4
Has a better taste	3	11.5
Softer and cooks faster	3	11.5
Drought resistant	3	11.5
Easier to grind	2	7.7
High yielding	2	7.7
Makes thick sauce	2	7.7
High oil content	1	3.9
Can be processed into a number of products	1	3.9
Attractive colour	1	3.9

Sources of groundnuts by the retailers

Most of the retailers purchased groundnuts from small scale farmers followed by small scale traders and large scale traders (Table 34). Processors were the least suppliers of groundnuts to retailers. However, in terms of proportion the largest (89.8%) was accessed

from large scale traders (or wholesalers) which is what was expected. The value chains of many farm commodities have a category of wholesalers who in many cases ply the farmers' places to purchase in large quantities and then sell to retailers who interface with consumers.

Table 34: Retailers' responses on the source of groundnuts

Category of supplier	Frequency (multiple responses; n=267)	Percentage	Mean (%)
Small scale farmers	115	43.1	78.3
Small scale traders	73	27.3	71.7
Large scale traders	60	22.5	89.8
Large scale farmers	8	3	68.1
Brokers and agents	8	3	58.1
Processors	3	1.1	63.3

Results further show that the majority (83.3%) of the retail traders did not provide any form of support to those from whom they bought groundnuts. The few retailers that offered services to their suppliers mentioned transport as one of the predominant service offered. This was reported by 61% of the retailers. The other service was credit reported by 22%.

Means of transport used by retailers

Retailers mainly used pickups to transport groundnuts from point of purchase to where they sold from (Table 35). This was mainly because most of them did not deal in large volumes, hence the pickups were the most convenient and cost-effective transport means. Trucks (4-6 tons capacity) and bicycles were the other means of transport.

Table 35: Mode of transport used by retail traders in groundnut trade

Mode of transport	Frequency (multiple responses; n=233)	Percent of retailers
Pickup	56	24.0
Truck (4-6 tons)	40	17.2
Bicycle	38	16.3
Motorcycle	35	15.0
Head	31	13.3
Lorry (>6 tons)	28	12.0
Trailers	3	1.3
Bus	2	0.9

It was noted that most of the mechanical means of transport used by the retailers were not owned (Table 36). This implies that transporters were also important actors in the groundnut value chain.

Table 36: Ownership of means of transport used by retail traders

Means of transport used	Owned		Hired	
	Frequency	Percent	Frequency	Percent
Head (n=33)	22	66.7	11	33.3
Bicycle (n=45)	22	48.9	23	51.1
Pick up (n=59)	4	6.8	55	93.2
Truck (4-6 tons) (n=44)	1	2.3	43	97.7
Lorry (>6 tons) (n=29)	0	0	29	100.0

c. Processors

This category of value chain actors were mainly involved in processing groundnuts which included shelling in cases where they bought unshelled, milling into flour, packaging and reselling. Some were involved in roasting and selling the nuts. The majority (96%) reported that they processed groundnuts throughout the year. However, there were months of peak supply and off-peak similar to what was reported by the wholesalers and retailers.

Red beauty was the most dominant variety processed in terms of both the number of value chain actors processing it and the volumes processed during the peak periods. This was followed by *Serenut 2* in terms of the number of processors, but by *Serenut 4* in terms of volumes per processor (Table 37).

Table 37: **Average amount of groundnut handled during the peak period by variety**

Variety	Frequency (n=93)	Percent of retailers	Average amount (Kg/month)
Red beauty	48	51.6	5,218
Serenut 2	34	36.6	2,145
Kabonge	3	3.2	1,033
Serenut 4	7	7.5	4,350
Tanzania	1	1.1	1,038

During the off-peak period, *Red beauty* was still the dominant variety processed followed by *Serenut 2* but in terms of volume, the latter dominated (Table 38). This further emphasizes the importance of these two groundnut varieties in the value chain. Processors as well mentioned that they were mostly processed because of consumer preference, especially because of their reportedly good taste, being relatively cheaper compared to other varieties, having an attractive colour, and easy to mill. Some varieties such as *Serenut 4* are not traded during the off-peak periods.

Table 38: Average amount of groundnut handled during off-peak period by variety

Variety	Frequency (n=88)	Percent of retailers	Average amount (Kg/month)
Red beauty	49	55.7	3,506
Serenut 2	34	38.6	10,364
Kabonge	3	3.4	500
Tanzania	2	2.3	659

Source of groundnuts for processing

The processors procured groundnuts from various sources including directly from small scale farmers, small scale traders and large scale traders (wholesalers). The biggest proportion of the produce (81%) was procured from the large scale traders (Table 39). The reason given for preference of this source was that the suppliers sorted the groundnuts prior to selling to the next actor in the chain. Only 25% of the processors provided services to those who supply them with groundnuts. The services were mainly credit and transport.

Table 39: Source of groundnuts handled by processors

Source of groundnuts (Multiple responses)	n	Proportion from source (%)
Small Scale Farmers	15	42.0
Small Scale Traders	21	45.2
Large Scale Traders	37	81.1
Brokers	11	29.1

Buying prices of groundnuts at processor level

Table 40 presents average prices at which processors bought groundnuts during the peak and lean seasons for both the unshelled and shelled. As expected, the unshelled groundnuts were bought at lower prices compared to the shelled.

Table 40: Average buying prices of groundnuts by variety

Variety	Unshelled (Sh/kg)		Shelled (Sh/kg)	
	Peak season	Lean season	Peak season	Lean season
Red beauty	900	1,000	2,634	3,554
Serenut 2	1,350	1,650	2,197	3,069
Kabonge			2,433	2,900
Tanzania	1,800	3,000	2,800	3,200
Serenut 4	2,400	3,400	2,875	3,575
Serenut 6			2,000	3,200

During the lean seasons the buying prices were expectedly higher than those during the peak season. Due to scarcity, there is an upward pressure on the prices due to the demand that is not matched by supply. *Serenut 4* was being bought at the highest prices among all the traded varieties followed by *Red beauty*.

Transport means used by the processors

Different processors used different means of transport for groundnuts depending on the volumes handled. Although Table 41 shows that the majority (45%) used lorries, a big percentage (37%) transported groundnuts on head. This gives a reflection of how small the size of the business was. Most of the means of transport used were hired.

Table 41: Means of transport used by the processors

Type of transport used	Frequency of those who use	Percent of those who use	Percent of those who own the transport used
Lorry	18	45.0	0
Head	16	37.2	25.0
Truck	10	25.0	0
Bicycle	6	15.8	16.0
Pick up	5	13.0	0
Motorcycle	5	16.0	0
Trailer	3	8.0	0
Taxi	1	3.0	0

3.3 Quality attributes considered by traders and processors

The main quality attributes considered by the groundnut value chain actors was grain size, cleanliness of the grains, moisture content and grain colour (Figure 3). Quality is a key aspect that is being stressed nowadays given the globalization and export trends. Many expatriates and some local consumers continue to be quality conscious. However, ensuring good quality grains still remains a challenge among the chain actors yet it is a prerequisite for accessing remunerative markets.

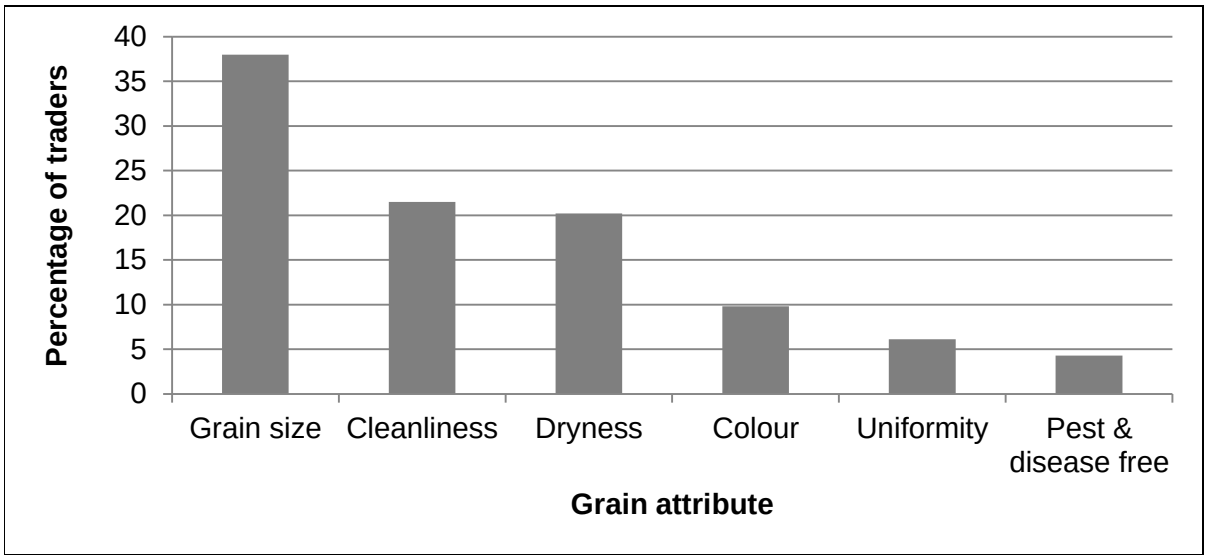


Figure 3: Quality attributes of groundnuts considered by traders

Generally, retailers considered the quality of the groundnuts traded as at least fair. However, results in Table 42 show that not many traders considered grain size, colour and other attributes as good.

Table 42: Retail traders' responses on the quality of groundnuts they trade

Quality attribute	Good (%) (n=320)	Fair (%) (n=141)	Poor (%) (n=50)
Grain size	24.1	23.4	24.0
Colour	16.9	18.4	8.0
Taste	9.1	3.5	4.0
Pest and disease free	7.8	7.8	10.0
Cleanliness	19.1	23.4	32.0
Uniformity	10.0	12.1	12.0
Dryness	13.1	11.3	10.0

Similarly, processors reported moisture content, cleanliness and colour as the main quality attributes they considered when purchasing groundnuts. Table 43 presents the ranks of the attributes they consider.

Table 43: Ranking of quality attributes considered by Processors

Quality attribute (Multiple responses)	Ranking of the respective quality attribute						
	1	2	3	4	5	6	7
Grain size (n=14)		28.6	35.7		21.4	7.1	7.1
Colour (n=22)	22.7	13.6	36.4	18.2	4.5	4.5	
Taste	8.3	25.0	16.7	25.0	16.7		8.3
Pests and diseases (n=13)	7.7	23.1	15.4	30.8	23.1		
Cleanliness (43)	34.9	37.2	14.0	9.3	4.7		
Uniformity (n=25)	8.0	32.0	24.0	8.0	8.0	20.0	
Moisture content (n=31)	87.1	9.7	3.2				

According to results in Table 3.40, majority of the processors considered the quality of the groundnuts as generally good. This is indicative of the efforts dedicated to quality assurance among all players of the crop along the chain. The processors are at the tertiary level of the chain and therefore have the final chance of receiving and judging the quality of the groundnuts.

Table 44: Processors' responses on the quality of groundnuts they handle

Quality attribute	Opinion about the status of a particular quality attribute		
	Good	Fair	Poor
Grain size (n=14)	57.1	42.9	
Colour (n=22)	72.7	27.3	
Taste	100.0		
Pests and diseases (n=13)	53.8	38.5	7.7
Cleanliness (43)	53.5	37.2	9.3
Uniformity (n=25)	56.0	40.0	
Moisture content (n=31)	71.0	29.0	

3.4 Activities carried out along the value chain and related costs

3.4.1 Activities undertaken by wholesale traders

A list of activities done by the wholesalers in the value chain is presented in Table 45. Harvesting is done by very few wholesalers (12.4%). One of the reasons given by those who undertook harvesting was to get the groundnuts at a relatively lower (farm) price. The other reason was to ensure quality. Those who did not harvest indicated that it was time consuming and/or costly, while others reported that it was not necessary because of there were many sellers from whom they easily purchased. Assembling the produce was also done by few wholesalers. The majority who did not assemble indicated that it was time consuming, costly, and not necessary because of existence of many sellers.

Activities mostly done by the majority of the wholesalers are sorting, packaging and storing. Packaging is one of the critical marketing activities and is done by the majority (59.3% of the wholesalers). Reasons for packaging were to ease transportation, weighing and storage. The few who did not package claimed they bought already packed produce, while others reported it was time consuming. Packaging in small quantities was practiced by many wholesalers. This was reportedly done to cater for differences in customer needs (including those that need very small packs). By doing this, they increase the customer base and maintain existing ones. However, some wholesalers do not pack in small quantities claiming that it was costly and not a profitable venture.

Sorting was done to ensure good quality by removing broken and rotten nuts and other foreign bodies. Results in Table 45 show that some wholesalers were also involved in processing. For example, 41.4 and 37.9%, respectively milled groundnuts into flour and paste.

Table 45: Activities undertaken by wholesale traders

Activity	Frequency	Percent
Harvest	18	12.4
Assemble	50	34.5
Transport	74	51.0
Drying	59	40.7
Packing	86	59.3
Sort	121	83.4
Shelling	25	17.2
Store	108	74.5
Package in small quantities	88	60.7
Mill into flour	60	41.4
Mill into paste	55	37.9
Roast	26	17.9
Transport to the buyers	32	22.1

Operating costs for the unshelled groundnuts

Results (Table 46) show that losses and damages during transportation were the most costly. Labour cost for harvesting was the second highest although it was done by few wholesalers. Transport costs were also very high. These costs are a function of many variables including fuel, spares, distances and status of roads. The total cost was estimated at Sh. 772.6 per kilogram of unshelled groundnuts. Reduction of these costs is an incentive to the wholesalers and other actors. Payment to agents is also costly.

Table 46: Operating costs for the unshelled groundnuts

Activity	n	Mean (Sh/kg)
Labour cost for harvesting	11	147.73
Assembling	10	17.30
Empty packaging material	29	11.50
Labour cost for packing	20	8.45
Loading	23	9.13
Payment to intermediary agent	7	32.86
Drying	7	23.90
Transport cost	20	39.35
Payment at road stop	1	10.00
Payment to broker	11	0.08
Offloading	18	7.94
Storing	13	7.41
Shelling	26	24.12
Milling into flour		
Milling into paste		
Roasting		
Taxes and market dues	9	21.44
Bribes	1	5.00
Fines		
Losses and damages during transporting	12	400.00
License	10	3.18
Accessing market information	12	0.71
Cost of advertising	5	0.51
Taxes and market dues	15	1.99
Total		772.6

All the costs incurred by wholesalers who traded in unshelled were also incurred by those who traded in shelled. This implies that the total operation costs for shelled groundnuts had to be higher than that of the unshelled. The total cost for shelled was estimated at Sh842.58 per kg (Table 47). This cost would be slightly lower if harvesting from the garden is not undertaken. The biggest cost item was due to losses/damages incurred during transportation like was the case for the unshelled. This accounts for about 47% of the total cost of operations. For the shelled type the second highest items was assembling followed by taxes and market dues.

Table 47: Operating costs for the shelled groundnuts

Activity	n	Mean (Sh/kg)
Labour cost for harvesting	5	15.00
Assembling	29	78.62
Empty packaging material	98	11.81
Labour cost for packing	57	10.61
Loading	78	10.08
Payment to intermediary agent	25	56.80
Drying	21	22.24
Transport cost (from source to selling place)	92	52.87
Payment at road stops	6	19.50
Payment to brokers	25	40.49
Offloading	92	9.98
Storing	98	10.30
Shelling		
Intermediary agent	15	0.17
Personal travel cost to buy	75	4.38
Taxes and market dues	19	63.86
Bribes	4	19.37
Fines	2	15.54
Losses and damages during transporting	56	400.00
License	75	0.18
Payment for accessing market information	94	0.75
Cost of advertising	5	0.03
Total (if grain is to be sold)		*842.58*
For value addition		
Milling into flour	59	198.56
Milling into paste	51	432.35
Roasting	12	300.00

Wholesaler' selling places

Most of the wholesalers (about 74%) sell their produce from one market every day (Table 48). These are premises which are hired, with storage and packing for ease of loading. Some are hired by a combined group while others are owned by individuals. In many cases such places were found to be in one gazette place in towns, with some being called produce line or produce market. They are re also considered a source of security where someone can be found all year round, compared to the mobile traders who are transitory. Other traders also make use of distant urban markets. These are usually considered if the costs are manageable or can be recovered by the premium selling price. Some wholesalers also use different market days to transport their produce and benefit from the populations of a range of customers in such markets. These occasional/weekly markets are also good platforms to purchase produce from farmers or other wholesalers.

The biggest percentage of wholesalers produce is sold in roadside markets and different markets on market days. This is to do with the dynamics of such markets. In these markets

there is a lot of excitement and people travel long distances to access them. They traverse villages and sub-counties to attend them. They travel with lots of money to transact business. The markets that are farthest are the urban and export markets. Marketing in these markets requires a lot of planning and are capital intensive. The exporters who were interviewed do informal cross-border trade in most cases with not addition legal and regulatory pre-conditions.

Table 48: Traders selling place and distance

Selling place (multiple response)	Frequency	Percentage
One market every day in town	113	73.9
Distant urban market	20	13.1
Different markets on market days	12	7.8
Export market	6	3.9
Roadside market	2	1.3
Market	n	Mean
Roadside market	111	94.9
Different markets on market days	17	58.5
Distant urban market	2	55.0
Export market	1	100.0
Distance from trader's place to the market (km)	n	Mean
Roadside market	2	10.0
Market day market	9	103.4
Town market	63	5.2
Urban market	14	126.6
Export market	2	128.5

Customers to whom the wholesalers sell the groundnuts and the respective percentages are shown in Table 49. Large scale traders and small scale traders are the major customers of the wholesaler's produce. Being wholesalers they find it much more convenient and quick to sell to fellow traders who specialize in selling smaller quantities to other traders or consumers. This model is much more cost-effective than selling to other categories who buy small volumes. Household consumers are the third major category. This diverse range of consumers offer the wholesalers a dependable market and many did not find it difficult to sell off their produce. The biggest proportion of the produce however, goes to exporters (though few are involved in this). Large scale traders take second position in percentage of wholesalers' produce they buy.

Table 49: Customers to whom the wholesalers sell and the respective percentages

Category of Supplier (multiple responses)	Frequency	Percentage	Proportion sold (%)
Small scale farmers	5	3.4	26.8
Small scale traders	71	49	12.1
Large scale traders	74	51	42.3
Large scale farmers			
Brokers and agents	2	1.4	13.3
Small scale processors	10	6.9	12.3
Large scale processors	2	1.4	12.5
Supermarkets	4	2.8	11.4
Exporters	10	6.9	56.4
Household consumers	60	41.4	23.8
Restaurants	12	8.3	12.9

Services offered by buyers to the wholesalers

The majority of wholesalers do not receive any business support services from those who buy from them. Only 28.3% was receiving support services (Table 50). Among the services provided are; transport, adding extra free groundnuts and packing. Storage and milling are the other services.

Table 50: Services offered by buyers to the wholesalers

Service provided	Frequency (n=25)	Percentage
Transport	12	48.0
Add some extra free groundnuts	5	20.0
Packing	4	16.0
Storage	2	8.0
Milling	1	4.0
Bonus	1	4.0

Means of transport used by customers who purchase from wholesalers

The majority of customers who purchase from the wholesalers use trucks (4-6 tons) to transport their produce (Table 51). This is followed by lorries which are greater than 6 tons. These means of transport are indicative of the volumes that are handled by the buyers. They also show the distances that buyers have to move to their point of operation. Head, bicycles and pickups are more common for movements within a short distance. Most of these means of transport are not owned by hired (Table 52).

Table 51: Means of transport used by customers who purchase from wholesalers

Means of transport	Frequency (n=164)	Percent
Truck 4-6 tons	38	23.2
Lorry >6 tons	37	22.6
Head	31	18.9
Bicycle	19	11.6
Pickup	16	9.8
Motorcycle	15	9.1
Taxi	6	3.7
Bus	2	1.2

Table 52: Ownership of the means of transport used by the wholesale traders

Means of transport used (n=145)	Owned		Hired	
	Frequency	Percent	Frequency	Percent
Head	34	23.4	11	7.6
Bicycle	8	5.5	21	14.5
Pick up	2	1.4	33	22.8
Truck (4-6 tons)	1	0.7	53	36.6
Lorry (>6 tons)	0	0	46	31.7
Trailer	0	0	1	0.7
Bus	0	0	5	3.4
Motorcycle	0	0	18	12.4

Selling price of various products of wholesalers

The prices vary within and between seasons and by variety. The selling prices were lowest for the unshelled (Table 53). The prices keep rising as more value is added. In general this is typical of both the peak and off-peak seasons. Results also show that for the unshelled during the peak seasons, Igola had the highest price followed by Serenut 4. For the shelled, Kabonge white and red and Tanzania were the highest priced. Flour from Tanzania and paste from Serenut were the most highly priced.

Table 53: Wholesalers selling prices (Sh/kg) of various products during the peak seasons

Variety	Unshelled	Shelled	Flour	Paste	Roasted
Etesot		2,675			
Igola	2,584	2,250		3,600	
Kabonge white		3,116	3,379	3,727	
Red beauty	1,969	2,852	3,302	4,556	3,325
Rudu red		2,544	3,200	4,000	
Serenut 2	1,649	2,462	3,325	5,509	1,600
Serenut 4	2,739	2,761		8,000	
Tanzania		3,000	3,500	4,000	
Rudu white		2,550			
Serenut 3	1,250	2,375			
Kabonge red		3,000		3,500	

Prices were expectedly higher in most cases during off-peak seasons (Table 54). Red beauty was the highest priced for the unshelled, and Kabonge white for the shelled. The wholesalers take about 10 days to sell off a certain stock.

Table 54: Wholesalers selling prices (Shs/kg) of various products during off-peak seasons

Variety	Unshelled	Shelled	Flour	Paste	Roasted
Etesot		2,909			
Igola	1,667	2,725		4,000	
Kabonge red		3,500		4,000	
Kabonge white		3,658	4,025	4,288	4,500
Red beauty	3,180	3,198	3,814	4,782	4,150
Rudu red		3,445	3,800	6,000	
Rudu white		2,600			
Serenut 3	1,500	3,433			
Serenut2	2,485	3,143	3,594	5,674	3,500
Serenut4	1,911	3,255		7,000	
Tanzanian		3,667	4,000	4,083	

The margins between selling and buying prices for the shelled type of groundnuts show that *Kabonge Red* pays best during the off-peak (Table 55). *Tanzania* pays best for the peak seasons. *Igola* pays least in both cases. If we consider the volume of produce however for all the varieties, *Red beauty* and *Serenut 2* earn the wholesalers more money than all the others. Their low margins are compensated for by the large volumes compared to others.

Table 55: Wholesale margins (Shs/kg) for shelled during peak and off-peak seasons

Variety	Shelled (off-Peak season)	Shelled (Peak season)
Etesot	284	225
Igola	81	-172
Kabonge red	3,500	650
Kabonge white	486	997
Red beauty	218	363
Rudu red	362	525
Rudu white	2,600	350
Serenut 2	266	242
Serenut 3	1,133	142
Serenut 4	388	407
Tanzania	700	1,200

3.4.2 Activities undertaken by retail traders

The retail traders undertake a number of activities from the time of purchase of the groundnuts to time of sell. The majority do not harvest groundnuts from the garden (Table 56). Only 25.2% do undertake this activity. The major reason given for harvesting in the farmers' field was to avoid buying from others a situation that compromises quality and makes it expensive. Those who do not harvest from the farmers garden revealed that; this process is time consuming and there are many sellers which makes it not necessary to undertake. Other reasons were that it is costly to undertake and for some it is not their core business so they specialize and leave it to others. When it comes to assembling the produces, very few farmers assemble groundnuts. This is to bulk and accumulate the required volumes from a number of suppliers and if small volumes are purchased from far. Those who do not undertake this claim that it is time consuming and/or not necessary because of many sellers within their vicinity. Some retailers say it is costly, while others buy small volumes and therefore it is not necessary.

Table 56: Activities performed by retail traders

Activity	Frequency	Percent
Harvest from the garden	52	25.2
Assemble	59	28.8
Transport	121	57.9
Dry	70	33.7
Packaging	105	50.5
Sort	158	76.0
Shell	62	29.8
Store for some period	102	49.0
Package the in smaller quantities	136	66.0
Mill into powder	76	36.5
Mill into paste	68	32.9
Roast	43	20.8
Transport to the market/buyers	69	33.3
Cook the fresh	11	5.3

The majority of retailers do transport their produce from the point of purchase to point of sell. Those who transport want to get higher prices and to access better markets. The few who do not transport their produce claimed that it was not necessary given that there are many sellers. Others indicated that its time consuming, costly and some lack adequate capital. As for drying, fewer traders engage in it (33.7%). Those who dry do it to obtain right moisture content and as such increase shelf life of the groundnuts and ultimately get higher profits. Retailers who don't dry indicated that they lack tarpaulins; quality of groundnuts is reduced when you group and buying well dried groundnuts.

Packaging is a critical step in the trade and must be done right. About 51% pack the groundnuts in smaller quantities, either using 100 or 50 kg packages. Reasons given by those who pack included in order of importance; ease transportation, storage, and handling, to get the right weight, ease weighing, ensure good quality and also use a standard pack. Those who do not pack said that they buy it when it is already packed and that its time consuming. Sorting the groundnuts is another critical value addition process that is expected to be undertaken by any trader. Results show that the majority (76%) do sort their groundnuts. Sorting is done to ensure good quality by removing broken ones, stones and chuff, attract more customers and invariably increase profits. Those who do not sort claimed to be buying already well sorted produce, others indicated that its time consuming.

Very few retail traders are involved in shelling groundnuts. This is partly because very few actually buy unshelled. Traders who do not shell gave the following reasons; buys already shelled groundnuts to reduce costs, its time consuming, lack of shelling machines and the process being labour intensive. The few who shell do so to increase profits, some because they have to cater for customer preference for shelled groundnuts. Shelling also attracts another category of customers, improves cleanliness and ensures good quality. Some retailers sell only shelled groundnuts and also shelling makes groundnuts ready for grinding for those who process or buy for processing.

Storage of produce is being done by 49% of the traders. This is lower than expected because of the innumerable benefits of storing produce. The retailers who store do so; to get a better price, due to variations in demand with some of the seasons having low demand, cater for seasonal variations in supply and to monitor demand and prices so that they can benefit optimally from their invested resources. A slight majority do not store, meaning that they sell immediately. They do this due to lack of enough capital for bulk purchase, handling low volumes which do not necessitate storage while some lack of storage space. Packaging is smaller quantities is a common practice among the retailers and is being practiced by the majority of traders. They use small black or transparent polythene or paper bags. This is done to cater for differences in customers' needs, cater for small customers, increase and maintain a strong customer base, get higher profits, and ease the selling process. Those who do not package in smaller quantities indicated that it is not profitable.

Processing into powder and paste is being done by retailers on a small scale. Those who process the groundnuts into flour do so to meet for differences in customers' needs, because of the high demand for the milled groundnuts, to get higher profits and to maintain the customer base. For the majority who do not mill claimed that it is not their core business. Others claimed that it is not profitable since it is a costly process, lack of market for the products and lack of processing machines. The few who grind the groundnuts into paste intimated that they need to cater for differences in customer needs. Others showed that the demand for pasted groundnuts is high demand and therefore they aim at getting higher profits. Those who do not paste gave the following reasons; not interested since it is costly and therefore not profitable, not core business specialized in a certain area, lack of processing machines and that it is not demanded by customers. As a value addition approach, roasting is also not done by many retailers. The traders who undertake roasting say it is part of value addition process which fetches more income. Also by roasting they cater for a specific customer segment and also increase the customer base. The majority who do not roast gave a number of reasons. Firstly, the majority indicated that they specialized and this is not their core business. Others claimed that it is not cost effective, its time consuming, they lack the skills and an effective demand for the products.

The majority of retail traders do not transport the produce to the buyers. Only about 33% do transport the produce to the buyers. Retailers who transport the produce aim at accessing markets and getting higher prices. Retailers who do not transport claim to have access to many buyers who find them at their point of operation. Others say it is not profitable due to high costs, while others indicated that they specialize in what they do and leave the transportation to some other people. Cooking the fresh groundnuts was the least done activity.

Selling location

The majority of retailers conduct their business from one market location every day in town (Figure 4). These are places which they hire, some do have storage facilities in them and they buy and sell their groundnuts from these locations. Some retailers ply different markets on different market days to ensure that they sell off their stock. Weekly roadside markets are also common selling places for retailers.

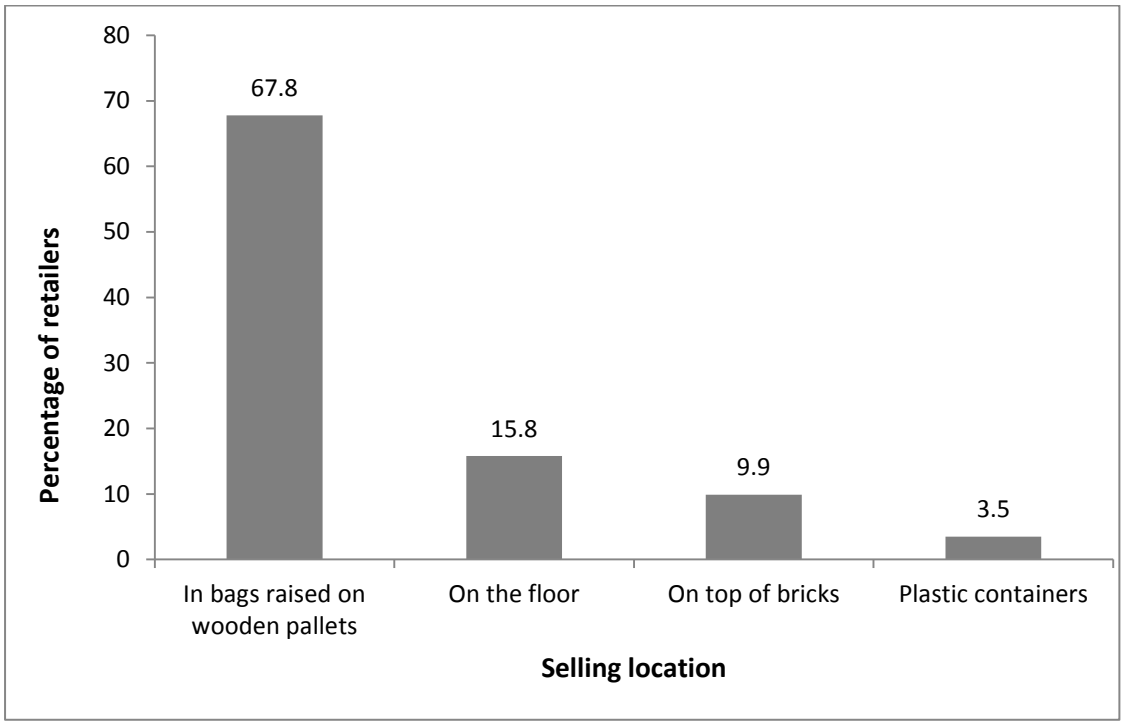


Figure 4: Locations where retailers sell groundnuts

Amounts of groundnuts traded (Kgs/month) during the peak seasons by variety

For the unshelled groundntus traded by retailers during the peak season, Kabonge White was traded the largest amount, followed by Etesot and Ergoromoit (Table 57). Though these were traded few traders were involved in them. Red beauty was the dominant in terms of traders that handle it, followed by Serenut 2. The least traded were Rudu red and Serenut 4. In the case of the shelled groundnuts, Red beauty was traded in the largest amount followed by Etesot and Kabonge Red those few traders were handling the two latter varieties. If one considers the total volume that is handled in the value chain by all traders during the peak season (product of volume handled and the number of traders involved), Kabonge white dominates with 70,000 kg/month, followed by Serenut 2 (66,127 kg/month) and Red beauty (35,088 kg/month). These three varieties account for 69.5% of the total volume of unshelled groundnuts handled in the value chain. For the shelled, the variety that dominated during the peak season was Red beauty (532,440 kg/month), followed by Serenut 2 (126,024 kg/month) and Etesot (34,335 kg/month). These three account for 87.3% of the total volume of shelled groundnuts handled in the value chain. In general, more shelled groundnuts were traded compared to the unshelled.

Table 57: Quantities of groundnuts traded (Kg/month) during the peak season by variety

Variety	Frequency (Multiple response)	Peak period	
		Unshelled	Shelled
Emoit	1	1,200	
Ergoromoit	12	1,507	38
Etesot	15	1,519	2,289
Etila	3		160
Igola	14	569	523
Kabonge Red	14	250	2,118
Kabonge white	14	5,000	2,025
Masaka Red	1		1,200
Mubende Red	2		1,100
Paidha Red	1		400
Red beauty	136	258	3,915
Rudu Red	11	155	158
Rudu White	4	240	133
Serenut 1	4	843	539
Serenut 2	89	743	1,416
Serenut 3	5	500	514
Serenut 4	18	140	615
Tanzania	8	1,340	1,500
Total	352	14,264	18,643

Amounts of groundnuts traded during the off-peak seasons by variety

During the off-peak season, Kabonge white and Emoit were the varieties traded in the largest volumes albeit by few retailers (Table 58). The varieties traded in largest volumes (considering amount and number) were Kabonge White (23,085 kg/month) and Serenut 3 (14,560 kg/month). These accounted for close to 81.8% of the total vlumume of unshelled grounduts that moved through the value chain on a monthly basis. For the shelled, Kabonge White and Rudu Red were the one traded in the largest amounts. However, as for the peak season, Red beauty was traded by the biggest number of retail trailers. In terms of volume of shelled groundnuts moving through the value chain Red beauty dominated with 45,600 kg/month followed by Serenut 3 (32,864 kg/month) and Kabonge Red (15,704 kg/month). These three varieties account for close to 72.0% of the total volume handled by retailers in the value chain. These results show the importance of Red beauty in value chain. The total amount of unshelled groundnuts traded was also far less (about one third) of the shelled groundnuts.

Table 58: Quantities of groundnuts traded during the off-peak season by variety

Variety (Multiple response)	Frequency	Off-Peak period (Kg/month) Unshelled	Shelled
Emoit	1	1,400	
Ergoromoit	8	204	43
Etesot	10	70	330
Etila	2		64
Igola	10	130	48
Kabonge Red	13		1,208
Kabonge white	9	2,565	1,550
Masaka Red	7		400
Paidha Red	1		
Red beauty	114		400
Rudu Red	4	291	1,326
Rudu White	4	375	69
Serenut 1	37		74
Serenut 2	13		140
Serenut 3	52	280	632
Serenut 4	6	75	841
Tanzania	2	103	348
Total	293	5,492	7,885

Transaction costs from time of accessing the groundnuts to point of sale

The transaction costs incurred by retailers from point of access to groundnuts to point of sell were captured (Table 59). Results show that the transaction costs for the unshelled are lower compared to those of the shelled groundnuts. This is anticipated since the shelled type is a result of value addition. Results also show that losses and/damages incurred during transportation contributed the highest to total cost for both the unshelled and shelled groundnuts. It is higher for the shelled compared to the unshelled due to the fact that the former is of higher value. Labour for harvesting from the garden and payment to brokers were responsible for the second and third highest contributor to total cost. Personal travel and cost of the packaging materials were also high contributors to total cost. Bribes, fines, storage and accessing information were the lowest. For the shelled groundnuts, the payment to brokers and personal travel contributed the second and third highest proportion to the total cost. The lowest costs were for accessing market information, storing and trading license.

Table 59: Transaction costs (Sh/kg) incurred by retailers for the unshelled and shelled

Costs (Sh/Kg)	Unshelled	% of total cost	Shelled	% of total cost
Losses/damages during transportation	200	41.1	250	44.4
Labour (harvesting from garden)	42	8.6	106.7	
Payment to broker	40	8.2	130	11.5
Personal travel cost	38	7.8	128	11.4
Empty packaging material	33.3	6.8	12.1	1.1
Shelling	28	5.7		
Transport (source to selling place)	22	4.5	52.3	4.6
Assembling	16	3.3	52.6	4.7
Loading	15	3.1	14.4	1.3
Offloading	12	2.5	9.5	0.8
Payment at road stop	10	2.1	30.7	2.7
Labour cost for packing	8	1.6	13.2	1.2
Taxes and market dues	8	1.6	36.3	3.2
Drying (labour and tarpaulin)	4	0.8	20	1.8
Payment to intermediary agent	3	0.6	13.3	1.2
Payment to intermediary agent	3	0.6	0.1	
License for trading	1.3	0.3	3.6	0.3
Bribes paid	1	0.2	58.8	5.2
Fines paid	1	0.2	50	4.4
Storing	0.7	0.1	0.8	0.1
Accessing market information	0.7	0.1	1.4	0.1
Total	487	100	983.8	100

Buying price during the peak and off-peak seasons

The retail buying prices for the unshelled and shelled groundnuts were captured for the different varieties that are dominant in the value chain. Results (Table 60) show as anticipated, the prices of the unshelled were lower during both the peak and off-peak seasons. This is because they are of lower value and few retailers prefer this type. One of the reasons given is that they are not sure of the size, uniformity and general nature of the grains inside. During the off-peak season Red Beauty and Kabonge White were purchased at the highest prices, while Etesot and Igola were purchased at the lowest for the unshelled type. For the shelled type Malawi Red, Masaka red and kabonge red were purchased at the highest prices, whereas Rudu red and Emoit were the least priced varieties. During the peak seasons, the highest prices for the unshelled type were for kabonge red and Red beauty, while the lowest were Kabonge white and Serenut 4. For the shelled groundnuts Malawi Red, Masaka red and Mubende red had the highest prices. The least priced were; ergoromoit and emoit. The high prices are indicative of the distances and transaction costs of accessing these particular varieties.

Table 60: Retailers' buying prices (Sh/kg) during the peak and off peak seasons

Variety	Off-peak seasons		Peak seasons	
	Unshelled	Shelled	Unshelled	Shelled
Emoit		1,500		1,300
Ergoromoit	1,200	2,600		1,467
Etesot	1,753	2,400		1,807
Igola	1,784	2,656		1,989
Kabonge Red		3,500	2,350	2,600
Kabonge White	2,650	3,117	1,400	2,083
Malawi Red		3,600		3,000
Masaka Red		3,600		2,800
Mubende Red		3,500		2,800
Paidha Red		3,147		2,200
Red Beauty	2,844	2,775	2,034	2,563
Rudu Red	2,267	2,000		2,100
Rudu White	2,200	2,700		2,267
Serenut 1		2,558		1,750
Serenut 2	1,932	2,535		2,142
Serenut 3	1,836	2,771		2,100
Serenut 4	1,876	2,800	1,178	1,842
Tanzania	2,250			2,050

Locations and customers of groundnuts sold by retailers

Results in Table 61 show that most retailers sell their groundnuts in different markets on different market days. In these markets they also sell their biggest percentage. Few exporters were interviewed, and these sell most of their produce in the export markets as expected. Some retailers sell in distant urban markets. Urban markets are the most distantly located for the retailers. These are not used by many due to high transaction costs. Market days are the second distantly located, followed by roadside markets.

Table 61: Proportion of groundnuts sold by retailers in various markets and the distances

Proportion (%) of groundnuts sold in various markets (multiple responses)	n	Mean
Different markets on market days	30	84.8
One market everyday in town	1	6.0
Distant urban market	5	47.0
Export markets	3	86.7
Distance (in km) to various selling points for retailers	n	Mean
To the roadside market	6	7.8
To the market day	44	21.0
To the town market	54	4.7
To the urban market	3	80.0

The majority of retail traders sell their produce to household consumers to whom they sell up to 54% of the produce (Table 62). This is expected as they are among the players at the last node of any chain (if no processing is to be done) and therefore interface with consumers a lot. These customers are located within a short distance. Some retailers sell to fellow retailers, and this is the second biggest market outlet for them. These are located a little further. The retailers who buy from fellow retailers are interested in making the desired volume. Another unexpected outlet is that of the wholesalers. It's a surprise because retailers sell their produce at a higher price compared to wholesalers, and so one is left wondering at what price the wholesalers would sell the produce. This arrangement however is health for all players to ensure that the value chain does not get supply challenges for the consumers who are readily willing to pay for the produce. Retailers also sell to restaurants, farmers and processors. These results also imply that the retailers have a diversity of market outlets with low chances of failing to sell their produce.

Responding to whether they provided any services to their customers, only 12.2% of the retailers indicated that they provide services. The majority do not offer any services. This result is similar to what wholesalers also reported. Among the few services rendered were; transport, credit, milling (some retailers were involved in value addition), storage, packing and sometimes they discount the price.

Table 62: Retailers' customers and proportions sold to them

Category of customers (multiple response)	Frequency (n = 208)	Percent	Percentage sold	Distance (km)
Household consumers	158	76.0	54.2	5.4
Small scale traders (retailers)	102	49.0	52.2	33.2
Large scale traders (wholesalers)	40	19.2	55.9	119.2
Restaurants	40	19.2	33.9	3.2
Small scale farmers	24	11.5	33.8	14.5
Small scale processors	11	5.3	22.8	4.0
Exporters	6	2.9	64.2	150.0
Large scale farmers	3	1.4	28.3	22.5
Brokers	1	0.5	1.3	40.0
Large scale processors	1	0.5	2.5	0.0
Supermarkets	1	0.5	45.0	0.0

Mode of transport used by customers to transport their produce

The major transport means used by the customers who buy from retailers is the head (Table 63). This implies that they sell mainly to customers buying small volumes. The retailers sell to the customers who use hired personnel to move the produce. Some of these take the produce to another location, say near the market (some pick up, lorries and motorcycle are packed outside but within the vicinity of markets). Bicycles, pickups, motorcycles and trucks (of 4-6 tons) are the other common means of transport used by customers. Most of the means used are hired.

Table 63: Mode of transport used by customers who buy groundnuts from retailers

Means of transport	Frequency	Percent	Percentage that own the means
Head	68	27.0	94.4
Bicycle	57	22.6	43.1
Pickup	47	18.7	1.9
Motorcycle	28	11.1	0.0
Truck 4-6tonnes	25	9.9	3.2
Lorry>6tonnes	10	4.0	0.0
Bus	8	3.2	0.0
Taxi	8	3.2	0.0
Wooden wheel barrow	1	0.4	0.0
Total	252	100.0	

Selling price

The selling prices for the unshelled were lower than for the shelled across all varieties (Table 64). This is a clear indication of what value addition is all about. The price for the unshelled is highest for Masaka red variety and lowest for Ergoromoit. For the shelled groundnuts sold by retailers Masaka red and Kabonge were the highest priced, while Etesot was the lowest priced. For the cooked type, Serenut 3 was the highest priced. For flour Serenut 4 was the highest priced while for paste and roasted it was Red beauty. Red beauty it was revealed by retailers produces the best flour and paste and therefore many processors blend it with other varieties.

Table 64: Retailers' selling price (Sh/kg) during the peak season for the different products

Variety	Unshelled	Shelled	Cooked	Flour	Paste	Roasted
Ergoromoit	1,200	2,950			3,000	
Etesot	2,017	2,263				
Igola	2,567	2,625			3,000	
Kabonge red	3,000	3,500	3,400	3,267	4,750	
Kabonge white	1,689	2,840	4,275	3,538		
Masaka red	3,500	3,500	3,800	3,800		
Paidha red		3,500			3,800	
Red beauty	2,256	3,340	3,500	3,483	4,900	4,980
Rudu red	1,653	2,533				3,100
Rudu white						2,000
Serenut 1	1,800	2,725	3,500	3,500		
Serenut 2	3,400	2,612	1,275	3,250	4,620	3,300
Serenut 3	2,954	2,936	4,562	4,302	4,525	
Serenut 4	2,450	2,717		6,000		
Tanzania		3,075		4,000	4,750	

During the off-peak seasons, the supply is lower and therefore prices are higher. However, retailers also revealed that in some instances they make losses when, for example, they stock during the off-peak seasons and as they hoard for better prices, other traders import or

buy from other areas which would have come into production at the time. Some varieties such as Emoit and Mubende red only appear during the off-peak period. Serenut 2 is the most expensive during the off-peak season for the unshelled. Kabonge red is the most highly priced for the shelled groundnuts (Table 65).

Table 65: Retailers' selling price (Sh/kg) during off-peak season for different products

Variety	Unshelled	Shelled	Fluor	Paste	Roasted
Emoit		3,500			
Ergoromoit	1,800	3,700			
Etesot	2,850	1,925			
Igola	2,416	3,225		3,200	1,500
Kabonge red		4,500	3,850	4,900	4,500
Kabonge white	2,625	3,595	3,550	4,500	
Masaka red		4,000		4,500	
Paidha red		3,800		4,500	
Red beauty	1,931	3,956	3,652	4,773	5,050
Rudu red	2,500	3,150			3,600
Rudu white		2,400			1,500
Serenut 1		3,317	3,650	5,000	
Serenut 2	3,252	3,296	3,570	4,700	4,583
Serenut 3	3,200	3,375	3,000	5,000	3,900
Serenut4		3,588		4,200	
Tanzanian		3,508	4,000	4,333	3,500
Mubende red		4,000		4,500	

Margin realized by retailers during the peak season

During the peak seasons retailers realize a margin between the buying and selling prices for all the varieties. For the unshelled groundnuts, Serenut 4 fetches a higher margin compared to all the others, while Red beauty fetches the lowest margin (Table 66). Ergoromoit and Paidha red fetch the highest for the shelled type whicle Etesot and Rudu red fetch the lowest. If it is presumed that retailers consider the transaction costs incurred prior to purchasing the groundnuts, then it can be said that they make a profit on all the varieties they trade during the peak season. For the off-peak seasons (Table 67), Serenut 3 and 4 fetch the highest for the unshelled groundnuts. .Emoit, Red bueaty and Rudu red fetch higher margins for the shelled, while Rudu white and Etesot fetch the lowest. The margins are good for both seasons and for almost all varieties to keep the traders entrenched in the business.

Table 66: Peak season margin realized by the retail traders

Variety	Unshelled (Sh/kg)	Shelled (Sh/kg)
Ergoromoit		1,483
Etesot		456
Igola		636
Kabonge red	650	900
Kabonge white	289	757
Masaka red		700
Paidha red		1,300
Red Beauty	222	777
Rudu Red		433
Serenut 1		975
Serenut 2		470
Serenut 3		836
Serenut 4	1,272	875
Tanzania		1,025

Table 67: Off- peak season margin (realized by the retail traders

Variety	Unshelled (Shs/kg)	Shelled (Sh/kg)
Emoit		2,000
Ergoromoit	600	1,100
Etesot	1,097	-475
Igola	632	569
Kabonge Red		1,000
Kabonge White	-25	478
Masaka Red		400
Mubende Red		500
Paidha Red		653
Red Beauty		1,181
Rudu Red	233	1,150
Rudu White		-300
Serenut 1		759
Serenut 2	1,320	761
Serenut 3	1,364	604
Serenut 4		788

3.4.3 Activities carried out by the processors

Activities that are undertaken by processors from the time of acquiring the product to final selling were established. Most processors do not get involved in harvesting the groundnuts from the farmers' fields (Table 68). The major reasons for given for not being involved in this was that it is a costly venture getting the groundnuts from the farmers' fields. This stems from the small scale operations of farmers that are dispersed. Those involved in harvesting do it because it is cheaper compared to other sources. Very few processors are also involved in assembling groundnuts but the few who undertake this do it to increase access to

the groundnuts. Those who are not involved in assembling say it is time consuming and costly. Transportation is done by many since they have to move the products to points of sale having procured the produce at lower prices.

Table 68: Activities carried out by groundnut processors

Activity	Frequency (multiple responses)	Percent
Harvesting	2	3.9
Assembling	5	9.8
Transport	23	45.0
Drying	17	33.3
Packaging	19	37.3
Sorting	49	96.1
Storing	31	62.0
Packaging	42	82.4
Milling	41	80.4
Milling into paste	48	94.1
Roasting	33	64.5
Transport	7	14.0
Cooking	0	0

Few processors are involved in drying the groundnuts. Others dry because they want a better product after processing, while others want to prolong the shelf life of the products. Packaging is also done by few processors for ease of storage and transportation but also to cater for the different customer needs. The majority of processors are involved in sorting the produce to ensure clean and quality produce and for grading. Shelling of groundnuts is minimal at the processing level because most of them buy groundnuts already shelled. Storage is done by many processors in order to get higher prices, and to buffer seasonal variations in demand and supply. However, those who did not store reported existence of high demand, lack of adequate capital to handle bigger volumes as the main reasons. Most processors mill groundnuts into flour and also into paste as one of their core activities. Activities that are done by very few processors include transporting to markets, roasting and cooking the groundnuts.

Costs incurred for the various activities

The highest cost incurred by processors is that for milling into paste (Table 69). For processors who mill groundnuts into and sell paste they incur Sh772/kg (excluding roasting) over and above the cost of a kg of the raw unprocessed groundnuts. Processors who mill and sell flour do incur less costs (Sh 412/kg), compared to those who mill into paste. This explains the higher price charged for the paste compared to the flour. As is evident processors incur much more than wholesalers and retailers due to the value adding activities that they undertake.

Table 69: Costs incurred for the various activities undertaken by Processors

Activity	Cost (Sh/kg)
Harvesting in the garden	3.7
Assembling	2.9
Empty packaging materials	25.0
Packaging	5.6
Loading	4.8
Paid to the intermediary	1.8
Drying	0.7
Transporting	37.3
Off-loading	26.7
Storage	14.3
Sorting	38.6
Telephone message	1.5
Milling into flour	204.9
Milling into paste	568.2
Roasting	136.2
Personal travel	3.9
Taxes and market dues	2.7
Loss during transport/loading/offloading/storage	36.8
Trade license	0.3
Accessing market information	0.5
Advertising	0.5
Total cost	1,116.9

Processors mainly sell their products in one market every day (Table 70). They are largely stationary compared to the wholesalers who are largely migratory, moving away from locations with groundnuts to other areas where the supply is assured.

Table 70: Markets where processors sold and respective proportion and distance

Market where groundnuts are sold	% sold	Distance (km)
Roadside market	2.4	1
Different markets on market days	0.0	NA
One market every day	96.0	5.6
Distant urban market	5.0	35
Export market	0.3	100

Locations where processors sell

Processors indicated a selling behaviour that allows them to sell to diversity of customers. The majority of processors sell their products to household consumers who are able to reach their stalls (Table 71). A number of them also sell to small scale traders who reach more customers much more cost-effectively while others. Another good number of processors also reach large scale traders.

Table 71: Locations where processors sell their products

Market where groundnuts are sold (Multiple response)	Proportion sold (%)	Distance (km)
Small scale farmers	0	na
Large scale farmers	0	na
Small scale traders	38.8	15.4
Large scale traders	16.7	35.9
Brokers	0	na
Small scale processors	0	na
Large scale processors	0	na
Supermarkets	2.8	8.1
Exporters	3.3	120.1
Household consumers	39.2	4.4
Restaurants	5.5	0.6

Very few processors provide services to their buyers (Table 72). The few who provide service to their buyers offer credit facilities to them, transport and storage facilities. Offering such services improves their business volume and relationship that keeps them coming back to buy from the processors.

Table 72: Processors' responses on the services they provide

Response/Service (n=51)	Frequency	Percentage
Provides service (s) to buyers	7	13.7
Credit	3	5.9
Transport	4	7.8
Storage	1	2.0

Means of transport use by buyers of processors' products

Processors revealed the different means of transport that are used by their buyers for the various products. Results show that most of the means are not owned but hired. Use of head was the dominant means followed by bicycle and motorcycle (Table 73). The least used are trailers and buses. This points to the low volumes of produce handled by the processors that do not necessitate use of means that would require big volumes.

Table 73: Processors' responses on means of transport used by buyers of their products

Means of transport (Multiple responses)	Percent	Own the means of transport Frequency	Percentage
Head	68.8	26	51
Bicycle	44.2	9	50
Pick-up	14.6	0	0
Truck (4 - 6 tons)	15.0	0	0
Lorry (> 6 tons)	12.5	0	0
Trailer	2.7	0	0
Bus	2.7	0	0
Taxi	13.5	0	0
Motor cycle	29.7	0	0
Private car	13.3	2	100

Prices of various products sold by processors during peak seasons

Products from the major varieties processed and sold by processors were revealed. Results show that the processed products were sold at higher prices compared to the unprocessed grain. This is because of the added expenses that are incurred during the processing. Paste was the most expensive since its high energy and time consuming compared to other products. This was the case for all the varieties considered. Serenut 4 was the most expensive variety for all the products that processors sell. Fluor was the least expensive product and this stems from the fact that its processing takes a few minutes in the machine compared to other products. It's evident that cooking is not among the products of the processors interviewed. Some Processors when asked about why they don't cook groundnuts for sale, among the reasons they gave was short shelf life and hardships in ensuring good quality.

Table 74: Prices (sh/kg) of products sold by processors during peak seasons by variety

Variety	Shelled	Cooked	Fluor	Paste	Roasted	Peanut
Red beauty	2,893		3,311	4,800	4,300	3,826
Serenut 2	2,754		3,375	4,986	4,375	4,500
Kabonge	2,800		3,500	4,600	4,500	3,850
Serenut 4	3,367		4,167	5,667		4,000
Tanzania			3,500	4,000	4,000	
Serenut 6	2,300			5,000		

Prices of various products sold by Processors during lean seasons

The product prices are higher during lean seasons and this is the case for all the products including the unprocessed grain. This is because of supply shortage compared to demand which creates an upward pressure on the prices. In the unprocessed and flour categories, red beauty had the highest price. Serenut 4 had the highest price for the pasted and roasted category of products (Table 75). No results were reported for the cooked and peanut

products. Processors revealed that they mix Red beauty flour with flour of Serenut varieties because the former varieties make very light coloured flour which is not attractive to customers.

Table 75: Prices (sh/kg) of products sold by processors during lean seasons by variety

Variety	Shelled	Cooked	Fluor	Paste	Roasted	Peanut
Red beauty	3,980		4,000	5,523	5,250	
Serenut 2	3,646		3,871	5,893	5,300	
Kabonge	3,400		4,000	6,500	5,000	
Serenut 4	3,833		3,467	7,000	6,000	
Tanzania	3,800		3,800	4,250	4,500	
Serenut 6	3,800			7,000		

Capacity utilization

On average it takes 11 days for the processors to completely sell off a given batch of groundnuts that they process into various products. With regard to capacity utilization, results show that processors do not fully utilized the installed capacities of their processing plants. Averagely they utilize 51% of the installed weekly capacities. The reasons given for the low capacity utilization were dominated by limited demand for the products (Table 76), which is also related to increased competition given that there were many processors involved in processing the groundnuts. Shortage in supply was another major reason given, followed by low power supply to run the machines. Other reasons given for the low capacity utilization were; high labour costs for roasting and perishability of the processed groundnuts.

Table 76: Reasons given processors for low capacity utilization

Reason	Frequency (n=73)	Percent
Limited demand	27	37.0
Supply shortage of groundnuts	22	30.1
Low power voltages to run the plant	9	12.3
Machine breakdown due to overheating of the motor	6	8.2
Lack of enough capital to purchase groundnuts	2	2.7
Resting the machine	2	2.7
Others	5	6.8

Nature of value addition

The value addition process starts with manual sorting the bought groundnuts to ensure that the dirty material is removed. This is followed by cleaning it to remove dust which is done through manual winnowing using trays. Then the clean groundnuts are poured into machines which then grind it into flour. This process is run for a short period of time and some blend this with fluor from a number of varieties which is used as sauce by many households. Some processors stop at this product because many claim that it has a higher demand yet doesn't require a lot of time and resources make. Further grinding leads to a thicker product which is used for sauce just like the flour. Paste is made from more intense grinding compared to flour which makes the product thick and oily. It is this that is sold for use as sauce or mixed with sauce such as fish, meat and beans. Some processors mix this paste

with sesame for use on bread and other foods and sauces while others use it as a paste on bread and other foods. No additives were mentioned as being added to the groundnut products.

The new products desired by clients are known by processors mainly through talking with clients (cited by 82.1% of the processors) and getting feedback from customers (given by 12.0% of the processors). Processors are also able to learn about market taste through talking with clients (88.2% of the processors), using sales volume of the different products (5.9% of the processors) and customer feedback (5.9% of the processors). Quality requirements of the markets are provided by customers (98% of the processors).

3.5 Business Support services to value chain actors

Some value chain actors reportedly received different business support services. The service providers included government, non-government organisations and financial institutions (Table 77).

Table 77: Wholesalers' responses on source and type of business support got

Institution/Organisation	Frequency	Percent	Type of Support
Central Government	0		
Local Government	0	0	
NAADS	2	1.4	Seeds
NGOs	5	3.5	Loans, Training
SACCOs	11	7.6	Loans
Banks	39	26.9	Loans
Transport Companies	0	0	
Farmer Oganisations	0	0	
Traders' Organisations	9	6.2	Loans, Market information, Savings

Business support was minimal among retailers, just like it was for other value chain actors. Only 37% of the retailers get support towards establishment, running and maintenance of their businesses. The NGOs that assist retailers include Build Africa and UWESO which mainly help the female traders. The type of support they get is in form of affordable credit. Banks are also critical service providers and their support is also in form of loans.

Similarly, few processors (43.1%) were getting support from other stakeholders. The support was got mainly from friends and the kind of support was credit. Local government was providing support to processors for checking and improving their weighing scales.

3.6 Health related aspects in groundnut value chain

3.6.1 Health problems related to groundnuts at wholesale trade level

The majority of the wholesalers (77.2%) were not aware of any health problem that is related to groundnuts. Very few wholesalers (about 15%) had heard about aflatoxins, and reported that it was caused by poor storage and resulted into colour change and rotting of the groundnuts. They further mentioned that aflatoxin can be detected using smell and change

in texture. Their source of this information included experience (they can simply observe and tell), workshops, friends and formal education (Biology subject). About prevent or control of aflatoxins, the majority (85.0%) did not know how to go about it. The few who claimed to know, gave two approaches that can be used; proper drying to the right moisture content, and proper storage in bags which are placed on wooden pallets. Asked about what they do when they detect aflatoxins in groundnuts, the few who responded said they reject them or pick out the affected ones.

Storage of groundnuts by the majority (73.6%) of wholesalers is done in bags raised on wooden pallets. Others simply place the bags on the floor, while others use plastic contains and tarpaulins. Our interpretation of these findings is that generally traders do not know much about the disease; they do not know the symptoms and the control measures. This situation is further exacerbated by the fact that health related inspections are not regularly conducted. Only 23.4% of the wholesalers had been inspected during the past one year. Health inspectors were mainly from city, town and municipal councils.

3.6.2 Health problems related to groundnuts at retail trade level

Similarly at retail level, results show that 82.8% of the traders did not know any health problem related to groundnuts. The few who knew some of the problems mentioned the following; stomach upsets, consuming iron metals that tear from the processing machines, cancer and diarrhoea. Most of them (94.4%) had not heard about aflatoxins. The few who had heard about aflatoxins mentioned that it causes diseases in humans (nothing beyond this was mentioned), groundnuts change colour when affected, it causes rotting and is caused by poor storage. Those who had heard about it got the information from friends, through workshops and seminars, radios, through experience. Change in smell, colour and texture are the ways through which they detect aflatoxins.

Results further show that most of retailers (91.7%) did not know how to control aflatoxins. This is obvious since they did not know about it. However, to keep the quality of the groundnuts, they reportedly dried the groundnuts well and stored them in bags raised off the floor. The few who would detect aflatoxins reported that they reject the groundnuts and remove affected ones. It was found that majority of the retailers (82.3%) were not inspected by health inspectors.

Most of the retail traders store their groundnuts in bags raised on wooden pallets (Figure 5), with the majority (68.5%) owning the pallets. Other methods used are use of the floor which is not recommended as it compromises quality. Some traders place the bags on brick-made platform. More training is required for the retail traders to undertake the right methods of storage.

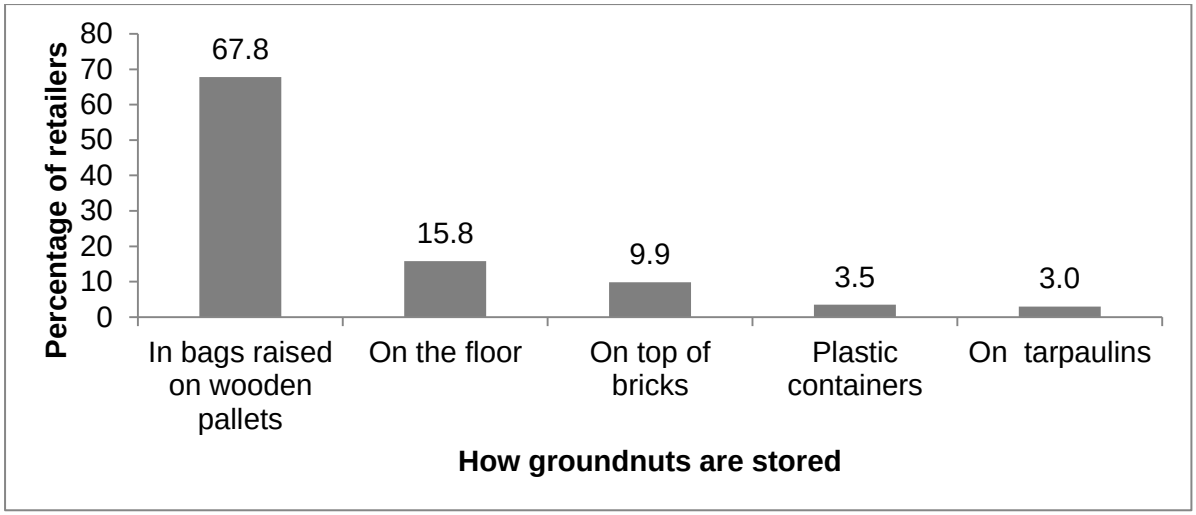


Figure 5: How the groundnuts are stored by retailers

3.6.3 Health problems related to groundnuts at processor level

Responses from processors indicate that the majority (about 71%) were not aware of any health related problems attributed to groundnuts consumption. The few (29%) who knew some health problems associated with groundnuts mentioned cancer, diarrhoea and stomach upsets as the predominant ones (Table 78). Others were throat problems, typhoid, and kidney-, liver- and lung-related problems.

Table 78: Processors' responses on health problems related to groundnuts

Health problem cited	Frequency (n=21)	Percent
Cancer	6	28.6
Diarrhoea	3	14.3
Stomach upsets	3	14.3
Throat problems	2	9.5
Typhoid	2	9.5
Dangerous to health	1	4.8
Kidney problems	1	4.8
Liver infections	1	4.8
Lung problems	1	4.8
Pimples	1	4.8

When asked whether they had ever heard about aflatoxin, the majority (86.3%) of the processors reported they had not. The few who had heard about it reported that the groundnuts turn black, it causes diseases in the body, and it causes cancer and having a funny smell. Those who had some knowledge about the disease claimed to have got the knowledge from traders, radios, trainings conducted by National Agriculture Research organisation (NARO), newspapers and using their own experience. They further reported that detection of aflatoxin can be done using physical inspection of the groundnuts, smelling

the groundnuts, mouldy colouring seen on the groundnuts, colour changing (i.e. groundnuts turn black) and tasting the groundnuts.

Given the fact that most processors do not know much about aflatoxins, when asked about preventive measures to avoid aflatoxins, only 21.1% responded affirmatively. The following were given as the methods used to control the disease; buy groundnuts with the right moisture content (i.e. well dried), further drying of groundnuts, avoid mixing groundnuts with beans while processing, not buying if aflatoxins are suspected, removing rotten and broken groundnuts before roasting.

Processors further pointed out that if they suspect presence of aflatoxins they reject the groundnuts and if already purchased they dispose them off. Others reportedly feed them on poultry and other livestock. The processors store the packed groundnuts mainly in bags on raised wooden pallets though a few use buckets, while others place the packed bags on cemented floor. The majority (86.3%) have wooden pallets in their stores. Most of the processors do not get health inspectors to inspect their products as would be expected. Only 35.5% got inspectors to inspect their premises but not their products nor their bodies. The inspectors come from town councils, municipal councils, Kampala Capital City Authority (KCCA) and the Uganda National Bureau of Standards (UNBS). Inspectors are said to be visiting the processors about 3 times a year.

Strategies used to overcome seasonal variations

Groundnuts like other agricultural products are characterised by seasonal variations in supply. Although Uganda has two seasons in a year and the seasons vary by district, there are months in a year when the supply does not rhyme with demand. Retail traders like other actors in the value chain have put in place strategies to minimise the variations and ensure that at least they have something to present to the customers throughout the year. However, some of them temporarily shift to other produce which are more lucrative at the time (Table 79). Some examples of the produce they shift to include maize, beans and rice. A good number of traders stock a lot during period of high supply while others claim to do nothing but continue to struggle in the hope that the seasons gets better. Other strategies include; continuous purchase at whatever cost to maintain customers, being in constant contact with suppliers, reducing quantities traded, and increasing prices to ensure that they do not incur losses.

Table 79: Responses on strategies used to overcome seasonal variations

Strategy	Frequency (n=212)	Percent
Shifting to other produce	46	21.7
Stocking during periods of high supply	41	19.3
Nothing	28	13.2
Continuous purchase at whatever cost to maintain customers	20	9.4
Being in constant contact with suppliers	17	8.0
Reducing quantities traded	10	4.7
Using suppliers from various districts	10	4.7
Having capital all the time	9	4.2
Increasing price	8	3.8
Sourcing groundnuts from different markets	15	3.8
Varying prices	3	1.4
Using brokers to regularly scout for groundnuts	2	0.9
Referring buyers to other traders in case of shortage	1	0.5
Trading in the Tanzania and Malawi variety	1	0.5
Purchasing from traders who purchase in big volumes	1	0.5

Results show that business has increased for the retail traders in the last 5 years. This was revealed by 61.5% of the retailers. The dominant varieties that were cited as having increasing demand were *Red beauty* and *Serenut 2* (**Table 80**). The reasons given for the increase in demand for these particular varieties were increase in population and presence of export market in the region with South Sudan and Kenya providing a good market. Some retailers expanded their stock by ploughing back the profits earned, while others obtained credit from SACCOs and banks.

Table 80: Traders' responses on varieties whose demand has increased in the last 5 years

Variety	Frequency (n=164)	Percentage
Red beauty	78	47.6
Serenut 2	50	30.5
Serenut 4	11	6.7
Igola	7	4.3
Kabonge white	5	3.0
Rudu red	4	2.4
Etesot	2	1.2
Serenut 3	2	1.2
Kabonge red	2	1.2
Masaka red	1	0.6
Serenut 1	1	0.6
Tanzania	1	0.6

3.7 Legal aspects of groundnut business

At wholesaler level, few wholesalers indicated that they needed commercial and health licenses to operate. Results show that the majority of wholesalers can operate without any license (51%). Most traders were aware of the commercial license requirement (95.6%) but not the health licenses. The respondents further revealed that it is not difficult to obtain the licenses if one had the money. The only challenge is about the licenses being expensive. Over 80% showed that the health license was harder to obtain compared to the commercial one. The wholesalers on average spend about Sh113,134 annually for the legal/regulatory requirements.

At retail level, retail traders require permits in order to operate legally. However, only 29% indicated that they do require the permits. The permits required to operate are commercial and health related. According to the traders, these permits are not difficult to obtain. This was consented by 92% of the responding retailers. At processing level, results show that processors did not have to have any permit to operate. This was revealed by 62.7% of the processors. About 37.3% indicated that they needed commercial licenses, while 13.7% required health licenses. According to the study, 88.9% indicated that it was not difficult to get the license. They found it easier to obtain the commercial licence than the health license. The cost of licensing was on average Sh103,750 (US$42) per year.

3.8 Opportunities and constraints in groundnut value chain

3.8.1 Opportunities and constraints at wholesale level

The wholesale traders that were interviewed during the study reported a number of opportunities in the business (**Table 81**). These included:

- groundnut trade is a profitable venture
- demand for groundnuts is high and the market is readily available

- the venture is less capital intensive compared to others that are being tried by the wholesalers
- the supply of the crop is relatively stable. This is possible due to the different agro-climatic conditions in the country. It is also a result of research efforts which have seen a number of varieties which perform well in various zones of the country.
- the ability to process the groundnuts into a number of products also makes it an attractive venture to many traders.
- groundnuts are not highly perishable; it has a good shelf-life
- availability of credit; some wholesalers are able to get groundnuts supply on credit from suppliers and pay later when they have sold out or been able to raise some money.
- the business is not labour intensive and there are low risks involved.

Table 81: Responses on opportunities for wholesalers

Opportunity (multiple responses)	Frequency (n=214)	Percentage
Profitable	63	29.4
High demand	62	29
Ready market	38	17.8
Less capital	9	4.2
More stable supply compared to other produce	9	4.2
Ability to be processed into a number of products	7	3.3
Groundnuts are not highly perishable	6	2.8
Ability to access groundnuts on credit	4	1.9
Others	16	7.5

On the other hand, wholesaler traders reported a number of constraints that hindered their business (Table 82). These included:

- Poor quality of the produce. This was the most mentioned constraint. This reduces the sale turnover and profits.
- Bad debts are also rampant and reduce trust and profit.
- Price fluctuation was mentioned as the second highest constraint. This compromises planning and may lead to reduced customers and profits.
- Supply fluctuations were also reported as a constraint as it slows down planning and volume in the value chain.
- High cost of transport still remains a big challenge for all traders in the value chain. It escalates due to high fuel prices and poor roads especially in the rural areas where most of the produce has to be accessed. High transport costs are also a result of traders moving to various sources to collect the produce from small scale and scattered suppliers.
- Limited capital reduces volume handled and reduces chances of attaining economies of scale and hence resource use efficiency.

Table 82: Responses on constraints faced by wholesale traders

Constraint	Frequency (n=239)	Percentage
Poor quality groundnuts which reduces profits	60	25.1
Bad debts	32	13.4
Price fluctuations	27	11.3
Fluctuations in supply	23	9.6
High transport costs	21	8.8
Limited capital which reduces profits	14	5.9
Capital intensive venture	10	4.2
High purchase price of groundnuts	8	3.3
Lack of ready market	8	3.3
High license and market fees	6	2.5
High competition among traders	4	1.7
High electricity costs for processing	4	1.7
Limited number of customers	4	1.7
Perishable if stored for long	4	1.7
Others	14	5.9

Suggested solutions and implementing agencies/institutions

The predominant solution that was mentioned as a means towards addressing some of the constraints among wholesalers was availing credit (Table 83). This points to the desire for many to expand their business and benefit fully from the value chain. The other solution was training all the stakeholders on quality related aspects to reduce losses and benefit more. If the quality aspect is addressed, chances of exporting to more lucrative markets are also available. This will greatly improve the position of groundnuts and increase it contribution to micro and macro level development. Monitoring quality for the produce was also suggested which calls for institutions strengthening and policy implementation. Wholesalers feel that the tax levied on fuel is high and therefore should be reduced. This could be one of the causes of the high transport that traders are complaining about. Road improvement was the other expected suggestion. Poor roads reduce volumes traded, time spent travelling and frequency of vehicle break downs. Further to training on quality issues, was reinforced with a suggestion to create awareness through various channels and means among all dealers.

Table 83: Reported suggestions to mitigate the constraints faced by wholesale traders

Suggested solution (multiple response)	Frequency (n=126)	Percentage
Availing credit	22	17.5
Training traders, farmers, and processors	21	16.7
Monitoring the quality of groundnuts sold	18	14.3
Training farmers to increase production	13	10.3
Reducing taxes levied on fuel	11	8.7
Improving on roads	8	6.3
Creating awareness campaigns on quality issues among all groundnut dealers	7	5.6
Availing inputs to farmers	5	4.0
Instituting proper marketing policies	5	4.0
Purchasing personal grinding machines	4	3.2
Reducing taxes	4	3.2
Others	8	6.4

Availing inputs to farmers was suggested as a possible solution to increased productivity and shortage in supply. In addition, revisiting the current marketing policies, reducing taxes were suggested.

The institutions that traders suggested to handle the constraints given above were Central and Local Governments. These are expected to handle policy related issues, work on roads and create an enabling environment for credit to be accessed at relatively affordable rates. Another role of Governments is to address the issues related to high tax rates. SACCOs and other financial institutions are expected to avail credit and to sensitize traders in aspects of saving and financial management. UMEME's role is to ensure dependable power supply at affordable rates. Researchers, Ministry of Agriculture, Animal Industry and Fisheries and NAADS are expected to train stakeholders, sensitize them about quality and provide technical advice related to accessing quality inputs and markets. The Uganda national Bureau of Standards needs to ensure that quality standards are adhered to. If all the constraints are well addressed, the groundnut sub-sector will become more vibrant and play a significant role in development.

3.8.2 Opportunities and constraints at retail level

The predominant opportunity in groundnut trade that was mentioned by retail traders is that it is a profitable venture (Table 84). Other major reasons were that the demand is high and there is ready market. Use of less capital compared to other ventures was also cited. In many instances investors go for low capital ventures. Groundnuts are not perishable was also mentioned which means that they can stay for long periods without spoilage which buffers the variations in demand. The fact that it can be processed into a number of products was another opportunity mentioned. This creates employment and offers a diversity of what can be offered to the market. Stability in supply is another opportunity in that even during lean periods, there are some supplies for sale.

Table 84: Opportunities associated with groundnuts trade

Opportunity (multiple responses)	Frequency (n=305)	Percentage
Profitable	94	30.8
High demand	72	23.6
Ready market	30	9.8
Less capital intensive	22	7.2
Groundnuts are not highly perishable	19	6.2
Ability to be processed into a number of products	14	4.6
More stable supply compared to other produce	9	3.0
Less labour	7	2.3
More stable supply compared to other produce	6	2.0
Quick turnover	5	1.6
Used in different forms	5	1.6
Other	22	7.2

However, some constraints were also reported. The major one was the poor quality of groundnuts which compromises marketing and invariably profits (**Table 85**). Price fluctuation is also a major constraint which affects planning and volumes traded. Fluctuations in supply also constrains retailers as it leads to uncertainty and makes it hard for the retailers to maintain their customers and to trade the required volumes. Limited capital is a big challenge as it affects the traded volume. Access to low interest rate and long term capital to expand business is a concern of the business community. High cost of transport due to high fuel costs and poor rural infrastructure is a big challenge. Among the other constraints that were mentioned are; intermittent and high electricity costs for processing, high transaction costs, high purchase price of groundnuts, high storage costs, lack of knowledge about market price, losses during transportation and low profit margins.

Table 85: Retailers' responses on the constraints they faced

Constraints	Frequency (n=311)	Percentage
Poor quality groundnuts which reduces profits	60	19.3
Price fluctuations	44	14.1
Fluctuations in supply	42	13.5
Limited capital which reduces profits	28	9.0
High transport costs	21	6.8
Losses through people consuming unpaid for small quantities	19	6.1
High license and market fees	17	5.5
Limited number of customers	14	4.5
Capital intensive venture	10	3.2
High competition among traders	9	2.9
Perishable if stored for long	7	2.3
Delayed payments when customers are supplied on credit	6	1.9
Other constraints	34	10.9

Reasons for keeping in business despite the challenges

The major reasons given for keeping in the business were that the business is profitable and the groundnuts are highly demanded and so it is easy to recover the money (Table 86). Others have not alternative apart from continuing with retail trading. Ability to obtain credit from wholesalers was also given. This creates an incentive for the retail traders in that they can get the stock on credit, sell and pay the suppliers later. Other reasons given were that groundnuts being a staple it has great demand. Competition among the retailers is limited competition and the venture requires little capital.

Table 86: Reasons for keeping in business despite the challenges

Reason (multiple responses)	Frequency (n=195)	Percentage
Profitable	90	46.2
High demand	20	10.3
No alternative job	18	9.2
Easy to sell and so recovers money fast	17	8.7
Experience	15	7.7
Ready market	10	5.1
Ability to obtain groundnuts on credit from wholesalers	5	2.6
Other reasons	20	10.3

Solutions to constraints and institutions to address them

A number of solutions were suggested by retail traders to address the given constraints. Improving the rural roads network ranked very high on the list. This is expected to reduce the transaction costs and hence improve the profit level. Another related suggestion is reduction on tax levied on fuel. Reducing power tariffs and instituting proper marketing policies were the other suggestions that were directed to the central and local governments and UMEME. Retailers also suggest that UMEME ought to ensure reliable power supply.

Availing affordable (low interest) and longer term credit mentioned and was directed to banks, MFI and SACCOs. This will help the traders to expand their business and attain economies of scale. Training farmers and traders in all aspects of production and quality control was given. This will ensure adequate production of quality produce. The institutions to undertake this include; Central and local governments and technical parastatals and authorities such as NAADS, NARO and UNBS. The former is also envisioned to assist in monitoring the quality of the groundnuts. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) is seen as providing the experts towards this. Availing inputs to farmers was given as a solution to solving the constraint of low production which makes supply low and sometimes uncertain. Rectifying shelters is paramount as many retailers were seen transacting business in open places under hot sunshine. It can also be difficult for the traders and market administrators to operate under heavy rains. In such circumstances business would definitely be very low. It was also pointed out that the market dues are high and therefore need to be revised by the market authorities.

3.8.3 Opportunities and constraints at processing level

Processors were asked about the opportunities that they see in dealing with groundnuts. Result in Table 87 show that the majority of them see profits as the biggest opportunity in groundnuts. This is followed by high demand for the products and a ready market for the products. Other reasons were value addition opportunities and ready supply of groundnuts. Some claim that the trade requires little capital. Experience gained over the years, Groundnuts not being perishable, low competition, ability to generate many products from groundnuts and quick turnover were the other opportunities that were mentioned by the processors.

Table 873: Responses on existing opportunities for processors

Opportunity (Multiple response)	Frequency (n=83)	Percent
Profitable	24	28.9
High demand	23	27.7
Ready market	16	19.3
Value addition	4	4.8
Ready supply of groundnuts	3	3.6
Requires little capital	3	3.6
Experience	2	2.4
Groundnuts are not perishable	2	2.4
Little knowledge	2	2.4
Low competition	2	2.4
Can generate many products	1	1.2
Quick turnover	1	1.2

The interviewed processors reported a number of constraints they faced. The major constraint given by the processors was the poor quality groundnuts that are not at the right moisture content that they get from traders (Table 88). This was followed by the high electricity costs that have been reported by in a number of earlier findings (e.g. Mugisha *et al*., 2008). This increases the transaction costs which push the products prices up hence compromising demand. Price fluctuations of the raw materials is also a major constraint. Lack of adequate capital is a major constraint that has been reported in earlier related studies. This affects the volume of trade and also compromises attaining economies of scale. High transport costs are also a major constraint which increases transaction costs. The high transport costs stem from high fuel prices and poor road network as observed by Kiiza *et al*. (2011). Power fluctuations are also rampart and this compromises productivity and planning by the entrepreneur. Bad debts are common and stem from credit facilities which are common among businesses nowadays. Load shading is a serious constraint that affects productivity and total output and invariably profitability.

Table 88: Responses on the constraints faced by processors

Constraint	Frequency	Percent
Poor quality groundnuts which are not well dried	21	19.1
High electricity costs	12	10.9
Price fluctuations	12	10.9
Lack of enough capital	10	9.1
Fluctuations in supply	7	6.4
High transport costs	5	4.5
Power fluctuations	5	4.5
Bad debts	4	3.6
Load shading of electricity	4	3.6
Fluctuations in demand	3	2.7
Losses due to theft	3	2.7
Other constraints	24	21.8

Changes in demand and thefts were also cited. Among the other constraints were; delays in delivery of groundnuts, faulty weighing scales, high price which reduces demand, increased competition due to increased number of processing machines, increase in the groundnut prices, labour intensive nature of processing due to poor and small machines and delayed payments by those they supply. Other constraints that need attention were; difficulties in obtaining UNBS standards, high cost of packaging materials, high machine maintenance costs, high ground and local rental costs, lack of ready market, low outturn especially for peanut butter, poor working conditions in the market, some varieties are too hard to grind and unskilled workers.

In spite of these constraints the processors indicate that they wanted to keep in business because it was profitable, the demand was high and the market is available.

Strategies used by processors to overcome seasonal variation in demand

Demand for groundnuts varies during the year and therefore processors have to devise means to ensure that they don't loose from the trade. The major strategy used by processors to overcome variations in demand was storage (Table 89). This is used as a buffer to be used when demand is high and the prices have risen. Increasing the price of groundnuts is the other strategy. Some processors reduce the stock handled and therefore sell less while others undertake a more intensive search for groundnuts. Others diversify to ensure that they cater for more customers and others reduce quantities handled. Importation from Tanzania and Kenya is also done by some processors to cater for increased demand. Keeping in touch with suppliers of groundnuts is also used. Some processors increase their stock when the demand increases and therefore are able to sell more. Shifting resources to other produce such as maize and beans is what some processors use. Packing is also used as a strategy.

Table 89: Strategies used by processors to overcome seasonal variation in demand

Strategy	Frequency (n=51)	Percentage
Storage	19	37.3
Rising the price for groundnuts	6	11.8
Reducing stock and selling less	4	7.8
Sourcing for groundnuts wherever they are	4	7.8
Diversifying groundnut products sold	3	5.9
Reducing quantities bought when demand is low	3	5.9
Imported groundnuts from Tanzania and Kenya	3	5.9
Constant communication with suppliers	3	5.9
Buying more during periods of shortage due to increased demand	2	3.9
Deal in other produce	2	3.9
Other reasons	2	3.9

Processors reported that the demand for groundnut products has increased over the last 5 years (Figure 6). This demand has been more pronounced for the Red beauty varieties compared to all the other varieties that are processed. Processors have experienced more sales of groundnuts. Among the reasons that were given to explain increased sales are high demand for the groundnuts, good quality products and increased consumption (**Table 90**). Some processors claim to have increased their investment and hence the stock and increased volumes sold. Some of the products are exported to Kenya. Among the other reasons that could explain increased sales are; diversification of uses for groundnuts, easier access to stores, experience gained over the years, processing being a profitable venture and selling at a lower prices to attract customers and sell off the existing stock.

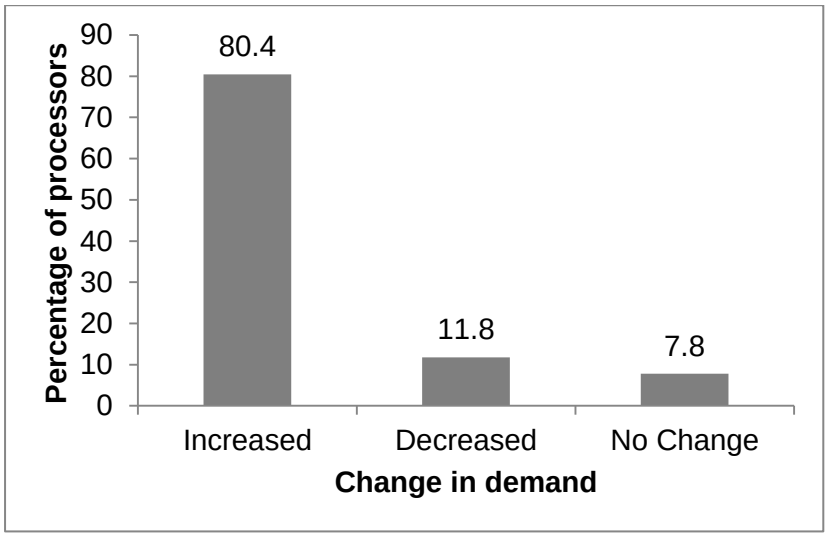


Figure 6: Trend in demand for processed products over the last 5 years

Table 90: Responses on reason for increased sales

Reason for increased sales	Frequency (n=64)	Percent
High demand	16	25.0
Good quality products	12	18.8
Increased consumption	10	15.6
More capital invested	6	9.4
Export market to Kenya	4	6.3
Good customer care	3	4.7
Increased population	3	4.7
Reduced supply of groundnuts	3	4.7
Ability to access loans from microfinance institutions	2	3.1
Other reasons	5	7.8

3.9 SWOT analysis for groundnut value chain

The matrix below (Table 91) gives a summary of the strengths, weaknesses, opportunities and threats in the groundnut value chain and has been adopted from aBi (2012). Strengths and weaknesses are from within the value chain (endogenous) while opportunities and threats are exogenous. The SWOT analysis is critical in identifying the challenges/constraints in the value chain and therefore what interventions can be implemented to improve it. It is an important strategic tool because when strengths and opportunities are identified, means of tapping and utilising them in upgrading the value chain are easily identified.

Table 91: SWOT analysis for the groundnut value chain

Strengths	**Weaknesses**
1. Nitrogen fixation in the soil by the plant hence low N_2 fertilizers is required (Okello *et al.,* 2010). 2. Good storage facilities in eastern Uganda where most of the produce comes from 3. Uganda will become a springboard for COMESA because of its central location 4. Reliable and growing market by city dwellers (USAID, 2008) 5. Offers relatively high returns for limited land area. 6. Well adapted to the hot, semi-arid conditions of Uganda. 7. Groundnut is an excellent crop for both domestic and regional markets crop due to its multiple uses (Okello *et al.,* 2010) 8. Two harvests are realized in a year thus are good source of food security (FIT, 2007). 9. When properly dried, they can be stored for long periods (FIT, 2007). 10. Legumes are a good source of proteins in rural area where they are scarce (FIT, 2007). 11. They can be exported to neighbouring countries that are deficit producer (FIT, 2007).	1. Low level of input usage especially improved varieties of groundnuts. Most farmers rely on low input varieties which are saved from previous season/harvests. Farmers lack physical and economic access to inputs (USAID, 2008). 2. Pests and diseases e.g. Rosette, Early Leaf spot (*C. arachidicola*), Late leaf spot (*Phaeoisariopis personata*), Rusts (*Pucciniaarachids*) and Aflatoxins (caused by *Aspergillus niger*, *A. flavus*) (FIT, 2007, USAID, 2008; Okello *et al.,* 2010). 3. Low rainfall and soil moisture and non –irrigation cultures (USAID, 2008) 4. Seed supply challenges (low supply, poor quality) (FIT, 2007) 5. Unsustainable research fund: Funds from GoU are inadequate and thus the fate of research lies in the hands of donors 6. Low production levels as a result of low input uses (Alipia, 2008; USAID, 2008) 7. Low levels of value addition (FIT, 2007) 8. Frequently unsupportive oilseed policies (SNV, 2009) 9. Postharvest handling & storage challenges results into possibility of increasing aflatoxin levels) (FIT, 2007, Masette and Candia, 2007) 10. Unavailability of marketing information (FIT, 2007; USAID, 2008) 11. Poor infrastructure (feeder roads are impassable and do not link farms to markets) (FIT, 2007). 12. Lack of access to necessary information for example on quality, storage etc 13. Low mechanization due limited land resources 14. Poor and wrong calculations by farmers when calculating their profit (USAID, 2008).
Opportunities	**Threats**
1. Demand for vegetable oil is increasing at 3% per annum (Ugen, 2009) 2. New market entrants creating competition and increased participation because of the perception that it is profitable (Ugen, 2009) 3. New market in DRC due the political instability (Ugen, 2009, USAID-LEAD, 2009) 4. Huge market potential domestically and regionally (FIT, 2007).	1. Formerly neglected pests and diseases have become a problem for example Rosette, Leaf spot, aphids, thrips (Okello *et al,* 2010). 2. Drought: This involves three factors; *timing*, *intensity* and *duration* of water deficit 3. Import restrictions by Tanzania (USAID-LEAD, 2009). 4. Aflatoxin due to poor handling and storage facilities for groundnuts threaten the international trade (Masette and Candia, 2007; Okello *et al.,* 2010).

Source: Adopted from aBi Trust (2012)

3.10 Institutional support and coordination along the groundnut value chain

Table 92 presents the different institutions that have been involved in and supported the groundnut value chain in Uganda. Some institutions have supported specific parts of the chain, while others have supported more than one. The groundnut value chain in Uganda has attracted both national and international institutions. This is because of the socio-economic value attached to groundnuts, mainly food and nutrition security and income generation. Institutions that have supported the value chain with

- Inputs are; NARO, NaSSARI, UNADA-stockists network, DANIDA and CARITAS
- Financial services are; Mercy Corps, DANIDA, Commercial Banks such as Centenary, Post Bank, MFIs, MDIs and SACCOs
- Extension Services are; NAADS, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
- Post-harvest handling and marketing services are; VECO East Africa- Uganda Programme, UOSPA and others.

Table 92: Institutions that have supported groundnut value chain in Uganda and type of support

Name of institution	Type of support
National Semi-Arid Research Resources Institute (NaSARRI)	Provide farmers with seed of improved groundnut varieties
NARO	Research and Development
Uganda National Agro-input Dealers Association (UNADA)	Supports a network of stockists who provide inputs to farmers. These include seed, pesticides, herbicides, pangas, hoes and ox ploughs
Donor and relief organizations (DANIDA, CARITAS and the Red Cross)	Supply farmers with improved seed
NAADS and MAAIF	Provide extension services and some inputs such as improved seed mainly to farmers.
	Promote the growing of *Serenut 1* because of its ability for high production and high oil content
Organisations such as DANIDA, Mercy Corps and others.	Offer guarantees to banks and microfinance institutions that are used for guaranteeing on-lending to farmers
VECO East Africa-(Uganda Programme	Offer marketing skills to farmers
Commercial Banks/MFIs/SACCOs	Provide financial services to value chain actors
Trader Associations	Provide technical support and assist in marketing

4 Groundnut value chain mapping

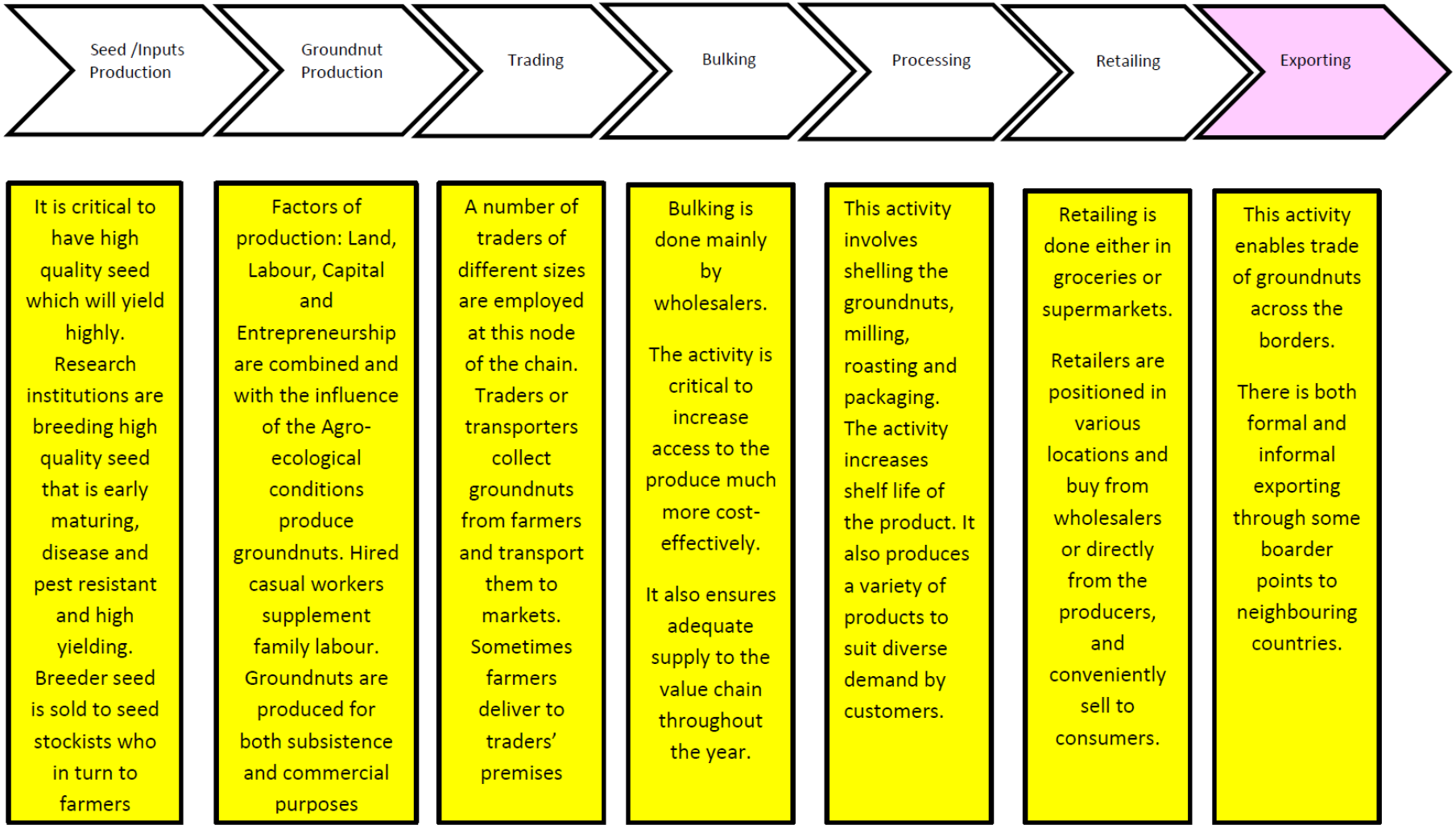
4.1 Business activities/functions

The first tier of the chain characterizes the major business activities (functions) for the groundnut enterprise. The functions start with seed production. Seeds are not the only inputs, and therefore this could be expanded to include production of organic and inorganic fertilizers, chemicals and farm machinery and implements. This is followed by the production process in which producers combine the factors of production to enable them produce groundnuts.

After harvesting the activity that follows is trading which involves post-harvest handling, transportation and storage. Bulking is the other critical activity done by farmers and/or traders to ensure that they get the required volumes to achieve economies of scale which culminates into better resource use efficiency.

Processing follows which is primarily shelling the groundnuts prior to further processing into flour or paste, and finally retailing. Exporting is the other function that is done either formally or informally across various border points. Informal export was found common in Arua where groundnuts were being traded with DRC (via Odramacaku town). It was also found at Busia and Malaba through the border with Kenya. Figure 7 is a mapping of these activities.

Figure 7: Activities in the groundnut value chain in Uganda



4.2 Roles of chain actors

Seed dealers: Although this study did not consider this stage, empirical studies have documented the actors and their roles in groundnut value chain. This is the first stage of the value chain. Farmers, seed companies and local stockists are the major actors at this stage. Besides the seed companies that undertake seed production with a professional approach, farmer-saved seed is also commonly used. Most of the farmer-saved seed has been grown for over 10 seasons and hence has lost the vigour due to segregation. This is partly the reason why the farmers' yields are declining. Local vendors buy seed from the licensed commercial seed companies. They also buy seed from farmers. Also involved in providing seed to farmers are NAADS which is a government organisation, NGOs and some Agricultural projects/programs, for example, World Vision and VECO.

Research and Advisory Services: This can be categorized as a value chain supporter. Seed related research and dissemination of new varieties and technical guidance is critical. This role is played by the National Agricultural Research System (NARS) that is dominated by NARO and Universities. For groundnuts, most of the research is carried out by NaSARRI which has released a number of varieties, the most famous being *Red beauty* and the *Serenut* series. After releasing the varieties, commercial seed companies undertake multiplication of the seeds and avail them to farmers. The Uganda National Agricultural Inputs Dealers Association (UNADA) is also critical to ensure that quality of the seed is controlled for farmers to get value for money. They regularly organize training of input stockists and sensitize them about new seeds. NAADS is another supporter that provides seeds and other inputs to selected farmers and also disseminates technical knowledge about how they should be used. The MAAIF handles policy related aspects concerning seeds including certification.

The Ministry houses the Uganda National Seed Certification Centre. Further, along with NAADS, MAAIF works with the Local Government to provide advisory services. Besides, a number of local and international NGOs provide extension services to farmers. These include World Vision.

Small scale Producers: Small scale farmers dominate the groundnut value chain. However, they are characterised by low productivity. During good seasons, they produce surplus which they sell to rural traders (sometimes through agents or brokers) in either unshelled or shelled form. Only about 33% of the produce can be considered as the marketable surplus. Going by empirical results, the small scale farmers sell about 500kgs per year. Farmers are in most cases influenced to sell their produce to be able to solve pressing family needs such as school dues or health care as indicated earlier on. The major varieties grown include *Red beauty*, *Serenut* and other local *Valencia* type varieties. *Red beauty* is the most preferred due to its bright attractive colour. However, the major challenge with this variety is the high susceptibility to rosette virus disease, a major disease that causes yield losses of 30-100% (Brink and Belay, 2006). As such, *Serenut* varieties 1, 2, 3, and 4 have been developed.

Weekly/Occasional market sellers: These operate largely from the rural markets. They comprise of mainly farmers themselves who take their harvests to the market for sale. A small portion of market sellers are not groundnut producers but concentrate on buying produce from farmers and selling to local consumers in the same or other rural markets (FIT,

2007). Market sellers operate all year round unlike farmers who are in business only during periods after harvesting when they still have the stock. Some farmers are charged a small fee for selling from these markets. In shelled or unshelled form, groundnuts are sold to wholesalers who assemble from markets or trading centres. In other cases they are sold to retailers who in turn sell directly to consumers or processors. The volume handled ranges between one to two 100kg-bags per day (FIT, 2007). They do not have stores and sell their produce in the open-air markets, sometimes even without shelter. Those located in distant markets lack adequate market information. Their adjustment of prices depends on supply, local demand, number of competitors and the season.

Middlemen/Agents/Brokers: These link producers and buyers. Most times these agents are farmers or members of the farming community. They normally guide buyers who are not familiar with the location of different farmers. Transport of produce and market information delivery are the major services they provide in the value chain. They sometimes buy farmers' produce and store it in trading and urban centres which are easily accessed by buyers (urban wholesalers).

Wholesalers: These are mainly involved in bulking and selling to other wholesalers, retailers or processors. They mainly operate in urban centres (USAID, 2008). They deal in general produce including groundnut, maize, rice and beans. They also undertake retail business at times to diversify their outlets. They normally handle large volumes compared to retailers. Results show that they earn a bigger margin compared to the retailers. Those identified in this study were located in Kampala and regional towns such as Lira, Gulu and Soroti. The main products are the unshelled and shelled groundnuts. Few of them also trade in groundnut flour, paste and butter. Results show that in a year, a wholesaler handles 557,754 kg of shelled groundnuts. One average, a wholesaler makes a margin of Shs 897 – 1,034 per kg.

Processors: There are no large scale processors of groundnuts in Uganda. Processing is done by urban-based traders and wholesalers as a means of adding value before selling. Value addition done is in form of shelling, milling or making paste. Products such as paste and flour are produced using both manual and motorised grinders. Some processors blend groundnut flour with sesame paste, pack it and label it for sale. On average, a processor handles 172,878 kg in year. The margin ranged between Shs 794 – 1592 per kg.

Retailers: Retailers normally purchase produce from wholesalers. Some do purchase directly from farmers located in rural areas. They try to sort the groundnuts before selling to consumers. The low quality nuts are milled into flour or paste. They handle relatively small volumes and earn a profit of between Shs.200 to 500 per kg. They are known to charge the highest prices in the whole chain for the unprocessed products. Compared to wholesalers, they have limited access to market information apart from the prevailing prices in their respective market locations. On average, a retailer is estimated to handle 159,168 kg of shelled groundnuts per year. Their margins range from Shs.256-671 per kg.

Consumers: These normally buy already sorted and cleaned groundnuts from retailers (mostly those located in urban centres). Depending on their needs, consumers buy either unprocessed or processed products and have a wide range of retailers they can buy from. St. Balikudembe market, located in Kampala, is reportedly the largest groundnut market.

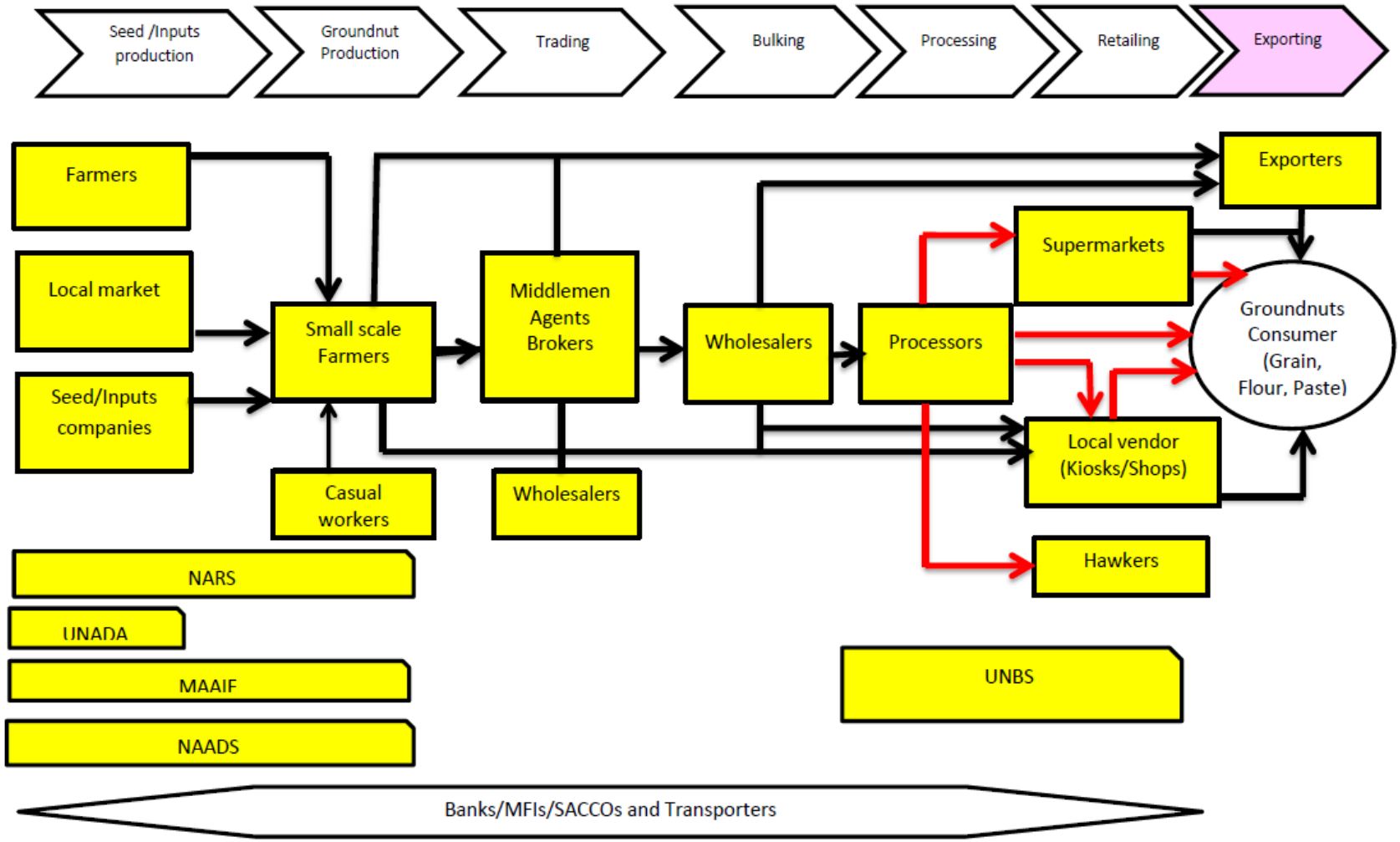
Almost throughout the year, groundnuts are readily available to the consumers in many parts of the country.

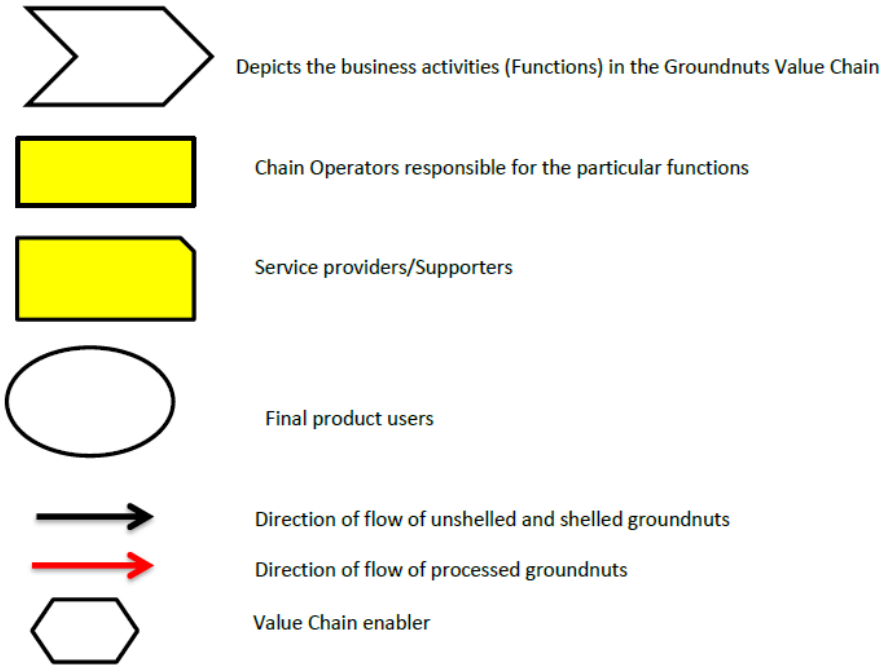
Exporters: Few traders are able to sell groundnuts to the neighbouring countries. The countries include Kenya, DRC, South Sudan, Rwanda and Tanzania. The groundnuts are mainly exported in shelled form. The export currently done for the Ugandan groundnuts is both formal and informal. This node of the chain requires further scrutiny to make it more lucrative. However, it will require that all the functions and actors play a proactive role. For example, the farmers have to be assisted to produce bigger volumes and of high quality so that there is enough for local consumption and export.

Enablers of the chain: Among the critical enablers of the value chain are commercial banks, microfinance institutions and SACCOs that provide financial services required to fund the various activities right from seed production to export. One of the challenges predominant for the value chain actors was inadequate capital to expand their businesses. The other enablers are transporters of various categories. They include owners or operators of trucks, lorries, motorcycles, bicycles, taxis, buses and trailers. These are constrained mainly by poor roads and high cost of fuel and spare parts for the vehicles.

Figure 8 presents the Uganda value chain maps for groundnuts specifically showing the actors and their relations, while Figure 9 presents the value chain actors and their functions in the chain. Figure 10 shows value addition components and selling price at each level, while **Figure 11** is a value chain map showing the number of actors that were involved in this study and the average volumes they handled.

Figure 8: Groundnuts value chain map: Actors and their relations




Depicts the business activities (Functions) in the Groundnuts Value Chain
Chain Operators responsible for the particular functions
Service providers/Supporters
Final product users
Direction of flow of unshelled and shelled groundnuts
Direction of flow of processed groundnuts
Value Chain enabler

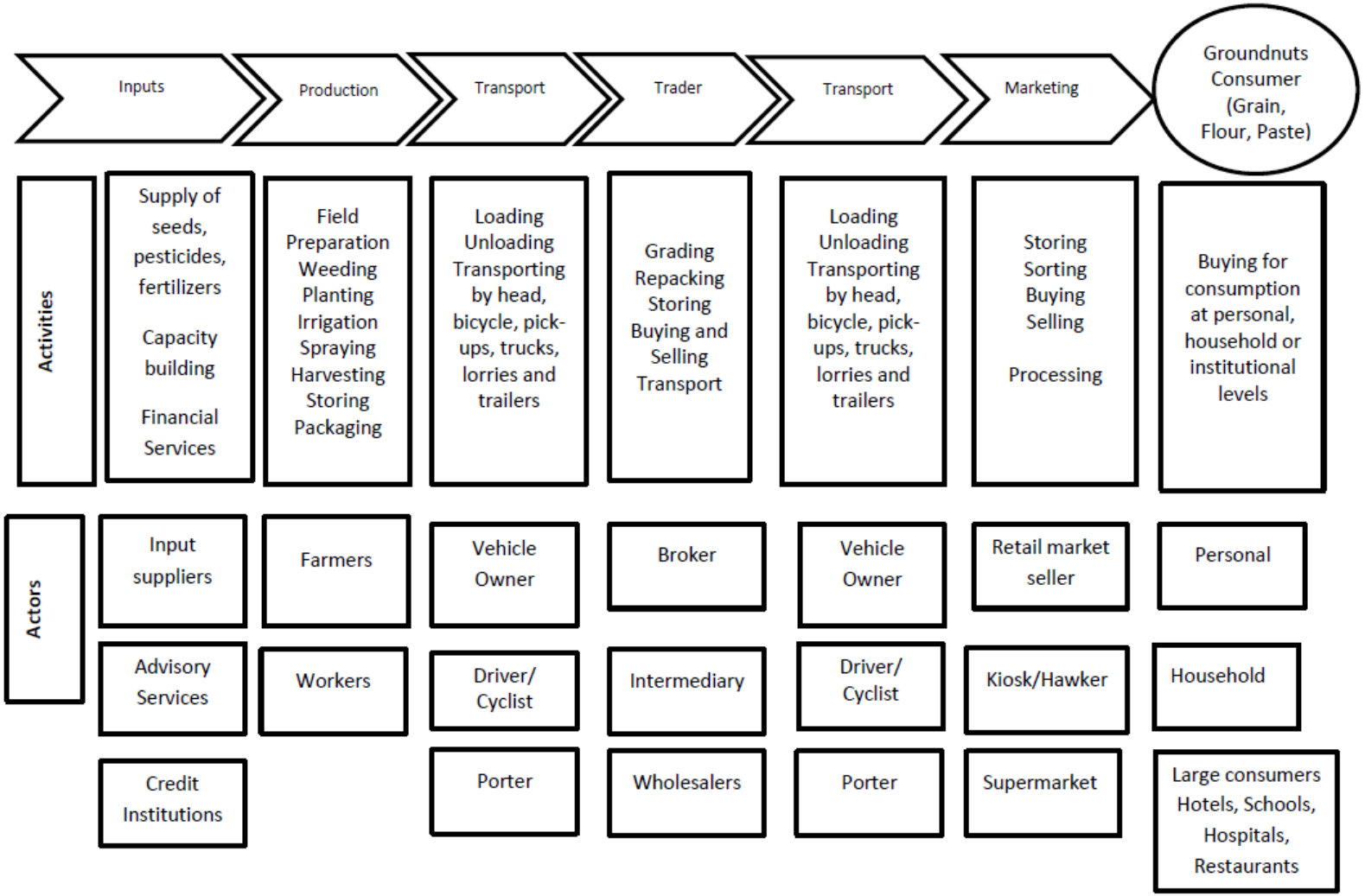


Figure 9: Groundnut value chain actors and their functions

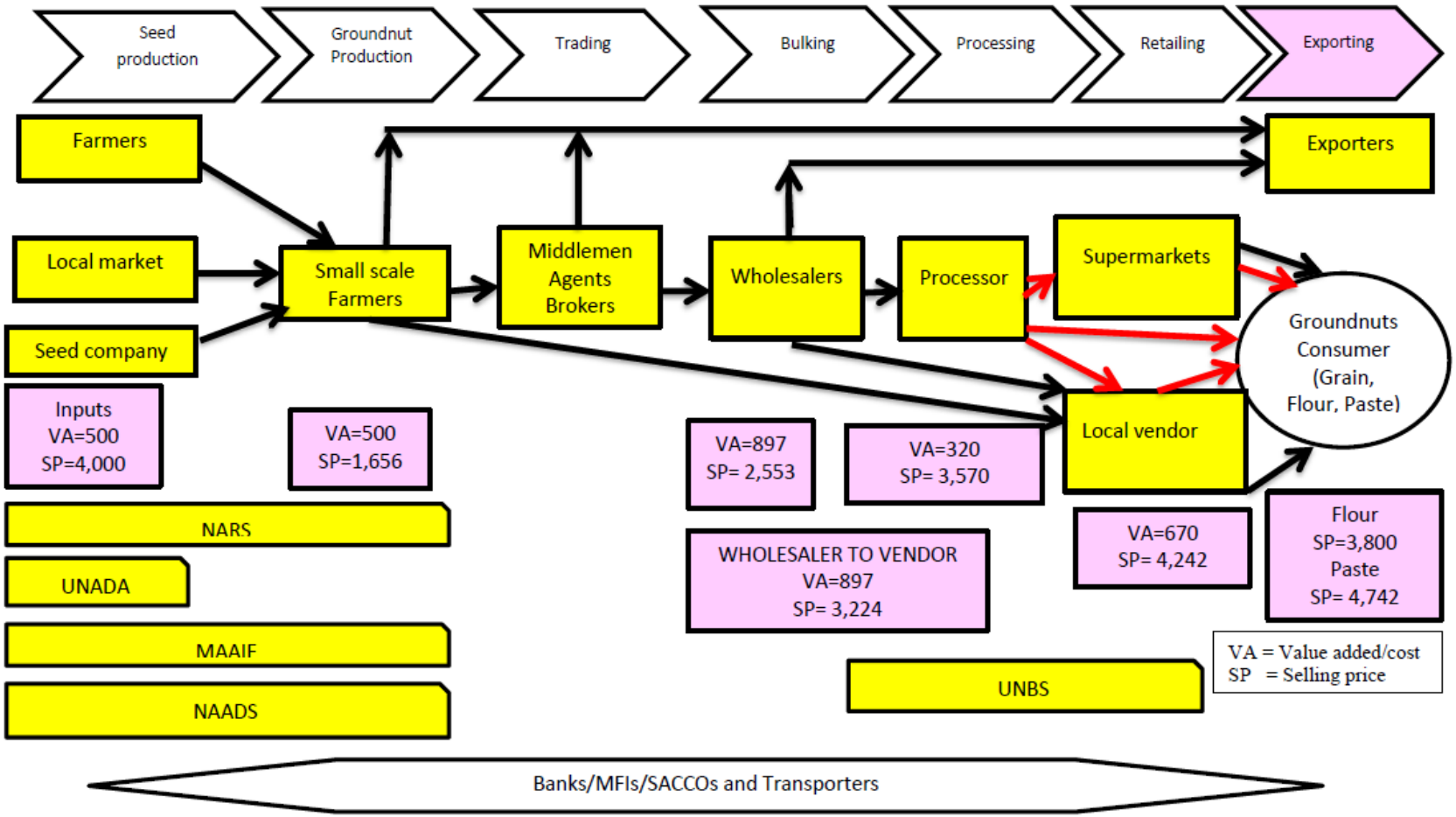


Figure 10: Value addition components and selling price at each level of the groundnut value chain

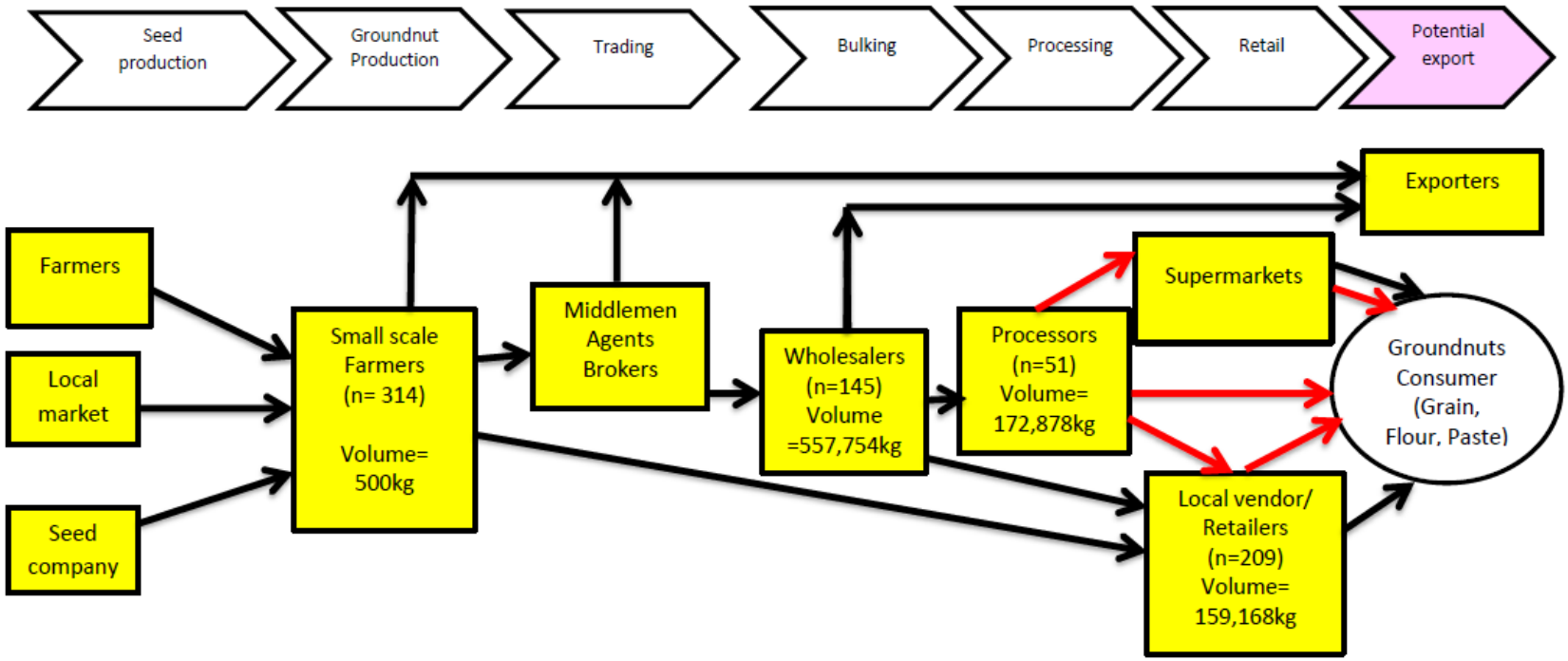


Figure 11: Value chain map showing number of value chain actors involved in the study and volumes handled

5 Conclusions and recommendations

Groundnuts have a special place in Uganda's agriculture in terms of cash needs for farm families. It also employs a number of actors who include farmers, traders, processors, brokers and other service providers. Its value chain has a number of opportunities that when exploited will directly and indirectly improve the welfare of the actors and their communities.

However, the groundnut value chain also has constraints faced by the different chain actors. These should be addressed in order to improve the value chain efficiency. This study therefore draws the following recommendations:

- There is need to build the capacity of value chain actors so that the major drawbacks are turned into opportunities for increased profitability. For instance, they should be sensitized on the advantages of adding value to groundnuts
- Research activities in developing disease and pest resistant varieties, high yielding varieties and high quality products should be supported.
- The government and other organizations involved in infrastructure development need to do more in developing the production and market infrastructure. This will not only benefit the groundnut sub-sector but also other economic and social sectors.
- The groundnut value chain actors should be provided with simple but efficient equipment such as the mobile sheller at affordable cost.
- The value chain actors should be sensitized on quality aspects including aflatoxins and the associated causes, effects and prevention/control.

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