



Enhancing market opportunities for farmers in the soybean value chain through increased access to

Market information: A case study of Bukedea District in Eastern Uganda

By

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Enhancing market opportunities for farmers in the soybean value chain through increased access to market information: A case study of Bukedea District in Eastern Uganda

A research project submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment of the requirements for the award of MSc in Agricultural Production Chain Management, Horticulture specialisation.

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Dedication

I dedicate this piece of work to my dear people: wife Atai Irene Sylvia, mother Aguti Jennifer and Uncle Okello Charles David.

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List of Acronyms

BDLG	Bukedea District Local Government
C	Carbon
COVID-19	Corona Virus Disease-19
DAO	District Agricultural Officer
DPU	District Planning Unit
FFP	Focal Point Person
FMO	Farmer Marketing Organisations
FY	Financial Year
GPD	Gross Domestic Product
HIV	Human Immune Virus
HLFOs	Higher Level Farmer Organisations
ICT	Information, Communication and Technology
IFAD	International Fund for Agricultural Development
LLFOs	Lower Level Farmer Organisations
LSB	Local Seed Business
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MIS	Marketing Information Systems
N	Nitrogen
NaCRRRI	National Crops Resources Research Institute
NaSARRI	National Semi Arid Resources Research Institute
NGO	Non-Governmental Organisations
NPA	National Planning Authority
NPHC	National Population and Housing Census
PESTEC	Political, Economic, Social, Technological, Environmental and Cultural factors
PPP	Public-Private Partnership
PSP	Pay for Service Providers
QDS	Quality Declared Seeds
SACCOs	Savings and Credit Cooperatives
SWOT	Strengths, Weaknesses, Opportunities and Threats
VCA	Value Chain Analysis
VODP2	Vegetable Oil Development Project Phase 2

Executive summary

Market information is important to farmers because it helps them to make optimal production and marketing decisions. This study focused on the development of a practical and operational strategy that increases market information access for soybean small holder farmers, consequently improving access to markets by for example increasing their capacity to bargain power for fair price, to access new markets and buyers, to improve the quality and quantity of the produce as well as improve information management (record keeping) at the farms. In this applied research the role of stakeholders in the chain, factors affecting farmers regarding the accessibility and dissemination of market information, and market information use and satisfaction. In this study we used both quantitative (survey) and qualitative (interviews) methods in addition to a desk study to obtain both primary and secondary data. Data was analyzed using tools such as Chain map, SWOT, PESTEC and statistical method (SPSS). The findings from this research were as follows: Among the various stakeholders in the soybean value chain, each playing a role in supporting chain activities, the Non-governmental Organizations' extension workers and private sector (PSP) played a major role in helping farmers to access market information. The results showed that farmers access market information through traders/middlemen (70%), trainings by government and NGOs extension workers (53.4%), other farmers (61.7%), local radios (48.3%) and telephone (45%). The total percentage is more than 100% because farmers had accessed information from more than one channel. Also the main information accessed by farmers was price, quality/grade of soybeans, volume of grains and information on available buyers. Importantly, individual farmers accessed market information mainly through traders/middlemen (40%) whereas farmer groups accessed mainly through trainings (41.7%), other farmers (33.3%) and local radios (30%). Farmers (63.3%) were generally not satisfied with the information that they received because it always came late and it was not the information that they expected. Regarding record keeping, farmers (68.3%) had kept records such as production costs and market information whereas 25% lacked information records in their farms, which shows lack of knowledge and training in record keeping.

The research also found that farmers had faced numerous challenges while accessing market information. The main constraints were (a) not being in a farmers group (25%), (b) costly for farmers to get information (18.3%), (c) poor relationship with buyers (28.3%), (d) lack of technological gadgets such as telephone to access digital information (21.7%) and (e) long distance to the markets (21.7%). Regarding the optimal use of information, the majority of farmers (84.5%) used it to bargain for price, improve grade/quality of the produce and to look for new markets/buyers whereas 15.5% were not able to use the information because it came too late and it was not the right information. Moreover, results from this research showed that knowing the current market prices (60%), knowledge and information on quality requirements (35%), information on available buyers (20%) and volumes required in the market (23.3%) were the most important to farmers. Farmers would also prefer such information to be disseminated through trainings (40%), telephone (31.7%) and local radio (25%). In addition, opportunities exist for increasing farmers' access to market information and the use of both government and NGO extension workers to provide relevant information, the availability of both media (i.e., digital and print) and public-private partnership in the area of market information sharing were mentioned as opportunities that could benefit farmers.

CHAPTER ONE

1.0 Introduction

Agriculture remains the backbone of Uganda's economy employing about 72 percent of the total labour force (NPA, 2015) and contributing 24% to the Gross Domestic Product, GDP (The World Bank in Uganda, 2020). The agriculture sector had a total contribution to GDP at current prices of 24.9 percent in the Financial year (FY) 2016/17 compared to 23.7 percent in FY 2015/16 with the food crop sub sector registering the highest contribution of 13.6 percent in FY 2016/17, representing an increase when compared to the FY 2015/16 with 12.1% (MAAIF, 2020). The Government of Uganda has identified oilseed crops as one subsector with the potential to stimulate economic growth and reduce the poverty of smallholders. Increasing the production of oilseeds and their products has gradually reduced national spending on the import of vegetable oil products and palm oil (Wanyoto, 2017).

1.1 Importance of the soybean crop

Soybeans (*Glycine max*) are one of the most valuable crops in the world (Masuda and Goldsmith, 2009). It represents a very important source of income for farmers. According to Tukamuhabwa *et al.* (2016), soybean is one of the most important oil crops grown in Uganda with various uses such as: (a) the protein content of soybean is the highest among legume crops; (b) averaging 40% on dry matter basis, and due to its nutritional superiority, soybean flour is the only substitute to animal and fish protein and for this reason, (c) soybean based foods are highly recommended for children under 5 years, expectant mothers and Human Immune Virus (HIV) patients, additionally (d) soybean oil is 85% unsaturated, comprising linoleic acid (omega-3 fatty acid) and oleic acid which are known to reduce the risk of heart disease by lowering serum cholesterol by about 33%. Soybean is also used in the animal feed industry to make feeds for livestock (Masuda and Goldsmith, 2009). And as it is a legume crop, it can be used to improve the soil nutrients, soybean residues are relatively rich in Nitrogen (N) with a narrow Carbon (C) - to-Nitrogen (N to C) ratio and these characteristics favour rapid decomposition and release of Nitrogen to subsequent crops for good crop growth (Franke *et al.*, 2018).

1.2 Production trends

Uganda is the leading producer of soybean in Eastern Africa, with an increase in production from 158, 000 tonnes in 2005 to 213,300 tonnes in 2011, whereas the area under production increased from 144, 000 to 150, 000 per ha (FAOSTAT, 2011) during the same period. Since 2012, soybean production has been growing steadily given the increased industrial capacity to process the soybean into oil and also its use in the animal feeds industry, there are approximately 35,000 soybean producers, with numbers continuing to grow (Wanyoto, 2017). The upward trend in production is attributed to improved soybean research by the government of Uganda, learning institutions and developmental organizations, which have resulted in the release of high-yielding varieties such as Maksoy 1N,2N,3N,4N and 5N (Fig 2) with increased tolerance to diseases, making Uganda one of the key exporters of soybean products at the level of regional markets (Murithi *et al.*, 2016). Furthermore, dissemination of soybean processing and cooking methods by non-governmental organizations among women groups has facilitated the adoption of soybean among smallholder households and led to an increase in the use of soymilk and soy flour among households in Uganda (Murithi *et al.*, 2016). According to the Ministry of Agriculture, Animal Industry and Fisheries, the production of the major oil crops increased by 19% from 2016 to 2017 (Fig 1) and this was attributed to the increased use of improved seed and enhanced extension services provided to farmers (MAAIF, 2020). As the production area increases, several challenges pose threat to soybean production. Crop pests, weeds and diseases such as the soybean rust have consistently

contributed to severe yield losses and affected the quality of soybean (Murithi *et al.*, 2016). In addition, other non-biotic factors such as declining soil fertility, extreme weather changes, poor nodulation and seed longevity have all affected soybean production (Murithi *et al.*, 2016; Tukamuhabwa *et al.* 2016).

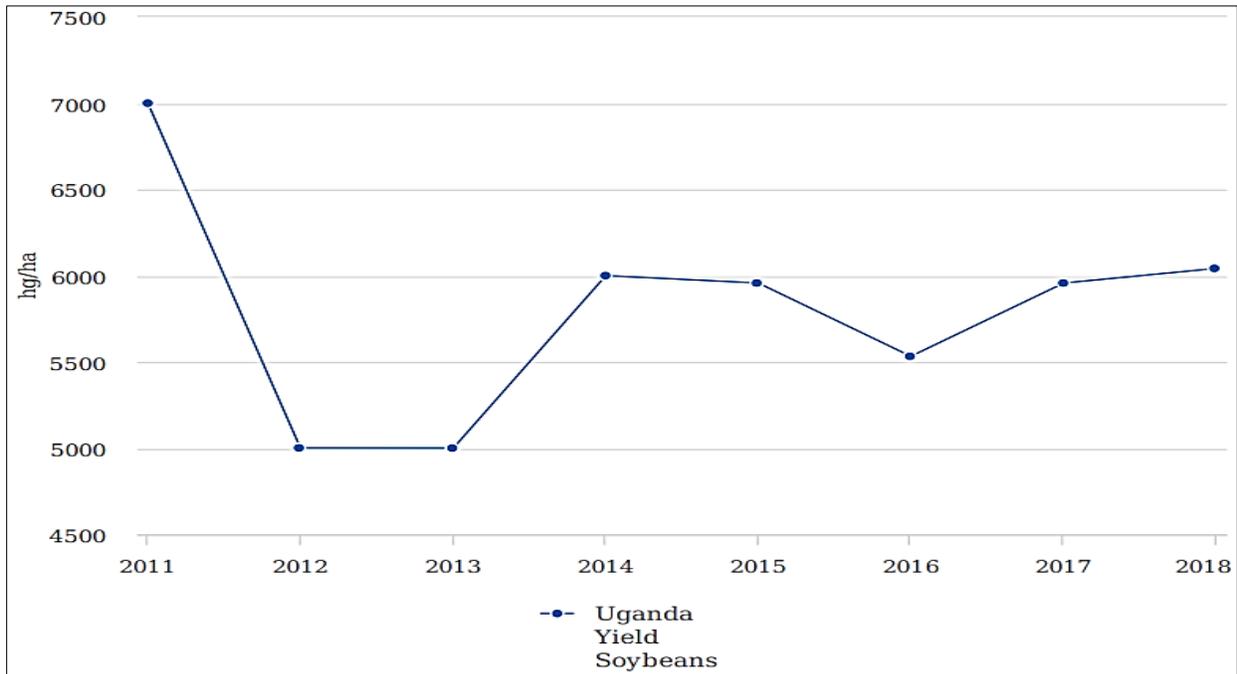


Figure 1: Soybean production trends (yield/ha). Source: FAOSTAT (June 04, 2020)

Fig 1 shows soybean production trends in Uganda. From the year 2011-2013, Production was still low but increased between the year 2013-2014 as more farmers adopted soybean production before declining again in 2015, which could be attributed to the prolonged dry spell that the country experienced in the period 2015-2016. However, since 2016 there has been an increasing trend.

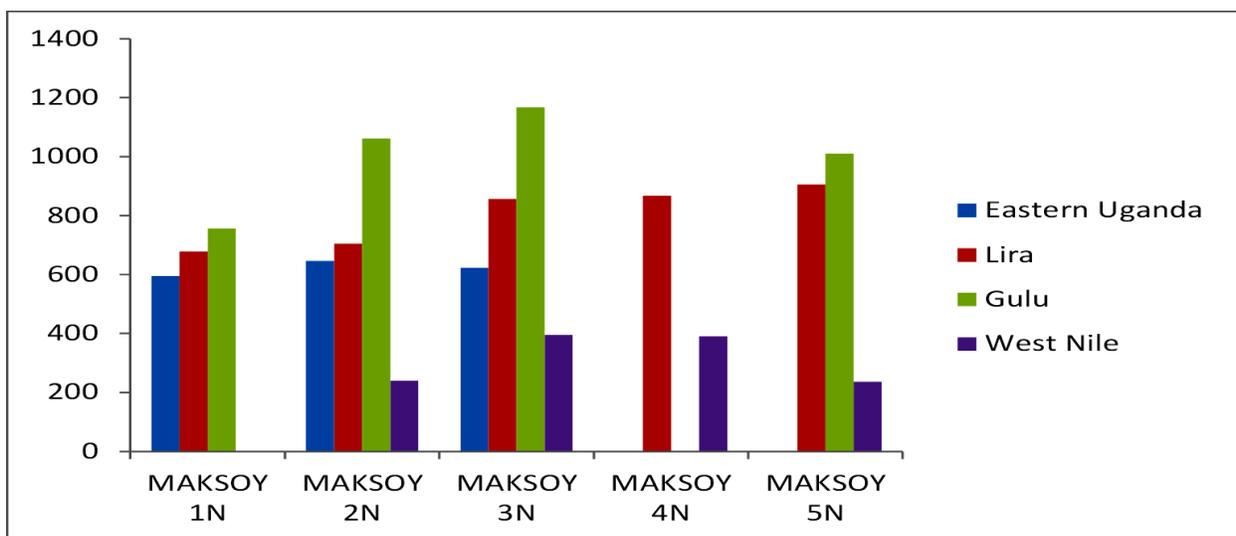


Figure 2: Soybean variety performance in the four regions. Source: IFAD-VODP2, 2016

1.3 Farmer access to markets

Kruijssen *et al.* (2009) reported that individual smallholders in developing countries face numerous constraints to marketing their products. Such constraints are education, cost of transportation, distance from farm to market and access to market information (Kruijssen, *et al.*, 2009; Mangnus and Piters, 2010; Ahmed *et al.*, 2016). In a study conducted by Tukamuhabwa *et al.*, (2016) in Uganda, farmers had challenges of low prices, high transport costs, distant markets and poor markets in the marketing of soybeans. According to Kyomugisha *et al.* (2018), understanding barriers to market access for smallholder farmers and their marketing efficiency when they participate in agricultural value chain is key to unlocking the market potential and overcoming market failures.

1.4 Access to market information

According to MAAIF (2010), there is inadequate market information to guide farmers in market oriented farming and KIT *et al.* (2006) further noted that knowledge is power, this poses an unfortunately common disadvantage for farmers as usually they have little or no information about the performance of their own organisation and of the market. Small holder farmers usually have limited access to information about prices, quality standards and other market related information and these factors make it especially difficult for the farmers to benefit from the chains they are involved in (KIT *et al.*, 2006). Easier access to market information enables buyers and sellers to make informed choices on where to sell, when, and at how much and access information on new technologies such as processing, packaging and storage (KIT and IIRR, 2008). Therefore, to improve the position of farmers in the chain, their access and management of information needs to improve. This is supported by Mitra *et al.* (2018) who said that smallholder farmers lack access to wholesale buyers and are unaware of the prices at which their produce are resold in the market.

1.5 Importance of market information

Market information helps farmers to improve their decision making and profits (Fafchamps and Minten, 2012; Tang *et al.*, 2015; Tadesse and Bahiigwa, 2015; Wang *et al.*, 2018). However, it is up to the farmers to make use of the information even if it is free of charge (Tang *et al.*, 2015). Market information can only be useful when acted upon (Fafchamps and Minten, 2012). The value of market information can change with circumstances and identifying its value is often difficult (Fafchamps and Minten, 2012).

1.6 Research problem

In the last ten years in the vegetable oil seed sector (through the Vegetable Oil Development Project (VODP), both individual small-scale soybean farmers and farmers groups, have been experiencing a lack of adequate access to market information. They often lack market information, for example farmers may not know how much their produce is really worth in economic terms, and how much more they might earn if they were to transport it to the nearby town rather than selling to the trader who arrives at the farm gate (KIT *et al.*, 2006). Therefore, because of the inadequate access to market information, most of the farmers do not have optimal bargain of their produce and the majority sell at low prices to the middlemen/brokers who move throughout villages to collect the produce, sometimes using inappropriate weights/measures. Better market information is a key incentive for increased sales of smallholder farmers (Omiti *et al.*, 2009) and inadequate access to it, is therefore associated with low returns in the households that grow soybeans (Magesa *et al.*, 2014) and could further act as a disincentive for farmers to participate in soybean production and marketing (Zamasiya *et al.*, 2014). This problem could also undermine the effort of the District and the government through VOPD towards developing well-functioning soybean value chain and to have farmers improve their livelihoods through increased incomes at household level.

Problem owner: Bukedea District Local government. The District under its department of production and marketing and in line with MAAIF has the mandate of transforming the livelihoods of farmers through the provision of agricultural extension services, appropriate technologies and promotion of agricultural commodity value chains.

1.7 Justification of the study

The Soybean has got several uses as described in section 1.1 and because of its importance, the government of Uganda through public-private partnership (PPP) had an intervention to increase the production and marketing of vegetable oil crops (Sunflower, Soybean, simsim and groundnuts) in the four hubs of Mbale, Lira, Gulu and West Nile through the Vegetable Oil Development project (VODP). This was done through formation of farmer groups and by providing them with Agricultural Extension Services, and linkages to inputs and markets. Bukedea District Local government (BDLG) is one of the public institutions that implemented the VODP, through the department of production and marketing, by providing agricultural extension services to the farmers. Farmers that have adopted soybean production for household income and crop production have also increased the average yield to 0.9 tons per hectare (MAAIF, 2019). Farmer groups have also started Local Seed Businesses (LSBs) to produce quality declared seeds (QDS) and supply to other farmers. Despite the efforts done by VODP, it has been reported by the MAAIF (2019) annual survey that the majority of the respondents (59%) had not received support in accessing markets showing a clear need to support small holder farmers to access markets. One relevant strategy to approach the aforementioned is to provide farmers a better access to market information. This research therefore researched on the factors affecting farmers' access to market information aiming at providing a practical and operational strategy that allows farmers to optimally access market information in the Bukedea District.

1.8 Research Objective

To develop a practical and operational strategy for the Bukedea District Local government that aims at improving the dissemination of market information to small holder soybean farmers so that ultimately the soybean grains value chain can be enhanced. This strategy will focus on addressing the major challenges that affects the accessibility and dissemination of market information to farmers, and by identifying gaps this strategy will raise tailored-made-recommendations.

1.9 Research Questions

1.9.1 What are the factors influencing access to market information by small scale soybean farmers in Bukedea?

- a) Who are the stakeholders and their roles in the soybean value chain?
- b) What channels that small scale farmers currently use to access market information and are they satisfied with the information?
- c) What kind of information' records do small scale farmers keep in their farms?
- d) What are the constraints that small scale farmers encounter while accessing market information?
- e) What is the difference in access and use of market information by individual smaller holder farmers and those in farmer groups/cooperatives?

1.9.2 What are the market information needs of small holder farmers?

- a) What kind of knowledge on market information do small holder farmers identify as the most needed?
- b) What are the preferred channels for delivering market information to small holder farmers?
- c) What are the opportunities available for increasing dissemination of market information to small holder soybean farmers by the District?

1.10 Conceptual framework

The conceptual framework in Fig 3 shows the formulation of the study. The small scale farmers/ groups in the value chain will need access to market information in order to achieve increased market access. To achieve the latter, farmers have to be supported by government institutions (District Local government, Line ministries), Non-Governmental Organisations (NGOs), processing Companies, Pay for Service Providers (PSP) and input suppliers. The government institutions provide market information to farmers through trainings and link them to the buyers while the NGOs further build the capacity of the farmers in marketing. Processing companies provide to the farmers information over the quality requirements for the grains they process, the prices they offer and the volumes that they require from farmers. The Processing companies usually channel the information through farmers' groups/cooperatives. The Agro input dealers provide the farmers with market information on input availability, usually through local media (radios) while the PSP links farmers to the buyers and provide them with training in marketing and farming as business.

Although in the ideal situation the market information is passed throughout effective fluxes (i.e., relevant stakeholders in the chain and optimal dissemination routes), there are still barriers (constraints) that curtail the market information access by farmers. Such barriers could be (a) institutional (extension services delivery to the farmers)(Simtowe *et al.*,2019), (b) human (Knowledge and skills of farmers in record keeping and marketing) (Dudafa, 2013), (c) organisational (farmers organised in groups or not (KIT *et al.*, 2006; Kiiza and Pederson, 2012), education levels of the farmers) (Anbarasan and Bhardwaj, 2017), (d) Technological (use of equipment/gadgets like cell phones to access market information (Ferris *et al.*, 2014) and (e) Financial (Cost associated with getting the information) (Tadesse and Bahiigwa , 2015). Additionally, based on the identified constraints, optimal opportunities need to be identified that enhance market information access by farmers.

Therefore, smooth market information flow for farmers in the value chain can be realised in the presence of support from stakeholders, the absence of barriers and when the optimal opportunities are utilised. Otherwise, farmers would still be unable to achieve increased access to markets due to inadequate access to the relevant market information.

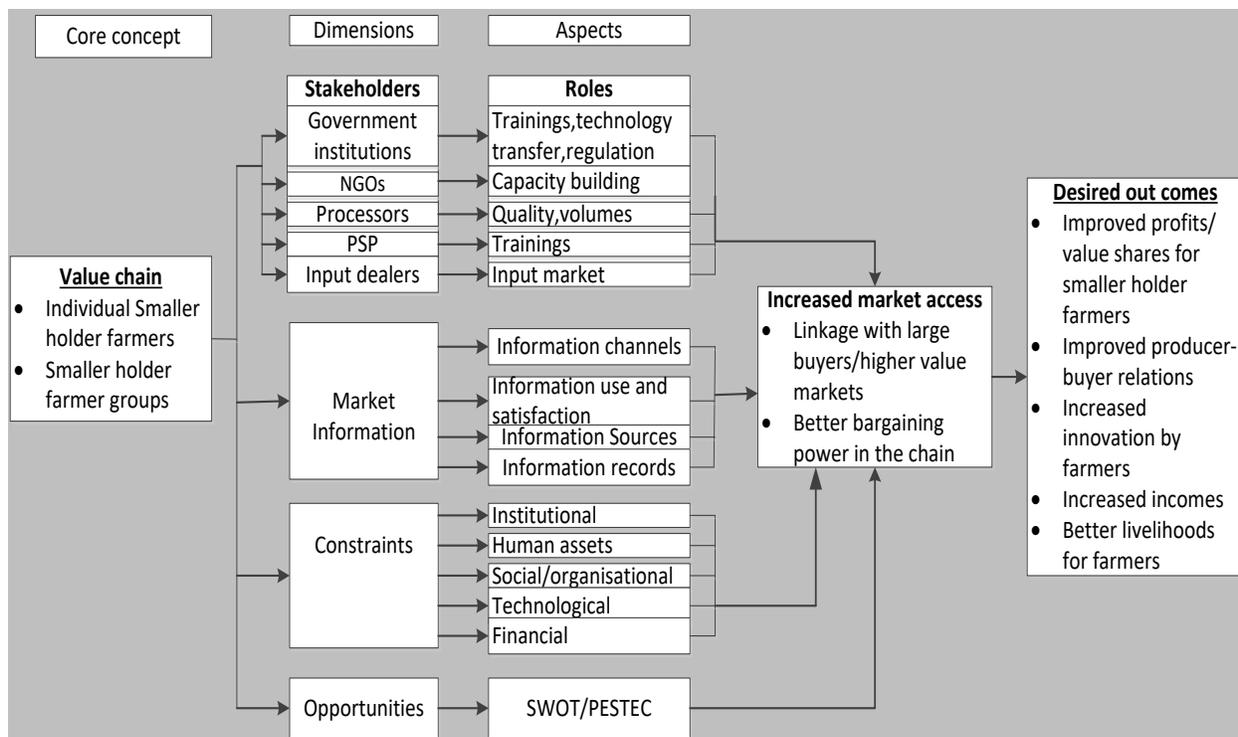


Figure 3: Conceptual framework. Source: Author's illustration.

Definition of concepts

- a) **Value chain:** Value chain is the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use (Kaplinsky and Morris, 2000). KIT *et al.* (2006) further defined value chain as a specific type of supply chain where the actors actively seek to support each other so that they can increase their efficiency and effectiveness by investing time, effort and money, and build relationship with other actors to reach common goal of satisfying consumer needs-so they can increase their profits.
- b) **Stakeholders:** a stakeholder is an individual or group with an interest in the success of an organization in fulfilling its mission- delivering intended results and maintaining the viability of its products, services and outcomes over time (Khudair and Abdalla, 2016).
- c) **Market information:** This involves knowing about prices and trends in the market so that the farmers can bargain with potential buyers (KIT *et al.*, 2006). Such market information includes: information on prices, buyers, processors, trends (demand and supply), available suppliers, transport costs, quality and quantity requirements in the market (Shiferaw *et al.*, 2011) and this information enables farmers to make long term production decisions (which crop to cultivate and how much to cultivate) and short-term selling decision- when to sell, where to sell and at what price (Chen and Tang, 2015).
- d) **Market access:** Market access includes the ability to obtain necessary farm inputs and farm services, and the ability to deliver farm products to buyers (van Schalkwyk *et al.*, 2012).

CHAPTER TWO

2.0 Literature review

This section reviews the literature from previous reports, research and publications done on the related research topic to get an insight into the factors affecting the access of farmers to the market information in Bukedea.

2.1 Stakeholders in a value chain

Stakeholders in an agricultural value chain play many roles. It was stated by van Schalkwyk *et al.* (2012) that stakeholders in the agricultural sector can improve market access by eliminating entry barriers, engaging in collective action, enhancing the transfer of technology, implementing a human resources development plan, improving access to a comprehensive range of rural and financial services including extension, and to improve the collaboration and coordination between government institutions, agricultural organisations, non-government organisations (NGO's) and civic associations. As regards to information dissemination to farmers, NGO community particularly have a big role to play because they have access to the latest ICT facilities and have more presence on the ground (Ferris *et al.*, 2014). Stakeholders in a value chain can be shown using a chain map (Fig 4). Stein and Barron (2017) noted that the creation of a value chain map is usually an integral part of most value chain analysis (VCA) as mapping a value chain with its various components, linkages and actors can among other things, facilitate a structured discussion about the opportunities and constraints that producers and other actors face as well as what could be done to address them. Value chain analysis is important because it helps to explain the distribution of benefits, particularly income, to those participating in the global economy and makes it easier to identify the policies which can be implemented to enable individual producers and countries to increase their share of these gains (Kaplinsky and Morris, 2000). However, a value chain analysis does not provide the whole overview, other factors need to be addressed such macroeconomic issues (particularly capital flows and their volatility), political issues (particularly the factors determining the rate and productivity of investment) and the determinants of social capital (Kaplinsky and Morris, 2000).

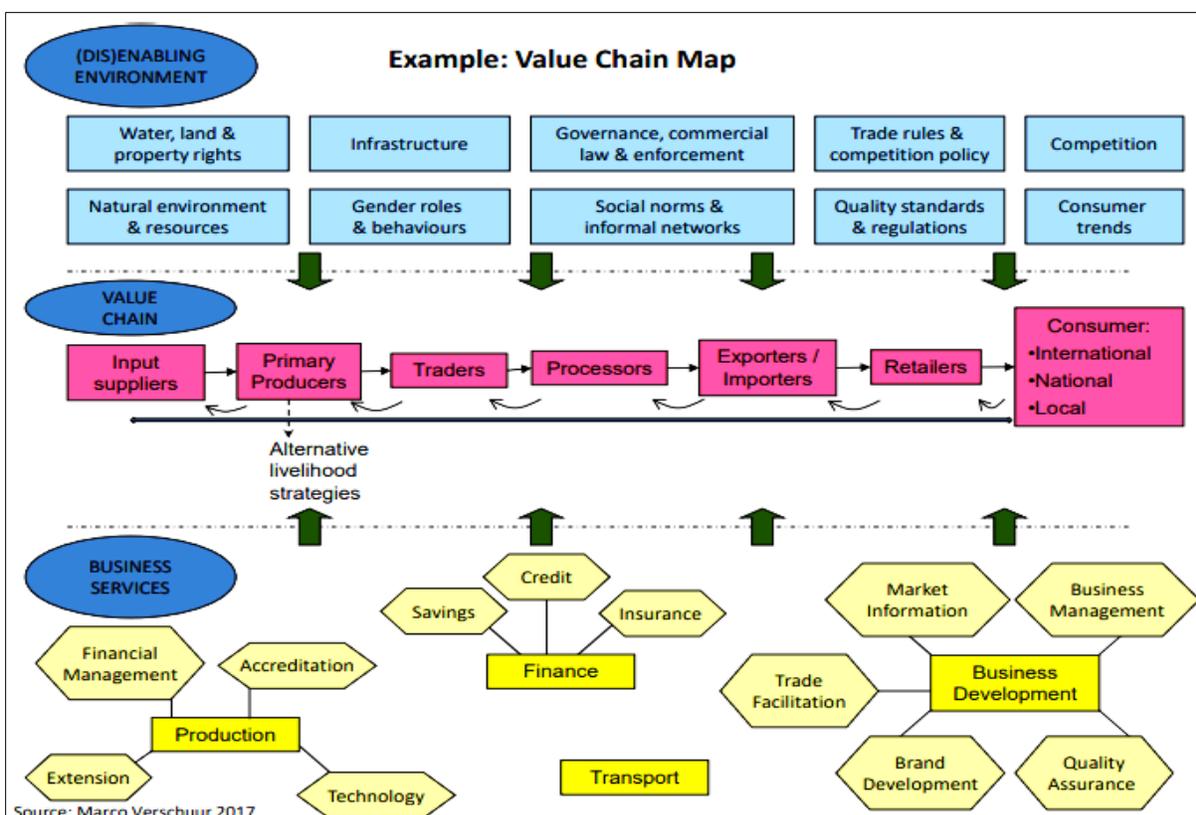


Figure 4: Illustration of value chain concept using chain map. Source: Marco Verschuur, 2017

2.2 Current status of soybean Value chain in Uganda

The soybean seed value chain is becoming operational and effective in producing QDS. Makerere and National Crops Resources Research Institute (NaCRRI) provide foundation seed and have trained 259 individuals farmers distributed in different groups in producing Quality Declared Seeds that locally have supplied to farmers. Additionally, the project directly supported 1,196 groups (27,508 beneficiaries) through Pay for Service Providers (PSPs), however there are also other small holder soybean farmers that were not covered by the project. Support by the PSPs to the missing farmers is needed. In the other hand, adoption of soybean production has improved, farmers purchased 18.2 tons of improved soybeans seeds in 2016 and the average yield for soybean across the hubs is shown in table 1 (IFAD-VODP2, 2016).

Table 1: Average soybean yield per acre in the four growing hubs in Uganda

Soybean variety	Yield per acre (Kg)				Variety Average
	Eastern Uganda	Lira	Gulu	West Nile	
MAKSOY 1N	595	678	756.0	-	676
MAKSOY 2N	646	705	1061.5	240	663.1
MAKSOY 3N	623	856	1167.2	395	760.3
MAKSOY 4N	-	867	-	390	628.5
MAKSOY 5N	-	905	1011.0	236	717.3
Hub Average (Kg/acre)	621.3	802.2	998.93	315.25	

Source: IFAD-VODP2, 2016.

Soybean grains sold collectively by farmers have continued to grow during the past 3 years, totalling 1,516 tons of soya beans in 2015. However, MAAIF-VODP2 (2019) in the annual outcome survey for the year 2018 indicated that in all the four vegetable oil seed growing hubs, only 12% of farmers sold their grain to the collection centres/farmer groups, with the majority of farmers selling their soybean grain to the brokers/middlemen/individuals whereas 4% sold directly to processing plants. Agents and intermediaries often take advantages of farmers’ limited marketing and business skills. There is, therefore, a strong need for trust building among all actors in the sector and for farmers to increase their capacity to take informed decisions and manage their farming as a business at the individual and collective level (IFAD-VODP2, 2016). There are around 110 mills in the four hubs, which are able to satisfy on average only 34% of their processing capacity, thus this market factor represents a clear opportunity for organized farmers to market collectively, which potentially sets the basis for mutually beneficial (“win-win”) business relationships (IFAD-VODP2, 2016).

2.3 Current value chain map for Soybean

Fig. 5 shows the Generic current soybean value chain whereby the functions, actors in the chain and the supporters appear. Only 24% of the farmers sell to the farmer groups/cooperative while 4% sell their soybean grain to the processors (Large buyers) and the rest sell through middle men.

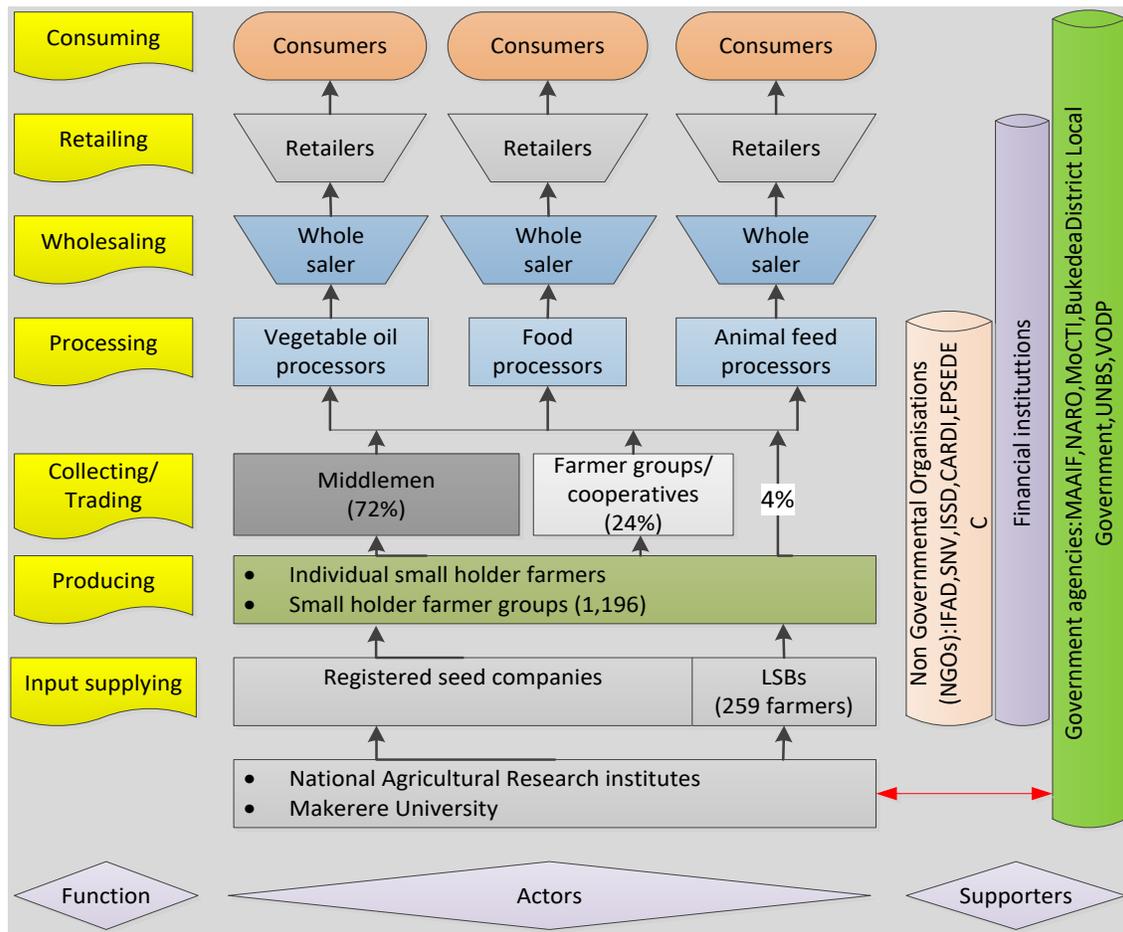


Figure 5: Generic value chain map. Source: Author’s illustration based on literature

2.4 Market access to Small holder farmers

Worldwide, many small holder farmers and producers are involved in food production, and average farm size is very small where they are typically unable to effectively access markets unless they organize into farmer groups, cooperatives and associations (The World Bank group, 2018). Often they lose out to larger commercial farmers around the world especially when it comes to accessing high value markets (Ton *et al.*, 2007). Farmer groups and cooperatives can empower smallholder farmers by procuring higher quality inputs, equipping them with cultivation technical skills, providing access to market information, and improving their negotiating power with companies in a value chain (Kruijssen *et al.*, 2009; Luan and Kingsbury, 2019). They act as intermediaries between individual households and chain actors such as buyers and processors and do quality assurance, collect, process and market agricultural produce (Ton *et al.*, 2007; Mangnus and Piters, 2010).

However, this type of collective action often fails because trust among farmers, and between farmers and processors is lacking (World Bank group, 2018). The latter is supported by Lutz & Tadesse (2017) who noted that efficiency in marketing depends on the commitment of members to sell through the Farmer Marketing Organisation (FMO). In addition, producers need to produce a surplus of produce and should be able to comply with the quality and quantity requirements, for many producers these are big challenges. Farmers who cannot access producers' organisations are often obliged to produce for inferior markets (Mangnus and Piters, 2010). Therefore, small holder farmers need support to achieve collective marketing through an enabling environment for economic activities, and by developing capacities to adapt to the changing conditions (Ton *et al.*, 2007). The World Bank group (2018) reported that there are numerous successful examples in other countries where development programs have helped promote such market-oriented farmer organizations, resulting in lower production costs, higher-quality products and larger sales volumes. Collective action through farmer groups can therefore be an important strategy for small holder farmers to remain competitive in a rapidly changing market (Fischer and Qaim, 2013; World Bank group, 2018). Individual farmers are usually too small to make a difference and only teaming up with peers can they reach sufficient force to make improvements in the value chain (KIT and IIRR, 2008).

2.5 Access to information

KIT *et al.* (2006) noted that knowledge is power, this poses an unfortunately common disadvantage for farmers as usually they have little or no information about the performance of their own organisation and of the market. Small holder farmers usually have limited access to information about prices, quality standards and other market related information and these factors make it especially difficult for the farmers to benefit from the chains they are involved in (KIT *et al.*, 2006). Easier access to market information enables buyers and sellers to make informed choices on where to sell, when, and at how much and access information on new technologies such as processing, packaging and storage (KIT and IIRR, 2008). Therefore, to improve the position of farmers in the chain, their access and management of information needs to improve. This is supported by Mitra *et al.* (2018) who said that smallholder farmers lack access to wholesale buyers and are unaware of the prices at which their produce are resold there, where the difference gaps between the resale prices and farm gate prices are large.

2.6 Market information dissemination channels

Previous studies suggest that bargaining power of farmers in the chain can be improved by providing them with current market prices using information and communication technology services (ICTs) (Ranjan, 2017). In order to address market information gaps in the value chain, up-to-date information and the channel of disseminating is important (Veit, 2009; Fafchamps and Minten, 2012). According to Chen and Tang (2015), Governments, NGOs and business sectors reduce market information gaps using ICTs to disseminate market information to farmers in addition to using extension officers to deliver

market information. Due to limited internet access in rural areas where most farmers are located, most governments and NGOs disseminate market information to farmers free of charge through different channels such as radios, television, and call centres (Tang *et al.*, 2015). Market information disseminated through phones was effective in helping farmers find markets in India (Anbarasan and Bhardwaj, 2017). However, Tadesse and Bahiigwa (2015) had a different opinion about the use of mobile phones as a channel for accessing market information. They reported that the number of farmers who had searched for information through mobile phones in Ethiopia was very small and could be due to lack of relevant information obtained through phones. Radios and televisions were the common channels for disseminating mostly weather information to the farmers, with less of crop prices being disseminated (Fafchamps and Minten, 2012).

2.7 Types of market information and sources

The different types of market information include: historical and current prices, marketing strategies, availability of processors and traders, and the grades of the produce (Ranjan, 2017; Fan *et al.*, 2018). These different types of market information help farmers to make production and selling decisions in their farms. Kiiza and Pederson (2012) categorised market information sources as formal or ICT based coming from sources such as FM radio stations, mobile phones and internet based telecom centres. The informal type of market information is obtained from traders, fellow farmers, relatives and friends who usually do not provide information with the proper quality to farmers. In addition, Fafchamps and Minten (2012) found that other source of information is the farmers' own experience/experimentation and the sharing with other farmers. Farmers also get to know market information by visiting market places and commission agents (Fafchamps and Minten, 2012).

2.8 Market information utilisation

Market information helps farmers to improve their decision making and profits (Fafchamps and Minten, 2012; Tang *et al.*, 2015; Tadesse and Bahiigwa, 2015; Wang *et al.*, 2018). However, it is up to the farmers to make use of the information even if it is free of charge (Tang *et al.*, 2015). Market information can only be useful when acted upon (Fafchamps and Minten, 2012). The value of market information can change with circumstances and identifying its value is often difficult (Fafchamps and Minten, 2012). Information on prices can be important to farmers at harvest time while input cost and advisory information can be useful to farmers at the start of the season (Fafchamps and Minten, 2012). Besides, information such as commodity prices often changes and therefore to be useful to a farmer, its delivery has to be timely (Fafchamps and Minten, 2012). A study conducted by Anbarasan and Bhardwaj (2017) found out that utilisation of market information varied with age, educational status, farming experience and ICT awareness of the farmers. They reported that educational status of the farmers positively correlated with market utilisation, suggesting that farmers with higher education attached more value to the information. The extent of farming activities could also affect market information utilisation among farmers, with commercial farmers more likely to adopt ICT based formal market information (Kiiza and Pederson, 2012).

2.9 Challenges to market information access

There are many factors that can hinder farmers' access to market information and farmers are affected when there is inadequate access to it. Poor price discovery in the chain, possible exploitation of farmers, market inefficiency, poor yields, and huge crop wastage, reduced farmers' earnings and livelihoods are the different ways in which farmers get affected (Veit, 2009; Tang *et al.*, 2015; Chen and Tang, 2015). It is often costly for farmers to obtain information such as the right price, right buyer, right standards and grades of the product (Tadesse and Bahiigwa, 2015). According to Ranjan (2017) and Fan *et al.* (2018), when farmers lack direct information, it may become costly for them to get such market information. In

a study conducted in the rural Ethiopia, farmers had mobile phones but did not use them for searching for information because of costs associated with information search, and the fact that market information can vary within short time (days or weeks), farmers always have to search for new information at the time of selling (Tadesse and Bahiigwa, 2015). Due to such costs of searching for information, farmers opt to transport produce to distant markets incurring in extra costs for frequent travels, loading and offloading, thus the cheaper alternative for farmers might be selling to traders in the villages (Tadesse and Bahiigwa, 2015). In addition, farmers are disadvantaged by geographical location. Farmers that are in remote locations have more difficulties to access market information because of poor ICT services and distant markets (Kiiza and Pederson, 2012; Fan *et al.*, 2018) and in some cases, market information may be available but its dissemination to farmers is not timely and efficient (Veit, 2009). In a study done in Uganda, Kiiza and Pederson (2012) reported that farmers who belonged to a farmer group or cooperative had 8.2% higher probability of adopting ICT based market information compared to those who did not belong to a farmer group/cooperative, further indicating that farmers' access to market information can be limited by lack of access to extension services. Simtowe *et al.* (2019) in their study reported high adoption rate among farmers who had received input information compared to farmers who had not, and this could be attributed to the difference in accessing extension services.

2.10 The role of traders and processors in supporting farmers

Processors can be individuals or entities that transform the produce into other products (Mutuyaba *et al.*, 2016). For the case of soybean grains, these products include soybean vegetable oil and soybean flour for human consumption, as well as animal feeds for livestock. Small holder farmers often benefit from processors. According to Bellemare (2010), the processor's support to small holder farmers can be through provision of extension services and inputs. However, it is mostly limited to farmers who have supply contracts with the processor, as these inputs have to be repaid after harvest in form of crop. Mutuyaba *et al.* (2016) further noted that there is always an information gap between the different actors in the chain and this is due to individualism and lack of cooperation in the chain.

Traders consist of retailers, village assemblers (brokers), transporters (travelling traders), wholesalers, and exporters (Mutuyaba *et al.*, 2016). Traders can offer different services to producers, such as collecting and transporting agricultural produce to the market or to the wholesalers (Mutuyaba *et al.*, 2016; Pomeroy *et al.*, 2017). Besides the services that traders offer to farmers, traders can be hindrance to farmers' access to market information. Pomeroy *et al.* (2017) noted that with specialised traders, producers often receive little prices and have difficulty in getting market information.

2.11 The role of middlemen

Wholesale buyers find it not worthwhile to negotiate small trades and monitor the quantity and quality of produce from many different individual farmers where there is mutual acquaintance (Mitra *et al.*, 2018). According to Oguoma, *et al.* (2010), middlemen operate in all the continents of the world especially where the economy is booming and act as intermediary between the producers (farmers), buyers and the consumers. With an abundance of middlemen, farmers hardly get real profit for their products because they sell at low prices yet their produce is sold at outrageous prices to the consumers. Neither farmers nor the consumers benefit but rather the middlemen, because they benefit from farm gate prices resulting from the toil of the farmers (Oguoma *et al.*, 2010). While it may be desirable to bypass middleman in selling produce, farmers still rely on middlemen in rural areas where infrastructure is poor and does not facilitate direct trade with other buyers and consumers (Ranjan, 2017).

2.12 Farm record keeping

Farm records can be broadly classified into: inventory or store Records, production records, financial records and other miscellaneous records like weather (Dudafa, 2013). Farm records such as the cost of labour and inputs used in the farm can help the farmer to bargain for better prices based on the production information recorded (KIT *et al.*, 2006). Although farm records help farmers in different ways, farmers usually lack farm records. In a study conducted by Dudafa (2013), it was reported that 50.4% of the small holder farmers in Nigeria did not keep records because of lack of knowledge on record keeping, which could be related to the literacy levels of the farmers and lack of the necessary training in record keeping. Poor record keeping could affect information access by farmers. Shitote *et al.* (2013) found that information dissemination on fish farming in Western Kenya was impeded because of poor record keeping by farmers.

2.13 Chain relationship

M4P (2008) defined relationship as a social connection between two parties. Having a good relationship between producers and buyers in the chain is important because buyers and small scale producers share a common interest of bringing a product on the market (Mangnus and Piters, 2010). However, it is not always easy to establish and maintain smooth working relations (Mangnus and Piters, 2010). Farmers and traders/buyers tend not to trust each other usually because of lack of transparency in relation to farm product quality, related prices and uneven distribution of bargaining power in the chain (Fischer and Hartmann, 2010). Farmers may not be involved in decision making about issues that affect them, however farmers may also have control and decide how much they sell, to whom, at what price and define product standards (KIT *et al.* 2006). It is therefore important for the producer and the private sector to overcome the obstacles that inhibit cooperation in order to benefit from each other's capacities (KIT and IIRR, 2008; Mangnus and Piters, 2010) and such benefits could lead to establishment of a contract regime, improvements in post-harvest and transport systems, improvements in quality and effective use of market information (M4P, 2008).

CHAPTER THREE

3.0 Methodology

3.1 Location of the study

The study was conducted in Bukedea District Local Government (i.e., BDLG) in the Eastern region of Uganda. BDLG is one of the districts that implemented the vegetable oil seed crop production of which Soybean is one of them. Besides, the District is in the main target region in this research where the status of soybean marketing will be reflected in. BDLG was gazetted to a District status on 13th July 2006 and took effect on 1st July 2007 (Formerly part of Kumi District). It's composed of 2 Counties, 14 Lower Local Governments (Sub Counties) and 2 Town Councils), 161 Parishes/Wards and 349 Villages/Cells. The District lies between latitudes 01° 21' North and longitudes 34° 03' East, with an average altitude of 1,080m (3,540 ft.) and total area of 1,049.34 sq. km of which land area is 1,035.84 sq. km (DPU,2018). The district population stood at 203,601 people of which female population were 51.32% and 48.68% male (104,478 Females and 99,123 Males) and a total of 33,058 households with average household size of 5.7 in 2014 (NPHC 2014). The 43.77% of the population still live below the poverty line, with 91.17% of the population depending on subsistence agriculture for a living with only 8.83% engaged in commercialized agriculture and non-farm economic activities for livelihood (NPHC 2014).

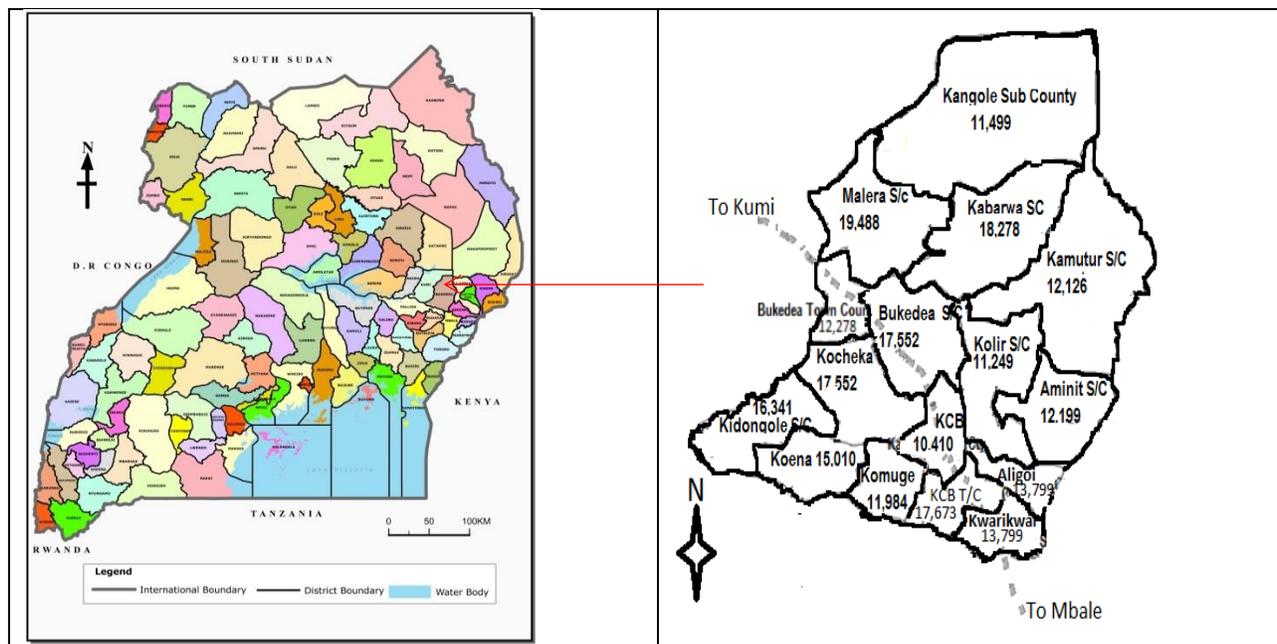


Figure 6: Map of Uganda showing Bukedea District. Source: District Planning Unit, DPU (2018)

3.2 Research approach

First, a desk study was used to get an insight into the factors influencing the access to market information and gain more knowledge about the study area by reviewing literature from text books, articles, proceedings and official statistical data such as from MAAIF, NPHC and District. The desk research was followed by a survey with semi structured questionnaires. The survey with semi structured questionnaires was used to collect both qualitative and quantitative information from the respondents in the field. In addition, a semi structured interview was conducted through telephone with key informants (expert, NGO representative, extension workers, processor and trader) to obtain more detailed information regarding farmers access to market information. Because of COVID-19 lock down measures worldwide, it was not possible to travel from Netherlands to Uganda (Research area) to collect data. Instead, an online questionnaire was sent to a colleague at work (Research Assistant) using google forms to help with data collection while interviews were conducted through telephone calls from the Netherlands. The Research Assistant is an extension worker with bachelor's degree in Agriculture, and has more than five years of field experience in data collection. To assure proper data collection, the data collection tool was explained to the Research Assistant to ensure that the tool was well understood. After data collection, the filled questionnaires were received back for analysis.

3.3 Research Framework

The following Fig. 7 illustrates the steps undertaken in the study. It started with the conceptual design, sampling design, data collection, data analysis and making conclusions about the findings.

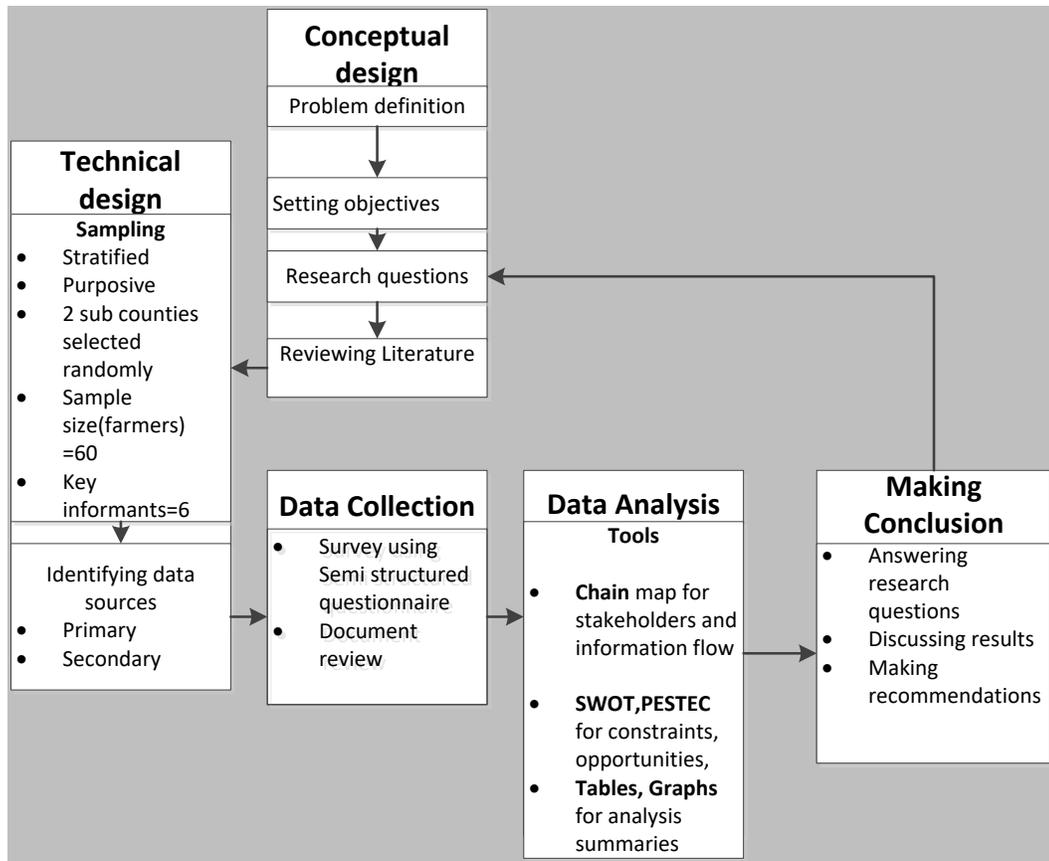


Figure 7: Research Framework. Source: Author's illustration

3.4 Research Methods

Desk research and survey were used in the study to collect both primary and secondary data. Both quantitative and qualitative research methods were applied. Quantitative research methods were applied to collect numerical data such as age of the respondents, quantities of soybeans sold by farmers and household size using semi structured questionnaires while qualitative methods were used to gather opinions/perceptions of the respondents regarding access to market information.

3.5 Data sources

The study made use of both primary and secondary data. Primary data was collected using semi structured questionnaires and interviews from the respondents while secondary data (published and non-published empirical data) was obtained by review of literature from books, articles, proceedings, documents and official statistical data. Documents are treated as sources of data in their own right (Laws *et al.*, 2013) such documents included reports from the District, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), and Uganda Bureau of Statistics (UBoS) from which geographical information and population statistics data were used.

3.6 Sampling

Studying an entire population is time-consuming, costly and it is often plagued by other practical considerations such as logistics to gather such information, therefore it is necessary the use of a population's sample that is representative of the whole population (Laws *et al.*, 2013). In this study, the sample population encompassed soybean farmers from which a sample size was pooled out from the list of farmers that grow soybeans in the two randomly selected sub counties.

3.7 Sample stratification and sample size

A stratified random sampling design was used to select soybean farmers. Random sampling is central to quantitative sampling and analysis as only cases that are selected randomly can be comprehensively used to make generalisations about the population (Probability theory) (Laws *et al.*, 2013). First, two Sub counties where soybean is grown were selected randomly from the list of sixteen Sub counties in the District. From the list of soybean farmers, two sub groups (strata) were selected comprising farmers that (a) belonged to a farmers group, and (b) those that operated individually. From the two sub groups, another sub- stratum was selected comprising (a) male and (b) female farmers from which 15 individuals per sub strata were randomly selected giving a total of 60 farmers. The underlying reason for the aforementioned stratification was to ensure a representative and unbiased sample (Laws *et al.*, 2013). Farmers were considered as respondents in this study because they are the main beneficiaries of market information and lack of access to it affects soybean marketing.

Table 2: Sub groups (strata) of farmers

Sub group (Strata)	Number	Male	Female
Individual farmers	30	15	15
Farmers in a group	30	15	15
Total	60	30	30

Apart from farmers, key stakeholders were also source of information in this research. The key stakeholders included (a) one expert (District Agricultural Officer, DAO) whom is the Focal Point Person (FPP) for VODP and is knowledgeable about stakeholders and their roles in the value chain, (b) two agricultural officers at the sub county (that provide extension services to farmers), (c) one soybean grain processor (Processes soybean grains from farmers), (d) one representative of the NGO in the District(supports livelihood activities of farmers) and (e) one middleman/trader (buys soybean grains from farmers). The expert, extension workers and the NGO representative (key informants) were

purposively selected because there was only one DAO and two extension workers in the sub counties. One NGO was selected randomly from the list of five NGOs operating and supporting farmers in the District and one key informant was selected from that NGO. In addition, one soybean processor was selected (based on proximity to the study area).The other respondent (middleman/trader) was selected purposively because their number is unknown in the study area.

Table 3: Summary of the respondents

Respondent category	Number
Soybean farmers	60
Middlemen/trader	1
Soybean grain processor	1
Representative of NGO	1
Extension workers	2
Expert (DAO)	1
Total	66

3.8 Data collection and tools

Semi-structured survey questionnaires and semi structured interviews through telephone were used in the study. The semi-structured questionnaire enabled the researcher to collect both quantitative and qualitative data from the respondents. A questionnaire is a written list of questions given to respondents who fill in by themselves (self –completion questionnaire) but sometimes due to the low literacy rates of the respondents, the researcher would ask the questions from the questionnaire verbally and the response recorded (Laws *et al.*, 2013; p.208). The survey questionnaire was designed to have both closed (pre-coded) and open questions. Pre-coded questions could give the respondent a choice between asset of categories determined by the researcher, whereas open questions would allow the respondents to write their own views on the issue (Laws *et al.*, 2013; p.210). Furthermore, pre-coded questions are quantifiable and easier to analyse, whereas open questions are usually not quantifiable and the responses have to be coded for easy analysis, but would give detailed qualitative information (Laws *et al.*, 2013; p.211). A mix of verbal (open) and more structured questions such as list, category, ranking and quantity questions were incorporated into the questionnaire to collect the different types of data from the respondents.

In addition, semi structured interview with five key informants (expert, NGO representative, extension workers, processor and trader) was conducted using telephone to obtain detailed information regarding farmers’ access to market information. Semi structured interview as well, would help collect both quantitative and qualitative data from the respondents (Laws *et al.*, 2013). One-to-one telephone interview with key informant using interview check list was adopted because it is a very efficient method of collecting reasonably straight forward information from professionals (Laws *et al.*, 2013; p.204). Besides, the Covid 19 travel restrictions could not allow travelling to the field to have face-to-face interviews with the respondents and since they all had contact telephone numbers, it was easier to conduct the interview on phone. The responses from telephone interview were recorded and transcribed for analysis.

Table 4: Summary of the survey questionnaire method

Type	Semi structured
Data	Quantitative Qualitative
Design	Survey
Tools	Semi-structured Questionnaires

3.8.1 Primary data

Primary data was collected from respondents using semi-structured questionnaires and interviews. The following was collected and registered from farmers: (a) Data on constraints encountered by farmers while accessing market information, (b) the kind of market information needed, (c) channels used to get information and (d) kind of information records. Data was also collected by asking farmers whether they are satisfied with the market information that they receive in terms of validity, reliability and who collects it. Data on market information use was collected by asking farmers whether they actually used this information to help them market their produce. Farmers were asked these questions because they are the primary respondents (affected by inadequate market information access). All the sub groups were asked the same set of questions in order to compare access and use of market information especially between those that operated individually and those that belonged to a farmer group, but also between male and female farmers.

The processors in most cases know the volumes and quality of the soybean grains that they need and at what price they buy. The processor was interviewed in order to obtain data regarding the kind of information that they provided to farmers. Similarly, a trader/middleman was interviewed to understand the relationship with farmers in terms of providing information such as the quality that is required by the processors. The Expert (DAO) provided data on the various stakeholder and their roles in the soybean value chain because DAO is the FPP for VODP in the district and therefore was knowledgeable about stakeholders and their roles. In addition, opinion was sought from the expert on the factors limiting farmers' access to market information and the opportunities that exist for farmers. The extension workers (key informants) provided data on the kind of services that they provide to farmers, what they think are the limiting factors that hinder the access to market information by farmers, and the kind of market information that the farmers need in the District. The other key informant (NGO representative) was interviewed to obtain data on their role in the provision of market information and what they think were the factors limiting farmers from accessing market information.



Figure 8: Field photos-administering questionnaire. Source: Research Assistant, 2020

Table 5: Summary of primary data collection

Data on	Respondents	Data collection tool
Stakeholders and their roles	Experts (DAO)	Semi structured Interview
Market information channels currently used Market information use and satisfaction.	Farmers	Semi structured questionnaire
Kind of information records kept by small holder farmers	Farmers	
Constraints encountered by small holder farmers while accessing market information	Farmers, Extension workers, Expert, NGO	Semi structured Questionnaire for farmers Semi structured Interview (expert, NGO representative, extension workers)
Kind of market information farmers need most	Farmers, extension workers, processor, trader	Semi structured Questionnaire for farmers
Preferred channels for delivering information	Farmers ,extension workers	Semi structured Interview (extension workers, Processor, trader)
Opportunities for farmers to improve market information access	DAO,NGO, extension workers	Semi structured interview (expert, NGO representative and extension workers)

3.8.2 Secondary data

Additionally, data on stakeholders and their roles, constraints as well as opportunities in the soybean value chain was collected by reviewing of sector reports and other literature on soybeans. Information regarding study area and population characteristics in the study area was collected by reviewing existing documents such as organisation's and National Population and Housing Census (NPHC) reports.

3.9 Validity and Reliability

The validity and reliability of the data collected was ensured by piloting the study (pre testing the questionnaire) so that the right data would be collected. For validity, the questionnaire was tested on a small number of respondents (5 farmers) from the study area to see how it worked under real circumstances and taking note of the gaps, including the time it took to complete the questionnaire. It was then revised in light of the test's results and the final questionnaire was administered to the final respondents. Reliability of the data was ensured by triangulating data from different data collection methods (survey, interview and desk study) and from different data sources (different respondents) to obtain different perspectives on the same issue.

3.10 Data processing

The power of qualitative data is in the concepts they convey- their inherent meaning (Laws *et al.*, 2013; p.262). We collected qualitative data using both semi structured questionnaire and interview, it was sorted and coded by creating categories for the responses. For data collected through interview, the recorded responses were first changed into text (transcribed) and then list of common themes that summarised important categories within the data were identified and placed in each category or code for easier analysis. For quantitative data, the responses to the pre-coded questions were summarised into frequency counts in excel sheets (Laws *et al.*, 2013; p.272). Codes for missing data were also

created and included in the frequency count/simple tally sheet to capture those respondents who did not give response to a particular question. From the Frequency count/simple tally sheet, it then became easier to count the number of respondents that answered a particular question.

3.11 Data analysis

The statistical analysis was done using the software SPSS (Specialist Statistical Packages, SPSS). First, we used clustered bar charts to represent the data on the factors that limit farmers' access to market information, the kind of market information that the farmers need, the channels for accessing market information, and the use of market information. Bar charts were used to show the variation of the variables (i.e., limiting factors) in the data.

For quantitative data, the general population characteristics such age, income and household size of the respondents were analysed using descriptive statistics (Means and mode) to get the mean age and household size of the respondents, whereas the sex and education level of the respondents were shown using frequency/mode to reflect the categories of respondents that appeared most in the study and summaries presented in tables. The general characteristics were used to get an understanding of the population under study. Further, comparison of different variables in the data were made: (a) Different types of market information accessed and used was analysed graphically using clustered bar chart to show the variation in access and use of market information by the two different groups of farmers. The difference in accessing information (whether one group gets more, less or the same information as the other) between individual farmers and those in groups was tested using non parametric test (Chi square test because the variable being tested was nominal) at 95% level of confidence (confidence interval, alpha, $\alpha=5\%$). The sub question 1.6.1 (e) was tested for a difference using the Null Hypothesis, H_0 : There is no difference in access to different types of market information between individual farmers and those in groups. The alternative hypothesis, H_1 : There is a difference in access to different types of market information between individual farmers and those in groups. The result of the test was interpreted in relation to probability (P) value ($P>\alpha$ or $P<\alpha$). Market information was presented in clustered bar charts to show the variation in the use of market information between the two groups of farmers. Testing the difference could provide an idea of how to improve access to market information in the two groups. (b) Data obtained on stakeholders and their roles was analysed using a chain map, to show the various actors and supporters (stakeholders), as well as information flow in the value chain and their roles were summarised in a table. (c) Constraints to farmers' access to market information was analysed and presented in clustered bar charts to show the main constraints which affect farmers and also summarised in a table of SWOT. In addition to SWOT, PESTEC was used to analyse external factors that might affect farmers' access to market information, and the results were summarised in a table,(d) the kind of information records kept by the farmers were presented in bar graph generated to show the different types of information records kept.

3.12 Data analysis tools

Different data analysis tools were used to analyse data obtained from the respondents so as to answer the research questions.

Table 6: Summary of the data analysis tools

Data	Analysis tools
Stakeholders and their roles ,Information in the chain	Chain map, Tables.
Constraints to market information access	SWOT, Clustered bar charts showing the different constraints encountered by farmers.
Opportunities available for increasing dissemination of market information to small holder soybean farmers	SWOT, PESTEC.
Preferred Information channels and satisfaction for information received by small holder farmers, Kind of information records kept by small scale farmers	Bar Graphs generated in SPSS showing information records, information satisfaction and preferred market information access channels.
Current market information channels, market Information access and use.	Bar graphs generated in SPSS showing current information access channels, information use and information access. Chi square to test for the difference in information access and use.

Table 7: Summary of research questions, data collection tools, sample size and analysis tools

S/n	Research question	Data collection method	Sample size	Method of analysis
1.a	Who are the stakeholders and their roles in the soybean value chain?	Semi structured questionnaire, Document reviews	1	Chain map, Tables
1.b	What channels do small scale farmers currently use to access market information and are they satisfied with the information?	Semi structured questionnaire	60	Clustered bar charts showing current market information access channels and information satisfaction.
1.c	What kind of information records do small scale farmers keep in their farms?	Semi structured questionnaire	60	Clustered bar graphs Showing types of information kept.
1.d	What are the constraints that small scale farmers encounter while accessing market information?	Semi structured questionnaire	64	SWOT, Bar charts generated in SPSS showing constraints encountered by farmers.
1.e	What is the difference in access and use of market information by individual smaller holder farmers and those in farmer groups/cooperatives	Semi structured questionnaire	60	Clustered bar charts showing information accessed and used by two groups of farmers, Chi square to test for the difference in access and use of information.
2.a	What kind of knowledge on market information do small holder farmers need most?	Semi structured questionnaire	62	Bar Graphs showing information most needed by farmers
2.b	What are the preferred channels for delivering market information to small holder farmers?	Semi structured questionnaire	62	Bar Graphs generated in SPSS showing preferred information delivery channels.
2.c	What are the opportunities available for increasing dissemination of market information to small holder soybean farmers?	Semi structured questionnaire Document review	4	SWOT,PESTEC

CHAPTER FOUR

4.0 Results

The results from the survey, interview and literature review are presented in this section, the tables and figures have been generated from the data collected.

4.1 General information about the population of study

A total of 60 respondents (farmers) took part in the survey in the randomly selected Sub counties of Kolir and Kamatur. The Table 8 shows the composition of the respondents by gender.

Table 8: Respondents by gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	29	48.3	48.3	48.3
	Male	31	51.7	51.7	100.0
	Total	60	100.0	100.0	

The descriptive statistics in table 9 show the average age and household size of the respondents. The small standard deviation of 11.5 shows that the age of the respondents is closely dispersed around the mean age and the house household size is also closely dispersed around the mean, with standard deviation of 3.5.

Table 9: Age and household size of respondents

	Age of respondent	Household size	Soybean grain produce per acre
N Valid	60	59	60
Missing	0	1	0
Mean	39.08	8.03	567.83
Mode	46	7	600
Std. Deviation	11.534	3.567	92.445

The 83.3% of respondents were primarily peasant farmers while others had different primary occupation but also practised farming and included teachers (3.3%), carpenters (1.7%), health workers (1.7%), mechanics (1.7%), tailors (3.3%), builder (1.7%), business (1.7%) and pastor (1.7%). Soybeans were grown by all respondents and the average yield of soybeans was reported to be 567.83 kg per acre with standard deviation of 92.4 indicating that the yield from individual farmers was closely dispersed around the mean (Table 9). Other crops grown were cassava, rice, sunflower, maize, beans, cotton, groundnuts and sweet potatoes. Most respondents had primary level of education as indicated in Fig 9. Other respondents (trader, processor, two extension workers, NGO representative and expert from the district participated in the study through interviews.

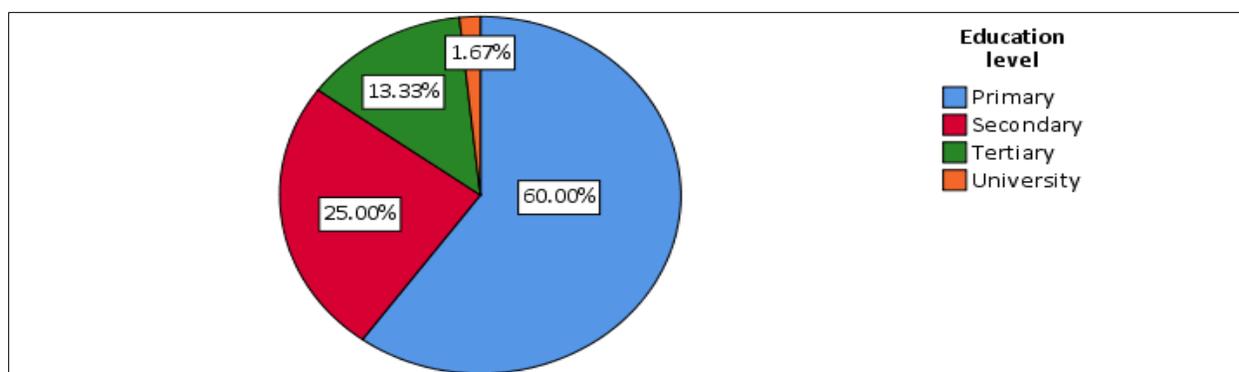


Figure 9: Education level of respondents

4.2 Stakeholders and their roles in the soybean value chain

An interview with key informant and document review indicated that various stakeholders in the soybean value chain, each playing a role in supporting the soybean value chain. The stakeholders could be categorised as chain actors and chain supporters. Table 10 & 11 show the summary of the different stakeholders and their roles.

4.2.1 Chain actors

Actors are those involved in producing, processing, trading or consuming a particular agricultural product (KIT *et al.*, 2006). The different actors and their roles in the soybean value chain are summarised in table 10.

Table 10: Actors in soybean value chain

Level	Actor	Role
Consumption	Consumers	<ul style="list-style-type: none"> Consume the various products from processed soybean grains such as vegetable oil, soybean milk and soybean flour.
Retail	Retail traders	<ul style="list-style-type: none"> Sell the various soybean products in small quantities to the final consumers, largely to small scale/individual consumers.
Wholesale	Wholesale traders	<ul style="list-style-type: none"> Sell the various soybean products in large quantities to mainly institutional consumers like schools.
Processing	Processors/Millers Agrinet	<ul style="list-style-type: none"> Buy the soybean grains from farmers and process it into vegetable oil and other products. Give information on quality requirements to the farmers.
Collecting/ bulking	Traders/middlemen	<ul style="list-style-type: none"> Buy soybean grains from farmers, bulk it and sell to the millers/processors. Provide farmers with some information such as quality requirements of the soybean grains.
Production	Farmers	<ul style="list-style-type: none"> Produce the soybean grains and sell to the millers for processing.
Input supply	Local Seed Businesses (LSBs)	<ul style="list-style-type: none"> Receive the foundation seed from the research institutions and multiply it into QDS to be accessed by farmers.
	Agro input dealers	<ul style="list-style-type: none"> Provides various agricultural inputs to farmers such as fertilisers, pesticides and sprayers.

Source: VODP2 annual reports, 2019; Interview with key informants, 2020

4.2.2. Chain supporters

This category of stakeholders offers various inputs and services to the different actors in the soybean chain thus facilitating value chain activities. Both literature review of sector reports and interview with an expert revealed that there are a number of supporters in the Soybean value chain, ranging from government agencies and institutions, NGOs/Donor organisations, private sector to financial institutions, each playing a supporting role towards facilitating chain activities as summarised in table 11.

Table 11: Supporters in Soybean value chain

Chain supporter	Role
IFAD	<ul style="list-style-type: none"> • Provided funds for the VODP2 project,
Government of Uganda (MAAIF)	<ul style="list-style-type: none"> • Hosted the VODP2 project, providing overall coronation activities. • Provided technical backstopping to the project and district staff.
District Local governments	<ul style="list-style-type: none"> • Provide extension services to farmers, • Carry out quality assurance of inputs and services. • Carry out quality assurance of the LSBs.
Research institutions (NaCRRRI & NaSARRI)	<ul style="list-style-type: none"> • Carry out research on vegetable oil crop varieties. • Production of breeder and foundation seeds.
Makerere University	<ul style="list-style-type: none"> • Carry out research on soybean crop varieties. • Production of breeder and foundation soybean seed varieties for farmers.
Uganda National Bureau of Standards (UNBS),	<ul style="list-style-type: none"> • For product quality assurance/ Certification.
National Seed Certification Services (NSCS)	<ul style="list-style-type: none"> • Carry out certification of soybean seeds.
Uganda Cooperative Alliance (UCA)	<ul style="list-style-type: none"> • Building the capacity of farmers to form farmer organisations (Lower level and higher level farmer organisations, LLFOs &HLFOs).
NGO such as ISSD, SNV	<ul style="list-style-type: none"> • Provided Funding. • Technical backstopping of District staff in QDS production.
Financial institutions such as Postbank, Uganda Development Bank Limited (UDBL), FINCA Uganda, Bank and Savings and Credit Cooperatives (SACCOs).	<ul style="list-style-type: none"> • Offer financial services to the farmers and other actors in the soybean value chain.
Pay for service providers (PSPs).	<ul style="list-style-type: none"> • Provide various trainings to farmers. • Linking farmers to input and output markets and financial institutions.

Source: VODP2 annual report, 2019; Interview with key informants, 2020

4.3 Current market information access channels

Most farmers were found to be getting market information mainly through traders/middlemen, other farmers and through training as summarised in table 12 and Fig 10. The total percentage was more than 100% because farmers could have more than one information access channel.

Table 12: Summary of market information access channels

Information access channel	Individual farmers		Farmers in group		Total percentage
	Number	Percentage	Number	Percentage	
Through trainings	7	11.7%	25	41.7%	53.4%
Local radios	11	18.3%	18	30%	48.3%
Telephone/SMS alerts	10	16.7%	17	28.3%	45%
Traders/middlemen	24	40%	18	30%	70%
Local newspaper	0	0%	7	11.7%	11.7%
Other farmers	17	28.3%	20	33.3%	61.7%
Noticeboards	8	13.3%	9	15%	28.3%
Email	0	0%	1	1.7%	1.7%
Internet	1	1.7%	1	1.7%	3.4%
None	1	1.7%	0	0%	1.7%

Results further show that majority of the individual farmers accessed market information through traders/middlemen while farmers in groups accessed information mainly through trainings, other farmers and local radios. Also some individual farmers did not access information from any channel.

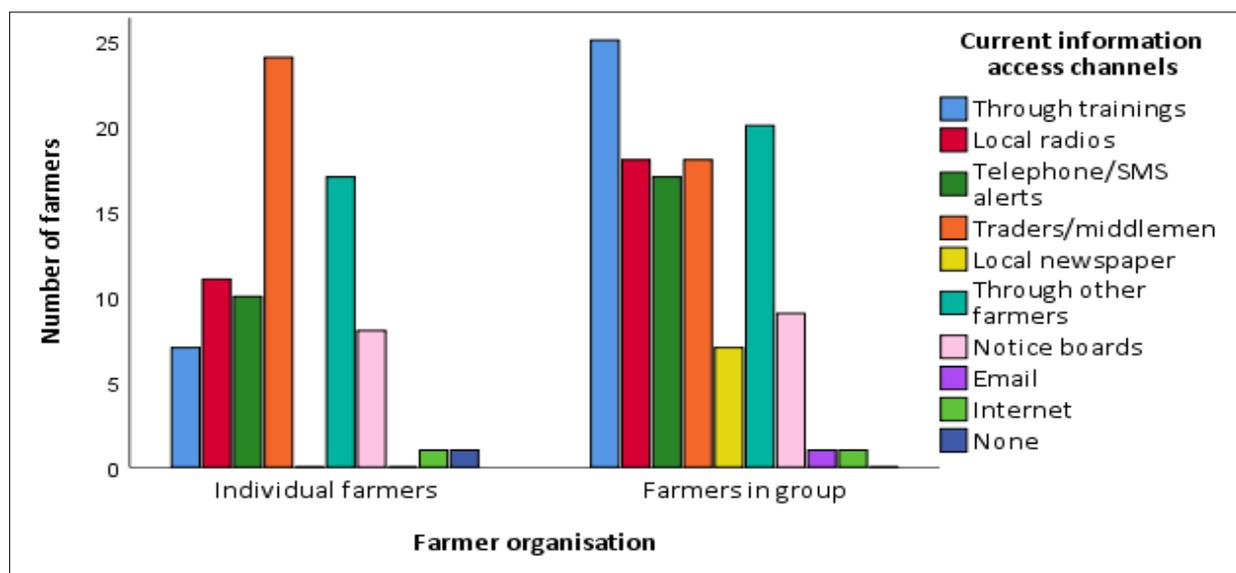


Figure 10: Current market information access channels

4.4 Farmers' satisfaction with the information

A total of 36.7% of the farmers (both individual and farmer group) said they were satisfied with the information that they received while 63.3% said they were not satisfied with it. More individual farmers were dissatisfied with the information that they received compared to those in farmer groups (Fig 11).

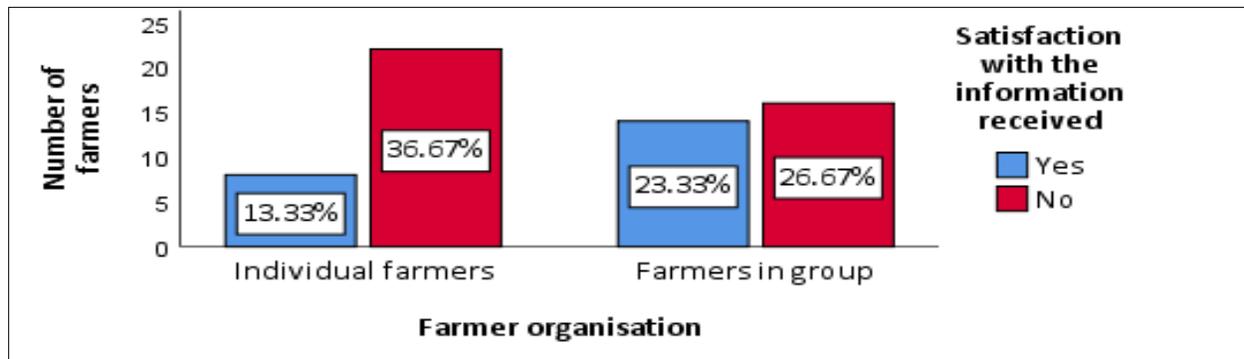


Figure 11: Farmers' satisfaction with information

4.5 Information records kept by farmers

The survey results obtained from 60 farmers show that most farmers had kept information records in their farms but there were also farmers without information records (Fig 12).

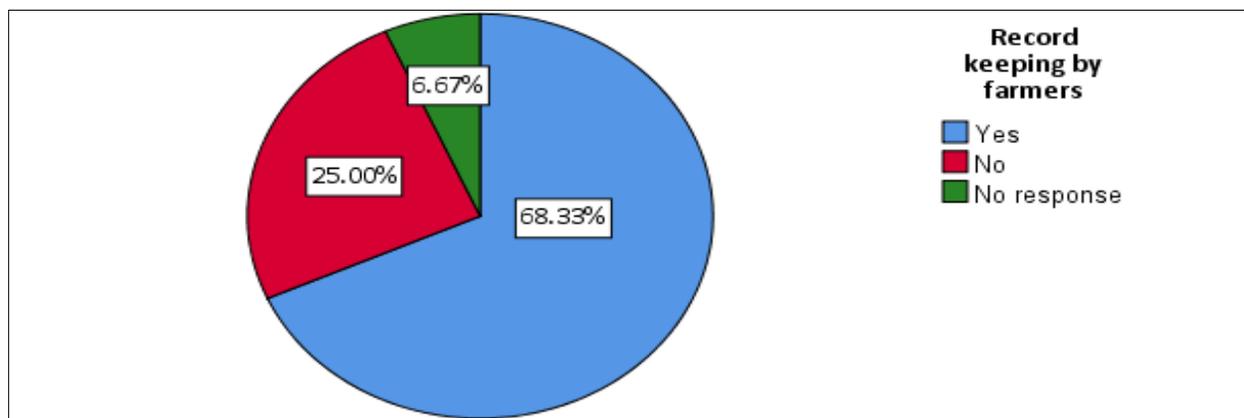


Figure 12: Record keeping by farmers

In total, the information records kept were mainly production costs, market information and pests and diseases (Table 13). Total Percentages are more than 100% because farmers kept more than one information record.

Table 13: Summary of information records kept by farmers

Information record	Individual farmers		Number of farmers		Total percentage
	Number of farmers	Percentage	Number of farmers	Percentage	
Production costs	17	37.0%	25	54.3%	91.3%
Weather	4	8.7%	6	13.0%	21.7%
Pests and diseases	5	10.9%	14	30.4%	41.3%
Market information	15	32.6%	20	43.5%	76.1%
Consumer profiles	0	0.0%	1	2.2%	2.2%

It was also found that more farmers in groups had kept more information records compared to individual farmers (Fig 13).

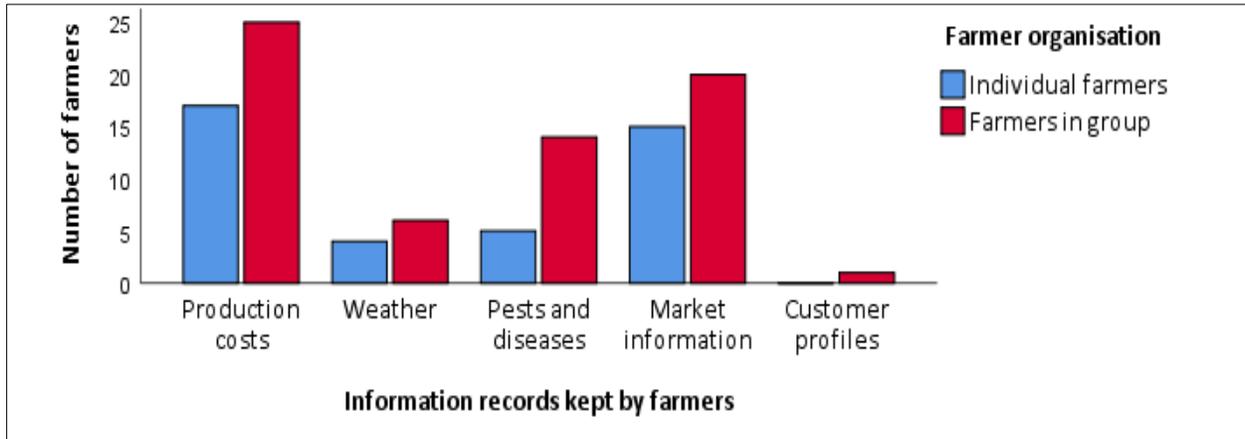


Figure 13: Information records kept by farmers

4.6 Constraints encountered by farmers while accessing market information.

The farmers were asked to rank the constraints that they encounter while accessing market information from the most pressing problem to the least (Annex 3). The ranking of the constraints is presented in Fig 14. The combined ranking of the constraints showed that not belonging to the farmer group (25%), the cost associated with getting market information (18.3%), the poor relationship with buyers (28.3%), the lack of telephone (21.7%) and the long distances to the markets (21.7%) are the major constraints that affect farmers to access market information. Lack of internet services (15%) and language barrier (5%) had the lowest rank. According to farmers, not being in farmer group (Rank 1) was the most important constraint and the least was language barrier (Rank 9).

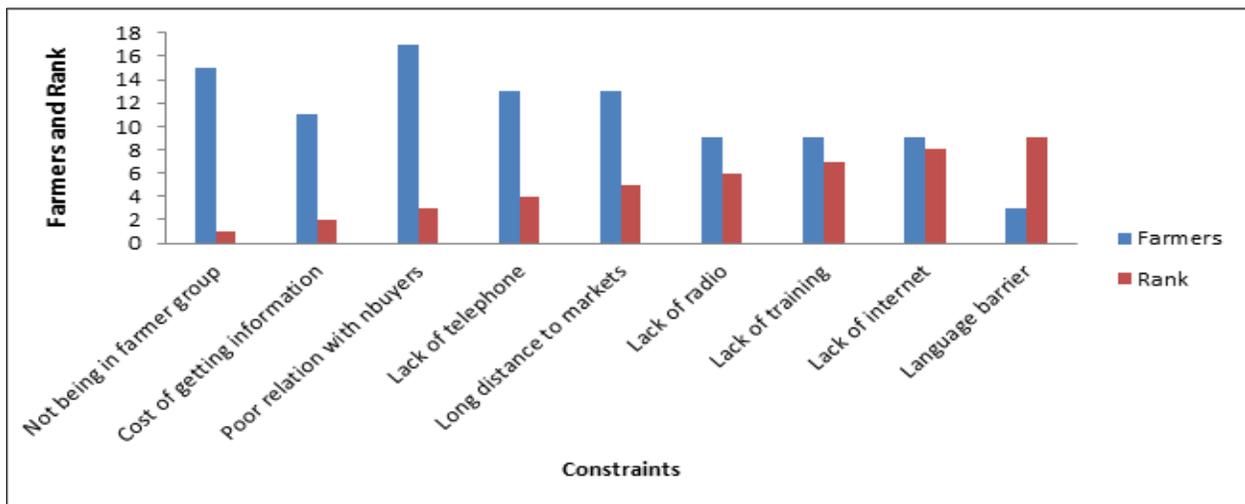


Figure 14: Ranking of constraints by farmers

When the constraints faced by the two categories of farmers were analysed separately (Annex 4), both individual farmers and those belonging to farmer groups had different ranking of the same constraints. For individual farmers, not being in a farmer group and lack of training were ranked high and the least was lack of internet services. The ranking from farmers in a group showed that cost associated with

getting the information was most limiting. Not being in farmer group was not valid because farmers are already in groups as shown in table 14.

Table 14: Ranking of constraints by farmer category

Constraint	Individual farmers			Farmer group		
	Number of farmers	Percentage	Ranking	Number of farmers	Percentage	Ranking
Not being in farmer group	12	40.0%	1	14	Not valid	Not valid
Lack of trainings	6	20.0%	2	8	26.7%	7
Cost of getting information	6	20.0%	2	8	26.7%	1
Language barrier	6	20.0%	2	7	23.3%	4
Long distance to the markets	7	23.3%	5	6	20.0%	6
Lack of radio	6	20.0%	6	6	20.0%	2
Lack of telephone	5	16.7%	7	7	23.3%	4
Poor relationship with buyers	5	16.7%	8	12	40.0%	3
Lack of internet	16	53.3%	9	4	13.3%	8

Key informants interview

The following are views given by the key informants and experts when asked about the challenges that could be faced by farmers while accessing market information

- Remote location of the farmers, as such, it becomes difficult to reach farmers in some areas in terms of road network and network coverage.
- Farmers are not organized into associations and groups so it becomes difficult for them to access market information.
- Attitude: most farmers do not listen to local radio programmes especially those related to marketing.
- Illiteracy. Most farmers cannot read and use mobile phones for accessing information.
- Weak farmer groups in terms of marketing, with most of them focussing on village savings and loans associations (village SACCOs).
- Poor technology adoption, most farmers cannot use the app (Easy Agric).
- Low produce, thus it becomes difficult to connect with large buyers.

4.7 Difference in access and use of market information

Difference in access and use of information between the two categories of farmers was tested using Chi square tests. In addition, difference in access to market information between male and female farmers was also done using the same statistical test.

4.7.1 Difference in access to market information between farmer category

Results showed that farmers had access to at least one type of market information while only 3.3% of farmers (individuals) had not received any information. Farmers had received information mainly on price and quality/grade of soybeans (Table 16). The difference in access to market information between the two categories of farmers was tested with Chi square at 95% level of confidence and Alpha, $\alpha=5\%$ (Table 15).

- Null Hypothesis, H0: There is no difference in access to different types of market information between individual farmers and those in groups. The alternative hypothesis,

- H1: There is a difference in access to different types of market information between individual farmers and those in groups.
- H0: is true when probability value, $P > \alpha$ and H1: is holds true when $P < \alpha$.

Table 15: Test for difference in access to market information

	Chi-Square Tests		
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.202 ^a	5	.392
Likelihood Ratio	5.381	5	.371
Linear-by-Linear Association	3.348	1	.067
N of Valid Cases	204		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.63.

The results of the Chi square test showed the probability (P) value of 0.392 ($P=0.392 > \alpha 0.05$) thus the Null Hypothesis is true, indicating that there was no significant difference in access to market information between the two categories of farmers.

Table 16: Market information accessed by farmer category

Market information accessed	Number of individual farmers		Farmers in group		Total Percentage
	Number of farmers	Percentage	Number	Percentage	
Price of soybeans	26	43.3%	28	46.7%	90%
Quality/grade of soy beans	22	36.7%	28	46.7%	83.4%
Quantity requirements	11	18.3%	15	25%	43.3%
Transport costs	4	6.7%	10	16.7%	23.4%
Input availability	5	8.3%	16	26.7%	35%
Information on buyers	10	16.7%	19	31.7%	48.4%
Production costs	2	3.3%	6	10%	13.3%
None	2	3.3%	0	0%	3.3%

For each type of market information accessed by farmers, there were more farmers that belonged to a group with access in comparison to individual farmers (table 16 and Fig 15). Even though there is a trend of farmers in a group having more access to information in comparison to individual farmers, results from the Chi square test shows that the difference was not significant.

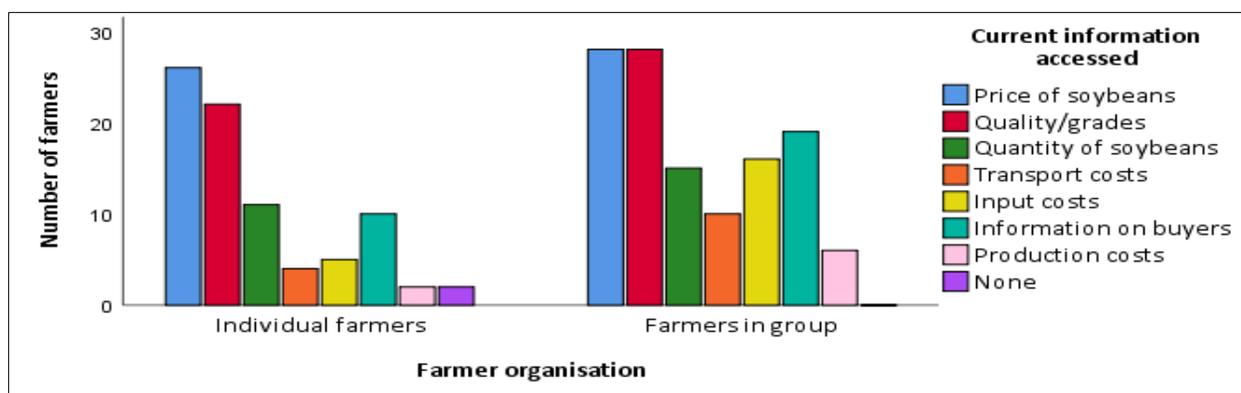


Figure 15: Current market information accessed by farmers

The main sources of market information for farmers were Middlemen/traders, government extension workers and other farmers while (5%) of the respondents reported that they did not receive from any source (Table 17).

Table 17: Source of market of information for farmers

Source	Individual farmers		Farmers in group		Total Percentage
	Farmers	Percentage	Number	Percentage	
Government extension workers	6	10%	22	36.7%	46.7%
NGO	2	3.3%	20	33.3%	36.6%
Trader/middleman	25	41.7%	17	28.3%	70%
Processor	7	11.7%	8	13.3%	25%
Other farmers	6	10%	17	28.3%	38.3%
Farmer cooperative	0	0%	1	1.7%	1.7%
Input dealer	1	1.7%	0	0%	1.7%
None	3	5%	0	0%	5%

Further analysis of the sources of information for the two categories of farmers indicated that Traders/middle were the main source of information for individual farmers while government extension workers, NGOs and other farmers were the main source of market information for farmers in groups (Table 17 and Fig 16).

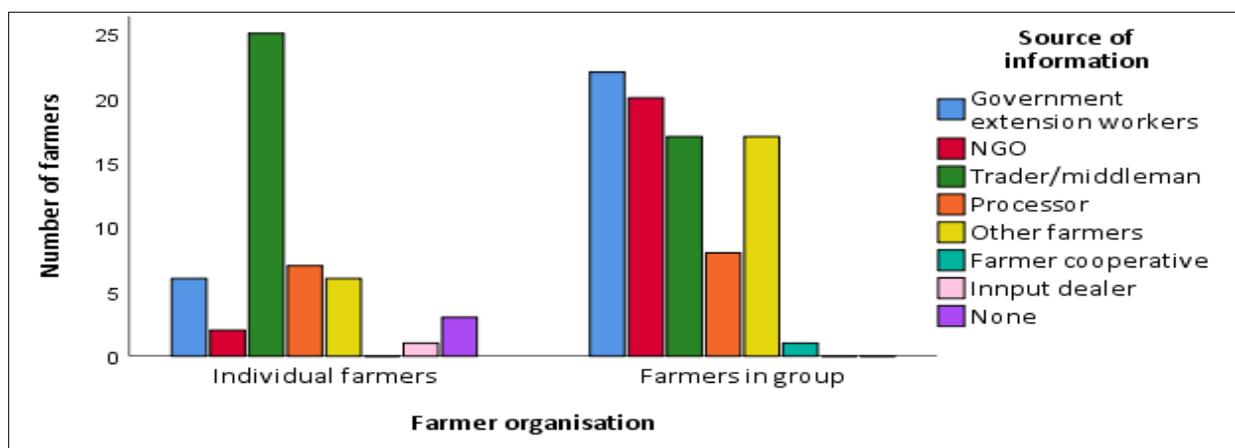


Figure 16: Sources of market information for farmers

4.7.2 Difference in use of market information

On the use of market information, farmers were found to utilise the information that they received mostly to bargain for prices, find markets/buyers and to improve the quality/grade of soybeans while 15% of the farmers did not use the information that they received (Table19). Difference in use of information between the two categories was tested with Chi square test (Table 18) at 95% level of confidence (alpha, $\alpha=5\%$), using hypotheses: Null hypothesis, H0: There is no difference in use of market information between individual farmers and those in groups, and Alternative hypothesis, H1: There is a difference in the use of market information between individual farmers and those in groups.

Table 18: Testing difference in use of market information

	Chi-Square Tests		
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.503 ^a	3	.682
Likelihood Ratio	1.507	3	.681
Linear-by-Linear Association	.578	1	.447
N of Valid Cases	143		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.18.

Since the P-value ($P=0.682$) > ($\alpha=0.05$), the Null hypothesis was true, indicating that there was no significant difference in the use of market information between the two categories of farmers.

Table 19: Summary of market information use by farmers

use	Individual farmers		Farmers in group		Total
	Number	Percentage	Number	Percentage	
Bargain for price	21	41.2%	19	37.3%	78.4%
Find new markets/buyers	16	31.4%	22	43.1%	74.5%
Transport the produce to the markets	2	3.9%	1	1.96%	5.9%
Improve the quality of the produce	11	21.6%	18	37.3%	56.9%
Improve the quantity produced	7	13.7%	10	19.6%	33.3%
Improve record keeping	2	3.9%	5	9.8%	13.7%
Did not use the information	6	10%	3	5%	15%

Fig 17 presents market information use by farmer category. With the exception of bargaining for price and transporting the produce to the market, market information utilisation was more observed among the farmers that belonged to a farmer group.

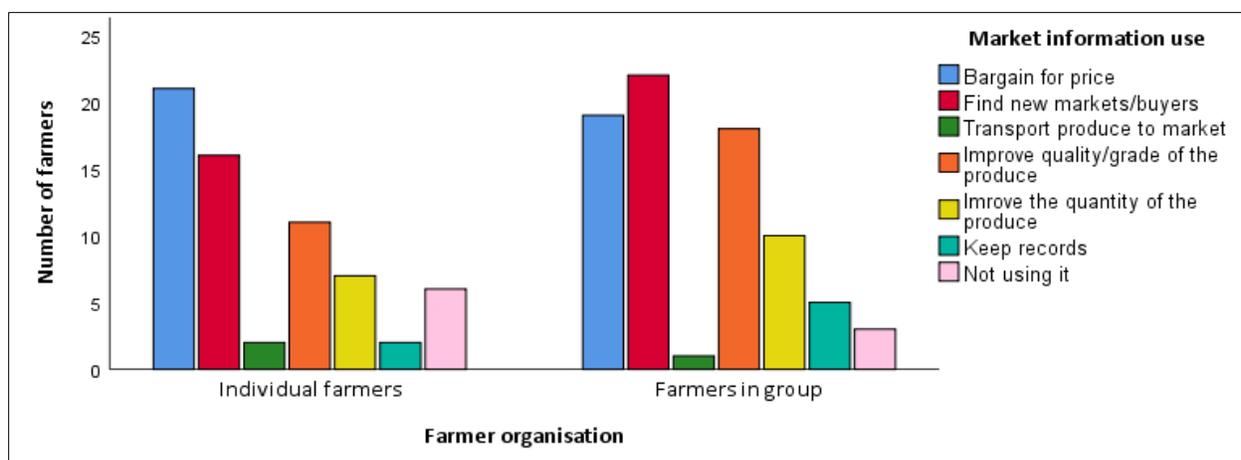


Figure 17: Market information use by farmers

Regarding the time of access to market information in a season, most farmers indicated that they received the information after harvest Fig 18.

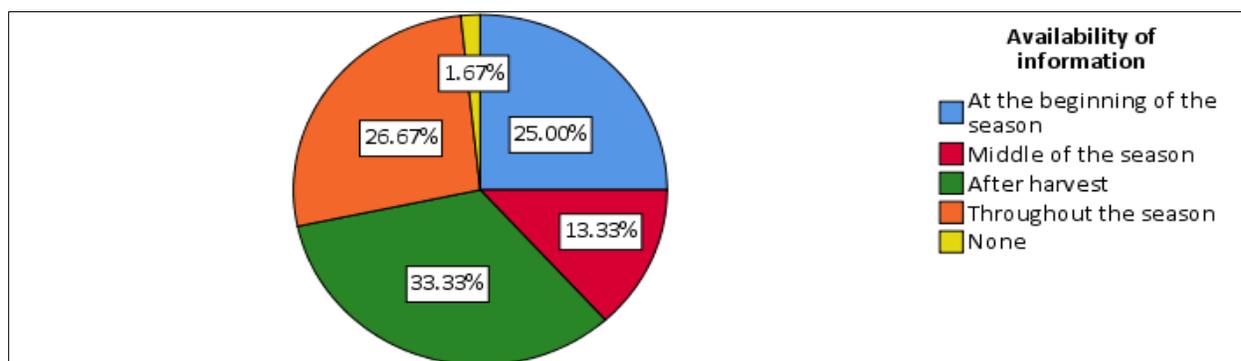


Figure 18: Market information availability to farmers in season

4.7.3 Access to market information by gender

There was no difference in access to market information between male and female farmers with Probability value, $P = 0.938$ (Table 20), indicating that both male and female farmers had accessed market information as shown in Fig 19.

Table 20: Test for difference in market information by gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.269 ^a	5	.938
Likelihood Ratio	1.273	5	.938
Linear-by-Linear Association	.187	1	.665
N of Valid Cases	204		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.73.

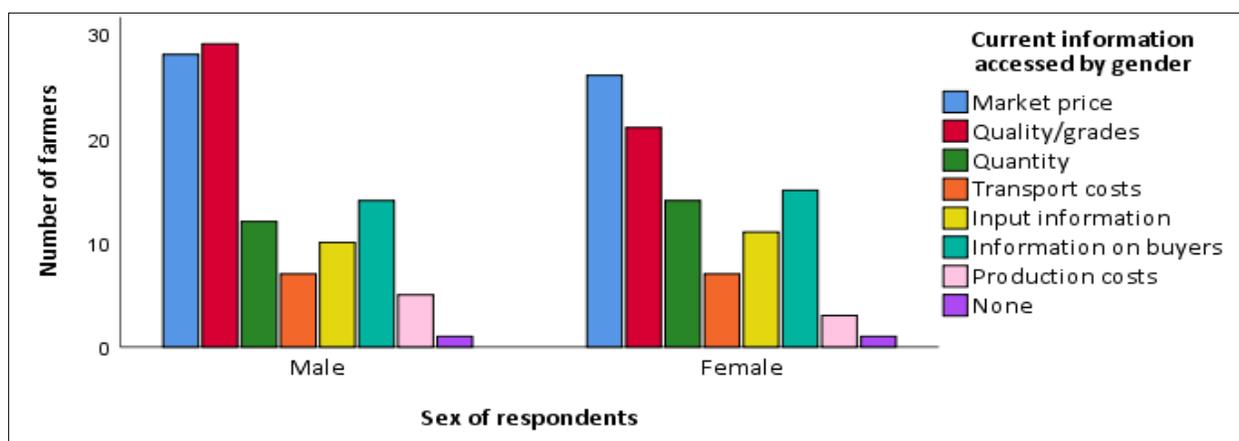


Figure 19: Market information access by gender

4.8 Knowledge and market information needs of small holder farmers

The ranking of market information types ranging from the most important to the least important (annex 5) showed that farmers require mostly knowledge and information over the market prices of soybean grains (60%) followed by knowledge and information on the quality requirements of the soybean grains (35%), information on buyers (20%), whereas the least required by the farmers was information on production costs (16.7%) (Fig 20).

Regarding the frequency of receiving such information, farmers (36.7%) (Annex 11) indicated that they would prefer to receive the information four times in a month (weekly).

Interview with key informants

An interview with the trader and processor further indicated that farmers often request information about:

- Production information that would help them to produce quality products and know cost of production.
- price information
- Quantity that processors require
- The variety required by processors

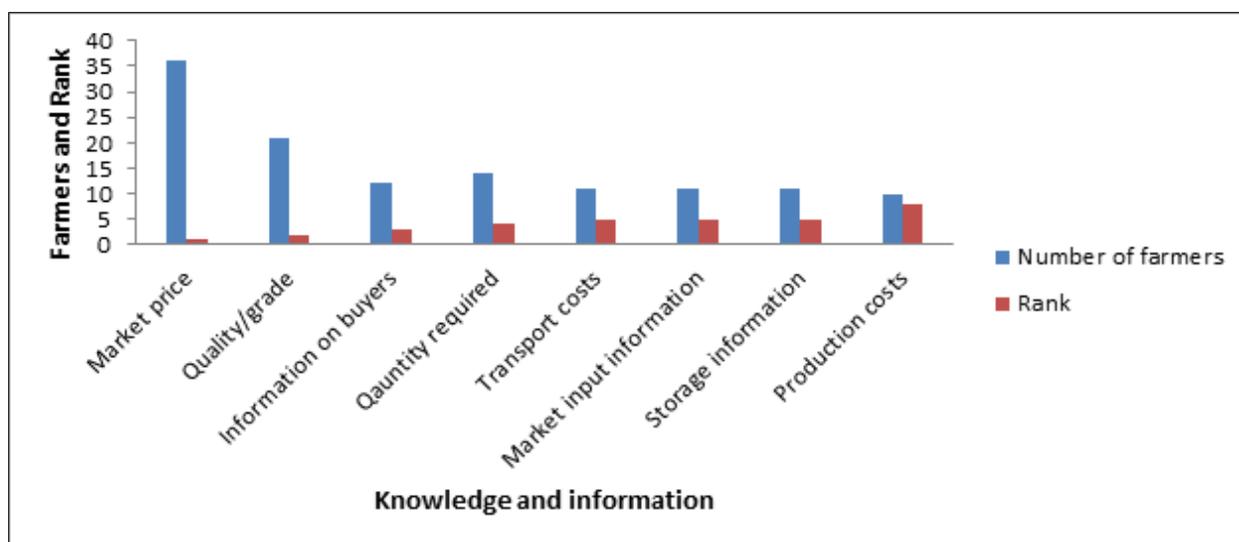


Figure 20: Farmer ranking of knowledge and market information needs

4.9 Preferred channels for delivering market information to small holder farmers

In order to consider what kind of market information access channel might be useful in delivering market information, farmers were asked to rank the different information access channels from the most preferred to the least. The ranking of the farmer preferred market information channels (Annex 6) showed that farmers preferred getting market information through trainings as the main channel (40%) followed by telephone/SMS alerts (31.7%), local radios (25%), and local newspapers (20%) among others. The traders/middlemen (1.7%) were the least preferred (Fig 21).

Views from key informants

- Extension workers can be the entry point, for example in the use of mobile apps so that they can teach other farmers
- Use of local radio stations can channel market information to farmers especially when local language is used
- Through use of extension workers
- Radio spot messages on market prices can also deliver information on marketing
- Use of local newspapers can also help in delivering market information
- Use of mobile phones
- Use of posters in relation to changes in market prices
- Social media can also be used for channelling market information
- Public meetings can also help farmers in sharing market information
- Use of newsletters, these are always sent to farmers periodically detailing the current market prices.

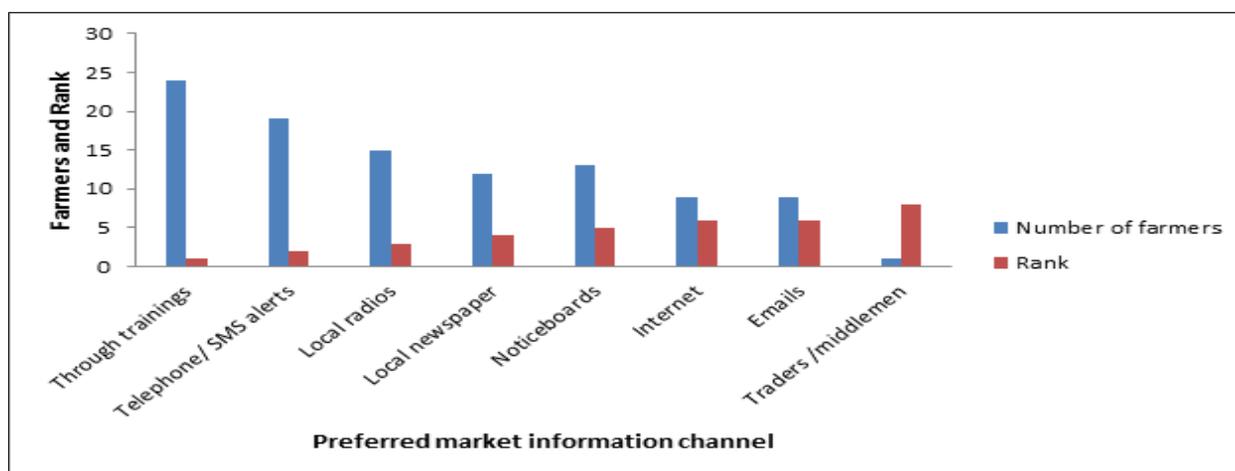


Figure 21: Farmer preferred market information access channels

4.10 Opportunities available for increasing dissemination of market information to small holder soybean farmers.

Through review of sector reports and interview from key informants, the following were highlighted as opportunities increasing farmers' access to market information.

- Extension workers who can be meeting with farmers regularly.
- Local radios could be of help because most people in villages listen to radios
- Local newspapers that publish articles related to marketing
- Mobile applications (Easy Agric) exists, that is designed to help farmers access information

4.10.1 SWOT analysis

Further opportunities for increasing access to market information can be identified by looking at the SWOT in the soybean sub sector as summarised in table 21.

Table 21: SWOT analysis of the soybean subsector

Strength	Opportunities
<ul style="list-style-type: none"> • High demand for the soybean grains 	<ul style="list-style-type: none"> • Supportive NGOs such as the example IFAD.
<ul style="list-style-type: none"> • Strong government support towards vegetable oil crop production. 	<ul style="list-style-type: none"> • Extension services provided both by the public and private sector.
<ul style="list-style-type: none"> • Availability of the processing mills (110 mills). 	<ul style="list-style-type: none"> • Financial institutions like Post Bank and Centenary bank extend financial support to various actors.
<ul style="list-style-type: none"> • Release of high yielding varieties of soybeans by research institutions 	<ul style="list-style-type: none"> • Good infrastructure such as roads for transportation and ICT.
<ul style="list-style-type: none"> • Farmers are producing quality declared seeds locally 	<ul style="list-style-type: none"> • Increasing number of both digital and print media provide channels for accessing market information.
<ul style="list-style-type: none"> • Farmers are increasingly adopting soybean production. 	<ul style="list-style-type: none"> • Suitable soils that can support soybean production to meet the demand.
Weaknesses	Threats
<ul style="list-style-type: none"> • Supply still low, mills (mills operating at only 34% milling capacity). • Some farmers still not organised into groups for effective chain participation. 	<ul style="list-style-type: none"> • Pests and diseases affect soybean production. • Adverse weather conditions such as draught affect soybean production.

Source: VODP2, 2019; Tukamuhabwa and Oloka (2016); Key informant interview, 2020

CHAPTER FIVE

5.0 Discussion

The results from the study are discussed in this section with reference to the relevant literature so as to justify the results and compare with findings from previous research done by other people.

5.1 Stakeholders and their roles in the soybean value chain

This study shows the various stakeholders in the soybean value chain in the Bukedea District (see Table 10 & 11) comprising of government, NGOs and private sector. These stakeholders could be categorised as actors (those directly involved in handling or moving the product along the value chain) and supporters (facilitate activities in the chain through provision of services or inputs to the various chain actors). This research showed that the soybean value chain has the relevant stakeholders that can work together to improve market information access to farmers and this is supported Adenkunle *et al.* (2012) who noted that the typical stakeholders in a value chain for the success of an innovation comprise of both public, NGO and private sector offering a range of inputs and services in the chain.

Our research also found that regarding the farmers' access to market information, the Non-governmental organisations SOCADIDO and Farm Africa (not for profit) played a role of giving inputs to farmers, training and linking farmers to the markets, whereas Pay for service providers (PSPs) such as EPSEDEC (for profit organisations) also supported farmers by providing them with market information and linking them to the markets. However, it is mainly farmers in groups that benefited from PSPs, the NGOs and government extension workers in terms of access to market information, as they preferred working with farmer groups, leaving out individual farmers. This was clearly shown by our results where 33.3% of the farmers in groups were getting market information from the NGOs compared to 3.3% of individual farmers accessing market information from the same source (Table 17).

Additionally, the government institutions were found to play many roles in the soybean value chain. The District local governments supported farmers through provision of agricultural inputs and extension services. An interview with extension workers indicated that the main inputs provided to farmers are planting materials (maize and bean seeds, cassava cuttings, citrus and mango seedlings), pesticides, small farm equipment (knap sack sprayers) and livestock, and the main trainings conducted were mainly agronomy, pests and disease management, postharvest handling and value addition. This was in agreement with farmers who indicated that they had received trainings mainly on agronomy, postharvest handling, marketing, pests and disease management and others (Annex 7) and the source of the training was mainly government extension workers, NGOs and farmer cooperatives (Annex 8). In the several case studies done by Adekunle *et al.* (2012), both public, NGO and private sector provided extension services and inputs to farmers. Farmers who did not receive the training (Table 22) reported that they were not getting timely information about trainings and trainings were mainly organised for farmer groups.

However, much still needs to be done by the government in the area of market information delivery to farmers. The interview with two extension workers revealed that other extension messages such as crop agronomy, postharvest handling, pests and disease management, soil and water conservation are the ones they mostly provide, and sometimes price information. They said sometimes they lack contact with buyers and may not know what the processors need.

Traders provided a wide range of services to the producers similar to the ones reported by Pomeroy *et al.* (2017). Apart from buying the produce from farmers, an interview with the trader pointed out that traders were sharing market information on market, quality of the soybeans required and also on production information right from planting as shown in Fig 16. Much as the traders provided information mainly to individual farmers, the results of this study show that most farmers were not satisfied with it because it comes late and always not the correct information. This is backed up by views from the processor who said that information distortion is a major challenge while channelling the information to farmers. This is in line with Kiiza and Pederson (2012) who noted that traders and middlemen provide unreliable market information to farmers.

The processors reported to be buying and processing soybean grains from all categories of farmers through their agents (middlemen) but also directly from organised groups/farmer cooperatives. In addition, Processors provided information such as preferred variety, quality and price of soybeans to farmers and used mostly agents to deliver the messages, indicating that there could be minimal contact between buyers (processors) and extension workers (also mentioned by extension worker).

With the support from various agencies and institutions of government, NGOs and other stakeholders, the improved chain (desired) should look like the one in Fig 22. Double arrows show that information can flow in either direction. There should be improved information flow within the chain: from chain supporters to different actors of the chain, input dealers to producers, processors/buyers to producers, and from the final consumer through the retailers, wholesalers to processors. As noted by (Ranjan, 2017), it may not be possible to eliminate middlemen completely because they link farmers to processors especially in remote locations. More farmers should be able to join farmer groups/cooperatives for various benefits such as effective information dissemination and use, quality improvement of the produce among others. However, for reasons such as failing to raise group membership fees, some farmers may still not be able to join farmer groups/cooperative but they should be able to get market information that can help them to plan for production and marketing of their produce.

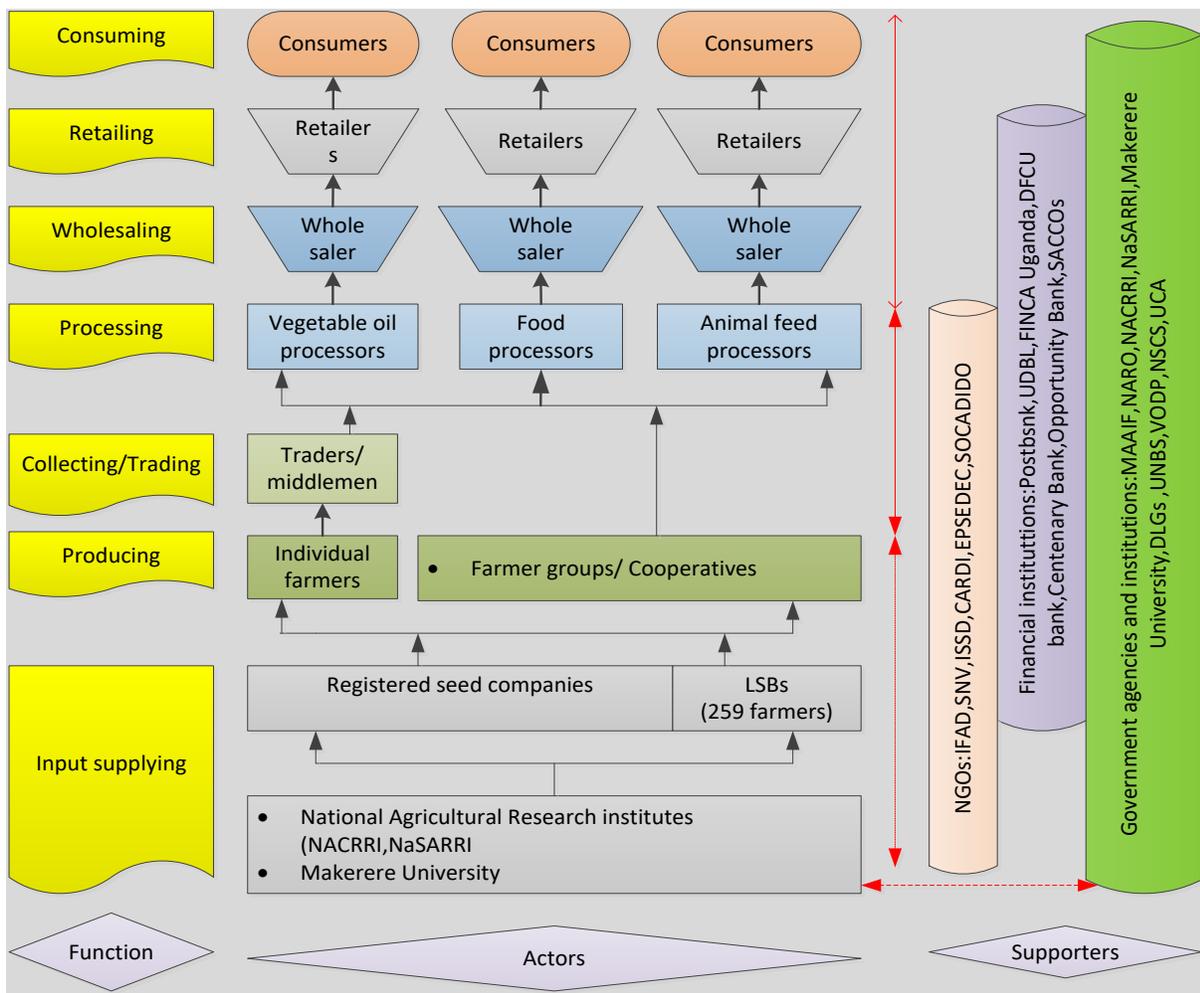


Figure 22: Proposed improved information flow in value chain

5. 2 Current market information channels

This study found out that most farmers were getting market information mainly through traders/middlemen (Fig 10 & Table 12). Traders/middlemen being the main source of market information for farmers underline the reliance of farmers on traders and middlemen especially in rural areas where infrastructures are not well developed to facilitate direct trade (Ranjan, 2017), which reduces farmers’ bargaining power. However, further analysis of market information access channels between the two categories of farmers (Table 12) showed that individual farmers were mainly accessing information through traders/middlemen while farmers in groups were mainly getting information through trainings and other farmers, suggesting that organised farmers had reduced contact with the middlemen in an attempt to bypass them. Farmer groups can increase farmers’ access to resources such as information (Kruijssen *et al.*, 2009; Luan and Kingsbury, 2019). This study found out that more

farmers in groups had accessed information through different channels compared to individual farmers (Table 12), for example more farmers in groups(33.3%) had accessed information through other farmers compared to individual farmers (28.3%) getting information through the same channel. This suggests that there could be more information sharing among the farmers in groups. It was however not known why more farmers in groups were still getting more market information through local radios, telephone and local newspapers. Internet based information access channels were the least used by both categories of farmers and this could be explained by views from key informant who attributed it to farmers' inability to use phones for internet and poor network coverage in remote areas as also discussed by Tang *et al.* (2015).

Table 22: Agricultural training

	Individual farmers				Farmer groups				No response	
	Yes	Percentage	No	Percentage	Yes	Percentage	No	Percentage		
Did you receive agricultural training?	19	31.67%	11	18.33%	28	46.67%	0	0%	2	3.33%

5.3 Farmer satisfaction with market information

Farmers were asked whether they were satisfied with the information that they received and a total of 63.3% of the farmers said they were not (Fig 11). As reasons for dissatisfaction with the information, farmers cited unreliability of the information (not the right and not regular/frequent information), also information being received late in the season, low prices offered, that the information keeps changing and farmers failing to meet the quantities required in the market even after receiving information on quantity. Results further showed that there were more individual farmers dissatisfied with the information compared to farmers in groups. This could be the case because most individual farmers received information mainly through informal channels (traders/middle men) that are not honest when it comes to sharing market information with farmers (Kiiza and Pederson, 2012), whereas farmers in groups mainly accessed information from government extension workers and NGOs who tend to give valid and reliable information. Interview with the processor revealed that market information is mostly channelled from the processor to the farmers/producers through agents. However, the processor also acknowledged that sometimes the information is distorted when it reaches and most times the processor receives complaints about prices from farmers being one of the reasons why farmers are not satisfied with the information they receive.

Information received at the start of the season helps farmers to plan for production and marketing of the produce (Chen and Tang, 2015). This study found that more farmers (Fig 18) had accessed market information after harvest, and this could mean that they did not know at the beginning of the season how much to produce, what quality is required, where the buyers are located and at what price the produce would be sold. The result on the availability of information to farmers in a season (Fig 23) further showed that farmers in groups mainly received market information at the beginning of the season and then throughout the season, this is another reason of why they are more satisfied with the information received compared to individual farmers who mainly received the information at the end of the season (after harvest).

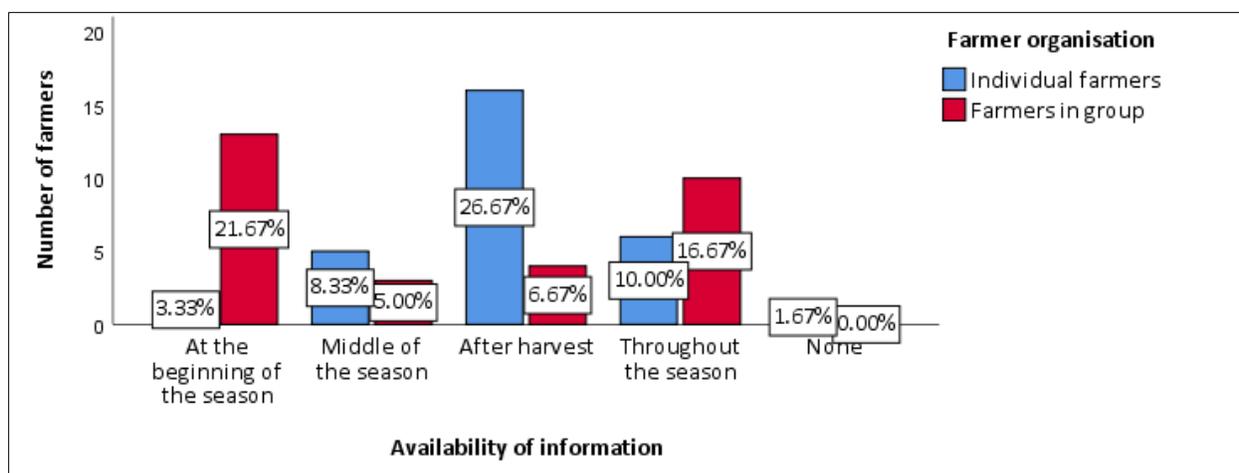


Figure 23: Time of market information access in season

5.4 Information records kept by farmers

The respondents were asked whether they had kept information records (Fig 12) and which type of records they had kept (Table 13). The results showed that farmers had kept records while 25% had no records. The respondents who did not have information records cited as hinder elements lack of knowledge and training on record keeping and their inability to read and write, which was consistent with the research findings by Dudafa (2013). In addition, lack of money for buying record information materials such as books was also mentioned by farmers as a reason for not keeping records. The latter results contradict those of Dudafa (2013) because more farmers with low education had kept records. As the majority of the farmers that participated in the study had low education (primary) (Fig 9), it would be expected that record keeping among such farmers would be consistently low among the population. It was interesting however to note that record keeping among farmers with low education level (primary education) was high (Fig 24). This could be attributed to the extension services provided to the farmers by government workers and NGOs (also observed in annex 9).

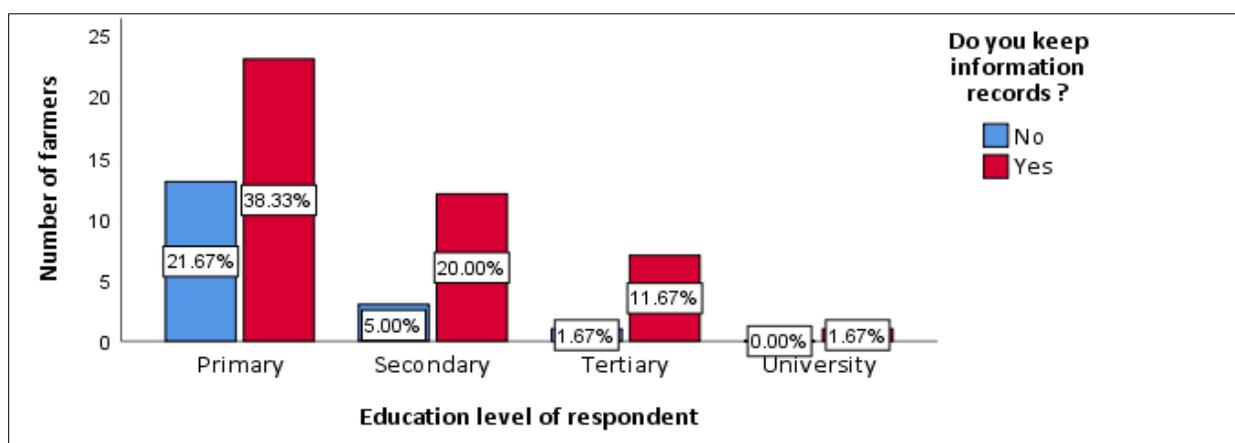


Figure 24: Record keeping by education level of farmers

5.5 Constraints encountered by farmers while accessing market information

Due to multiple constraints that could exist while farmers are accessing market information, farmers were asked to rank the identified constraints using a scale from the most pressing problem to the least (Annex 3). Not being in a farmers' group ranked as the most pressing problem followed by the cost of getting information (Fig 14). Farmers reported that they have incurred in costs for buying airtime for

calling, buying radio batteries and transportation costs to the markets in order to access market information. The latter is in agreement with Tadesse and Bahiigwa (2015) who noted that farmers incur in costs for searching market information. When the constraints were analysed by farmer category (Annex 4), it was found that individual farmers were more disadvantaged by not being in a farmer group and by the lack of trainings among others. This could point to the earlier discussion that extension workers and NGOs mostly work with organised farmers.

The interview with the NGO representative indicated that when farmers are not in groups or farmer associations, it becomes difficult for them to access market information and trainings, which supports the findings of Kit *et al.* (2006) who asserted that other chain actors and supporters find it attractive to work with farmer groups than with numerous individual small holder farmers. This underscores the importance of farmers being in groups (Kruijssen *et al.*, 2009; Luan and Kingsbury, 2019). For farmers belonging to groups, the costs associated with getting market information were ranked as the most pressing problem including buying airtime for making phone calls. Also, it was found that in both categories of farmers (individual vs. groups), the lack of access to internet services was mentioned as the least pressing problem that farmers encounter while accessing market information.

Views from key informant (Expert) revealed that it becomes difficult to reach farmers in remote locations that have poor road networks and poor internet coverage. In addition, both extension worker and NGO representatives said that farmers rarely use internet for accessing market information because they cannot use phones (Due to low literacy levels) to access internet based market information. Another key informant (extension worker) also reported that it is not easy to find relevant information in some of the market information applications (Easy Agric) and therefore for the use of such apps there is training required. This is supported by findings from Tadesse and Bahiigwa (2015) that found farmers to have mobile phones but did not use them to search for market information because they always failed to access relevant information. Language barrier was also mentioned and ranked fourth and fifth by individual farmers and farmers groups respectively. The latter is; possibly because population in the study area is comprised of different tribes since the two sub counties share boundaries with the neighbouring regions.

5.6 Difference in access and use of information between individual farmers and those in groups

The results show that farmers in groups generally have more access to information compared to individual farmers for each type of information (Fig 15 and table 16) which could be related to the benefits of being in farmers group. Kit *et al.* (2006) noted that farmer groups have more access to market information in comparison to individual farmers. However, when the difference in access to market information between individual farmers and those in groups was tested using Chi square test (Table 15), there was no significant difference in access to market information between the two groups. The lack of significant difference could be due to small sample size and the fact that individual farmers had also received information though mainly through traders/middlemen. Despite the results, farmer groups still offer comparative advantage to farmers (Hellin *et al.*, 2009; Kruijssen *et al.*, 2009; Luan and Kingsbury, 2019) and it is one way of increasing access to market information, also mentioned by key informants.

As mentioned earlier in section 5.2, traders were the main source of information for individual farmers while farmers in groups mainly sourced their information through agricultural extension workers and NGOs. There was also difference in terms of information availability to farmers as discussed in section 5.3, with more individual farmers accessing information after harvest, while farmers in groups got

information at the start and throughout the season, suggesting that farmer groups were able to plan for their production and marketing of their produce from the beginning of the season.

Regarding information use, both categories of farmers were found to utilise information they received mainly to bargain for price and find new markets/buyers as shown in table 19 and Fig 17. However, there was no significant difference in the use of market information between the two groups, possibly because of small sample size. On the contrary, Ferris *et al.* (2004) reported that farmer groups had used more market information to increase their bargaining power and sold their produce at 5%-15% higher price while other farmers sold at normal price.

The computed average selling price per kg of soybean (Annex 10) showed that farmers who had used the information sold their grains at an average price of Uganda shillings 1,901.96 (\$ 0.52) per kilogram which was 5.3% higher than the average price of Uganda shillings 1,805.56 (\$0.49) per kilogram got by farmers who did not use information. This could point to the fact that market information access improved the price bargaining power of the farmers, which is in line with what Ranjan (2017) in Svensson and Yanagizawa (2009), and Courtois and Subervie (2015) reported. The results in the table 19 also indicate that farmers hardly transported the produce to the market despite receiving market information. This could be attributed to remote location of farmers and distant markets which translated into high transport costs (Ranjan, 2017).

It was further found that individual farmers sold their produce mainly to the traders/middle while farmers organised in groups sold to farmer cooperatives with some selling to processors (Fig 25). The latter suggests that organised farmers had limited transactions with traders/middlemen who tend to offer low prices for the produce. However, even within the farmers groups, there were some farmers who still sold their produce to the trader/middlemen suggesting that it may not be possible to completely avoid middlemen. Moreover, the interview with the key informant indicated that small holder farmers have ad-hoc needs and therefore they practice the side selling of their produce from time to time.

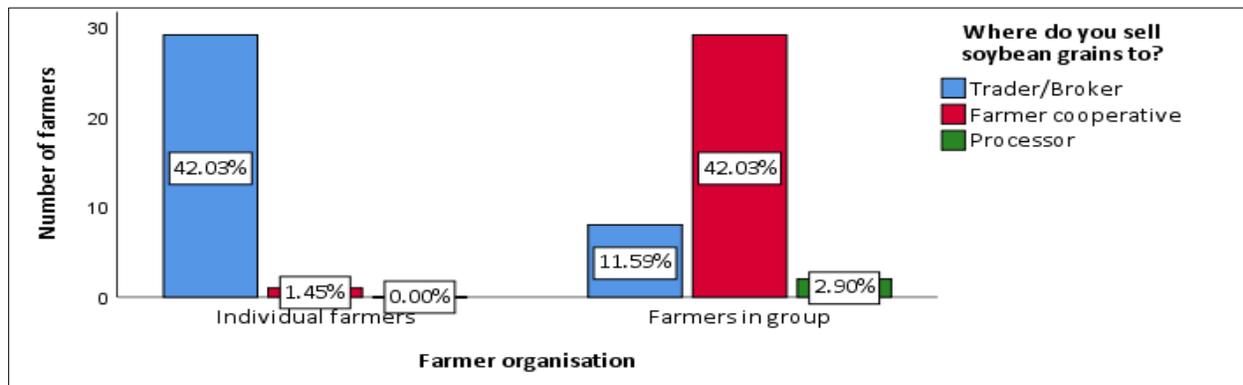


Figure 25: Place of sell of soybean grains by farmers

On the other hand, farmers did not use information and the reasons given by farmers were: (a) unreliability of the information (not the right information), (b) information was received late in the season, (c) low prices offered and (d) farmers failing to meet the quantities required in the market even after receiving information on quantity. This corresponds to views from Fafchamps and Minten (2012) and Veit (2009) who asserted that information can only be useful when it's up-to-date and provided in a

timely manner. Besides that, other factors such as education level could affect the farmers' decision to use the information. The results of this study showed that there were more farmers with lowest education (primary) not utilising information compared to farmers from other education levels (Fig 26) and this is comparable with findings from Anbarasan and Bhardwaj (2017). It could be that more educated farmers valued market information more than the less educated farmers.

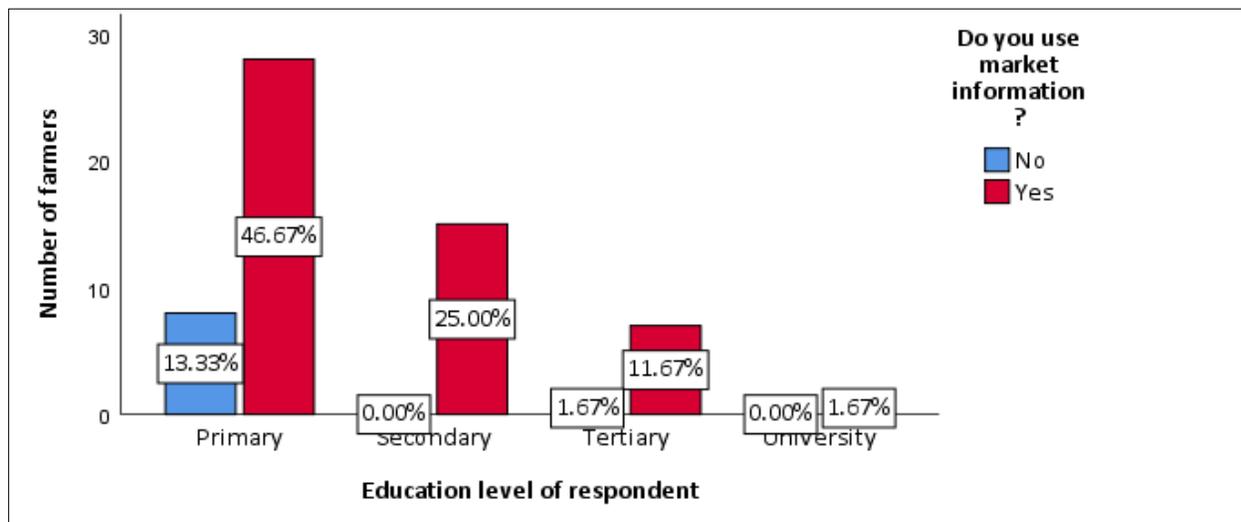


Figure 26: Information utilisation by education level of farmers

This research found that both male and female farmers accessed market information (Fig 19) and there was no significant difference in access to market information between male and female farmers, suggesting both male and female farmers sought for the information, and perhaps were equally considered by stakeholders while disseminating market information. The results here contradict with Rapsomanikis (2015) who reported that women farmers have less market information compared to male farmers.

5.7 Knowledge and market information needs of small holder farmers

Results in Fig 20 show that knowing the market prices was the most important to farmers followed by having knowledge on the quality of soybean grains, received on weekly basis. Previously, 25% of the farmers (annex 12) were receiving market information once or twice in a month, suggesting that farmers received late and outdated information, which was noted by the study of Tadesse and Bahiigwa (2015) where information changes within days or weeks. Therefore, knowing the current commodity prices in the market could help farmers improve on their bargaining power with traders and middlemen/commission agents (Fafchamps and Minten, 2012). A study conducted by Chomba *et al.* (2002) in Zambia also found that farmers liked to get information relating to prices on weekly basis but the findings of this research contradict with that of Mittal and Tripathi (2009) who reported that farmers in India had selected information on seed as their highest priority.

Having knowledge on quality requirements of the soybean grains in the market could further enable them to produce quality grains that fetch high prices. The interview with the trader revealed that the price offered to the farmers depends on among other things, the quality of the grains (moisture content, purity, size and sorted one). As such, a trader had different views about farmers knowing current prices, saying in most cases farmers would want to know about the price and buyers available and they forget

about production information including costs that would help them to produce good quality of soybean grains and if they have good quality and know how much they spent, they can bargain for better prices. Indeed production information including production costs was ranked the least required by farmers (Fig 20 and annex 5), thus confirming what the trader said. The traders' views were in agreement with KIT *et al.* (2006) who asserted that knowing production costs can be the basis for farmers to bargain for their produce. The interview with the processor further revealed that information such as quality and buying prices is communicated to the farmers but mostly through agents and also to farmer groups because it is difficult to deal with unorganised farmers. Responses from farmers show that information through agents either delays or gets distorted thus the farmer is not able to use it.

5.8 Preferred market information access channels

Results in Fig 21 and Annex 6 show the most preferred channel for market information delivery was the one through farmer trainings/extension services by both government and NGO extension workers, followed by telephone whereas the least preferred was through traders/middlemen. As already discussed in section 5.3, the results here are not surprising because farmers in groups mainly received their information through government extension workers and NGOs and were more satisfied with the information received compared to individual farmers who mainly received their information through traders/middlemen who tend not to provide the right information especially on prices.

Besides delivering the right information, the government and most NGOs provide information to farmers free of charge (Tang *et al.*, 2015) and as noted in this research farmers consider costs as a constraint to access market information. Therefore, information delivery through trainings by both government extension workers and NGOs could be a better option for them. The key informant (expert) also noted that extension workers can be very useful in delivering market information to farmers because they often meet. The findings of this study somehow contradicted with Ferris *et al.* (2008) who reported that the most preferred channel for accessing information was through local radios. Farmers had said they had incurred costs in buying batteries for the radios and this could possibly be the reason radios did not rank first. Also, key informant reported that due to remoteness of locations, it may be hard to reach farmers because network coverage may be poor (e.g., roads and signal coverage for telephone).

In addition, Internet based channels (Internet and emails, 15% and 15% respectively) were ranked least, second to traders/middlemen. One extension worker noted that internet based channels are difficult for farmers to follow, and needs the extension worker to first understand it and then relay the information to farmers. Besides, poor internet coverage and low literacy levels of farmers are revealed by another key informant as reasons for not preferring internet based channels. On the other hand, mobile phones are becoming popular among farmers in Uganda (Ferris *et al.*, 2008) and could be the reason why telephone was the second most preferred channel for receiving market information. In contrast to our findings, previous studies showed little success in the use of telephone for accessing market information. Tadesse and Bahiigwa (2015) reported that farmers in Ethiopia did not search for information despite having phones because of the costs involved while Fafchamps (2012) found that only a small number of farmers in Maharashtra benefited from the information received through telephone/SMS alerts and its uptake was generally slow.

Traders/middlemen were the least preferred channel for accessing market information possibly because middlemen and traders do not give the right and timely information. As seen in section 4.7, the main source of information for individual farmers was traders/middlemen and such farmers were more likely to be dissatisfied with the information received (section 4.4). However, it may not be possible to

completely remove the traders/middle as they can be the link between producers and processors especially in remote areas and in situations where farmers are not organised (Ranjan, 2017). Instead, relationship /trust between producers and traders/middlemen ought to be improved for effective use of market information (M4P, 2008).

5.9 Opportunities for increasing farmers access to market information

The use of extension workers to deliver market information to farmers was mentioned by the extension worker, NGO and expert as an opportunity. They said this because extension workers often meet with farmers and can share the information. Besides, extension workers from government and not for profit NGOs provide free services to farmers. There are also private sector organisations/companies (PSPs) that are contracted by the government to provide paid for services to the farmers.

In addition, there are a number of local media houses (both print and digital) such as radios that could be used to channel information to farmers. Interview with key informants also revealed that most farmers, for example listen to local radios even in the rural areas and having programmes on marketing or spot messages could help in delivering information to farmers.

Table 23: PESTEC analysis of the Soybean subsector

Political	<ul style="list-style-type: none"> Political stability in the country and government support towards the subsector in terms of funding and collaborations with other international development partners such as IFAD
Economic	<ul style="list-style-type: none"> Market is available for the Soybean grains and its products, both in local and international markets
Social	<ul style="list-style-type: none"> Increasing consumption of the soybean products among the population because of its nutritional benefits
Technological	<ul style="list-style-type: none"> Strong research institutions such as NaCRRI and Makerere University that have produced several improved soybean varieties. Availability of processing mills, that process 2-300 tons of soybean daily. Infrastructure development such as roads, ICT facilities can facilitate transportation and information dissemination. Human resource required to provide extension services to farmers
Environmental	<ul style="list-style-type: none"> Outbreak of soybean pests and diseases like soybean leaf rust Suitable soils the country can produce competitive quantities of soybean to meet the increasing demand for the grain as both human food and livestock feed
Cultural	<ul style="list-style-type: none"> Farmers have adopted soybean production, mainly as a cash crop, shift from their traditional staple crops.

Source: Source: VODP2, 2019; Tukamuhabwa and Oloka (2016); Key informant interview, 2020

5.10 Reflecting on research process

Overall, the research process was achieved within the planned time frame though there were some delays especially in scheduling interviews with key informants because most of them reported to be busy. This research was initially designed to have only survey using semi structured questionnaire but was later adjusted to incorporate interviews with key informants to get more detailed data from the respondents. However, due to covid 19, it was not possible to have face to face interview with respondents and perhaps make some observations during the study. Since survey data was collected by the research assistant, it was also important for the researcher to participate in data collection through phone call to appreciate challenges and success in the data collection exercise. Online data collection

was adopted given the travel restriction imposed due to covid 19. It was however easier to process data received online, but had its challenges as well especially poor network interrupted the flow of the interviews with key informants.

Both source and method triangulation was used in the study to ensure that the data obtained were reliable and questionnaire was pre tested before the actual data collection to ensure validity of the data collected. As result of pretesting, some questions were adjusted especially multiple choice questions to enable respondents choose more than one option. The survey helped to collect primary data from farmers and was backed up with key informant interviews to get detailed views regarding farmers' access to market information, and literature review provided additional information to answer the research questions.

A precaution was taken in selecting the respondents for the survey by randomly picking them from the list of farmers so that the selected sample is representative of the whole population, and therefore generates results that are generalizable to the whole population. The quality of one's research can be doubted when the response rate is very low (Laws *et al.*, 2013). In this research, the response rate was 100% and this could have been possible because of the incentives (Transport refund) given to the respondents for their participation in the study.

While bias especially in qualitative research is inevitable and may not be possible to avoid (Laws *et al.*, 2013), efforts were made in this research to minimise bias by avoiding leading and sensitive questions during interview, recording all the responses from respondents and analysing it objectively. In addition, random sampling and stratification were useful in minimising bias and ensure equal representation of respondents in the study.

Finally regarding the sample size, Laws *et al.* (2013) noted that a sample of 15-30 cases is the minimum to be able to do statistical data analysis. Therefore, the sample size of 60 respondents in this survey was adequate to make statistical data analysis. A sample larger than 60 respondents for the survey would have given better results, but because of resource constraint, it was not possible to have one. On the other hand, the sample size of five key informants was adequate to get detailed information, since qualitative research involves few cases (Laws *et al.*, 2013).

CHAPTER SIX

6.0 Conclusion

The conclusion is based on the survey, interview and findings from literature review to answer questions pertaining small holder soybean farmers access to market information in the soybean value chain.

Stakeholders' support is key in the soybean value chain. Much has been done in the areas of input supply, financing and trainings but more still needs to be done in regards to increasing market information access to farmers. There are a number of market information access channels currently being used to provide information to farmers but the most preferred by the farmers is through trainings by government, NGO, and private sector because the farmers receiving information through this channel are more likely to be satisfied with the information as compared to other channels (traders/agents) who deliver late and inaccurate information to farmers, thus the reason farmers are dissatisfied and not able to use the information.

Record keeping can improve information management among farmers and together with the provision of the relevant up-to-date information such as price, quality/grade of soybeans and the availability of buyers in a timely manner, farmers can plan and make decisions that will increase their profits. This can be achieved by breaking some of the barriers such as lack of trainings, not being in farmer groups and costly information. According to Kit *et al.* (2006), farmers can improve their position in the chain (chain management) by improving their management of information because the more information they can manage, the better the farmers can manage their farms and groups and the returns are likely to be higher. The Fig 27 illustrates how farmers would upgrade their position in the value chain. Currently most of the farmers both individual and those in groups are in position one (chain actors), producing fairly good soybean grains but they need to improve on information management and organise themselves into farmer groups/cooperatives so that they can access better services such as prices, quality improvement and innovation in the chain when they are in position two.

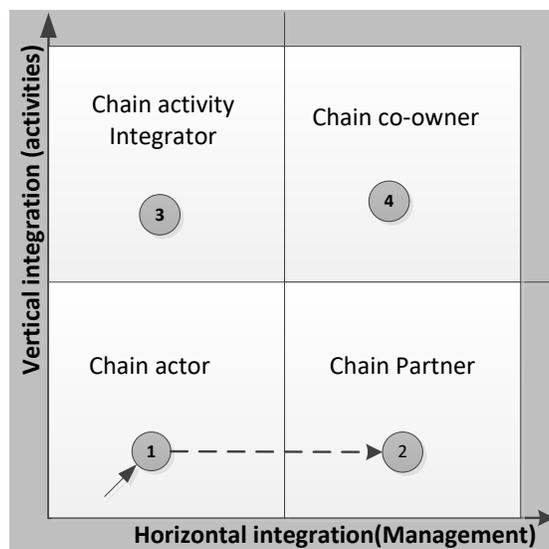


Figure 27: Proposed chain upgrade for soybean farmers
Source: Adapted from KIT *et al.* (2006)

The findings further present opportunities for increasing access to market information. Use of government extension workers, local media (both digital and print) and public-private partnerships were mentioned as some of the opportunities that can be exploited to increase access to market information in the chain.

6.1 Recommendations

The recommendations are based on the findings of the study. The District local governments (Bukedea), NGOs, private sector and farmers have the role to play in increasing farmers' access to market information.

a) Bukedea District and other development partners

Stakeholder role: Bukedea District and other stakeholders (NGOs and PSPs) involved in supporting farmers should increase farmers' access to free market information through extension services (trainings) to deliver timely and relevant market information (current prices, quality/grades, available buyers).

- There is need for the District extension staff to establish linkages with the relevant actors such as processors for easy flow of market information.

Record keeping: The District should further develop the capacity of farmers in record keeping in order to improve information management of farmers, and in group dynamics (formation) for ease of delivery of market information to farmers.

Knowledge and information: The District should provide regular (weekly) market information about current soybean prices, quality and grades and available buyers in the market. Conducting weekly market surveys can help to generate up-to-date market information for farmers.

b) Farmers

- Farmers should improve on their relations with other actors in the chain especially traders/agents who could be having market information.
- Individual farmers should join farmers groups for easy access to services such as market information and minimise hindrance to market information access.

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Annex 2: Survey questionnaire

Dear respondent,

My name is Imalingat Julius Joseph, a student of Van Hall Larenstein University of Applied Sciences in the Netherlands. I am carrying out a research on "enhancing market opportunities for farmers in the soybean value chain through increased access to market information". Kindly provide your responses to the questions provided. Note that all the responses that you provide shall be treated with confidentiality and your name will remain anonymous. This questionnaire takes 10-15 minutes of your time.

Date.....Name of interviewer.....Contact.....

SECTION A: FARMERS

General information

1. District.....(2).Sub County.....(3) Age..... (4)Sex.....(M/F)
5. Primary occupation..... (6)Household size
7. Education: (i) Primary (ii) Secondary (iii) University (iv) Tertiary
8. Are you in farmer group? (Yes/No)
9. What Crops do you grow for sale? (Give 5)
10. How much soybean grain do you produce per acre?.....
11. Where do you sell your crop after harvest? (More than one option possible)
(i) Broker/Trader (ii) Farmer group (iii) Farmer Cooperative (iv) Processor
12. At what price do you sell it per Kilogram?
13. Do you know how much is soybean grain sold in other areas? (Yes / No)
14. Do you know the resale price of your produce? (Yes/No)
15. Do you know where the processors are located? (Yes/No)
16. Did you receive agricultural trainings? (Yes/No)
17. If no, briefly explain why it has not been possible for you to get training?
18. If yes, which training did you receive? (More than one option possible)
(i) Marketing (ii) Agronomy (iii) Post-harvest handling (iv)group leadership
(ii) (v) Pest and disease management (vi) other
19. If yes, from whom did you receive the training? (More than one option possible)
(i) Government extension staff (ii) NGO (iii) Farmer group (iv)
processor(v) Farmer Cooperative (vi) input suppliers (vii) other.....
20. Which of the following information do you currently receive as a farmer to help you market your soybean grains? (More than one option possible)
(i) Price (ii) Quality (iii) Quantity (iv) Transport costs to the market
(v) Market input (Fertilizers, pesticide) information (vi) Information on available buyers
(vii) Production costs (viii) none (ix) other.....
21. From whom do you mostly get this information? (More than one option possible)
(i) Government extension workers (ii) NGO (iii) Middleman/Trader (iv) Processor
(v) Other farmers (vi) none (vii) other.....
22. How do you mostly get the information that helps you to sell your soybean grains? (More than one option possible)

- (i) Through trainings/meetings (ii) Local Radios (iii) Telephone/SMS alerts (iv) Traders/Middlemen
- (v) Local Newspapers (vi) through other farmers (viii) Notice boards
- (ix) E-Mail (x) Internet (xi) none (xii) other.....

23. Who collects the information for you?

24. How many times do you receive this information in a month?

25. on average, how many days do you take to get this information after harvesting your crop?

26. When do you always get market information that helps you to plan and market your soybeans?

- (i) At Beginning of season (ii) Middle of the season (iii) After Harvest (iv) Throughout the season

27. Are you satisfied with the information that you receive to help you market your produce? (Yes/No)

28. If no, why?

29. To improve the selling of your produce (soybean grains), do you use market (Yes/No)

30. If yes, in which ways do you use this information? (More than one option possible)

- (i) Bargain for price (ii) Find new markets/buyers (iii) transport the produce (iv) Improve quality of produce
- (v) improve quantity of the produce (vi) Keep records (vii) Other.....

31. If No, why don't you use this information to help you market your produce?

32. Please rank the following according to how important is this factor to you for receiving market information that helps you to sell your soybean grain? (From 1-8, most important to the least)

- (i) Through farmer trainings (ii) Through Radios (iii) Telephone/SMS alerts (iv) Traders/middlemen
- (v) Newspapers (vi) Internet (v) Notice boards (vii) Emails

33. Please rank the following according to how important is each type of market information to you (1-8 most important to the least).

- (i) Price (ii) Quality (iii) Quantity (iv) Transport costs to the market
- (v) Market input (Fertilizers, pesticide) information (vi) Information on available buyers
- (vii) Production costs (viii) Storage information

34. How many times in a month would you want to receive information that can help you to market you produce?

35. Do you incur in costs to get market information that would help you to sell your produce? (Yes/No)

36. If yes, which ones?

37. Do you keep information records in your farm?

38. If yes, which kind of information do you record to help you find markets?

- (i) Production costs (ii) Weather (iii) Pests and diseases (iv) Market (prices, suppliers, transport Costs)
- (v) other.....

39. If No, briefly explain why you don't record information about your farm?

40. Please rank the following constraints that prevent you from getting information that would help you to market your soybean from the most serious problem to the least (From 1-9, from the most serious to the least)

- (i) Lack of trainings (ii) Cost involved in getting the information (iii) Lack of Telephone
- (iv) Language barrier (v) Poor relationship with buyers (vi) Lack of a radio
- (vii) Long distance to the market (viii) Not being in a farmer group (ix) Lack of internet

Annex 3: Combined ranking of the constraints encountered by farmers

Combined Ranking of the constraints while accessing market information (1=Most important and 9 =Least Important)											
Rank	Lack of training	Cost of getting information	Lack of telephone	Language barrier	Poor relation with buyers	Lack of radio	Long distance to markets	Not being in farmer group	Lack of internet	Number of farmers	Percentage Rank
1	14	8	1	12	1	1	1	15	7	60	25
2	10	11	1	7	9	8	7	4	3	60	18.3
3	8	6	2	10	17	4	5	5	3	60	28.3
4	7	16	13	6	5	1	9	3	0	60	21.7
5	2	5	10	12	7	8	13	1	2	60	21.7
6	7	1	5	7	8	9	13	6	4	60	15
7	9	6	12	2	4	14	3	7	3	60	15
8	2	7	11	1	8	11	7	4	9	60	15
9	1	0	5	3	1	4	2	15	29	60	5
	60	60	60	60	60	60	60	60	60		

Annex 4: Ranking of constraints by farmer category

Individual farmers ranking of the constraints (1 =Most Important,9=Least important)											
Rank	Lack of trainings	Cost of getting informaion	Lack of telephone	Language barrier	Poor relationship with buyers	Lack of radio	Long distances to markets	Not being in farmer group	Lack of internet	Farmers	Percentage Rank
1	11	0	0	5	0	0	0	12	2	30	40
2	6	6	0	6	5	2	2	3	0	30	20
3	6	4	0	4	5	4	2	3	2	30	20
4	3	10	6	4	1	0	5	1	0	30	20
5	0	3	5	5	6	2	7	0	2	30	23.3
6	3	0	3	3	5	6	7	2	1	30	20
7	1	3	5	1	2	8	2	5	3	30	16.7
8	0	2	6	0	5	5	4	3	4	29	16.7
9	1	0	5	1	1	4	1	1	16	30	53.3
Farmers in group ranking											
Rank	Lack of training	Cost	Lack of telephone	Language barrier	Poor relationship with buyers	Lack of radio	Long distances to markets	Not being in farmer group	Lack of internet	Farmers	Percentage Rank
1	3	8	1	7	1	1	1	3	5	30	26.7
2	4	5	1	1	4	6	5	1	3	30	20
3	2	2	2	5	12	1	3	2	1	30	40
4	5	4	7	2	4	1	4	2	1	30	23.3
5	2	2	5	7	1	6	6	1	0	30	23.3
6	4	1	2	4	3	3	6	4	3	30	20
7	8	3	7	1	2	6	1	2	0	30	26.7
8	2	5	5	1	3	6	3	1	4	30	13.3
9	0	0	0	2	0	0	1	14	13	30	46.7

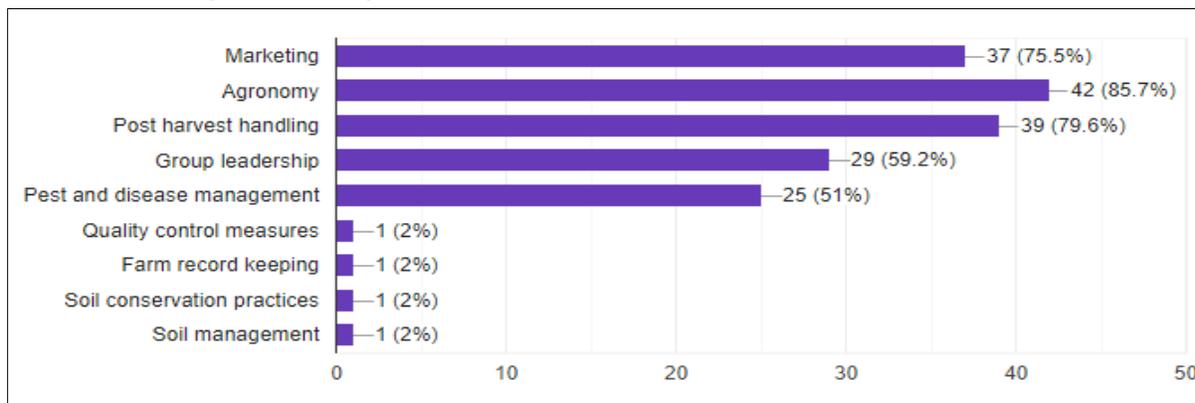
Annex 5: Knowledge and market information needs of farmers (n=60)

Ranking of knowledge and market information needs of farmers (1=Most important,8 =Least important)											
	Rank given	Market price	Quality/grade	Quantity required	Transport costs	Market input information	Information on buyers	Production costs	Storage information	Number of farmers	Percentage rank
	1	36	10	4	1	0	7	2	0	60	60
	2	13	21	13	4	1	3	5	0	60	35
	3	6	16	11	10	2	12	2	1	60	20
	4	5	7	14	4	8	16	5	1	60	23.3
	5	0	4	7	11	11	12	4	11	60	18.3
	5	0	1	7	7	11	6	18	10	60	18.3
	5	0	0	3	9	13	4	14	17	60	18.3
	8	0	1	1	14	14	0	10	20	60	16.7
		60	60	60	60	60	60	60	60		

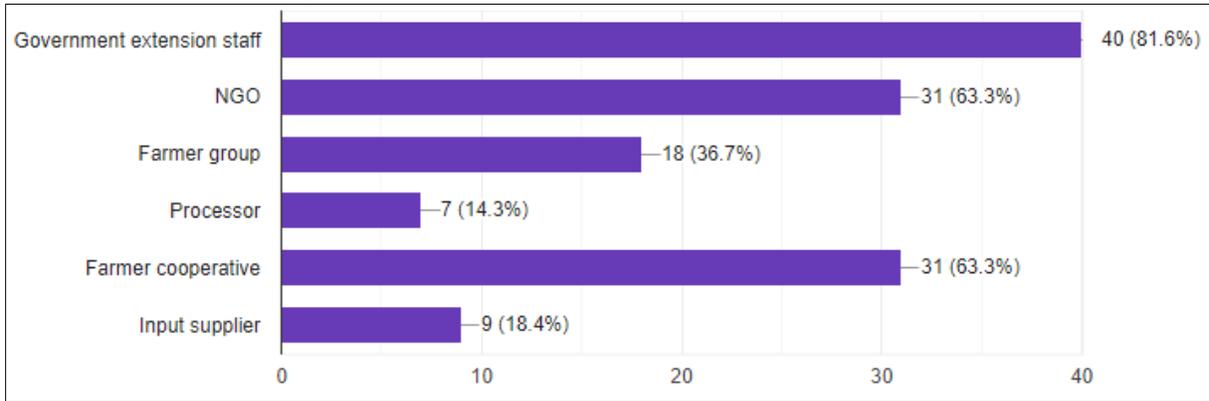
Annex 6: Farmer preferred market information access channels (n=60)

Ranking of farmer preferred market information access channels (1= Most important,8 =Least important)											
Given	Through trainings	Local radios	Telephone/SMS alerts	Traders/middlemen	Local newspaper	Internet	Notice boards	Emails	Number of farmers	Percentage Rank	
1	24	7	3	18	0	0	8	0	60	40	
2	10	10	19	10	0	0	9	2	60	31.7	
3	9	15	15	14	2	0	5	0	60	25	
4	2	16	11	10	12	1	8	0	60	20	
5	2	9	7	3	19	3	13	4	60	21.7	
6	7	1	3	2	20	9	9	9	60	15	
6	1	2	1	2	5	26	7	16	60	15	
8	5	0	1	1	2	21	1	29	60	1.7	
	60	60	60	60	60	60	60	60			

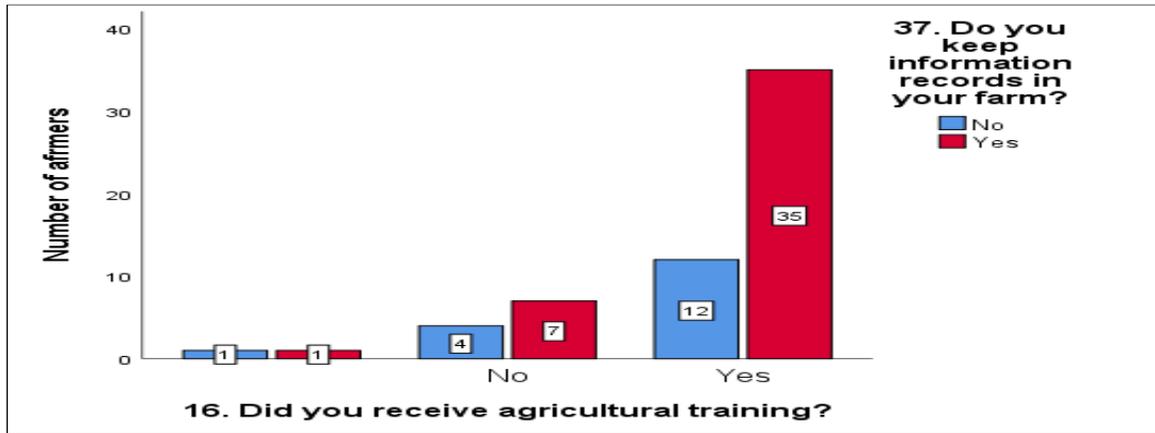
Annex 7: Trainings received by farmers



Annex 8: Source of training for farmers



Annex 9: Record keeping versus training received by farmers



Annex 10: Average selling prices

Group Statistics					
	Do you use market information	N	Mean	Std. Deviation	Std. Error Mean
Selling price per kg	No	9	1805.56	191.122	63.707
	Yes	51	1901.96	146.274	20.482

Annex 11: Desired frequency for receiving market information

How many times in a month would you receive information that can help you to market you produce?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	3.3	3.3	3.3
	2	7	11.7	11.7	15.0
	3	8	13.3	13.3	28.3
	4	22	36.7	36.7	65.0
	5	2	3.3	3.3	68.3
	6	6	10.0	10.0	78.3
	7	1	1.7	1.7	80.0
	8	9	15.0	15.0	95.0
	10	2	3.3	3.3	98.3
	25	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

Annex 12: Current frequency of receiving information

How many times do you currently receive this information in a month?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	1.7	1.7	1.7
	1	15	25.0	25.0	26.7
	2	15	25.0	25.0	51.7
	3	7	11.7	11.7	63.3
	4	15	25.0	25.0	88.3
	5	3	5.0	5.0	93.3
	6	3	5.0	5.0	98.3
	7	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

Annex 13: Interview Checklist for Middleman/Trader

1. Briefly introduce your self
2. What price do you buy soybean grain from farmers?
3. What price do you sell the soybean at?
4. Do you buy soybean grains at the same price from all farmers?
5. What do you consider when offering the price for the soybean grains?
6. Do you help the farmers you work with in terms of market information?
7. What kind of market information do you give them, if any?
8. What challenges do you face in trying to share market information with them, if any?
9. Do you get market information as a trader?
10. Where do you get information about the market that helps you to sell your produce?

Name of interviewee (Trader).....

Name of interviewer:Imalingat Julius Joseph Date: 16/7/2020

Interviewer	Interviewee (respondent)
<p>Introduction. My name is Imalingat Julius Joseph, iam carrying out a research on soybean farmers’s access to market information in Bukedea and I would like to have a 20 minute interview with you. Qn. Can you briefly introduce yourself?</p>	<p>Okay, my name is..... iam a trader and ideal in a variety of commodities including soybean grains. I have been in this business for more than seven years.</p>
<p>Qn. At what price do you buy soybean grains from farmers Okay, do you buy from particular farmers</p>	<p>It depends on the quality of the soybean grains and the season, but on average, it is between 1500-2000 (0.4-0.5 euros) per kilogram and I sell it between 2,500-2,800 (0.6-0.7 euros) to the processors Sometimes I also sell soybean seeds to the farmers. For the seeds, I buy from only registered groups who have been trained on how to produce quality declared seeds. For the Soybean grains, I buy from any farmer who has the grains and the price will depend on among other things the quality of the product (Moisture content, purity, size and sorted one) and the scarcity. And usually when iam buying for hoarding /for future, iam not on pressure so I set my own price that I buy from the farmers but when there is demand for it at a given time, sometimes I buy it at farmers’ price.</p>
<p>Qn. Do you share market information with farmers that you buy from? What kind of information? Okay. Do some farmers sell direct to the processor or do they have supply agreements with the processor</p>	<p>Yes, we do share information with them right from planting, for example how space the crop, pre germination, importance of the soybeans for example easy to manage and improves soil and then sensitise them about the market. We also tell them about the quality but for quantities, we do not know the definite amount required by the processor. In most cases farmers would want to know about the price and buyers available and they forget about production information including costs that would help them to</p>

	<p>produce good quality of soybean grains and if they have good quality and know how much they spent, they can bargain for better prices.</p> <p>We then tell them to grow more soybeans because the market is there, and we get their contacts so that when they have soybean grains they can call us. We have made contact with one soybean grain processor (Agrinet from Tororo). We also received requests from other soybeans grain processors to supply them with the grains.</p> <p>Usually processors buy from organised traders or farmer groups because they need large quantities, but farmers need market assurance. Farmer groups are working towards making supply agreements with the buyers (processors)</p>
<p>Qn. What challenges do you get in trying to share information with farmers? For you as a trader where do you get your information from?</p>	<p>Poor linkage. It is not easy to get information as an individual farmer but at least it is easier to pass information across a group of farmers. Group is a better way to access information but there is need also to build the capacity of the groups interims of training, but they liase with extension workers at the Sub county.</p> <p>Processors give information to the traders about the quantities and mostly through telephone because we have their contacts.</p>

Summary

- Information types: importance of soybeans, market, production information, quality and quantity. Farmers need price and buyers but it would be important for them to know production information.
- Challenges: Difficult for individual farmers to access information, group is a better way to access information, individual farmers poorly linked to information.
- Usually processors buy from organised trader or farmer groups.
- Price determinants: Trader buys from all farmers. Price determined by quality, season and demand.
- Relationship: No agreements between farmers and buyers, there is information sharing, farmer groups working towards making agreements with buyers
- Group is a better way to access information
- there is need also to build the capacity of the groups in terms of training,

Annex 14: Interview checklist for extension workers

1. Briefly introduce your self
2. Do you support farmers with Production inputs?
3. If yes which ones?
4. Do you conduct farmer trainings for farmers?
5. Is yes, which ones?
6. Do you provide market information to farmers?
7. If yes, which ones?
8. How often do you provide market information to farmers in a month farmers?
9. Which are the common channels through which you provide information to farmers?
10. What challenges do you face in providing market information to small holder farmers?
11. What do you think is limiting farmers from getting market information that would help them to market their produce?
12. What do you think is a better way (channels) of delivering market information to farmers?
13. What are the opportunities that can be exploited to increase farmers' access to market information?

Name of respondent: A (extension worker)

Name of interviewer: Imalingat Julius Joseph Date of interview: 22/7/2020

Interviewer	Respondent
Introduction. My name is imalingat Julius Joseph, iam doing research on how to increase farmers' access to market information. I need to hear some views from extension workers.	Okay, yes we can do it now.
So let me start with number two, do you support farmers with production inputs? Which ones? So basically planting material?	Yeah, the other one (introduction) you will just put. Yes we do. It's mainly seeds (planting material) and may be sometimes chemicals and small equipment (pumps). Yeah, and some chemicals.
Which trainings do you always carry out? So what about market information do you provide to farmers, for example commodity prices, availability of the buyers, quality requirements, etc? So which kind of information do you always try to pass across? So which channels do you always use to deliver information to farmers?	Postharvest, sometimes we train on value addition, and best agronomic practices. We do but it is not very pronounced. Most of our farmers look for their own market. It is usually the prevailing prices in the market, but other information like the availability of the buyers, it is not so pronounced. Yeah, word of mouth, one –on- one, then through those trainings that we usually have, then sometimes through phone calls, a farmer just calls you and then you talk to them on phone.
Okay, so what could be some of the challenges that you face while trying to provide market information to the producers? Yeah, so it becomes difficult. So it needs to get intouch with those big buyers.	The biggest challenge is that don't have the information myself to give them. I mean I may not know the buyers. Yeah, there is even an application called easy agric where prices could be got, I have tried to visit it but I have not clearly understood it. I think some company collaborating with MAAIF I have tried to follow it but I do not understand.

Is it by MAAIF?	
So there is an app where farmers could access information? True it becomes difficult	Yeah, but even the extension officers were not understanding it, now what about farmers who don't have the phones.
Okay. In your own opinion, what do you think is constraining farmers from accessing market information? So because of small quantities there is not much connection with buyers? What about if you look at the organisation of farmers, can it be a challenge?	Poor technology adoption, and then also, the farmers are producing low quantities and it becomes difficult to connect with buyers. They therefore end up selling within the village. Yeah. Yeah, some of the farmer groups we have are focussed on other activities like saving and not look for market and the related information.
Yeah I see. If we are improving dissemination we are to improve farmers' access to market information, what do you think is a better way of delivering such information?	First I think first we begin with extension workers. The app would actually be very useful. Teach extension workers how to get this information so that they can pass it on to the farmers, even if the farmers don't have the phones. The extension workers should be guided better. And then also form stronger groups so that information can be passed to groups where farmers can easily pick it up and share, because individual farmers have their own issues.
What could be in place to take advantage of, to increase farmers' access to market information, you have already said extension workers. What else?. Okay thank you so much for your time. That is what I wanted to discuss with you.	Local radios could also be of help because most of the people in the village listen to radios, and such information could be passed on radios

Constraints

- Weak farmer groups
- Poor technology adoption, most farmers cannot use the app (Easy agric)
- Low produce, thus it becomes difficult to connect with large buyers.
- Most groups focus on activities like savings and not marketing

Opportunities

- Extension workers to deliver the information
- Local radios could be of help because most people in villages listen to radios

Kind of information farmers need

- Most farmers need information on Price

Annex 15: Interview with NGO representative

Name of interviewer:Imalingat Julius Joseph Date: 17/7/2020

<p>My name is Imalingat Julius Joseph, iam carrying out a research on soybean farmers’s access to market information in Bukedea and I would like to have a 20 minute interview with you. Qn. Can you briefly introduce Can you briefly introduce you self</p>	<p>Iam....., Senior Agricultural Officer working with Soroti Catholic Diocese Integrated Development Organisation (SOCADIDO), but we work in Bukedea as well</p>
<p>Do you give support to small holder farmers?</p>	<p>Yes, we give support to our farmers but the project currently looks at restoring the degraded eco systems where farmers derive their livelihoods. Besides that we build capacity of farmers in number of ways especially in relation to environment conservation, disaster risk reduction strategies, savings and loan methodology, good agronomic practices, income generating activities and development of community action plans among others. Direct support Provision of drought tolerant planting materials like improved cassava varieties and potato vines, provision of tree seedlings, savings kits, provision of tarpaulins to water logging prone areas, provision of Pics bags to improve on post-harvest handling, de-silting of valley dams to increase amount of water for animals and domestic use, part finance community action plans, establishment of tree nursery sites where communities can access tree seedlings at no cost</p>
<p>Which market information do you mostly extend to small holder farmers in the District, if any?</p>	<p>Market information is mostly where, when and how to sell their farm products. In my area of work small holder farmers are surrounded by middlemen who always cheat them by giving faults marketing prices. We have told our farmers to always carry on market survey before the products are taken to the market.</p>
<p>Which channels do you think are most appropriate for delivering market information to farmers?</p>	<p>Use of local radio stations can channel market information to farmers especially when local language is used, radio spot messages on market prices can also deliver information on marketing, use of local and international newspapers can also help in delivering market information, use of mobile phones ,use of posters in relation to changes in market prices, creation of marketing association for easy delivery of market information, organizing farmer in groups for easy delivery of market information, social media can also be used for channelling market information, public meeting can also help farmers in sharing market information, exchange learning visit also help in channelling market information, use of newsletters, this are always sent to farmers periodically detailing the</p>

<p>In your opinion, what do you think is limiting farmers from accessing market information?</p>	<p>Most of the farmers are illiterate who cannot read and use mobile phones ,most farmers do not listen to radio programmes especially the once related to marketing, location of most farmers ,farmers are not organized in to associations and groups so it becomes difficult for them to access market information, farmers have different attitudes and different problems so they can sell off their products at any time, in accessibility of some areas in terms of bad roads and poor network coverage</p>
<p>What opportunities are there for farmers to increase access to market information in the District?</p>	<p>Capacity building of stakeholders on marketing channels, improvement on communication channels, farmers being in marketing associations for easy dissemination of information, use of local leaders to dissemination of market information, agricultural officers to be meeting farmers regularly in order to disseminate market information, listening to local radio programmes related to marketing, reading of local articles in relation in papers related to marketing</p>

Annex 16: Interview Checklist for Processor

1. Briefly introduce your self
2. Where to do you mostly buy your soybean grains from?
3. How much soybean grain do you need to operate at full capacity?
4. What is the average quantity that you receive from farmers?
5. At what price do buy it?
6. Do you have contracts/agreements with the suppliers?
7. Do you communicate with your suppliers of soybean?
8. If yes, what kind of information do you mostly communicate to them?
9. Through which means do you mostly communicate to them?
10. What challenges do you face in trying to share market information with them, if any?
11. What other products/services do you mostly provide to your suppliers /farmers?

Interviewee (processor).....Agrinet

Name of interviewer:Imalingat Julius Joseph Date: 22/7/2020

Interviewer	Interviewee (respondent)
<p>Introduction. My name is Imalingat Julius Joseph, iam carrying out a research on soybean farmers’s access to market information in Bukedea and I would like to have a 20 minute interview with you. Qn. Can you briefly introduce yourself?</p>	<p>Ihave around five minutes for you because iam busy. What do you need to know? Iam the Director of this company (Agrinet),we buy and process soybean grains from farmers</p>
<p>Qn. How much soybean do you need and is enough for you? okay</p>	<p>Our processing capacity is one ton per hour, we don’t have enough quantity</p>
<p>Qn. So where do you always buy soybeans from?</p>	<p>We buy from all, we buy from anybody, aah... farmer groups, organised farmer groups, we also buy from agents who bring to our place, like that</p>
<p>Qn. So do you have some supply agreements with your suppliers?</p>	<p>Afew with farmer groups,</p>
<p>Qn. What kind of information do you give to your suppliers or would you want them to know.</p>	<p>They want to know the variety we buy, the quantity we want and the price that we offer. We give them such information mostly through agents and their representatives.</p>
<p>Qn. What could be the challenge you get when you try to pass the information to them?. Okay so you mostly use the agents to deliver the information?</p>	<p>Ahh.....the main challenges is some of the information is distorted or not obtained clearly, for example they can say we had that your price is this then I begin to wonder who gave them such price, where and when. So information distortion is the main challenge. Yeah, yeah.</p>
<p>Apart from information, what other services to you provide to farmers/your suppliers</p>	<p>Yeah we do train them and also provide transport, pick up service</p>

Annex 17: Consent Form

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Theme/Study:

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