

Assessing the factors affecting adoption to certified sunflower oil seeds to smallholder farmers: A case study of Kalambo District Council, Tanzania.



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Assessing the factors affecting adoption to certified sunflower oil seeds to smallholder farmers. A case study of Kalambo District, Tanzania

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Specializing in Horticulture chain

By

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Dedication

This research findings report is dedicated to Catherine Nyaki who is my partner, Enock, and lovely mother Ruth Mwalukasa, who suffered a year without my presence. This plaque is dedicated to the sunflower stakeholders in the Kalambo District in Tanzania

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ABBREVIATIONS

ARDS	Agricultural Rooting Data System
ARI	Agricultural Research Institute
TADB	Tanzania Agricultural Development Bank
BRiTEN	Building Rural Income Through Entrepreneurship
DC	District Council
EU	European Union
FAO	Food and Agriculture Organization
OPV	Open Pollinated Varieties
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
KDC	Kalambo District Council
PESTEC	Political, Economic, Social, Technological, Environmental and Cultural
QDS	Quality Declared seed System
RC	Region Commissioner
RUDI	Rural and Urban Development Initiatives
SSA	Sub-Saharan Africa
SPSS	Statistical Package for Social Science
SWOT	Strength, Weakness, Opportunity and Threat
TARI	Tanzania Agricultural Research Institute
TOSCI	Tanzania Official Seed Certification Institute
UN	United Nation

Abstract

Kalambo District in the Rukwa region of Tanzania is an important sunflower-growing area in the country. Several initiatives have been launched to develop the sunflower subsector, and more are planned. The key challenge facing farmers is increased productivity. This can be achieved by ensuring that their farming skills are in Sunflower oil seed, variety selection, pest and disease control, and other inputs. The work aimed on exploring the reasons that influence farmers' acceptance on certified sunflower oil seed.

This study was conducted using both qualitative and quantitative methods to acquire ancillary data then ground study to get prime data. The survey, interview, and FDG were used to help obtain information. A study was conducted in four villages in Kisungamile , Kizombwe, Mkowe, and Sopa, where 40 farmers were interviewed. The questionnaires asked about their farming practices and farming experiences. The results of the survey were obtained from the survey respondents.

The survey data was analyzed by IBM's Factual Bundle for Social Science software version 26. The subjective information was analyzed through the story method. Descriptive measurements were used to provide overviews and charts were connected to compare and differentiate different factors in the sample. Seventy percent of respondents do not use certified sunflower oilseed. The findings suggest that one of the main reasons farmers are reluctant to adopt certified sunflower seed is the high cost of certified seeds, as well as the lack of available extension services.

Keywords: Certified sunflower seed, Smallholder farmers, adoption, Kalambo District

CHAPTER ONE : INTRODUCTION

1.0. Background information

Agriculture is an important part of the Tanzanian economy, providing jobs and income for many people. Agriculture is a important part of the Tanzanian economy, accounting for over two-thirds of jobs and half of the country's GDP (Leavens et al., (2019). Sunflower (*Helianthus annuus* L.) is an annual plant, native from temperate North America, which is one of the four most important oil seeds in the world. The sunflower is a well-suited crop for many regions of the world, as it is very drought-tolerant and can grow in a variety of soils (Vilvert et al.,2018). Because of sunflower oil's high quality and the resulting high demand, the cultivation of sunflower is spreading to countries in Asia and Africa (Jocic et al., 2015).

Isinika (2021) noticed that, Tanzania positions 10th on the planet among sunflower producer and second in Africa after South Africa. In East Africa, Tanzania is the main producer with the biggest region under development, and sunflower is accounted for to be the main eatable oil crop in Tanzania (NBS, 2019), filled in practically all locales of central area Tanzania, including the Rukwa district where Kalambo Region is found.

Sunflower production is overwhelmed by smallholder ranchers, who represent practically 95% of all producers and develop 2 ha or less, 4% are medium-scale ranchers (5 to 100 ha), and just 1% are huge scope ranchers (Isinika., et al., 2021). In Tanzania, around 6% of developed land is utilized for sunflower creation (Groot A., et al 2019). Tanzania's interest for eatable oil was assessed at 570,000 t each year in 2018 and is supposed to increment to 700,000 t by 2030 (BoT, 2017).

Nearby production jst meets around 30% to 45% of demand (CIAT & World Bank, 2017). Thus, the nation imports almost 320,000 tons yearly, worth over US\$83 million. Farmers' efficiency and paye expected to increment later (CIAT & World Bank, 2017). In spite of somewhat great production and business conditions for sunflower development, Tanzania stays a net merchant of consumable oil . Public interest demand for eatable oil is expanding by 3% every year (Zhihua Zeng, 2017). An examination of the sunflower sub-sector shows that Tanzania can possibly build its intensity (BoT., 2017; RLDC 2010).

In Rukwa , where Kalambo district is found, most smallholder farmers accomplish an efficiency of 1 tone/ha of sunflower seed, which is low contrasted with the likely efficiency of 3 tons/ha. As per the Agricultural Routine Data System (ARDS, 2021) data, the typical production of sunflower seed per unit area in Kalambo District Council board for the 2020/2021 agricultural season was 1.1 tons/ha.

Kalambo District has decided to develop and strengthen the value chain of sunflower which take more than 17,712ha per season as the third leading crop in production as subsistence and a cash crop, and other three commodities which are maize value chain, fish value chain, and milk value chain. Previous study from one of the Kalambo staff member revealed that there was low production and productivity of sunflower oil seed in the District, and this was due to use of local seed ,lack of good agricultural practices ,poor access to market information and others. Improving sunflower production and productivity is expected to go hand-in-hand with the reducing sunflower post-harvest losses

1.1. Research problem statement

In spite of endeavors by the public authority and different partners to increment horticultural production and efficiency, for example, advancing the utilization of further developed crop assortments in Tanzania, sunflower efficiency is still generally low (Tibamanya et al., 2021). The public typical yield of sunflower is 0.6 tons/ha, contrasted with the possible yield of 3 tons/ha (Kombe et al., 2017).

Different analysts revealed that the reception of high-yielding advances including sunflower seeds by smallholder farmers has been displayed to further develop efficiency and homestead pay (Nata et al., 2014, Shiferaw et al., 2014, Afolami et al., 2015, Khonje et al., 2015, Mpeta 2015, Emerick et al., 2016). Mgeni and Mpenda (2021) noticed that the ongoing pace of change in sunflower cooking oil production each year is low. This present circumstance calls for partners and advancement actors to mediate and improve available technologies to increase farmers' productivity in sunflower seed production. Hence there is need to evaluate the elements that forestall farmers to take on confirmed sunflower seeds in Kalambo District Council.

1.2. Problem owner

Kalambo District Council is the main owners, as the main responsibility of the district agriculture department is to implement the policy by providing extension services to farmers.

1.3. Research objective

The objective of this research was to make an assessment of the factors limiting small holder farmer's adoption to certified sunflower oil seed at Kalambo District council.

1.4. Research question

Q1. What is hindering farmers' adoption to certified sunflower oil seed in Kalambo District council?

Sub questions

- i). Who are the stakeholders and their role in the sunflower sub-sector in Kalambo District Council?
- ii). What are the determinants of farmers adoption to certified sunflower oil seed?
- iii). What are the production challenges faced by the sunflower farmers?
- iv). What marketing variables are used by certified sunflower seed producers?
- v). What are the challenges encountered by the certified sunflower seed producers in promoting their product to farmers?

CHAPTER TWO : LITERATURE REVIEW

This chapter highlights previous studies about the key concepts used in this study. The chapter reviews issues relating to certified seeds, Agricultural technology adoption, Determinants of technology adoption, Household specific factor, Social-economic factor, Technological factor, Institutional factor, seed governance and seed accessibility in the sunflower value chain.

2.1. Certified seeds

According to Baglan et al.,(2020), certified seed is produced from seed of known genetic origin and genetic purity with controlled and audited production, processed and declared in accordance with the Seed Law. Certified seed is propagated under the supervision of the Ministry of Agriculture and Environmental Protection by seed producers formally registered in the Seed Register.

Seed processing is carried out in registered seed processing centers, and quality is tested in laboratories accredited for seed testing. The organization approved by the Ministry of Agriculture and Environmental Protection issues labels for packaging certified seed. With certified seed, the genetic potential of varieties in terms of quality and yield is exploited (Baglan et al.,2020).

There are few countries in the world that make full use of certified seed. The Republic of Croatia is an example of a country where the use of certified seed was 100% before joining the EU (Baglan et al.,2020). As in most other African countries, the seed industry in Tanzania consists of two systems: the informal sector and the formal sector (Mabaya et al., 2017).

The terms informal and formal seed systems are used to distinguish between the two different sources of genetic resources. Among smallholder farmers in SSA, most seed is sourced through the informal seed system, and only a small proportion of seed planted annually is sourced through formal market channels directly linked to plant breeding (Westengen et al.,2014).

According to Tibamanya (2022), seed quality control and certification in Tanzania is carried out by the Tanzania Official Seed Certification Institute (TOSCI). Since the 1950s, TOSCI has been working with the Agricultural Research Institute (ARI) and private seed companies within and outside the country to develop and market sunflower seed of both open pollinated varieties (OPVs) and hybrid varieties. However, only 8 of the 1,058 seed companies registered with TOSCI breed new sunflower varieties and have them certified with TOSCI. According to the Tanzania Official Seed Certification Institute (2017, 2020), only 17 sunflower varieties have been approved, released and disseminated in Tanzania (Tibamanya et al.,2022).

The government is working with the private sector and development agencies to increase the supply of affordable hybrid seeds, which typically yield 5-8t/ha and have higher oil content (43-48 per cent). In 2018/19, the government passed the Seed Registration and Financing Act, which, among other things, provides for accelerated registration of hybrid seeds for use in Tanzania. Since then, private investment in seed multiplication has increased. More than ten new locally bred hybrid seeds have been released and the price of high-yielding hybrid sunflower seed has been reduced by about 60 per cent from 70,000 TSh/kg to 30,000 TSh/kg (Dalberg 2019).

Table 1 Certified sunflower varieties in Tanzania

Sn	Variety	Type	Year	Company	Yield/t/ha
1	RECORD	OPV	1950	ARI- Ilonga	1 -2
2	CRN 1435	Hybrid	1999	Monsanto South Africa	2 -2.5
3	PAN 7352	Hybrid	2002	Panna Seed Co.	1.5 – 2.5
4	KENYA FEDHA	OPV	2006	Kenya Seed Co. Ltd	3 -3.5
5	NSFH 36	Hybrid	2016	Sunflower development Co.	3.4
6	NSFH 145	Hybrid	2016	Sunflower development Co.	3.6
7	AGUARA 4	Hybrid	2016	Advanta Seed Co. Ltd	2 -2.5
8	HYSUN 33	Hybrid	2016	UPL-INDIA	2 - 4
9	ANCILLA	Hybrid	2019	East African Seeds (T) Co. Ltd	2.5
10	MICHEL	Hybrid	2019	East African Seeds (T) Co. Ltd	2.5
11	SOLEADO	Hybrid	2019	East African Seeds (T) Co. Ltd	2.5
12	ARCHEO	Hybrid	2019	East African Seeds (T) Co. Ltd	2
13	SUPERSUN64	Hybrid	2019	Silver lands Ndolela Ltd	2 - 3
14	SUPERSUN66	Hybrid	2019	Silver lands Ndolela Ltd	2 - 3
15	NALSUN 1-2018	OPV	2020	TARI	1.5 - 2
16	NALSUN 2-2018	OPV	2020	TARI	1.5 - 2
17	AGUARA 6	Hybrid	2020	Advanta seed co. Ltd	1.5 - 2

Tibamanya *et al.*,2022

2.1.2. Seed governance

The empirical data show that, in line with theoretical considerations, all stages of the seed supply system are affected by governance challenges. These challenges include limited participation of smallholder farmers in setting breeding priorities, limited private sector participation in seed production, limited capacity of an under-resourced public regulator to ensure high seed quality through mandatory seed certification, and over-reliance on a weak public extension system to promote improved varieties (Poku *et al.*,2018).

Tanzania does not have a stand-alone national seed policy. The National Agriculture Policy (2013) provides general policy guidelines for the development of agricultural inputs in the country (Mabaya *et al.*, 2017). Tanzania's Seeds Act (No. 18) was enacted in 2003. The Seeds Regulations followed in the same year. In 2014, Parliament passed an amendment to the Seeds Act (CAP. 308) that focused on strengthening the mandate of TOSCI, expanding the scope of quality-declared seeds and convening a forum for the seed sector. Since 2014, industry stakeholders have been in discussions with the government to update the existing regulations to be in line with the Seed Act 2014 (CAP. 308). The latest seed regulations were adopted in January 2017. The legal framework for plant variety protection is the Plant Breeders' Rights Act (2002). The last amendment to the Plant Breeders' Rights Act was passed in 2012 (Mabaya *et al.*,2017).

As part of its efforts, the Government of Tanzania introduced the Quality Declared Seeds (QDS) production system around 2000 to promote the use of quality seeds (Levinson *et al.*, 2013).

2.1.3. Agricultural technology adoption.

Different authors define technology in different ways. Levinson *et al* (2013) define technology as the means and methods of producing goods and services, including methods of organization and physical technique. There is continued interest in the adoption of new technologies and their impact on

productivity. To increase crop yields and sustain yield gains, recent case studies on technology adoption unanimously recommend the adoption of integrated agricultural management systems, especially in SSA.

The decision to adopt a particular agricultural technology does not happen overnight. The adoption process of a new agricultural technology starts with the adopter learning about the existence of the specific technology. In the next phase, the potential adopter analyses the information about the new technology and the potential adopter gets to know the characteristics of the technology better. In the third phase, the potential adopter conducts a trial or experiment before adopting the technology. Based on the perceived benefits of the technology, the individual goes through the fourth phase, which involves the actual adoption of the technology. Once the technology is adopted, the user can decide whether to continue using it or not, depending on the experience and benefits after adoption (Simtowe et al., 2016).

Takahashi *et al.*, (2020) pointed out that even when profitable technologies are potentially available, they may not be widely adopted, partly because of credit, insurance and other market-related constraints, and partly because of the ineffective information dissemination system, largely due to the lack of effective agricultural extension systems.

Research and development of new improved varieties suitable for local agro-climatic conditions and their dissemination are considered the most important means of increasing crop yields and improving the welfare of farmers in developing countries. The adoption of improved varieties generally has positive effects on farmers' yields and welfare (Takahashi *et al.*, 2020).

2.2. Determinant of technology adoption

Various studies have been conducted in Africa on the determinants of technology adoption, concluding that the decision to adopt agricultural technologies is influenced by demographic, socio-economic, institutional and plot factors (Zegeye *et al.*, 2022).

It was explored that the decision to adopt a new agricultural technology may be influenced by a number of factors such as household specific factors (gender, age, education level, household size, farming experience), socio-economic factors (farm size, cost of adopting a new agricultural technology, off-farm income, tropical livestock unit), technology factors, i.e. the characteristics of the new technology, and institutional factors (membership of a social group, access to extension services, access to credit, distance to nearest market (Berhanu, 2018; Obayelu et al., 2017).

2.2.1. Household specific factors

Among household-specific factors, the gender of the household head is one of the most commonly used variables of interest in the adoption of agricultural technologies. A review of the literature on factors influencing the adoption of new agricultural technologies in Ethiopia by (Berhanu, 2018) revealed that the prevailing social structure of rural households provides for differential responsibilities between male and female members and that women in most parts of rural Ethiopia are disadvantaged groups in society who do not have easy access to technological information, which could also be the case in Tanzania. For example, many studies have found that being a woman-headed household has a negative impact on the decision to adopt agricultural technologies. The study by (Launio *et al.*, 2018) on factors influencing the adoption of selected groundnut conservation and production technologies in Northern Luzon, Philippines, also found that the gender of the household has a statistically significant impact on the use of chemical fertilizers and pesticides in groundnut farms. Male farmers are more likely to use chemical fertilizers and pesticides than their female counterparts. In the same study, the gender of the household is found to have no significant effect on the use of inoculants and seed treatment. Similarly, Solomon et al. (2014)

confirmed the adoption of improved wheat varieties in Robe and Digelu Tijo districts of Arsi zone in Oromia region, Ethiopia, using a double hurdle approach that gender has a significant influence on the adoption of improved wheat variety.

Household education level is one of the most interesting variables in studies of agricultural technology adoption. In many studies, farmers' level of education is assumed to have a positive influence on farmers' decision to adopt a new technology because a farmer's level of education increases his or her ability to obtain, process and use information relevant to adopting a new technology (Mwangi & Kariuki, 2015). For example (Abay et al., 2016; Challa & Tilahun, 2014).

2.2.2.Socio-economic factors

Among socio-economic factors, farm size plays a prominent role in the adoption of agricultural technologies. Some studies have shown that farm size has a positive influence on the adoption decision. For example, Milkias and Abdulahi (2018) investigated the determinants of adoption of improved highland maize varieties in Toke Kutaye district, Oromia Regional State, Ethiopia, and found a significant positive effect. Numerous studies have found a positive and significant relationship between farm size and adoption of agricultural technologies. Yigezu *et al.* (2018), in their study on adoption of zero tillage among wheat and barley producers in Syria, found that relative area under wheat cultivation was the main determinant of the duration of adoption, rather than total area under cultivation. Accordingly, farmers with a large wheat area are likely to adopt zero tillage earlier than farmers with a small wheat area. Ponguane and Mucavele (2018), in their study on the determinants of agricultural technology adoption in Chókwe district, Mozambique, found that farm size has a significant and positive impact on the adoption of improved seeds and mechanization.

The cost of adopting new agricultural technologies is one of the most important variables constraining the process of agricultural technology adoption. It is clear from many studies that the high cost of agricultural technology is a major barrier to adoption. Djibo and Maman's (2019) study on the determinants of agricultural technology adoption in Niger reports that high prices of agricultural inputs have a negative effect on the adoption of improved seeds and a positive effect on the use of inorganic fertilizer.

Farmers who earn off-farm income are more likely to adopt modern agricultural technologies than farmers who do not use off-farm income sources. This could be due to the fact that in many developing countries, off-farm income can be an outlet through which farmers can overcome credit constraints to purchase agricultural technologies. Ponguane and Mucavele (2018) reported that farmers with other sources of income in Mozambique are more willing to adopt both mechanization and improved seeds because farmers with off-farm income can overcome financial constraints required to purchase these agricultural technologies. Challa and Tilahun (2014) also reported that non-farm income has a strong positive influence on households' decision to adopt new agricultural technologies.

2.2.3.Technology factors

The characteristics of the new technology are the crucial thing in the process of introducing agricultural technology. The associated characteristics of a technology are a prerequisite for the adoption of an agricultural technology (Mwangi & Kariuki, 2015) also pointed out the importance of the characteristics of an agricultural technology when it comes to conducting small-scale trials first before fully adopting agricultural technologies. Mignouna et al., (2011) studied the determinants of adoption of imazapyr-resistant maize (IRM) technology in western Kenya and found that farmers who feel that the technology

is in line with their needs and compatible with their environment are likely to adopt it as they see it as a positive investment.

2.2.4. Institutional factors

Belonging to a particular social group is very important in a situation where there is information asymmetry regarding various agricultural technologies, as it paves the way for farmers to share information and learn from each other (Feyisa, 2020; Ketema et al., 2016). In addition, Simtowe et al. (2016) found that membership in a social/religious group has a negative significant impact on adoption decision, while membership in a farmers' association has no significant impact on the process of adopting agricultural technologies.

Access to extension services is one of the institutional factors in technology adoption decision. When farmers are informed about the existence, use and benefits of a new agricultural technology by extension workers, they can make a decision on the adoption of agricultural technologies. In this regard, many studies have advocated the positive effect of frequency of contact with extension agents in increasing the likelihood of adopting new agricultural technologies (Mignouna et al., 2011; Milkias & Abdulahi, 2018). In addition to increasing the likelihood of receiving up-to-date information on new agricultural technologies, extension agents or agricultural development workers in many developing countries can offset the negative impact of a lack of many years of formal training on the overall decision to adopt certain technologies.

Access to credit is considered one of the most important variables for the adoption of agricultural technologies. Simtowe *et al.*, (2016), in their study on the adoption of improved pigeon pea in Malawi, found that households that borrowed money from a credit institution were more likely to grow improved varieties of pigeon pea, consistent with the economic constraint paradigm of adoption models. Like off-farm income, access to credit can also go some way towards removing farmers' financial constraints to purchasing agricultural technologies. In this regard, studies in Ethiopia (Abay *et al.*, 2016; Feyisa, 2020; Milkias & Abdulahi, 2018) have found that access to credit can offset farmers' financial constraints to purchasing agricultural technologies.

The distance to the nearest market has a huge impact on the decision to adopt agricultural technologies and market agricultural yields. Amare and Simane (2017) found that distance to the nearest market has a negative impact on the likelihood of choosing different agronomic practices. They generalize that adoption of different technologies booms in areas with developed rural infrastructure and markets, as well as in areas where commercial farming is prevalent. Many studies on agricultural technology adoption have shown a significant and negative influence of distance to the nearest market on farmers' decision to adopt agricultural technologies (Milkias & Abdulahi, 2018; Hagos & Zemedu, 2015). In contrast, Feyisa (2020) in his meta-analysis on agricultural technology adoption in Ethiopia found that distance to market has a significant and positive effect on farmers' decision to adopt agricultural technology.

2.2.5. Seed accessibility

Accessibility is the degree of accessibility for users with different needs and preferences (UN, 2015). According to WUR (2017), seed accessibility implies the strategies and channels used by seed producers. Sometimes farmers only have access to what is available in the market, and so seed availability can determine farmers' access to seed. Also have demonstrated that poor accessibility to quality seed, the high cost of quality seed and farmers' lack of awareness of the existence and benefits of quality seed are reasons why smallholder farmers do not use quality seed.

2.3 . Conceptual Framework

To conduct this research work, the following conceptual frame work will be used to generate the required information concerning the factors limiting small holder farmer’s adoption to certified sunflower oil seed from the study area (see figure 2).

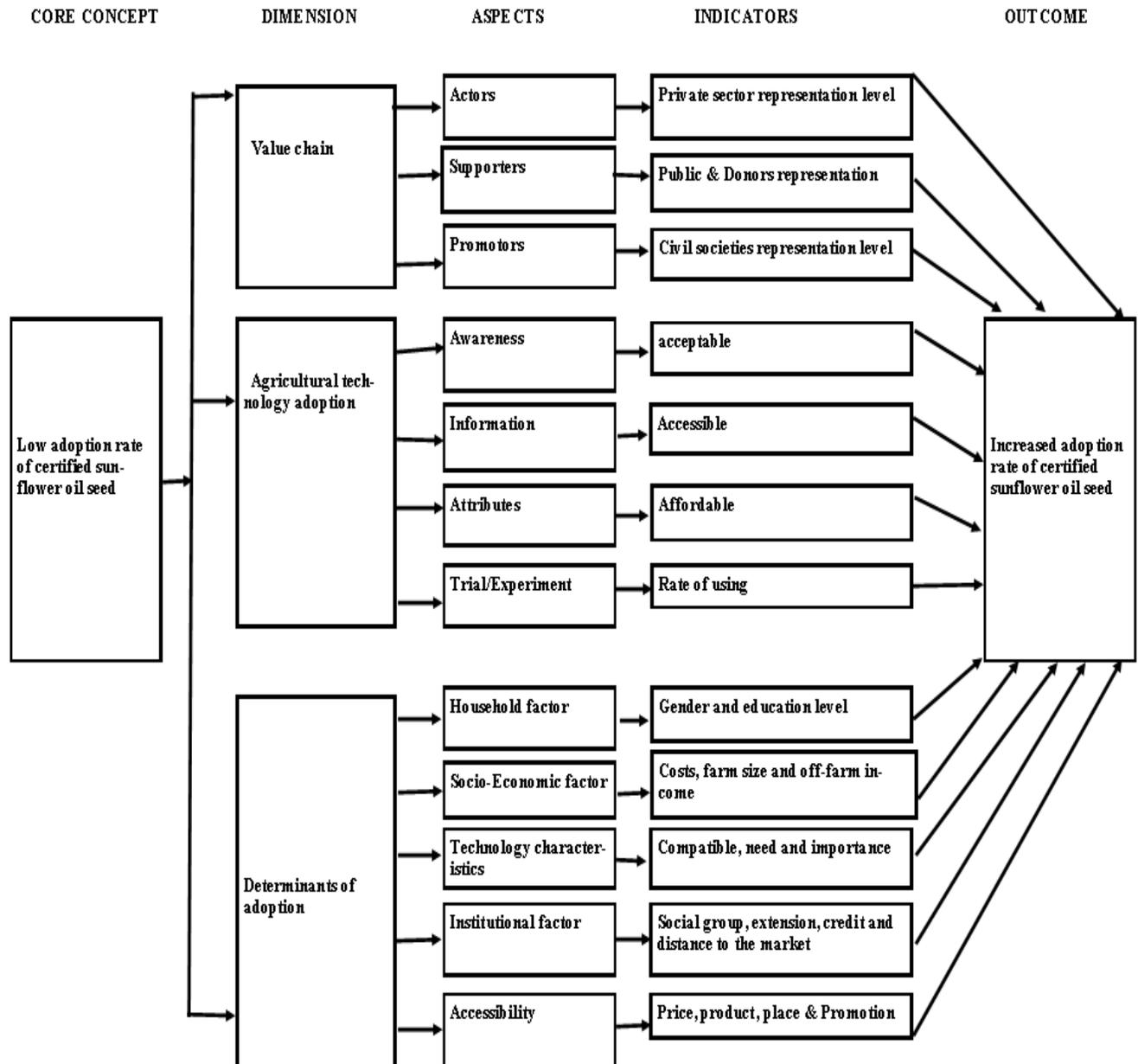


Figure 1. Conceptual framework

Author, 2022.

2.4. Concept definition.

Value chain: The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. This includes activities such as design, production,

marketing, distribution and support to the final consumer. Value chain activities can occur within or between firms, within a single geographical location or spread across wider areas, and can produce goods or services (Mc Guffog,T.2016).

Stakeholders: people who are directly or indirectly involved in the sunflower value chain. These include actors, chain supporters and chain Influencers.

Policies: The policy is a law, regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions. Policy decisions are frequently reflected in resource allocations. Health can be influenced by policies in many different sectors.

Socio-economic status: A way of describing people based on their education, income, and type of job. Socioeconomic status is usually described as low, medium, and high. People with a lower socioeconomic status usually have less access to financial, educational, social, and health resources than those with a higher socioeconomic status

Knowledge and information: information, understanding, or skill that you get from experience or education or the state of being aware of something.

CHAPTER THREE : RESEARCH METHODOLOGY

This chapter explains the area of the study, study design and data collection strategy and the way collected data were analyzed. It highlights how data was collected and analyzed. The research incorporates qualitative and quantitative methodology. It comprises primary and secondary data sources. Primary data were obtained through the interviews, focus group discussions and a questionnaire. The secondary data was obtained from desk study (books, journals, reports and internet search).

3.1 Study area

The study was conducted in 4 villages in Kalambo District Council, this is because of their potential in sunflower production. Kalambo District Council is located in the Southern highland of Tanzania, is estimated to be in latitude 8.15 and 32.1 south of the equator and Longitude 31 and 32.1 East Greenwich and Kalambo is found at 1700 M above the sea level.

It is estimated that Kalambo District council has total area of 1,165,101 Acres of which 124,541 Acres is water (10.49%) and 1,040,560 Acres land (89.31%). In 1,040,560 Acres of land, 105,024.25 Acres is forest reserve (9.01%), 1805 Acres is forest (0.15%), 788,990 Acres is area potential for agriculture (75.82%). Administratively the head office of Kalambo District council is located at Matai which is 54Km from Sumbawanga municipal. The district has one constituency 5 Divisions, 23 wards, 111 Villages and 439 hamlets and population of 271,393 people with 54,279 households families.

Map of Rukwa Region and Kalambo District showing the study area.



Figure 2 Map of Rukwa Region showing Kalambo District

Author 2022

3.2 Research Design

The research approach includes together quantitative and qualitative through desk research to obtain secondary information and field research to obtain primary information through the use of interviews, questionnaire and focus group discussion.

3.3 Research Framework

The framework prepared as the diagram representation of the research objective through different steps necessary for the effective achievement of the research (Verschuren and Doorewaard, 2010). The research framework consists of desk study, field work for information gathering (survey), data analysis, conclusion and recommendations (see figure..). A value chain map will be used to map out the actors, supports and influencers of the chain.

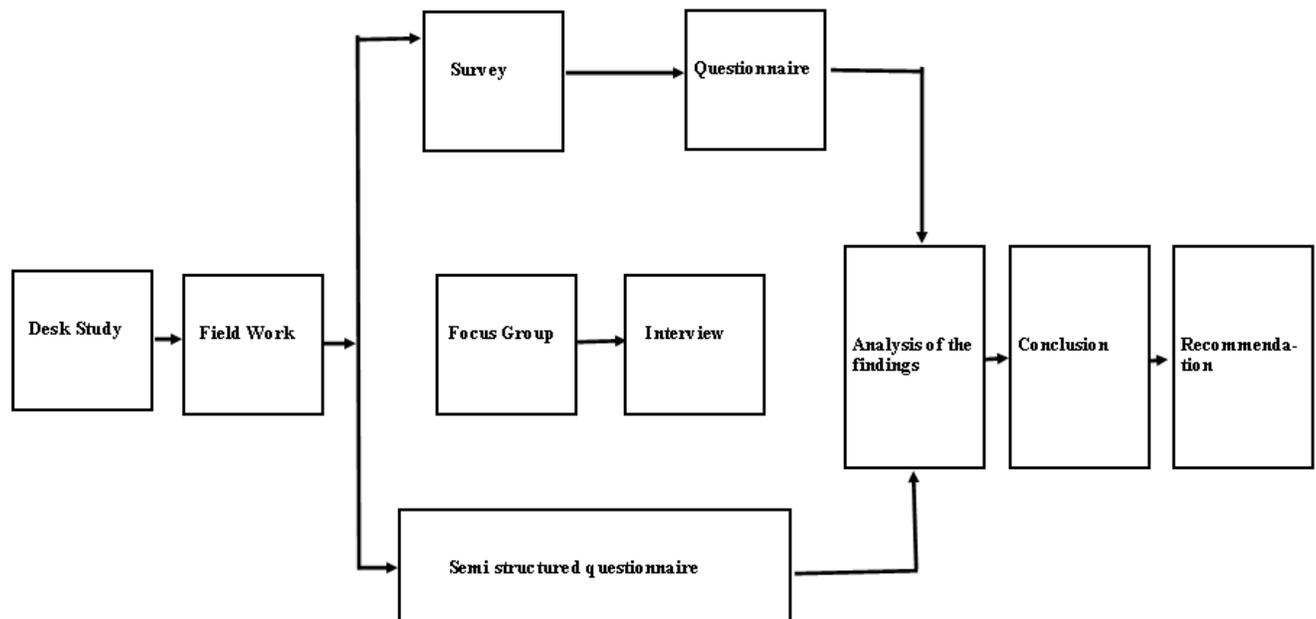


Figure 3 Research frame work

Author 2022

3.3.1 Desk Research

Desk research was carried out to obtain secondary data on the concept of farmer's seed adoption. Also, it was used to answer research questions and compare results with what has already been researched. This information was extracted from books, journals, internet search and different agriculture reports in the Ministry, Department of Agriculture, Irrigation and Cooperative.

3.3.2 Case study

A face to face interview was conducted by using a check list to 3 government officer, 2 sunflower input supplier, 2 sunflower seed growers, 2 middlemen and 1 retailer. From the government officer the aim was to find out their functions, policies and regulations for sunflower oil seed value chain and how they are helping farmers' access certified sunflower oil seed. The middle men and traders was interviewed to find out what are the need for sunflower oil seed market, the selling and buying price of sunflower oil seed and the problems/constraints they face in sunflower business.

3.3.3 Focus Group discussion

One focus group discussions was conducted, farmers only was involved in the discussion, the reason behind involving farmers in FGD was to discuss in depths issue related to the limitation and opportunities about certified sunflower oil seed.

3.3.4 Survey study

The survey study was used both probability and non-random sampling. Forty farmers was purposively selected from 4 wards namely Matai, Mkali, Sopa and Mkowe. According to John and Christensen (2004), purposive sampling relies on the decision of the researcher. Based on high rate of production compared to other villages, one village was selected in each of the following Wards: Matai, Mkali, Sopa and Mkowe respectively.

In each village, a sample of 10 farmers was selected at random to ensure that each farmer has an equal chance of being selected. Their names ware written on a piece of paper, placed in a container and 10 pieces of paper are pulled out and the farmer whose name appears on it is selected. The same procedure was repeated in each village so that a total of 40 farmers are selected. A structured or semi-structured questionnaire was used to collect the information limitation for farmer's adoption to certified sunflower seed (quantities, chain relationships, market linkages, market information and barriers to accessing certified seed).

3.3.5 Data collection

Data collection was done by using different methods. Pre-test of the questionnaire ware done to test whether questions are clear to the respondents (farmers). Different actors ware interviewed for information gathering. Farmers, Traders, Other supporters and government staffs ware interviewed (see table 2)

Table 2 List of selected respondents

Name of respondents	Ward	Institution	No. of members
Farmer	Matai	Kisungamile Village	10
Farmer	Mkali	Kizombwe Village	10
Farmer	Mkowe	Mkowe Village	10
Farmer	Sopa	Sopa Village	10
Focus Group Discussion			1
Government officer		District and Ward agricultural officers	3
Trader			2
Middlemen			2
Retailer			1
Total	-	-	49

Author,2022.

3.3.6 Research design matrix

The table 3. indicates the methods of data collection, tools for data collection, tools for data analysis and source of information.

Table 3 Research design Matrix

Sub Question	Data	Data source	Tools
i	Stakeholders and their roles in sunflower sub-sector(Value chain)	Desk research, smallholder farmers, Stakeholders and supporters	Internet Articles, Journals and books Checklist
ii	Determinants of farmers adoption to certified sunflower seed	Desk research, smallholder farmers, Traders, processors and chain supporters	Internet, Articles ,Journals and books. Interviews(checklist), questionnaire
iii	Production challenges from farmers	Desk research, Smallholder farmers	Internet, Articles ,Journals and books. Interviews(checklist), questionnaire
iv	Marketing variables	Desk research, smallholder farmers, traders and processors	Internet, Articles ,Journals and books. Interviews(checklist), questionnaire
v	Seed producer challenges	Desk research, chain actors, seed producer(breeders)	Internet, Articles ,Journals and books. Interviews(checklist), questionnaire

Author,2022.

3.3.7 Tools of analysis

Stakeholder matrix

To identify the actors and supporters and their roles in the chain including the challenges they encounter.

Value chain map

For mapping the sunflower oil seed value chain in Kalambo district for identification of product flow, information flow and the overlays of the chain.

MS Excel

To indicate how value shares in the sunflower seed chain are distributed among the various actors using tables and charts

SWOT and PESTEC

To identify the major challenges and opportunities in the sunflower value chain

SPSS

For analyzing different statistical parameters using graphs, chart and tables

3.3.8 Limitation of the study

The survey of this study was conducted from the end of June to the beginning of August, the busiest months of the year for farmers. It was a time when all the activities that was not done during the rainy season can be done during this period. It was a time for repair and maintenance of farm implements, houses, marriage ceremonies, initiation ceremonies and sacrifices, activities that ware done during the dry season. Therefore, there were many opportunities to interact with farmers. In some cases, it was difficult to reach all respondents as expected because they were busy with harvesting and other social activities.

3.3.9 Research planning

The following table (4) shows the plan of my research from May to September. It shows different activities that was done for each month

Table 4 Time table for Research plan

Activity	TIME																	
Activity	May					June	July				August	Sept						
Research Proposal	■	■	■	■	■													
Data Collection							■	■	■	■	■	■						
Data Analysis										■	■	■	■	■				
Thesis Report writing													■	■	■			

Author,2022.

CHAPTER FOUR: RESULTS

The chapter provides the research findings.

4.1 Sunflower stakeholders and their roles.

The key informants were asked to mention the stakeholders in the sunflower value chain in Kalambo District in order to evaluate and relate the current sunflower seed situation to the way they act or they are coordinated. The interviews results showed that there are many stakeholders who play different roles in sunflower sub-sector. The stakeholders were then grouped into categories of actors, supporters and promoters. The Table shows that stakeholders and roles the key informants mentioned when asked about the stakeholders and their roles.

Table 5 Stakeholder roles and their challenges

S/N	STAKEHOLDERS	ROLES	CHALLENGES
1.	Input suppliers OCP Tanzania Ltd ,Yara Tanzania Ltd, Tanzania Fertilizer Company	Supply inputs especially seeds, fertilizers and agrochemicals	<ul style="list-style-type: none"> - High transport cost from Dar es Salaam to Kalambo District. - Poor road network. - Shortage of improved seeds from ASA and Research Institutions.
2.	Producers	Producing sunflower seeds and selling to traders ,middlemen or oil millers	<ul style="list-style-type: none"> - High cost of inputs (seeds, fertilizer and agrochemicals). - Reduced soil fertility. - Difficult in assessing market information. - Occurrence of diseases & pests. - Bad weather (Excess rainfall). - Little attention of government support to sunflower farmers. - Low Farm productivity. - Difficult in assessing financial support. - Own farm sunflower seed (local seeds). - Low farm gate price of sunflower.
3.	Middlemen	Buying sunflower seeds to farmers (packing) and selling.	<ul style="list-style-type: none"> - Use of unstandardized weighing scales. - Existence of crop levies.

4.	Retailers	Selling sunflower seeds to the local oil millers.	<ul style="list-style-type: none"> - Use of unstandardized weighing scales e.g. buckets and tins. - Low oil content from poor sunflower seeds used.
5.	Whole sellers	For selling in bulk the sunflower oil to shops and supermarket	<ul style="list-style-type: none"> - Use of single filter oil machines. - High cost of transport. - Price fluctuations.
6.	Consumers	Final users of the final/end product	They consume what do not know their source.
7	TARI -ILONNGA	Conducting trials of improved seeds, research and soil test	Inaccessibility of certified seeds by farmers because of little investment by seed companies and other actors
8	ASA	Expanding seed production and distribution network	Low seed multiplication capacity
9	KDC-Kalambo District Council	Social services provider	<ul style="list-style-type: none"> - Low productivity caused by local seeds used by farmers - Lack of Agricultural staff
	AGRA	Collaborate with Tanzania ministry of Agriculture to technical support the sub-sector	<ul style="list-style-type: none"> - Poor budget allocation from the public sector
	TOSCI	Seed registration	<ul style="list-style-type: none"> - Poor supervision to seed suppliers/distributers
	SAGCOT	Provide linkages to stakeholders	<ul style="list-style-type: none"> - Poor coordination among stakeholders within the chain
	TADB	Financial service providers	Majority of farmers have no collaterals to meet loan services
	NMB	Financial service provider	Majority of farmers have no collaterals to meet loan services

Source: Findings from interview (2022)

PESTEC of the smallholder sunflower value chain in Kalambo District

Table 6 PESTEC analysis of smallholder sunflower VC in Kalambo

POLITICAL	ECONOMIC	SOCIAL	TECHNOLOGICAL	ENVIRONMENTAL	CULTURAL
<ul style="list-style-type: none"> • High taxes • Changes of rules and regulations 	<ul style="list-style-type: none"> • High input costs • Inadequate access to credit • Low income • High transport costs • Price fluctuation • Fixed pricing 	<ul style="list-style-type: none"> • High illiteracy rate • Smallholder farming • Slow adoption to improved seed varieties 	<ul style="list-style-type: none"> • Low level of technology adoption • Inadequate information • Poor pest and diseases control • Insufficient extension services • Poor infrastructure • Poor quality of produces (use of single refined Oil milling machines) 	<ul style="list-style-type: none"> • Climate change • Pests and diseases • Over raining • Unreliable rainfall • 	<ul style="list-style-type: none"> • Male dominance on decision making

Author 2022

SWOT analysis of the sunflower value chain in Kalambo

Table 7 SWOT analysis of the sunflower VC in Kalambo

INTERNAL FACTORS	STRENGTH	WEAKNESS
1.	Availability of Arable land for Sunflower production	Low farm gate price of sunflower
2.	Availability of land for Irrigation	Lack of market information
3.	Presence of extension officers	Lack of knowledge
4.	Presence of ox and power tillers	Improper management of water in the farm from rainfall and natural flowing rivers
5.	Availability of feeder roads	Use of improper agronomic practices
6.	Presence of small oil millers	Limited access to loans
7.	Presence of plenty rainfall	High transport cost
8.	Accessibility of roads to towns	Post-harvest losses
9.	Availability of rivers for irrigation	Few processing industries(oil milling machines)
10.		Uses of local seeds(own farm sunflower seed)
EXTERNAL FACTORS	OPPORTUNITY	THREATS
1.	High demand of cooking oil in the country	Occurrence of pest and disease
2.	Presence of international market for sunflower oil	Unpredictable weather changes
3.	Availability of NGO's and research institutes to promote sunflower crop	Shortage of extension officers at village level
4.	Availability of numerous varieties of sunflower oil seeds in the district	Trade restriction
5.	Availability of agro dealers	Increasing crop levies

Author 2022

SUNFLOWER VALUE CHAIN MAP OF KALAMBO DISTRICT DISTRICT COUNCIL

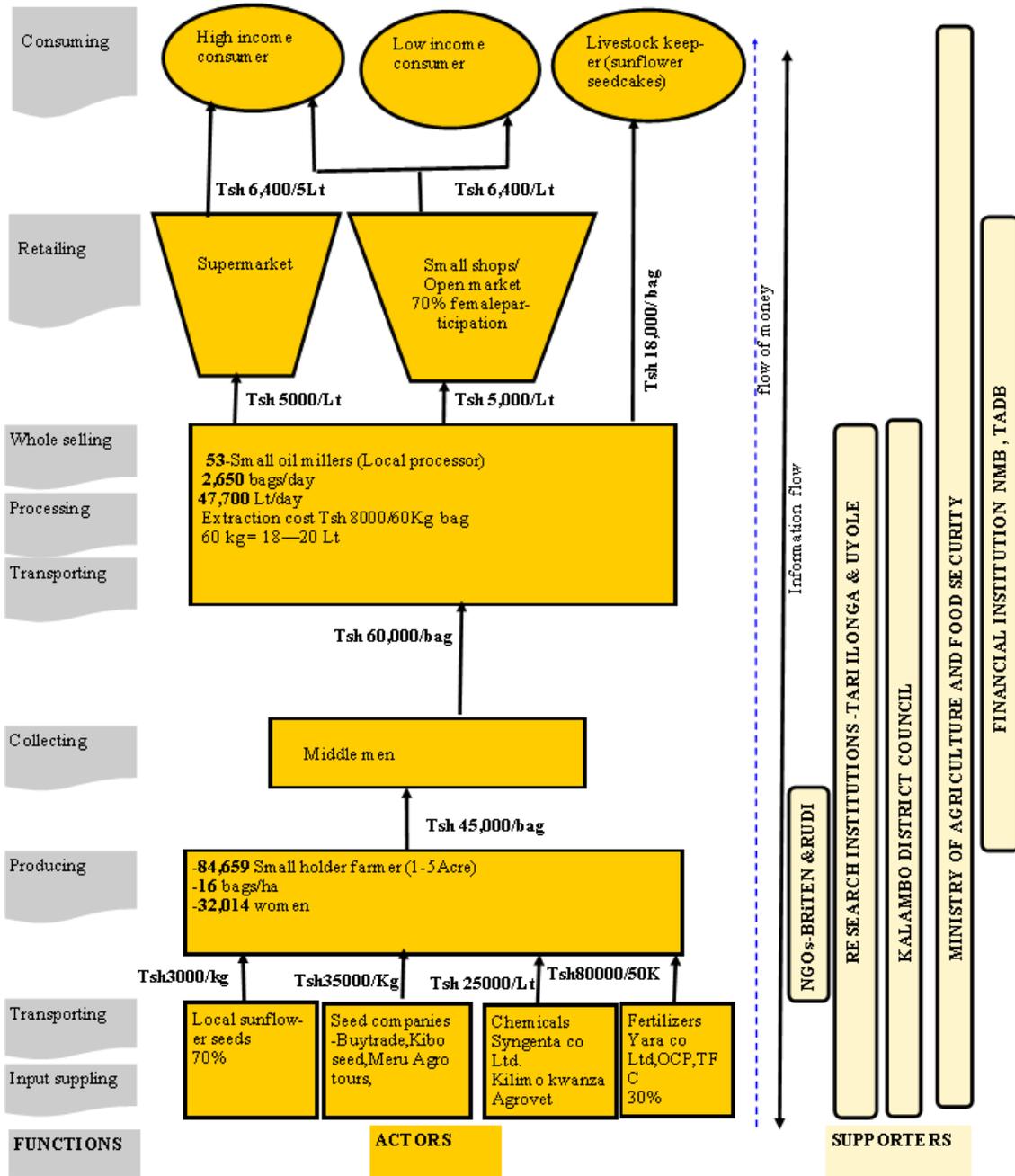


Figure 4 Sunflower value chain map of Kalambo

Source: Authors interview data and literature

4.2 Determinants of farmers adoption to certified sunflower oil seed

This section is presenting the findings about the determinants of farmers adoption to certified sunflower oil seeds which were acceptability, perception, availability, affordability and attractiveness.

During the field survey respondents were asked as to whether they use certified sunflower oil seed or not , the result show that most of farmers do not use certified sunflower oil seed(70%) as indicated in figure 5 Below

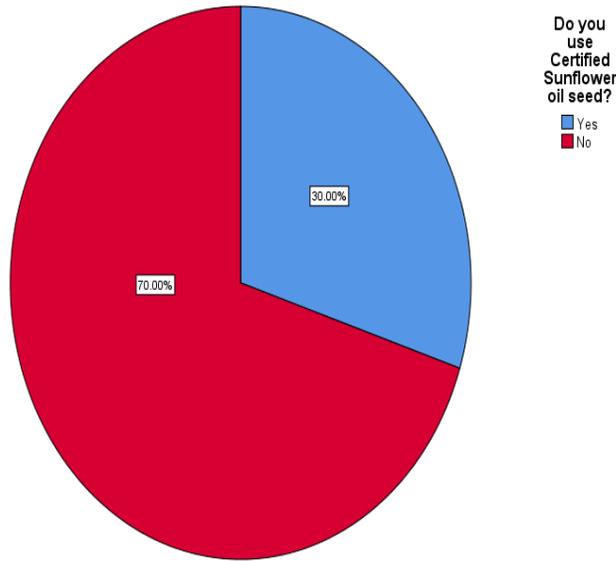


Figure 5 Rate of using certified sunflower seed

Source: Author survey data 2022.

However, Mkowe ward had a large proportion of respondents who use certified sunflower oil seed much more than other wards as indicated in the figure 6.

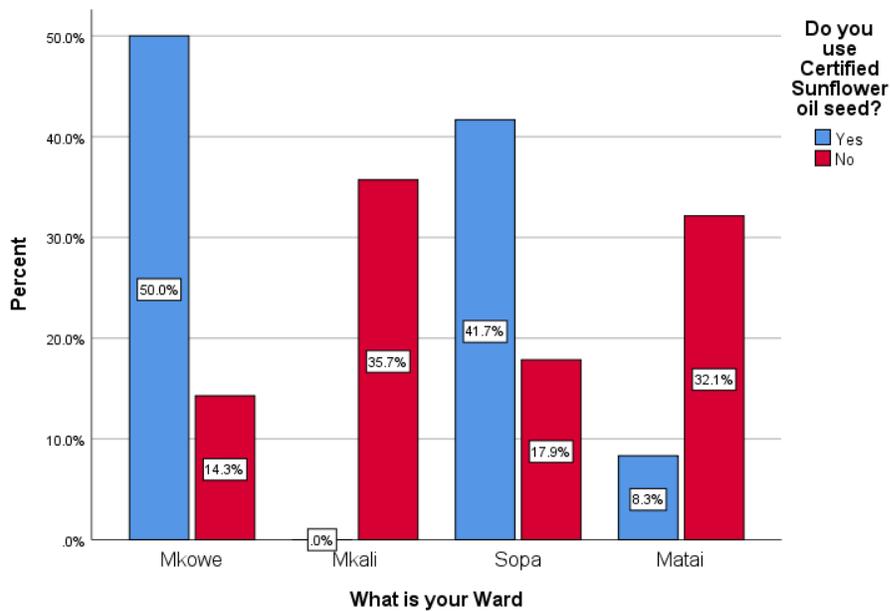


Figure 6 Respondents certified sunflower using in all Wards

Source: Author survey data 2022

4.3 Reason of not using certified sunflower seeds

Farmers reaction on the reason of not using certified sunflower oil seed in four wards indicates that , the affordability to price of seed variety is the most influencing factor in all wards surveyed as indicated in the figure 7 below.

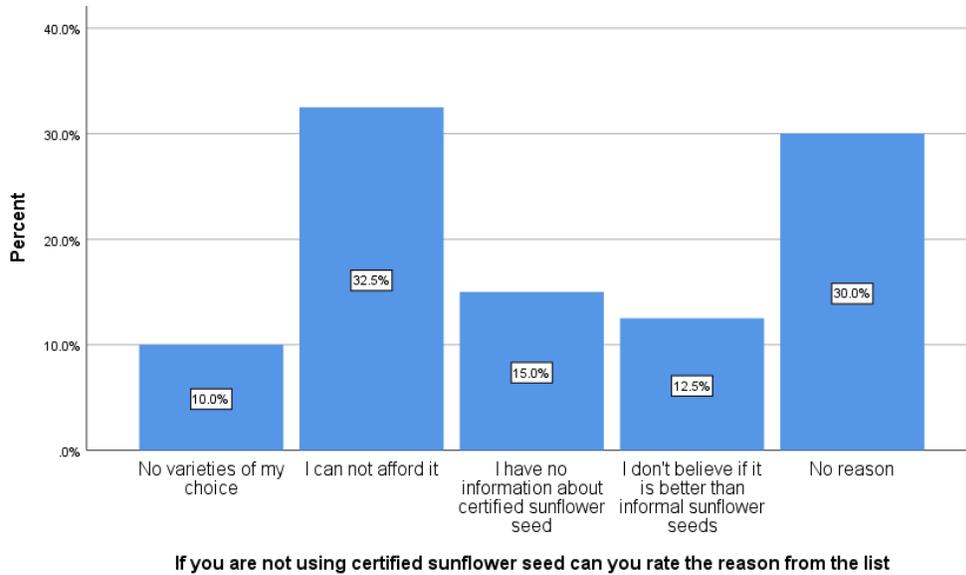


Figure 7 Reason of not using certified sunflower seed

Source: Author survey data 2022.

One way ANOVA test was conducted to compare the reason of not using certified sunflower seed four wards at level of confidence of 95%. The P-value 0.916 ($P > \alpha = 0.05$) indicated that there is no significant difference reason of not using certified sunflower seed between the ward of Matai , Mkali , Sopa and Mkowe (Appendix 4).

4.4 Factors guiding choice of variety to grow

Farmers reaction on the factor guiding their choice for sunflower varieties to grow in the four wards indicates that the financial return of the variety per hectare is the most influencing factor as indicated in figure 8, other factor mentioned was resistance of the variety to diseases and variety needed in the market.

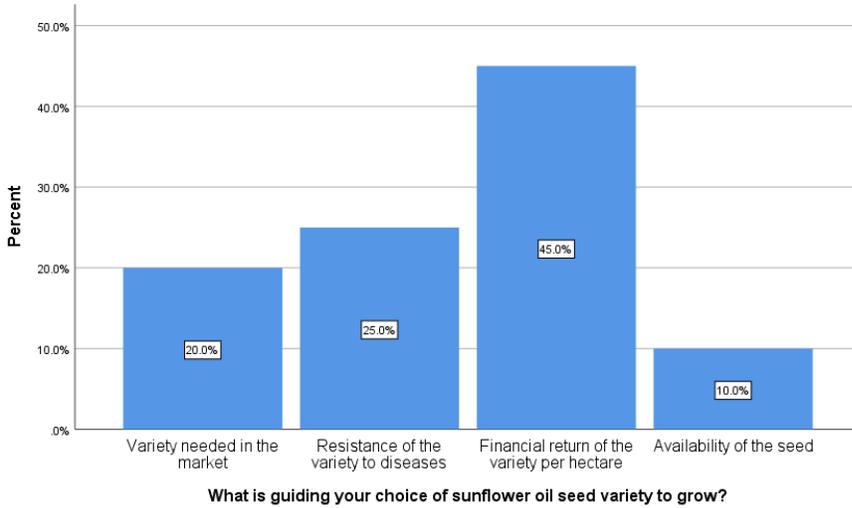


Figure 8 Choice of variety to be grown

Source: Author survey data 2022.

The actual variety grown

Respondents were asked about the actual sunflower variety that they are growing in order to add an insight about their sunflower variety preference and they mentioned local variety as the most used variety for growing sunflower (70%) and improved variety(certified)(30%) as indicated in the figure 9.

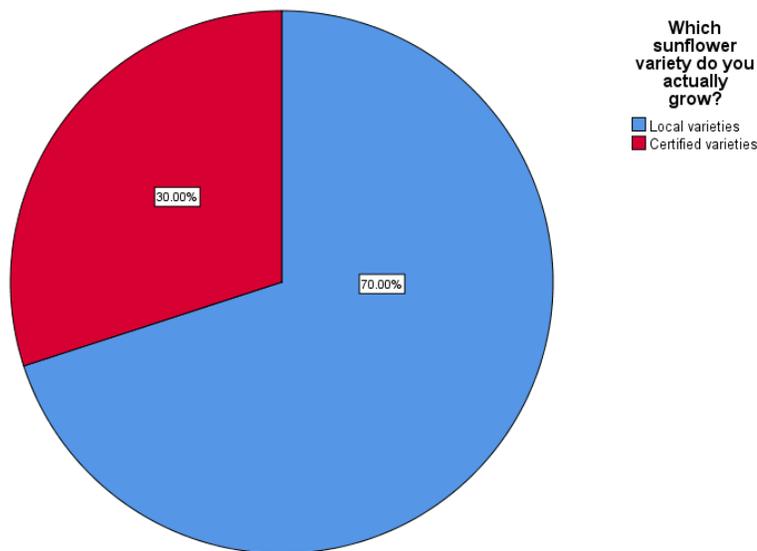


Figure 9 Actual variety grown by farmers

Source: Author survey data 2022.

4.4.1. Quality of sunflower oil seed required by customers

Respondents were asked about what are the quality of sunflower seed that their customer need , most of them mentioned that oil content(87.5%) their customer prefers sunflower oil seed with high oil content as indicated in figure 10.

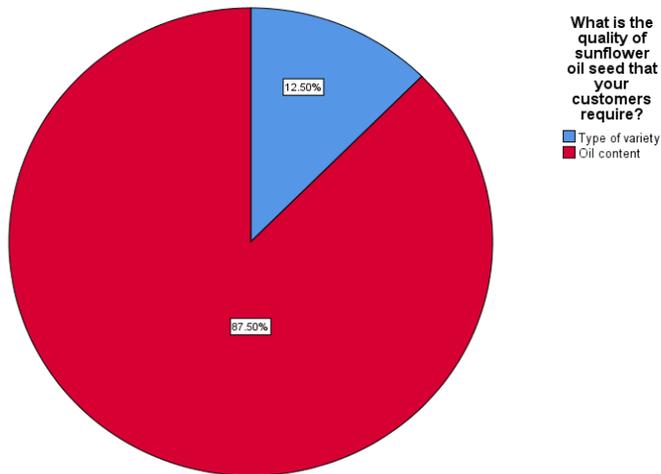


Figure 10 Quality of sunflower oil seed required by customer

Source: Author survey data 2022.

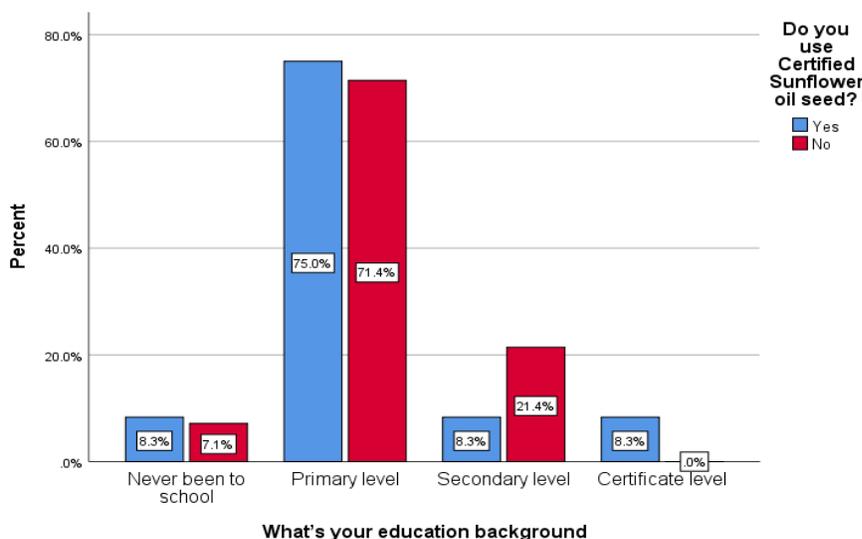
4.4.2 Perception influences on adoption of certified sunflower seed

Respondents were asked about their level of education ,experience in farming ,size of their farm and amount they harvest ,in order to get well understanding on how these characteristics influence their perception about certified sunflower oil seed.

4.4.3 Respondents level of education

Regardless of the all wards surveyed, the largest group of respondents were at primary education level as it shown in table 7.

Table 8 Respondents level of Education



Source: Author survey data 2022.

The responses shows that there is a high use of local sunflower varieties by the less educated than by higher educated farmers as shown in figure 11.However with Chi -square test for the difference in education background on the use of certified sunflower seed shows that there is significant difference on the use of certified sunflower seed with education background , with P-value of **0.000 (P< α 0.05)**

Appendix 3.1(b)

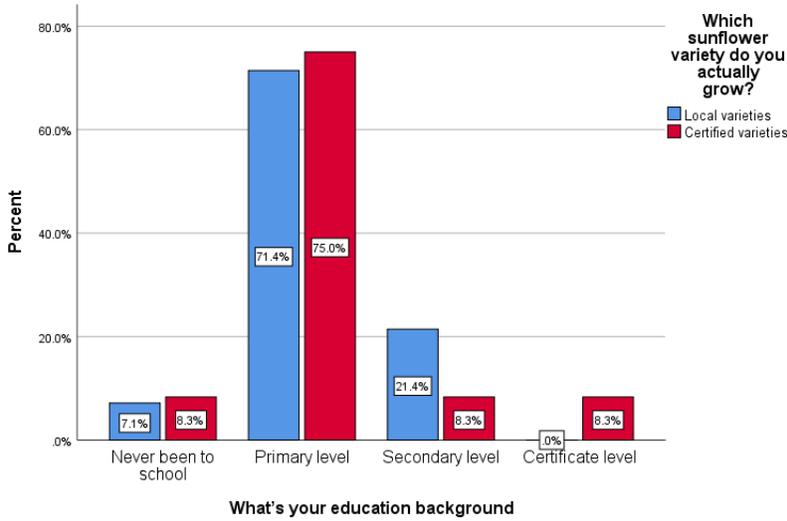


Figure 11 Comparison of certified seed uses with education

Source: Author survey data 2022.

4.4.4 Respondents farming experience

Most of the respondents with less experienced in farming responded to use certified sunflower oil seed as depicted in figure 12.

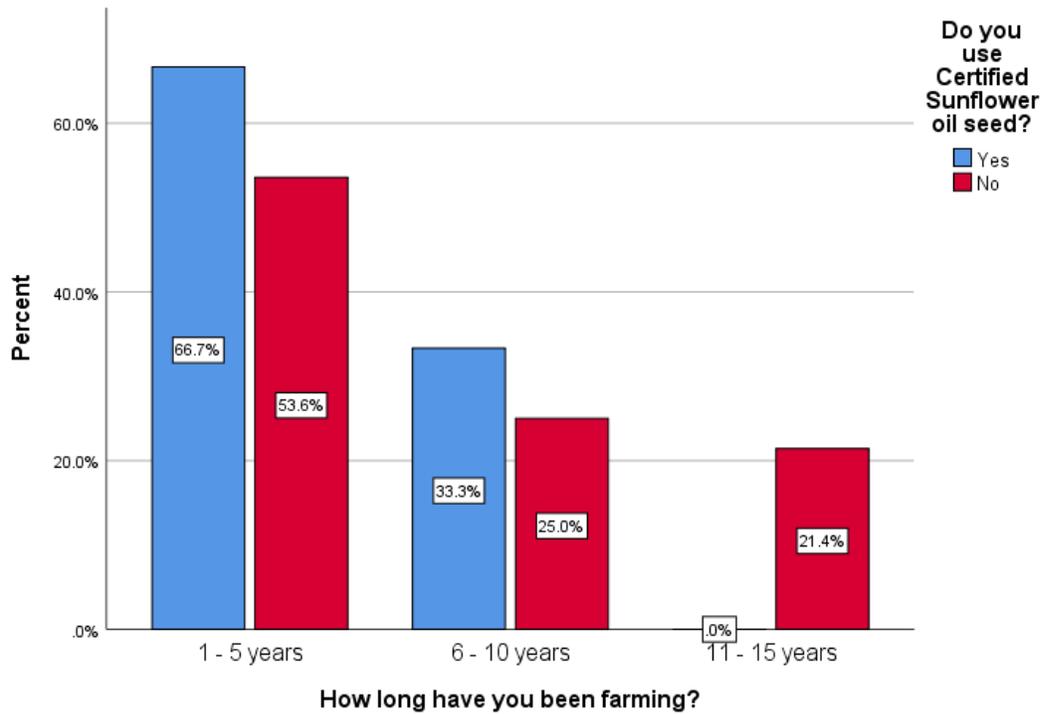


Figure 12 Respondents farming experience

Source: Author survey data 2022.

However the Chi -square test for the difference in the use of certified sunflower seed farmers with experience in farming indicates that there was a significant difference in the use of certified sunflower

seed between the different year of experience on sunflower farming ,with P-value of 0.003($P=0.003<\alpha=0.05$) **Appendix 3.1(a)**

4.4.5 Farm size of the farmer

Respondents were asked about their farm size that they use to grow sunflower, the responses shows that those farmers with less farm size were able to use certified sunflower seed (30%) than those farmers with large farm size as it is depicted in the figure 13.

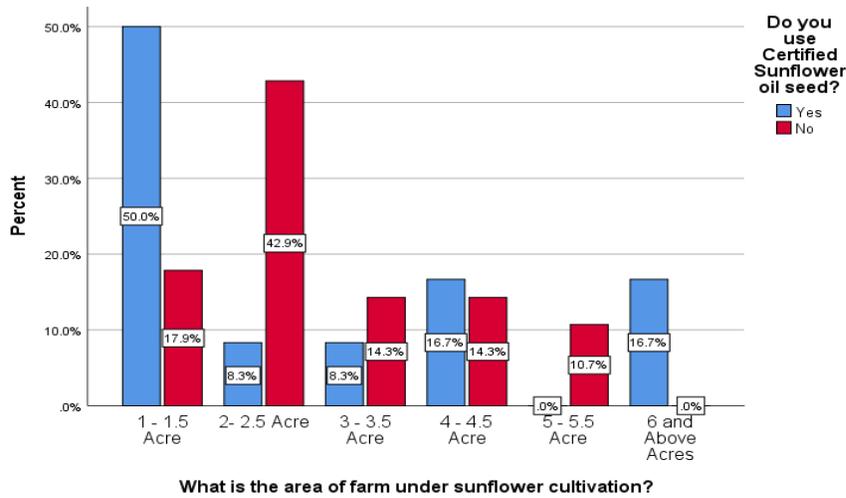


Figure 13 Farm size of the farmer

Source: Author survey data 2022

4.4.6 Amount of sunflower harvested

Respondents were asked about the amount of sunflower seeds they harvest per acre , the responses show that farmers who harvest more than 6 bags per acre use certified sunflower seed as indicated in the figure 14.

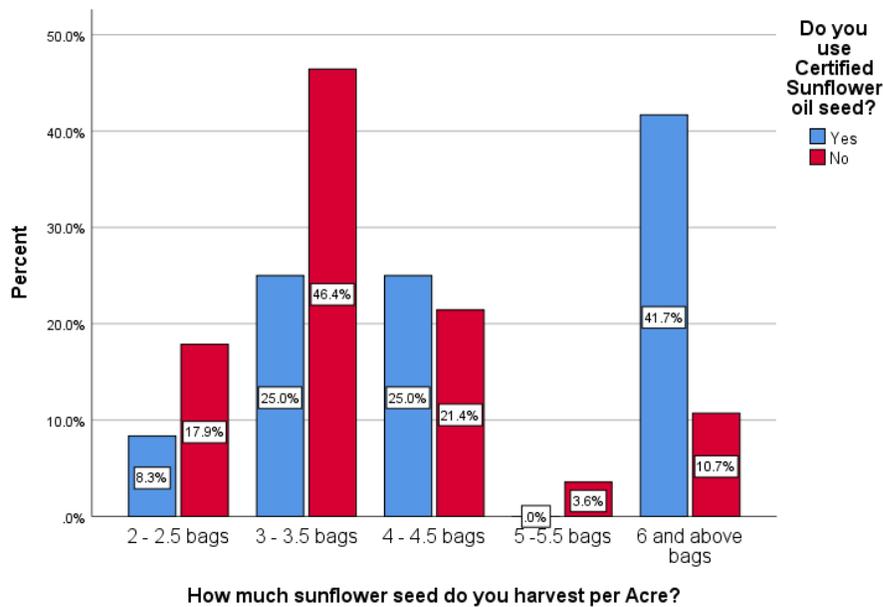


Figure 14 Amount of sunflower seed harvested

Source: Author survey data 2022.

4.5 Production challenges faced by smallholder farmers

Farmers were asked about the challenges that they are facing on sunflower farming, respondents mentioned different challenges due to their experience on farming, their answers were grouped into five themes as input challenges (pests and diseases, low productivity, high price of Agricultural inputs ,delaying of Agricultural inputs and low extension services .The responses have been illustrated in figure 15

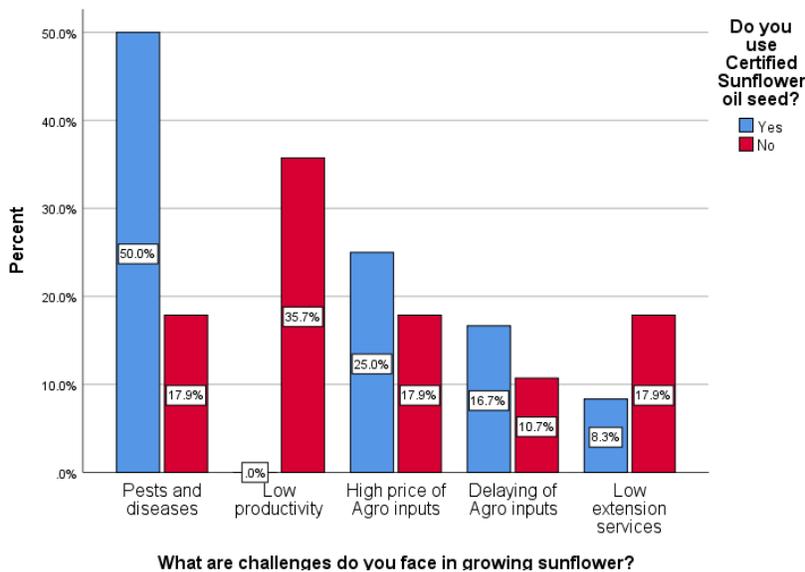


Figure 15 Challenges on growing sunflower

Source: Author survey data 2022.

The main challenge respondents mentioned in all four wards was pest and diseases, another important challenge mentioned was low productivity of the sunflower seed and high price of agricultural inputs,

Extension services to farmers through visiting

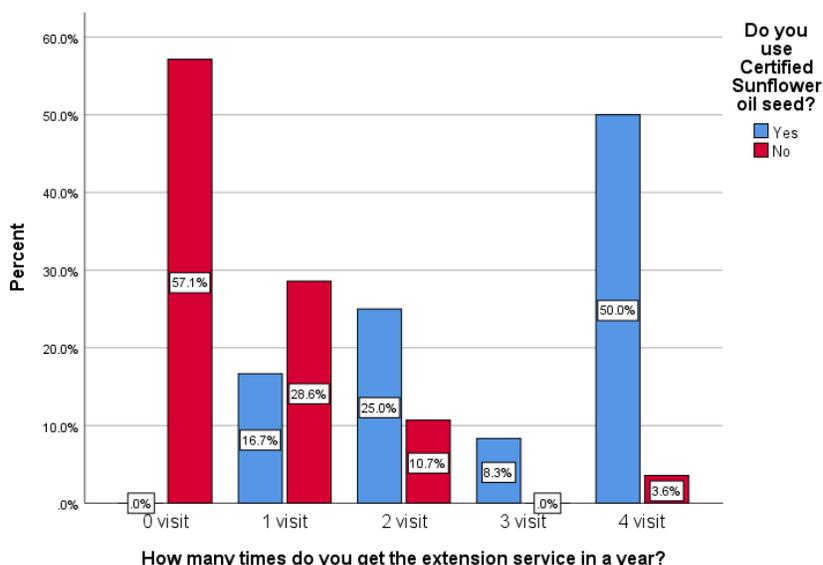


Figure 16 Rate of extension services given to farmer per year through visit
Source: Author survey data 2022.

4.6 Problems that farmers are facing on marketing

Respondents were asked on what problems they are facing on sunflower marketing, most of the respondents mentioned low price of sunflower seeds was most marketing problem, another mentioned problem was the use an authorized measuring standard and low bargain power as shown in the figure 17.

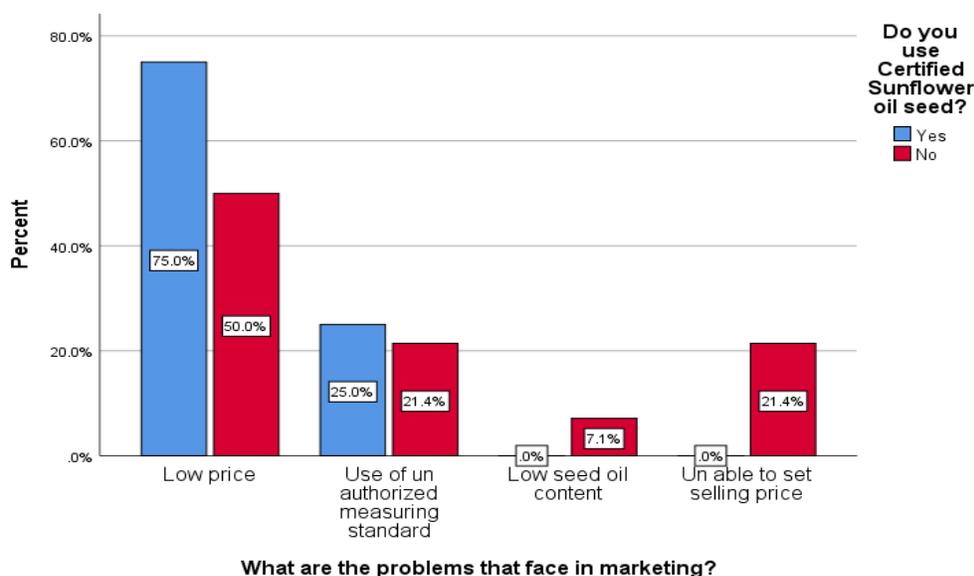


Figure 17 Problems on marketing sunflower oil seed
Source: Author survey data 2022.

4.7 Marketing variable used by certified sunflower seed producers

This results comes from interview asked to key informants on how the certified sunflower seed producers market their seeds in order to understand how it relates to certified sunflower seed adoption.

Product

Certified sunflower seeds mentioned that seeds produced by producers are only Record and Kenyafedha seeds, other varieties like AGUARA 4, HYSUN 33, CRN 1435, NSFH 145 and Super sun 64 and 66 they are imported from outside the country.

Price

During the interview farmers were asked about the price of certified sunflower varieties, most of them mentioned that the price for Kenya fedha and Record was Tsh 8000/2kg and other certified varieties its prices ranges from Tsh 25000 to Tsh 35000/kg (Hysun 33, Aguara 4 and others).

Place

From the interview respondents were asked whether they are using certified sunflower seed and if they are not using to mention the source of their seed so as to understand how the producers market their seed to farmers, most of the respondents use their saved on farm seed (70%) and the remaining source their certified seeds from Agrovets at Matai center the headquarter town of Kalambo District.

Promotion

Respondents were asked to give the means on how they get the availability of the certified sunflower seed, most of them mentioned that they hear about certified sunflower seeds from other farmers and others from extension officer.

Results from interviews

Interview with research institution (TARI-Ilonga, Mr Frank M. Reuben)

the trend of using certified sunflower seeds in Tanzania and in Rukwa Region

The trend of using certified seeds is increasing in Tanzania. This has been attributed due to increase of production of pre-basic, basic seeds by Tanzania Agricultural Research Institute (TARI), supply of certified seeds by Agricultural Seed Agency (ASA), Seed Companies and QDS by contract farmers.

factors affecting adoption of certified sunflower seed by smallholder farmers

- lack of information, capital constraints and subsidies
- Some farmers especially women and youth lack land
- Lack of assurance on the performance of improved sunflower varieties supplied by some seed importing companies .

contributions of research institutions to the sunflower sub sector in Tanzania

TARI Ilonga has a national mandate to coordinate sunflower research in Tanzania. The institute develops sunflower varieties and associated technologies through breeding, research and innovation. The Institute supports private sector for evaluation of sunflower genotypes for release in Tanzania. TARI has technology transfer department which conducts on-farm trials, demonstration plots, farmer field days and agri-business expos which are useful in supporting the farmers. The technology transfer uses mass media outlets that create awareness which increases adoption to our technologies among farmers. The recent research and technology transfer efforts by TARI have resulted in better sunflower farming practices, use of new improved sunflower varieties, and improvements in farm management practices. However, the

farmers to gain from these improved technologies is through adoption, after perceiving them to be beneficial and profitable under their farm conditions.

the challenges facing the sunflower sub sector

Low productivity: Sunflower production in Tanzania is growing, and 70% of the sunflower farmers are women who live in rural areas that depend on the crop as a source of livelihood. The sector is not growing fast enough to meet edible oil adequacy. Much of the production growth achieved to date is by the expansion of cultivated land area. In the face of an increasing population and demand of edible oil, there is a need of increasing productivity.

improving the sunflower sub sector

Sunflower sub-sector is still an important economic sector, and it employs over 8% of working adults. Improving sunflower production and productivity through adoption of improved technologies such as improved seeds, fertilizers, and irrigation is an important pathway that will improve livelihoods of the majority. Adoption of new and improved practices, expansion of rural financial markets, increased capital and equipment ownership, and development of research and extension linkages could all contribute to increases in productivity.

Results from Focus Group Discussion

The focus group discussion was contained almost 90% women due to their highly dominating the sunflower sub-sector at Kalambo District. The group discussion was conducted at Sopa Village at Kanyezi AMCOS's meeting room, where the main issue for discussion was the factors limiting adoption to certified

Partner in day to day production of sunflower : Farmers mentioned that their day to day partner on sunflower production are their fellow farmers.

Areas where cooperation with partners : farmers responded that they cooperate on selling their sunflower oil seed.

Services that they get from NGOs in sunflower sub-sector : farmers mentioned that the services that they get from NGOs sometimes are different training but normally occurs.

Services from District council : Respondents concluded that there is very low services from the District council due to absence of agricultural extension officers.

Buyers of sunflower oil seed : Farmers responded that the buyers of their sunflower oil seeds are small local buyers/middle men.

The price of certified sunflower seed per kilogram : Farmers mentioned that the price for certified sunflower oil seed in their area are Tsh 6000/kg for record and Tsh 35000/kg for other hybrid seeds.

Satisfied with the price of certified sunflower seed : Most of the respondents shows that they did not satisfied with the price of certified seeds due to high price.

Knowing about certified seed : Farmers responded that they have low knowledge about certified sunflower seed.

Accessing certified sunflower seed for growing :Farmers responded that they buy certified sunflower seed from Sumbawanga town 75 Km from Sopa village.

Challenges encountered in using certified sunflower seed :Farmers mentioned that there is absence of input suppliers ,diseases and pest ,high price of agricultural inputs ,delaying of seeds with the seasonal calendar of agriculture and lack of survey on soil fertility status.

CHAPTER FIVE : DISCUSSION

5.1 Sunflower stakeholders and their roles

This study discovered that there is various stakeholders who have been categorized as actors and supporters. Some of the supporters of the sunflower subsector are NGOs such as BRITEN and RUDI who are organizing farmers into cooperatives in order to support farmers in areas of access to inputs, access to good markets and participate in farmer group awareness. Having other partners that underpins the sunflower sub-sector is an advantage to Kalambo farmers. The Ministry of agriculture Through Kalambo District council provides extension services in spite of the fact that it has been shown by this study that extension services is insufficient as farmers demonstrated on figure 16 that farmers were hardly visited by extension officers . Therefore, there is the need for improving provision of extension services delivery to farmers.

5.2 Determinants of farmers adoption to certified sunflower oil seed

Acceptability

Farmers considered the sunflower variety with high oil content and the variety which are resistant to pest and diseases so as to reduce risks. Farmers mentioned record and kenyafedha as the sunflower certified seed they grow, however the finding shows that there is low adoption rate of certified sunflower oil seed and most of the adopted varieties are record and kenyafedha . This implies that out of all certified sunflower oil seed registered record and kenyafedha are the variety which some of the farmers are trying to adopt .This could be due to disease and pest tolerant and longtime of using the variety.

Perception

The results indicates that most of the respondents who grow local seeds have primary level of education .There is significance difference between the use of certified sunflower with farmers education background, the result have shown that as the farmers possess more education background the percentage of not using certified sunflower seed decreases (Figure 16). The findings shows that all farmers with secondary education and above are likely to understand the new technology and practice it as the frequencies of promoting the required technology will be enough given, which in one way or another affect the adoption rate of the certified seed.

Mignouna et al .,(2011) moreover revealed that education level of a farmer increments his capacity to get; prepare and utilize information appropriate to adoption of a new innovation . level of education had a positive and critical impact on the selection of the innovation. Typically since higher instruction impacts respondents' demeanors and considerations making them more open, levelheaded and able to analyze the benefits of the unused innovation (Waller et al., 1998).

Availability

During the Focus Group Discussion it was said that accessibility of certified sunflower seed to their area is the foremost challenge which affect their cultivating ,this might be due to the poor extension services delivery and information on the need of certified seed by the farmers. The respondents said that they purchase certified seed exceptionally distant from their range which increment their costs.

According to WUR (2017), Sometimes farmers only have access to what is available in the market, and so seed availability can determine farmers' access to seed. Also confirmed that poor availability to certified seed, the high cost of certified seed and farmers' lack of awareness of the existence and benefits of certified seed are reasons why smallholder farmers do not use certified seed.

Affordability

Most of the respondents when asked their opinion mentioned that they are not able to afford the cost of using certified sunflower seed ,during the discussion farmers said that the price of certified sunflower seed is very high(Figure 15).

5.3 Reason of not using certified sunflower seeds.

When farmers asked to give reason on why they are not using certified sunflower oil seeds , respondents gives the reasons said that they cannot afford it, they have no information about certified sunflower seed, they do not believe if it is better than informal sunflower seed, others with no reason and that it is not the variety of their choice (Figure 7),however about a half of the respondents reason shows that they don't use certified sunflower seeds without giving its cause .The findings shows that low income and low awareness of certified sunflower seed to many farmers contribute to them to have low adoption rate.

Tibamanya at el.,(2021) also discovered that smallholder farmers appeared to have deficiently finance to purchase certified sunflower seed due to its cost , hence the foremost reason of farmers not utilizing certified sunflower seed is need of adequate cash to cover the seed costs. This proposes a predominance of insufficient information on the opportunity fetched and benefits of owning fluid resources and credits in financing cultivating inputs(Tibamanya at el., (2021).

5.4 Factors guiding choice of variety to grow

Respondents reaction on the factor guiding their choice for sunflower varieties to grow in all wards indicates that the financial return of the variety per hectare was the most influencing factor as indicated in figure 8, other factor mentioned was resistance of the variety to diseases and variety needed in the market. In any case, most smallholder farmers exceptionally once in a while purchase certified seeds but more often than not sow seeds that they retained from the seeds that they gathered within the past developing season (Kosmowski et al., 2018).

5.5 Production challenges faced by smallholder farmers

Respondents mentioned different challenges due to their experience on farming, their answers were grouped into five themes as input challenges (pests and diseases, low productivity, high price of Agricultural inputs ,delaying of Agricultural inputs and low extension services(Figure 15).

Adeleke and Babalola(2020) said that ,sunflower production is being prevented by numerous variables, which can be biotic or abiotic. In common, its production challenges incorporate diminished soil fertility ,lack of improved seed varieties, unpredictable rainfall, low rainfall, undependable markets, price fluctuations, and the high price of agricultural inputs (such as fertilizers and chemicals). Others are bothers , destitute agricultural extension services, lack of awareness, absence of farm tools, attacks by birds, competition from edible oil imports, and extraordinary climate conditions.

Also adequate information about planting, seed rate, the type and quantity of fertilizers to be applied, infection and bother control, and promoting accessibility is imperative to attaining optimal yield in sunflower farming (Gupta, 2014).

5.6 Problems that farmers are facing on marketing

Respondents were asked on what problems they are facing on sunflower marketing , most of the respondents mentioned low price of sunflower seeds was most marketing problem , another mentioned problem was the use an authorized measuring standard and low bargain power as shown in the figure 17.

The functioning of markets in numerous countries was obliged by higher costs and coordination issues along the producer-consumer value chain (Bekele, S. et al, 2008).

According to Pote (2008) on the off chance that agricultural markets are not appropriately investigated and the necessities met, such openings will stay slippery to most farmers. Besides , in the event that there is data asymmetry, need of foundation, credit offices and high exchange costs among others; small scale farmers will be rendered defenseless to different sorts of showcase flaws. Bekele and others (2008) propose organization advancements to fortify maker organizations and the arrangement of collective showcasing bunches as a way to cure inescapable advertise disappointments in country economies.

Reflection

This work mirror my own job as a scientist when I was doing the entire exploration process. Experience about research recognizing factors influencing adoption of certified sunflower seed by smallholder farmers in Kalambo through planning, arranging ,execution ,change and methodology.

Research process and methodology

The research process was started with the research proposal which completed before I started the process of data collection, analysis and finally results was to be discussed and produce conclusions. All the processes need to be geared towards the objective of the research. It started with the choice of my thesis topic.

The selected value chain of sunflower was based on the personal experience as an extension officer in Kalambo District and that obtained from literature review. I also selected the sunflower value chain as the chain to spotlight during the module Value Chain Analysis. The experience that I got from the previous module lead me into choosing sunflower as the chain of my thesis topic.

The research proposal that was guiding the whole process was prepared in the period of May-June. The objective of this research was to make an assessment of the factors limiting small holder farmer's adoption to certified sunflower oil seed at Kalambo District council. I had an inclination that leading actual overview is the experience that was required to investigate more through perception and I acquired distribute during the field review.

CHAPTER SIX : CONCLUSIONS

The following are the conclusions which are based on the results from the field survey, interviews, observations and from literature review.

1. Limitation to adoption of certified sunflower seed to smallholder farmers at Kalambo District are the following.

- a) Pest and disease – The study observed that sunflower producers have been affected by pests and disease which lower their production and hence lower their morale of investing much in sunflower production.
- b) Price of Agricultural inputs -The findings shows that farmers are experiencing high production costs which caused by high price of agricultural inputs especially certified sunflower seed and fertilizer, this contributes much for not using certified sunflower seed to many smallholder farmers.
- c) Extension services delivery – the study observed that sunflower farmers have been shown to have very low good agricultural practices which contribute to low sunflower productivity, the absent of agricultural officer from government and private institutions affects much the lack of awareness on good farming practice and other innovation .
- d) Low promotions on the use of certified sunflower seeds – The study also observed the low promotion done by certified seed producers and other seed company on use of certified seed to farmers this has contributed to low production and productivity of sunflower oil seed.
- e) Low linkages between farmers and other stakeholders within the sunflower value chain – It has been observed weak linkages between stakeholders in sunflower value chain in Kalambo District. Also it has been found that sunflower stakeholders in Kalambo district have poor relationship among each other which this weakening the development of the sunflower value chain.
- f) Lack of support from the government and financial institutions has discouraged farmers to integrate along the sunflower value chain which lower sunflower value chain development.

CHAPTER SEVEN : RECOMMENDATIONS

Basing on my study findings ,the study recommends the following to be implemented.

- ✓ The government with other sunflower stakeholders to formulate stakeholder meeting to discuss and solve some constraints together and strengthen their relationship.
- ✓ The government to formulate farmers group and cooperative societies and training them to the preparation of starting producing quality declared seed (QDS) to increase sunflower production , oil production and resolve the challenges of availability and accessibility of certified sunflower seed.
- ✓ The government together with other seed companies to provide extension services to farmers on the good agricultural practices for sunflower and other crops.
- ✓ The government together with processors and traders to establish sunflower contract farming with smallholder farmers so as to give assurance to both farmers, traders and processors for their output.
- ✓ The government through their extension officers and research institutes to breed sunflower seed which will resistant to pests and diseases and find out the solution of the existing sunflower diseases and pests.
- ✓ I will work to gather with researchers, NGOs and other actors within the sunflower value chain to provide extension services to farmers, assisting in organizing farmer's group and initiate the process of obtaining quality declared seed from the seed producer company or researchers, also facilitating platforms of sunflower stakeholder meeting to support the development of sunflower value chain in Kalambo District.

PROPOSED SUNFLOWER VALUE CHAIN MAP OF KALAMBO DISTRICT

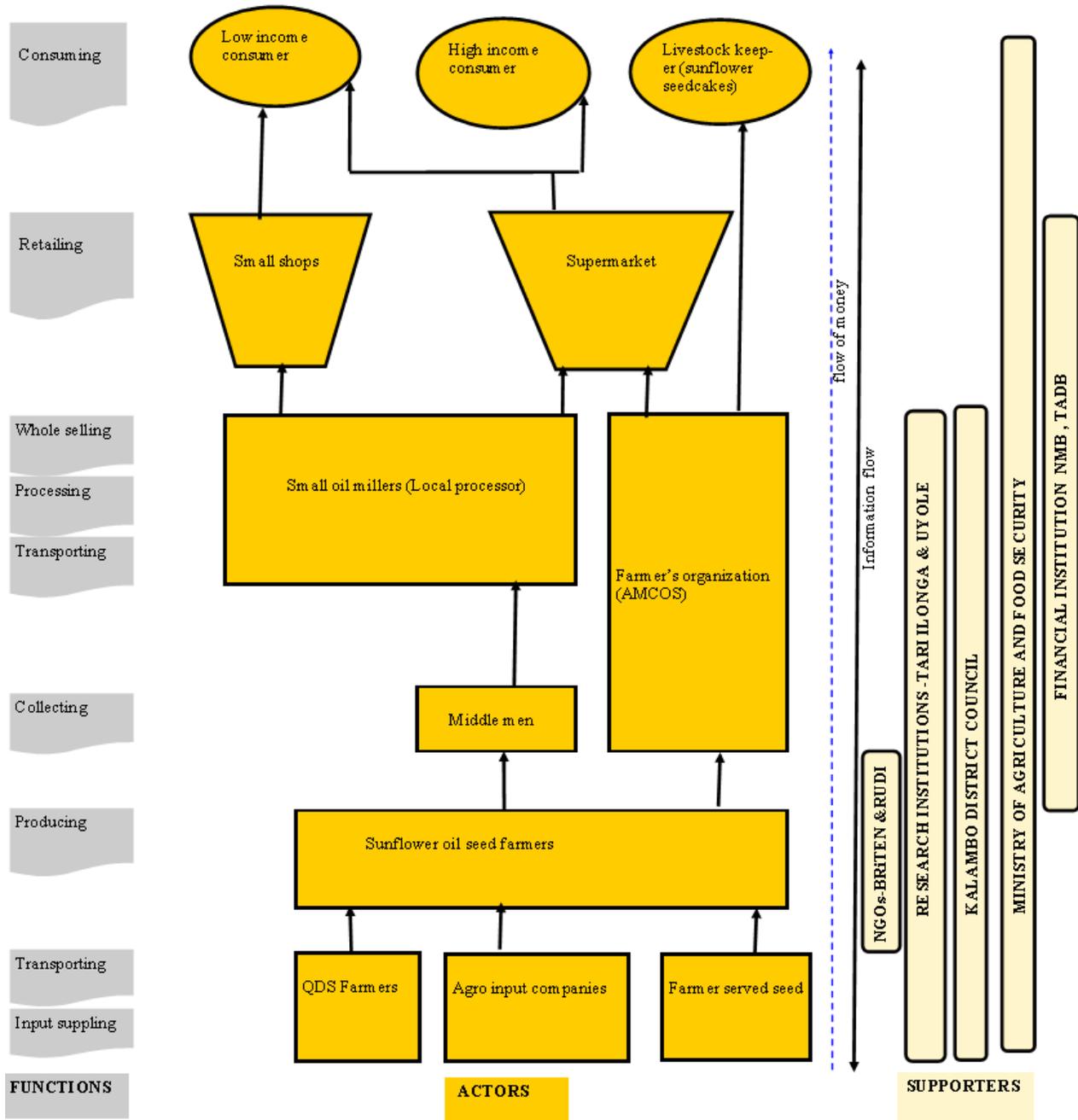


Figure 18. Proposed sunflower value chain in Kalambo

Source: Survey field data 2022.

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Appendix 1: Farmers' survey questionnaires

Introduction on the study.

I am Erasto Mwasomola, from Van Hall Larenstein University of Applied Sciences conducting an academic research on the smallholder farmers adoption of certified Sunflower oil seed in Kalambo District. Your participation is needed and appreciated for this study in order to understand the factors that limiting the adoption so that I can recommend for improvement and increasing adoption rate. You are kindly requested to cooperate in answering questions from this questionnaire; the information you provide is going to be used for academic purposes only and will remain confidential.

Section 1: Socio-demographic information

1. Village.....
2. Farmers' ward.....
3. Age
4. Sex
5. What is the area of farm under sunflower cultivation?.....
6. Is production output mainly for?
 - (a) Domestic (b) Commercial (b) Both (d) Others specify
7. What's your education background?
 - (a) Never been to school(b) Primary level (c) Secondary level (d) Certificate level (e) College level

Section 2: Sunflower production & Marketing

8. How much sunflower seed do you harvest per Acre? _____
9. How much of these (sunflower oil seed harvested per hectare) are rejected during grading? _____
10. How long have you been farming?
 - (a) <5 years (b)6-10 years (c)11-15 years (d)>16 years
11. Where do you sell your sunflower oil seed?
 - (a) traders (b) local market (c) processors (d) Retailer (e) others specify
12. Where do you get about market information of sunflower?
 - (a)from traders (b)from radio (c) from television (d) from extension officer (e)others specify

13. There are several improved sunflower varieties available, do you have a preference for a variety?
Please rank the sunflower varieties listed (1 =Not preferred, 2=Least preferred, 3=Preferred, 4=More preferred,5 = most preferred),

	1	2	3	4	5
RECORD					
CRN 1435					
PAN 7352					
KENYA FEDHA					
NSFH 36					
NSFH 145					
AGUARA 4					
HYSUN 33					
ANCILLA					
MICHEL					
SOLEADO					
ARCHEO					
SUPERSUN64					
SUPERSUN66					
NALSUN 1-2018					
NALSUN 2-2018					
AGUARA 6					

14. Which sunflower variety do you actually grow?

15. Do you use Certified Sunflower oil seed? (a) Yes (b) No

16. How did you get information about the certified sunflower seed?

(a)From a neighbor farmer

(b)From an extension officer

- (c) From media
- (d) From the Certified Sunflower producer
- (e) Other (*please mention*)

17. What is your source of sunflower seed to grow ?

- (a) Own served
- (b) Neighboring farmers
- (c) From Agrovat
- (c) Other (*please mention*)

18. If you are not using Certified Sunflower seed, can you rate the reasons of not using from the list.

No varieties of my choice	
Not available locally	
I cannot afford it	
I have no information about the sunflower seed	
I don't believe it is better than the informal sunflower seed	

19. What is guiding your choice of sunflower oil seed variety to grow?

You can select more than one choice

- (a) Variety needed in the market?
- (b) Resistance of the variety to diseases?
- (c) Financial Returns of the variety per hectare
- (d) Availability of the seed
- (e) Agronomic attributes of the variety

(f)Other (please mention)

20. How many times do you get the extension service in a year?
21. What are challenges do you face in growing sunflower?
22. What are the problems that face in marketing?
23. Do you have decision making on price? (a) Yes (b) No
24. What is the price of sunflower oil seed per 60kg /bags during harvesting? _____
25. Who are your customers?
(a) Local markets (b) Institution (c) Supermarkets (d) Others specify
26. What is the quality of sunflower oil seed that your customers require? (a) type of variety (b) oil content
(c) Others specify
27. Do you get any support from the Government(a) yes (b) no
28. Which kind of support do you get? (a) training (b) incentives (c) advice (d) No support received
29. Do you get any support from NGOs(a) yes (b) no
30. Which kind of Support do you get? (a) training (b) incentives (c) loans (d) No support received
31. Who links you to the market? (a) NGOs. (b)Extension officer (c) Others specify
32. Do you see any opportunities to improve the market of sunflower oil seed?

Appendix 2: Checklist Interview question

Checklist interview questions to the FGD team (Farmers)

1. Who are your partner in day to day production of sunflower?
2. In which areas do you cooperate with your partners?
3. What services do you get from NGOs in sunflower sub sector?
4. What services do you get from the District Council?
5. Who is the buyer of your sunflower oil seed?
6. What is the price of certified sunflower seed per kilo?
7. Are you satisfied with the price certified sunflower seed?
8. Do you know about certified sunflower seed?
9. Where do buy your certified sunflower oil seed?
10. What challenges do you encounter in using certified sunflower seed?

11. What do you see as opportunities to improve your sunflower oil seed production?
12. What support do you offer to your members?

2.2 Checklist Interview questions to Local Trader

1. Where are you buying the sunflower and its by-products?
2. Where are you selling the sunflower and its by-products?
3. What are the costs and level of profit gained in your buying and trading sunflower and its by-products?
4. Do you get required quality of sunflower from smallholder farmers?
5. What quality attributes do you want from farmers in order to meet your market?
6. What are the challenges you encounter in sunflower trading?
7. What challenges do you think are facing the sunflower value chain most in the District?
8. What do you see as opportunities in improving sunflower value chain in the District?
9. What are your suggestions in general improvement of the sunflower value chain in the District?

2.3 Checklist For Sunflower Seed Processors

- i. How do you source your raw materials (raw sunflower oil seed)? (direct from farmers, through middlemen, other)
- ii. How do you rank the quality of the sunflower oil seed you are getting from the market? (fair, good, best)
- iii. Do you face challenges on quality of the sunflower oil seed from your sources? What is the most quality challenge with the sunflower? (oil content, size, variety, diseases, other)
- iv. What varieties do you prefer to process? And Why?
- v. What varieties can you get from the market? Is it sufficient?
- vi. What is your processing capacity? Does the supply fill the volume requirements?
- vii. What other challenges do you face on your business as a processor?

- viii. What solutions do you suggest to the named challenges?
- ix. Do you think there is an opportunity for the sunflower sector to grow? Can you name the opportunities?

2.4. Checklist For Certified Sunflower Seed Producers/Multipliers Interviews

- i. What sunflower seed varieties do you grow?
- ii. What is the price of the sunflower seed variety per kilo?
- iii. What is the productivity potential of the varieties you are growing?
- iv. What is guiding your choice for the sunflower seed production?
- v. What is your target market for the sunflower seed?
- vi. How do you promote your sunflower seed?
- vii. How do you sell your sunflower seed? Deliver/have agents/online/physical
- viii. What enabled your sunflower seed growing business?
- ix. What hindered your sunflower seed business?
- x. What could be the possible solutions?
- xi. Who are the players/actors/stakeholders to provide the solution? Including your role.
- xii. What opportunities are there in the sunflower sub-sector?

2.5 Checklist interview questions to DAICO

1. What support and services do you provide to the sunflower smallholder farmers in the District?
2. What are support and services do you provide for improving the sunflower value chain in the District?
3. What do you think is the reason for low adoption of certified sunflower oil seed in your District?
4. What challenges do you encounter in supporting the sunflower subsector in the District?
5. What do you see as opportunities in the sunflower subsector?
6. What are your future plan for improving the sunflower value chain in the District?

2.6 Checklist For Experts Interview(Agriculture Extension officers)

- i. What role do you play in the sunflower sector? You and your Institution
- ii. What can you name as the causes for farmers to NOT use Certified Sunflower seed?
- iii. What opportunities are there in the sunflower sector?
- iv. What are the challenges facing actors in the sunflower sector? Farmers, sunflower seed producers, researchers, etc
- v. What strategies do you think can be formulated to contain the challenges of the sector?
- vi. Who are important stakeholders in sunflower sector in Tanzania?
- vii. Are there any certified sunflower seed producers in your area?

Appendix 3: Test statistics from analysis

Test statistics

3.1 (a) Chi-square test

Test for difference in use of certified sunflower seed basing on year of farming experience.

Chi-square test at 95% level of confidence and confidence limit, $\alpha = 5\%$ (0.05)

Hypothesis

Null hypothesis (H_0): There is no difference in the use of certified sunflower seed between farmers with different year of farming experience.

Alternative hypothesis (H_1): There is a difference in the use of certified sunflower seed between farmers with different year of farming experience.

Test Statistics

	How long have you farming?	Do you use Certified Sunflower oil seed?
Chi-Square	11.450 ^a	6.400 ^b
df	2	1
Asymp. Sig.	.003	.011

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 13.3.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.0.

3.1 (b) Chi-square test

Test for difference in use of certified sunflower seed basing on education background of the farmer.

Chi-square test at **95%** level of confidence and confidence limit, $\alpha = 5\%$ (**0.05**)

Null hypothesis (H_0): There is no difference in the use of certified sunflower seed between farmers with different education background of the farmer.

Alternative hypothesis (H_1): There is a difference in the use of certified sunflower seed between farmers with different education background of the farmer.

Test Statistics

	What's your education background	Do you use Certified Sunflower oil seed?
Chi-Square	50.000 ^a	6.400 ^b
df	3	1
Asymp. Sig.	.000	.011

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 10.0.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.0.

3.2 One way ANOVA test

ANOVA

What is your Ward

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.903	4	1.476	1.171	.340
Within Groups	44.097	35	1.260		
Total	50.000	39			

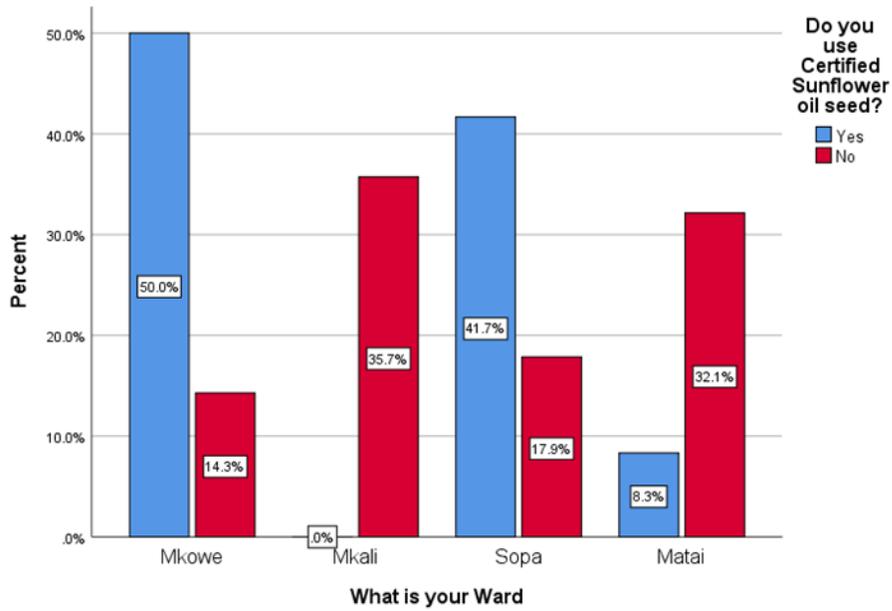
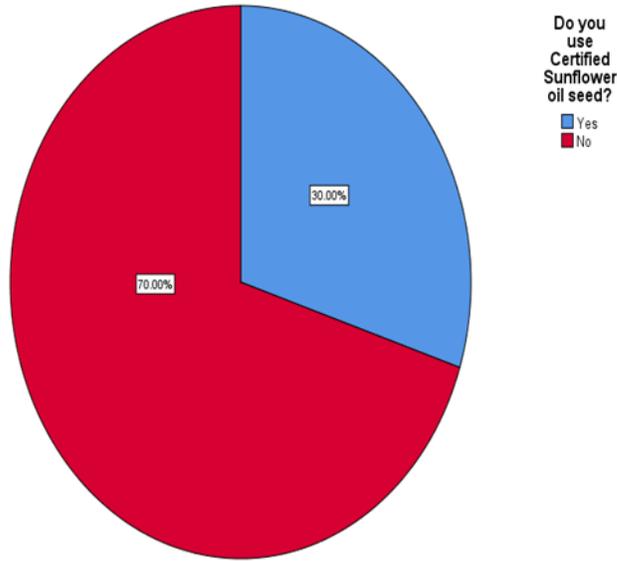
Multiple Comparisons

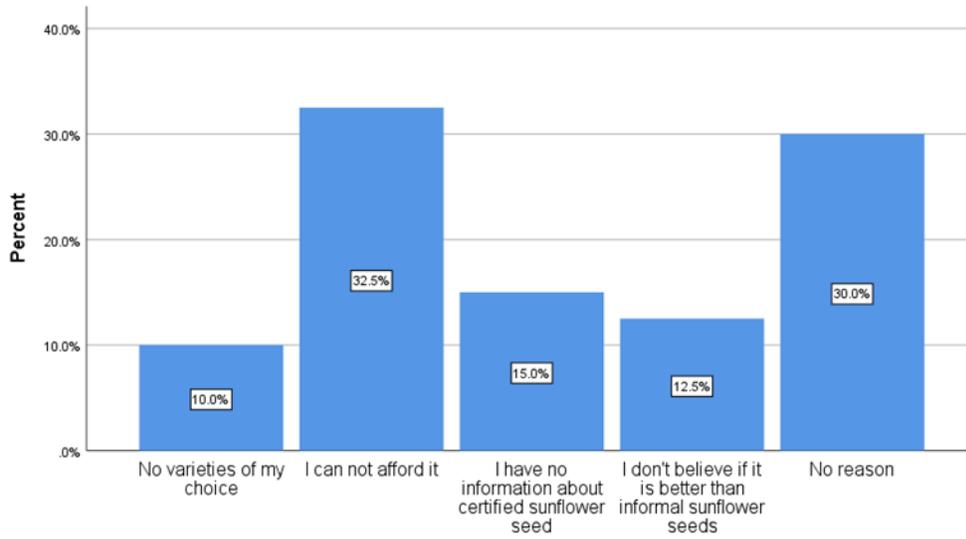
Dependent Variable: What is your Ward

Tukey HSD

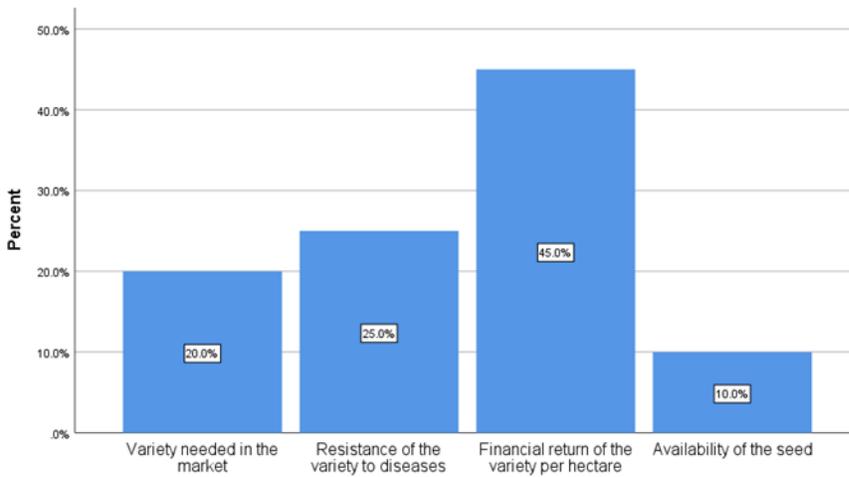
(I) If you are not using certified sunflower seed can you rate the reason from the list	(J) If you are not using certified sunflower seed can you rate the reason from the list	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
No varieties of my choice	I can not afford it	.788	.642	.735	-1.06	2.63
	I have no information about certified sunflower seed	.250	.725	.997	-1.83	2.33
	I don't believe if it is better than informal sunflower seeds	.850	.753	.790	-1.31	3.01
	No reason	1.167	.648	.390	-.70	3.03
I can not afford it	No varieties of my choice	-.788	.642	.735	-2.63	1.06
	I have no information about certified sunflower seed	-.538	.554	.866	-2.13	1.05
	I don't believe if it is better than informal sunflower seeds	.062	.591	1.000	-1.64	1.76
	No reason	.378	.449	.916	-.91	1.67
I have no information about certified sunflower seed	No varieties of my choice	-.250	.725	.997	-2.33	1.83
	I can not afford it	.538	.554	.866	-1.05	2.13
	I don't believe if it is better than informal sunflower seeds	.600	.680	.901	-1.35	2.55
	No reason	.917	.561	.487	-.70	2.53
I don't believe if it is better than informal sunflower seeds	No varieties of my choice	-.850	.753	.790	-3.01	1.31
	I can not afford it	-.062	.591	1.000	-1.76	1.64
	I have no information about certified sunflower seed	-.600	.680	.901	-2.55	1.35
	No reason	.317	.597	.984	-1.40	2.03
No reason	No varieties of my choice	-1.167	.648	.390	-3.03	.70
	I can not afford it	-.378	.449	.916	-1.67	.91
	I have no information about certified sunflower seed	-.917	.561	.487	-2.53	.70
	I don't believe if it is better than informal sunflower seeds	-.317	.597	.984	-2.03	1.40

3.3 Frequencies uses of certified sunflower seed

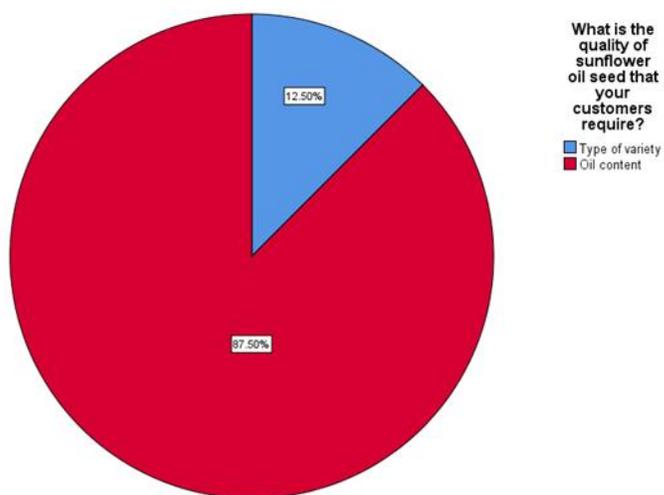
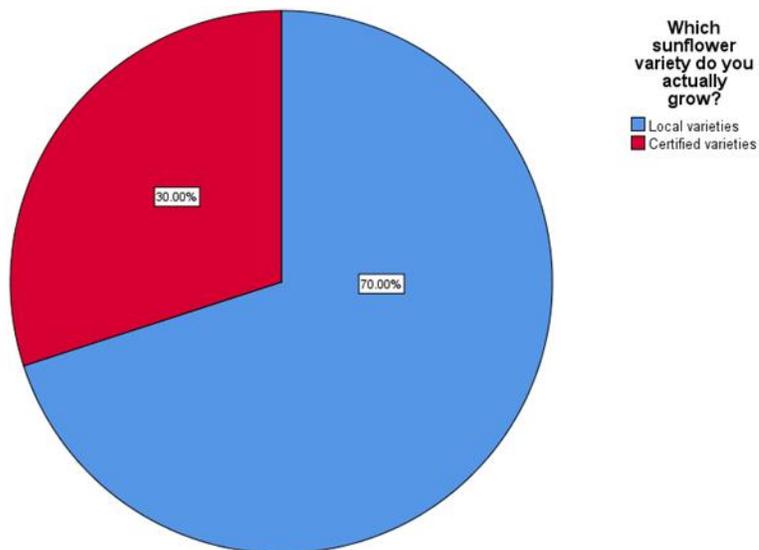




If you are not using certified sunflower seed can you rate the reason from the list

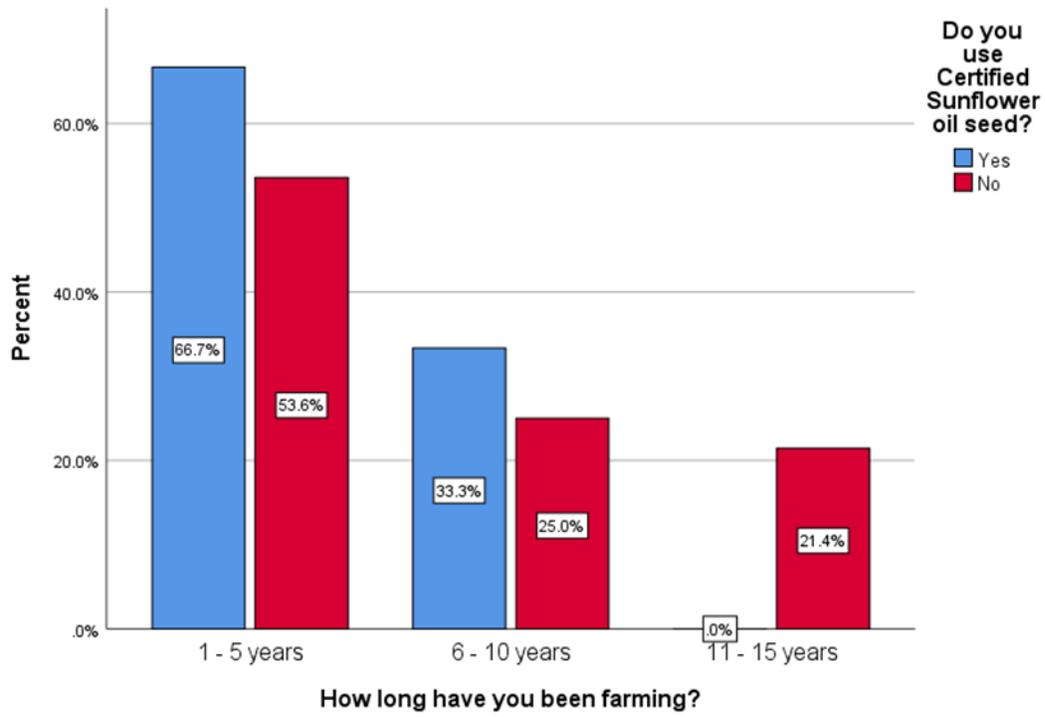
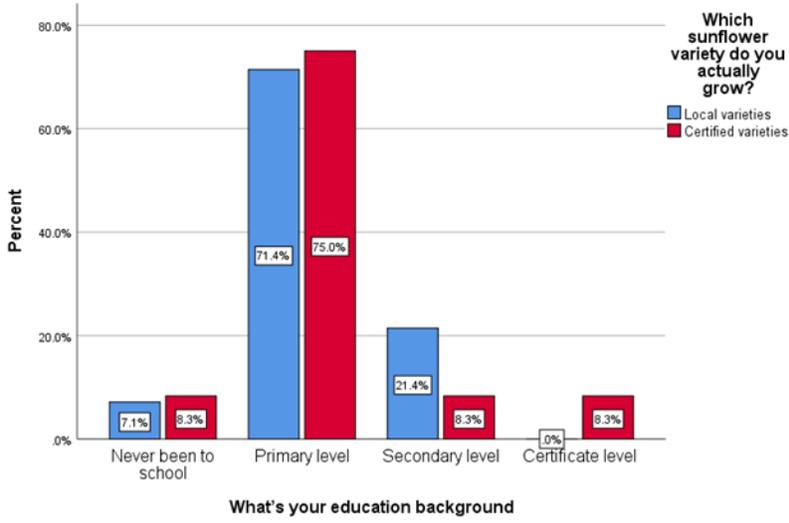


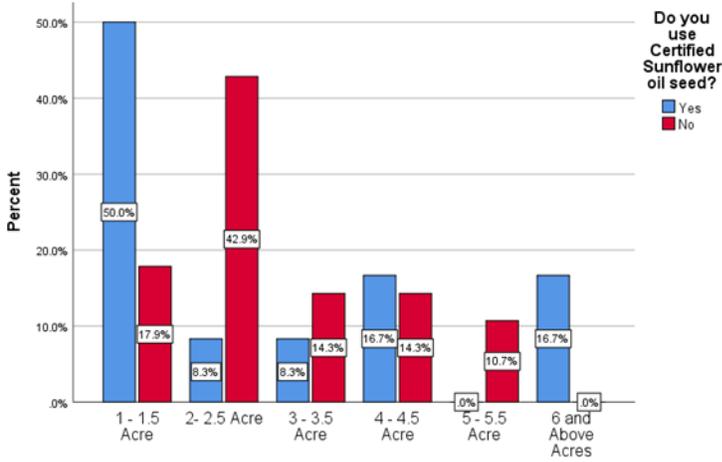
What is guiding your choice of sunflower oil seed variety to grow?



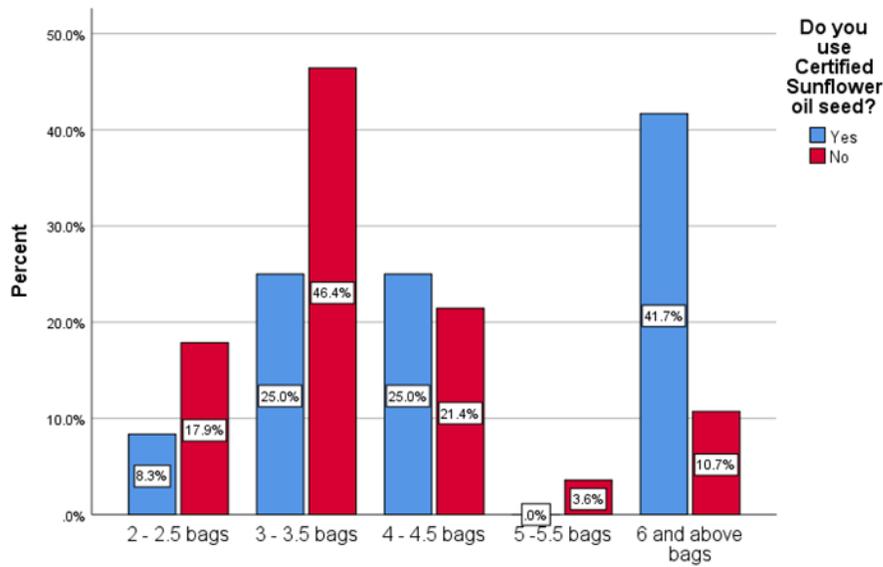
What's your education background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never been to school	3	7.5	7.5	7.5
	Primary level	29	72.5	72.5	80.0
	Secondary level	7	17.5	17.5	97.5
	Certificate level	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

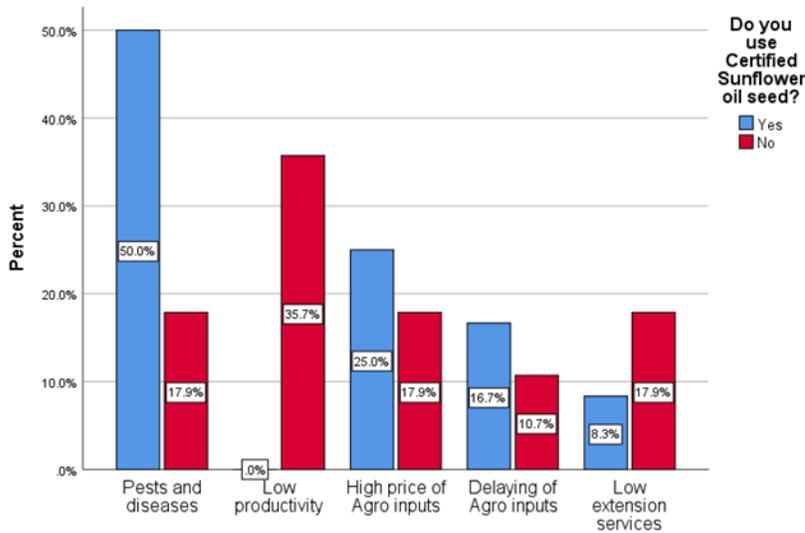




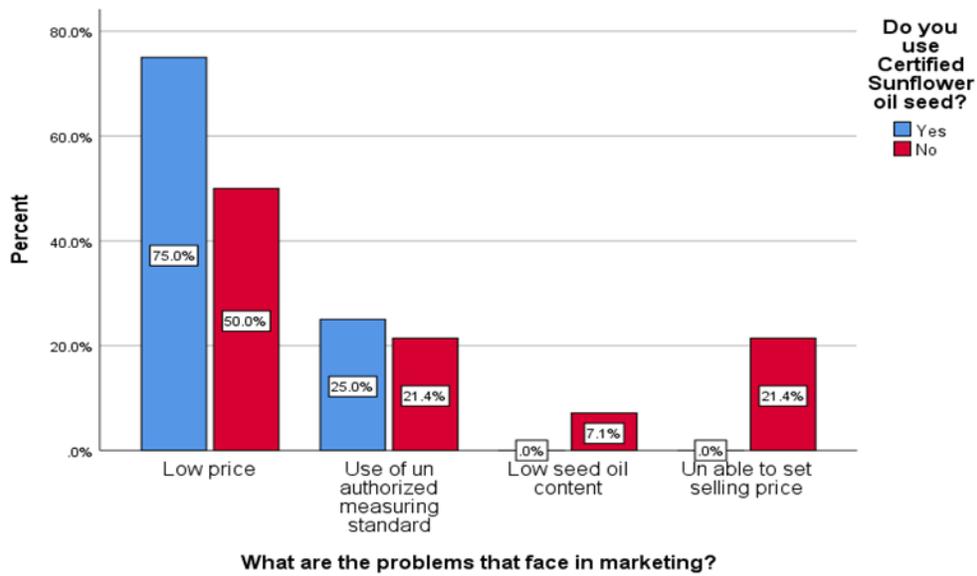
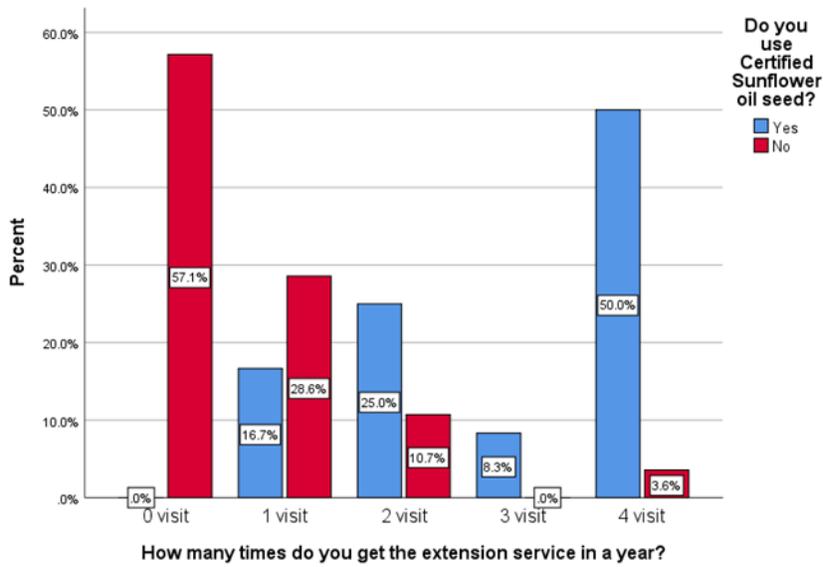
What is the area of farm under sunflower cultivation?



How much sunflower seed do you harvest per Acre?



What are challenges do you face in growing sunflower?



Appendix : 4 Frequency Tables

What is your Village

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mkowe	10	25.0	25.0	25.0
	Kisungamile	10	25.0	25.0	50.0
	Sopa	10	25.0	25.0	75.0
	Kizombwe	10	25.0	25.0	100.0
	Total	40	100.0	100.0	

What is your Ward

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mkowe	10	25.0	25.0	25.0
	Mkali	10	25.0	25.0	50.0
	Sopa	10	25.0	25.0	75.0
	Matai	10	25.0	25.0	100.0
	Total	40	100.0	100.0	

What is your Age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21 - 30	8	20.0	20.0	20.0
	31 - 40	12	30.0	30.0	50.0
	41 - 50	9	22.5	22.5	72.5
	51 - 60	8	20.0	20.0	92.5
	61 - 70	3	7.5	7.5	100.0
	Total	40	100.0	100.0	

What is your Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	18	45.0	45.0	45.0
	Female	22	55.0	55.0	100.0
	Total	40	100.0	100.0	

What is the area of farm under sunflower cultivation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 1.5 Acre	11	27.5	27.5	27.5
	2- 2.5 Acre	13	32.5	32.5	60.0
	3 - 3.5 Acre	5	12.5	12.5	72.5
	4 - 4.5 Acre	6	15.0	15.0	87.5
	5 - 5.5 Acre	3	7.5	7.5	95.0
	6 and Above Acres	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

Is production output mainly for?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Domestic	12	30.0	30.0	30.0
	Commercial	12	30.0	30.0	60.0
	Both	16	40.0	40.0	100.0
	Total	40	100.0	100.0	

What's your education background

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Never been to school	3	7.5	7.5	7.5
	Primary level	29	72.5	72.5	80.0
	Secondary level	7	17.5	17.5	97.5
	Certificate level	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

How much sunflower seed do you harvest per Acre?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 - 2.5 bags	6	15.0	15.0	15.0
	3 - 3.5 bags	16	40.0	40.0	55.0
	4 - 4.5 bags	9	22.5	22.5	77.5
	5 - 5.5 bags	1	2.5	2.5	80.0
	6 and above bags	8	20.0	20.0	100.0
	Total	40	100.0	100.0	

How much of these (sunflower oil seed harvested per hectare) are rejected during grading?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 2 tins	16	40.0	40.0	40.0
	3 - 4 tins	9	22.5	22.5	62.5
	5 - 6 tins	5	12.5	12.5	75.0
	7 and above tins	10	25.0	25.0	100.0
	Total	40	100.0	100.0	

How long have you been farming?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 5 years	23	57.5	57.5	57.5

	6 - 10 years	11	27.5	27.5	85.0
	11 - 15 years	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

Where do you sell your sunflower oil seed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Traders	31	77.5	77.5	77.5
	Local market	5	12.5	12.5	90.0
	Processor	4	10.0	10.0	100.0
	Total	40	100.0	100.0	

Where do you get about market information of sunflower?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	From traders	37	92.5	92.5	92.5
	From radio	1	2.5	2.5	95.0
	From Extension Officer	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

There are several improved sunflower varieties available, do you have a preference for a variety?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not preferred	28	70.0	70.0	70.0
	More preferred	4	10.0	10.0	80.0
	Most preferred	8	20.0	20.0	100.0
	Total	40	100.0	100.0	

Which sunflower variety do you actually grow?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local varieties	28	70.0	70.0	70.0
	Certified varieties	12	30.0	30.0	100.0
	Total	40	100.0	100.0	

Do you use Certified Sunflower oil seed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	30.0	30.0	30.0
	No	28	70.0	70.0	100.0
	Total	40	100.0	100.0	

How did you get information about the certified sunflower seed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	From neighbour farmer	24	60.0	60.0	60.0
	From Extension officer	3	7.5	7.5	67.5
	From media	7	17.5	17.5	85.0
	From certified sunflower producer	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

What is your source of sunflower seed to grow?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Own served	25	62.5	62.5	62.5
	Neighbouring farmers	3	7.5	7.5	70.0
	From Agrovot	12	30.0	30.0	100.0

Total	40	100.0	100.0	
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If you are not using certified sunflower seed can you rate the reason from the list

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No varieties of my choice	4	10.0	10.0	10.0
	I can not afford it	13	32.5	32.5	42.5
	I have no information about certified sunflower seed	6	15.0	15.0	57.5
	I don't believe if it is better than informal sunflower seeds	5	12.5	12.5	70.0
	No reason	12	30.0	30.0	100.0
	Total	40	100.0	100.0	

What is guiding your choice of sunflower oil seed variety to grow?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Variety needed in the market	8	20.0	20.0	20.0
	Resistance of the variety to diseases	10	25.0	25.0	45.0
	Financial return of the variety per hectare	18	45.0	45.0	90.0
	Availability of the seed	4	10.0	10.0	100.0
	Total	40	100.0	100.0	

How many times do you get the extension service in a year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 visit	16	40.0	40.0	40.0
	1 visit	10	25.0	25.0	65.0
	2 visit	6	15.0	15.0	80.0

3 visit	1	2.5	2.5	82.5
4 visit	7	17.5	17.5	100.0
Total	40	100.0	100.0	

What are challenges do you face in growing sunflower?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pests and diseases	11	27.5	27.5	27.5
	Low productivity	10	25.0	25.0	52.5
	High price of Agro inputs	8	20.0	20.0	72.5
	Delaying of Agro inputs	5	12.5	12.5	85.0
	Low extension services	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

What are the problems that face in marketing?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low price	23	57.5	57.5	57.5
	Use of un authorized measuring standard	9	22.5	22.5	80.0
	Low seed oil content	2	5.0	5.0	85.0
	Un able to set selling price	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

Do you have decision making on price?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	40	100.0	100.0	100.0

What is the price of sunflower oil seed per 60kg /bags during harvesting?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tsh 30000 - Tsh 40000	21	52.5	52.5	52.5
	Tsh 50000 - Tsh 60000	18	45.0	45.0	97.5
	Tsh 70000 - Tsh 80000	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

Who are your customers?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local market	40	100.0	100.0	100.0

What is the quality of sunflower oil seed that your customers require?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Type of variety	5	12.5	12.5	12.5
	Oil content	35	87.5	87.5	100.0
	Total	40	100.0	100.0	

Do you get any support from the Government?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	45.0	45.0	45.0
	No	22	55.0	55.0	100.0
	Total	40	100.0	100.0	

Which kind of support do you get from the Government?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Training	9	22.5	22.5	22.5
	Advice	9	22.5	22.5	45.0
	No support received	22	55.0	55.0	100.0
	Total	40	100.0	100.0	

Do you get any support from NGOs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	17.5	17.5	17.5
	No	33	82.5	82.5	100.0
	Total	40	100.0	100.0	

Which kind of Support do you get from NGOs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Training	7	17.5	17.5	17.5
	No support received	33	82.5	82.5	100.0
	Total	40	100.0	100.0	

Who links you to the market?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NGo's	2	5.0	5.0	5.0
	Extension Officers	11	27.5	27.5	32.5
	Traders	17	42.5	42.5	75.0
	Neighbour farmer	10	25.0	25.0	100.0
	Total	40	100.0	100.0	

Do you see any opportunities to improve the market of sunflower oil seed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	40	100.0	100.0	100.0

APPENDIX :FIELD WORK PICTURES



Source :Field work & Authors interview (2022)



Source :Field work & Authors interview (2022)



Source :Field work & Authors interview (2022)