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The Politics of Seed: Investigating the privatization and promotion of hybrid maize seed and their impacts on small scale maize farmer's livelihood;

The case of Moshi Rural District at Kilimanjaro region, Tanzania

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Disclaimer:

This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

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List of Acronyms

FAO	Food and Agriculture Organization
ISS	Institute of Social Studies
ARI	Agricultural Research Institutes
AGRA	Alliance for Green Revolution Africa
ASA	Agricultural Seed Agency
DRD	The Division of Research and Development
FAO	Food and Agriculture Organization of the United Nations
GMO	Genetically Modified Organism
IPR	Intellectual Property Right
ISSD	Integrated Seed Sector Development
MALF	Ministry of Agriculture Livestock and Fisheries
MRD	Moshi Rural District
NMRP	National Maize Research Program
TASTA	Tanzania Seed Trade Association
TOSCA	Tanzanian Official Seed Certification Agency
TSCA	Tanzania Seed Company Ltd
NAP	National Agricultural policy
DFID	Department for International Development
SADC	Southern Agricultural and Food Security
KATC	Kilimanjaro Agricultural Training Centre
NBS	National Bureau Statistics

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Abstract

Seed is considered a centre key issue in agricultural activity as it plays a significant role in the production process. Seed's accessibility and supply to farmers are crucial, the shortage of seed can cause nationwide hunger and economic downfall. Due to the importance, Tanzania government together with other stakeholders such as private sectors and research institutes play an enormous role in its promotion.

This study set to explore the politics of seed in Moshi Rural district in Northern Tanzania based on the role of the state in promoting hybrid maize seed in the area. This was done through interviewing essential stakeholders who are farmers, government official, extension officers, seed company representatives and agro-dealers. Also, the investigation of policies and regulation which influence the use, the supply of extension officers who work under the government was done.

The adoption of hybrid maize seeds are influenced by the government through setting up of policy and regulations, seed companies through organising the trade fair and education to extension officers which in turn go and train agro-dealers and farmers. There is a significant increase in adoption rate in northern part of the country since the state privatised its seed sector in early 1990, with significant private players being multinational companies such as Monsanto and Pannar. These companies own the seeds intellectual properties, and hence smallholder farmers are forced to buy the seeds from seed companies or their agents every season thus leads to household economy impact on their income and expenditure. Hence, regarding who loses and who gains, the seed companies win, and local farmers lose.

Keywords

Hybrid maize seeds, politics of seed, Adoption factors, privatisation, smallholder farmer's livelihood.

Chapter: 1 Introduction and background.

1.0 Introduction

Tanzania is one of the poorest countries in the world, and agriculture is a keystone sector of the economy. Since its independence in 1961, farming remains key to the country's economic and social development. To date, farming provides three-quarters of merchandise exports, contributes about 95% of the country's food demand, 26.8% of GDP, 30.9% of foreign currency and employs over 75% of Tanzanians (Chauvin et al. 2012: 26). Food crops such as maize, sorghum, millet, rice, wheat, beans, cassava, potatoes and bananas account for 65% of the agriculture gross domestic product. Among those food crops, maize use 45% of the cultivated area (Lyimo et al. 2014) and accounts for 31% of the agricultural GDP and 14% of total GDP (Fischer 2003).

Despite the significance of agriculture sector to the country's economy, the industry faces a number of restraints among them being poor soils, drought, temperature stress (Kathage et al. 2012), and input based challenges such as high cost and availability of seeds and fertilisers. As part of inputs, seeds play a significant role in improving agricultural productivity around the world. "Researchers, policymakers and foundations are working hard to improve seeds provisioning to farmers in developing countries to increase agricultural productivity, food security and poverty reduction (Coomes et al. 2015: 42). Before the 1970s, Tanzania had informal seed sector; the government was in charge of the seed system.

By understanding the significance of maize to the economy and shortage of formal seed system. The official seed sub-sector was established in the 1970's as a seed project funded by the USAID (Fischer 2003). Tanzania government created the National Maize Research Program (NMRP) in 1970. The objective of the program was to develop cultivars suitable for maize producing areas. In addition, the NMRP supported efforts on liberalisation of agriculture market inputs such as seeds. Under this program, research in developing new varieties was carried out together with the establishment of seed farms and formation of the National Seed Company (TANSEED) in 1973. Also, the government enacted the Seed Act No. 29 of 1973. In the same year Tanzania Official Seed Certification Agency (TOSCA) was launched, with three laboratories to regulate the quality of seeds (Lyimo et al. 2014).

In 1989, the state launched the National Seed Industry Development Program, which was in line with the global privatisation agenda as part of the structural adjustment programmes, which emphasized moving from State controlled economy to free market economy (Malope 2011: 504). The "National Seed Industry Development Programme set out to reduce state control in the seed

sector” (ASARECA/KIT 2014: 6). This means Private seed companies were therefore allowed to operate in the country. The deregulation of seeds industry allows private sectors to invest in seeds industry.

Most of the private companies such as Monsanto, Pannar, Cargill, Pioneer, Dekalb and Kenya Seed Company were interested in investing into maize seeds industry, up to the year 2001 when the private sector introduced 17 varieties of hybrid maize seeds (Lyimo et al. 2014). Private seeds companies were interested due to the natural characteristics of the hybrid seeds of not being able to reproduce after the first production. Farmers would thus be compelled to turn to hybrid Seed Company each cultivation season for a new supply that creates ongoing market value for seed. As, Kloppenburg (2005) pointed out, hybridisation and patenting of maize in the United States, separated farmers from planting material and created an opportunity for private capital to profit from the sale of the seeds.

Although the state and private sector have made a considerable impact on increasing adoption of hybrid maize seeds to small-scale farmers, there remains a lot to be explained about the dynamics of maize hybrid seed introduction and adoption by small farmers in Tanzania. There have also been different opinions that need to be studied in the promotion and management of hybrid seed. These include intellectual and patent rights, which apparently have made local farmers vulnerable regarding the seed security. It is against this background that this study was conducted to evaluate the blurred issues surrounding the seed industry in Tanzania. The review discusses how and why the government promotes hybrid seed as well as why farmers opt to use the hybrid seeds.

The study is based on the concept that some factors influence the adoption of hybrid seeds. Studies by (Chirwa 2005, Dorward and Chirwa 2011, Kathage et al. 2012) conducted on hybrid seeds in Tanzania reported that the various factors (i) economic factors; household income, labour costs, government policy, taxes and management. (ii) social factors; level of education and age; (iii) environment factors: soil fertility, pest’s outbreaks and climate change are among the significant factors influencing adoption of hybrid seeds.

Also, the broader repercussions of liberalising seed markets are not yet adequately agreed and have been the subject of debate among researchers. Scholars such as (Putterman 1995, Jayne et al. 2002, Cooksey 2011) have studied liberalisation of seed systems and market in Tanzania. The results of their studies emphasises that market liberalisation of agriculture inputs including seeds started in the 1990s when the Government of Tanzania opened doors for multinational and private investors such as Cargill Hybrid Seeds, Alpha Seeds, Incofin Tanzania Ltd, East African Seeds Co and Monsanto.

These companies seek to spread their business and increase profit margin, along with encouraging the increase in the adoption rate of their hybrid seeds in Tanzania. For instance, Cargill was the first company to release seven different types of hybrid maize, followed by Monsanto and Pioneer. The market liberalisation process promoted the supply and distribution of hybrid seeds throughout the country.

However, for a farmer to access these hybrid seeds, they are required to purchase them from the seed companies or agents every growing season. This is because a farmer cannot replant the F1 hybrid seed. Also, even if they can produce the hybrid seeds, the intellectual property laws prohibit them from doing so. Depending on the prices of the hybrid seeds and the financial conditions of the smallholder farmers, some smallholder farmers may be left out from accessing the new seeds variety (hybrid seeds) (Lipton and Longhurst 2010).

The political economy of seeds has hardly been the focus of most previous studies in Tanzania. Most of the studies (Putterman 1995, Jayne et al. 2002, Cooksey 2011) carried out do not show in details how government and private seed companies play a significant role on influencing the accessibility of hybrid seeds for easy adoption and how farmer's household income is affected by the use of these hybrid seeds.

This study addresses this research gap, focusing on the hybrid maize seeds in Tanzania. The paper illustrates some of the different issues such as the role of state and private sector in influencing the small-scale farmers to use hybrid seeds and the reasons behind the farmers' choice (if any) to use hybrid seeds. This study was conducted in two villages, Himo and Mwika of Moshi Rural District (MRD) in Kilimanjaro region in Northern Tanzania.

In Tanzania, the governments through its Ministry of Agriculture, Livestock and Fisheries (MALF) put in place policy, Act, Rules, Regulations and Guidelines to ensure that the seed industry is well regulated and contributes to national food security. Currently, the government has the following measures on seed industry: The Seeds Act of 2003 and its Regulations of 2007, the Protection of New Plant Varieties (Plant Breeders' Rights) Act (2002) and the Plant Breeders' Rights Regulations (2008).

Other state-level legislation influencing the seed sector as documented by (ASARECA/KIT 2014: 33) is "The Executive Agencies Act No 30 of 1997, the Executive Agencies Act Cap.245 R.E. 2002, which facilitated the establishment of the Agricultural Seed Agency in June 2006 as a semi-autonomous MAFSC. In addition, there is the Protection of New Plant Varieties (Plant Breeders' Rights) Act, No 22 of 2002, The Plant Breeders Right Regulations 2008, The new Plant Breeders'

Rights Act of 2013; The Environmental Management Act of 2004, and National Biotechnology Policy 2010.

1.1 Seed stakeholders in Tanzania

Tanzania government (state) through the Ministry of Agriculture, Livestock and Fisheries (MALF), is the highest government body responsible for agriculture sector as well as the respective agro-inputs such as seeds. Its primary function is to formulate, coordinate, monitor and evaluate the implementation of relevant policies in the agriculture sector, monitoring of crops and regulating institutions (MALF. October 30th). Regulatory seed Agencies includes “Plant Breeder Rights Association, Tanzania Official Seed Certification Institute (TOSCI), Agricultural Seed Agency (ASA), National Variety Release Committee and National Biosafety Committee. All these seed agencies are responsible for controlling and protection of certified seeds quality and managing certified seeds distribution and services” (ASARECA/KIT 2014: 3).

Research institutions’ stakeholders mainly engage in the development of new seed varieties and sale of such resources. They “focus mostly on the certified seed production, distribution and seed quality control” (ASARECA/KIT 2014: 3). Majority of these institutions are under the management of public sector with financial and technical support from donors such as Alliance for a Green Revolution in Africa (AGRA) which is also funded by the Bill and Gates foundation their primary objectives focuses on development of new seed varieties which more effort is directed to the private seed companies and agro dealers that are more dealing with new and certified improved variety of seeds (Bezner 2012).

Private seed companies such as Monsanto, Pannar, Pioneer, Seed Co. and Cargill primarily focus more on production, marketing and supply of certified seeds through Agro dealers who act as agents for the seed companies. The agents do purchase the seeds from these companies and sell them to farmers (ASARECA/KIT 2014: 3).

Farmers are termed as the end users of the produced certified seeds. Farmers do also use local seeds and are involved in natural seed production (ASARECA/KIT 2014: 3).

1.2 Definition of the terms

Seed system is defined “as the sum of physical organizational and institutional, components of the seed, combining both actions and interaction which then determine seed supply and use in

quantitative and qualitative terms (Scoones and Thompson 2011: 7). The seed system is categorized into informal and formal systems.

The formal seed system; This is the system “The formal sector refers to seed production activities by the public and commercial sector” (Almekinders and Louwaars 2002: 1). In this system breeding gene banks, private seed companies and agro-dealers are governed by law and regulations and are registered and certified seed providers.

The informal seed sector is usually defined as “the total of seed production activities of farmers, mostly small-scale farmers.” (Almekinders and Louwaars 2002: 1). Within this system, seeds are selected from home farm production and saved. The system includes household seeds selection and saving but may also involve farmer networks of gift and exchange and local market (Scoones and Thompson 2011, Langyintuo et al. 2008: 326).

Local seeds or traditional seeds, or farmer seeds are the seeds that farmers are domestic producers from the selection of the high-quality products from their yield and save these for the next farming season. Farmers traditionally save seeds and reuse them, and do exchange seeds with each other (Sell 2009: 189). Similarly, Mayet (2015) refers to “local seeds as the farmer’s seeds based on the ways farmer themselves socially organise them and how they produce, disseminate and obtain seeds through on-farm saving and exchange with neighbours and sometimes selling to each other”. Mayet (2015) points out that the most significant advantage of local seeds is that farmers can access them with no cash involved. On the other hand, the farmers’ seed system is seen as a system in which farmers produce seeds while at the same time practising a form of crop development and maintain crop genetic diversity in situ (Almekinders and Louwaars 2002).

Hybrid seed is defined as the first generation (F1) hybrid seeds. It has unique characteristics where such seed cannot be replanted or freely exchanged because it has property ownership right (it is legally owned by the seeds company). Every farming season, the farmer must buy new seed. Sell (2009: 189) suggests that seeds companies preferred to develop hybrid seeds because they do not yield if the progeny is used and therefore farmers must purchase new hybrid seeds every planting season.

Genetically modified organisms (GMO) seeds are famous for the use of intensive agrochemical inputs. Their main characteristic is resistance to herbicides. The GMO seeds genes travel easily with wind due to its small and smooth shape, this causes many complications to farmers who do not have the patent right on the seeds on their farm as they may be considered to be illegally using them (Sell 2009). GMO seeds and hybrid seeds are the private seeds owned by the individual

companies or public. For farmers to have access to them, they must purchase the seeds from the owner and seeds come with tight restrictions on their use (Scoones and Thompson 2011).

1.3 Research Objectives

The primary objective of this study is to analyse the politics of hybrid maize seed in Moshi rural district, the main stakeholders who promote the adoption of hybrid maize seeds as well as factors that influence smallholder farmers to use hybrid maize seed and the impacts of hybrid maize seed to their household economy.

1.4 Research Questions

Based on the above background, this research was undertaken with the view of answering the main question;

How has privatization and adoption of hybrid seeds been promoted in Moshi Rural District (MRD) at Kilimanjaro region in Northern Tanzania, and what are the power politics behind this? Who benefits and who loses?

To achieve the objective of the study the main research question was broken down into specific questions to allow analysis of the variables that influence the study. The study, therefore, established reasons why smallholder maize farmers in Moshi District use hybrid maize seeds. The study also demonstrated how the government (extension officers) and corporate actors influence farmers' decisions regarding the use of hybrid maize seed. The study also established the impact of using hybrid maize seed in household economy of the smallholder maize farmers based on their expenditure and income

1.5 Justification and relevance of the research

For the past decades, Tanzania government focused on improving seed production, accessibility and supply by putting a strong effort on the developing seeds industry sector. This was done by adjusting and amending some policies and regulation such as The Seed Act, 2003 created the right patent protection of the seeds, allowing own seeds company to invest into the business as well as the establishment of an agricultural development project which focuses on improved certified seed, for instance, Kilimo Kwanza.

Based on the effort of Tanzanian government and other seed actors on promoting privatization and hybrid maize seed, there is a significant increase in agricultural yield and improve rural farmer's

livelihood. This is because the majority of farmers depends on agricultural activities for food and source of income. In addition to that majority of them (farmers) over 75% are poor and live under income of USD 1 per day, and for them to access hybrid maize seed, they needed to purchase them in every farming season from the seed owner.

This research contributes to adding the knowledge to the body of literature on the politics of hybrid maize seed; the role played by state and corporate seed owner on promoting hybrid maize seed and the way they influence farmer's decision on which type of seed to use. The study also helps in understanding the contribution of agro-dealers and extension officers' services and advice on the promotion of hybrid maize seed. Too, the study critically looks at the reasons of smallholder maize farmers to adopt hybrid maize seeds as well as the household economy impact of the adaptation.

1.7 Overview of Chapters

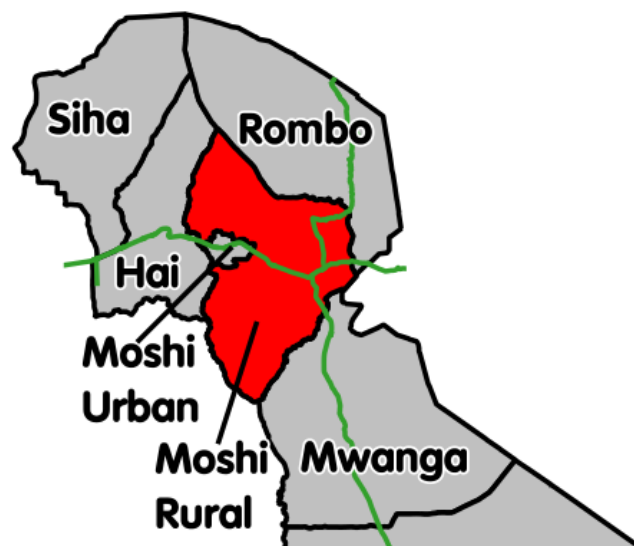
The subsequent chapters of this research are organised as follows; Chapter 2 introduces the study area and highlights the research methodology, methods and techniques used for data collection and analysis. Chapter 3 discusses the literature review and conceptual frameworks that guide the discussion of this paper in understanding the findings of the study. Chapter 4 presents the research findings using empirical evidence from the collected data, and finally, Chapter 5 gives the concluding remarks of the research and highlights how the results of this research could apply to similar contexts of the world.

Chapter 2 : Research Methodology

2.1 The Study Area

This study was conducted Moshi Rural District (MRD) in Kilimanjaro region in Northern Tanzania. MRD is among the seven districts of Kilimanjaro Region. The MRD has borders with Rombo District, Hai District, Mwangi District, Moshi Urban and Kenya.

Map 1 : Moshi Rural District in Kilimanjaro Region, Tanzania



Source: (2012, NBS Census Data)

The region is in the northern zone of the country, which is “characterized by several agro-ecological sub-zones with elevation varying from 400-1930 m.a.s.l. and annual rainfall ranging from 150 mm to 1500 mm” (ASARECA/KIT 2014: 58). Small-scale farmers carry out agricultural production predominantly. Also, the northern zone has three major rainfall zones: High rainfall zone (1,200 - 1,500 mm of rainfall per year, moderate rainfall zone ranging from 800 to 1,200 mm per year and the low rainfall zone that receives rainfall ranging from 500 to 800 mm per annum (ASARECA/KIT 2014). In Kilimanjaro region, the area planted with maize in 2007/2008 season, was 107,932 Ha which constituted 60 percent of the total area planted with annual crops (NBS, 2012).

As reported by (Moshi and Nnko 1989: 141) “Northern region is rated as the second higher of hybrid seed adaptation with an estimated rate of 66% and contributes 10% of the total maize produced in the country”. The choice to conduct this research in the Kilimanjaro region was due

to following reasons. One, Kilimanjaro is one of the regions that utilize over 90 percent of the arable land (ASARECA/KIT 2014).

Two, Kilimanjaro is one of the early adopters of improved seeds in Tanzania. In 1989, National Seed Industry Development Programme was developed (ASARECA/KIT 2014: 6), and six years later in 1995, Kilimanjaro was one of the four regions with the highest use of improved seed, due to its geographical location. Seeds were marketed from Kenya. The third reason for the choice of the area is due to the fact that, Kilimanjaro is a pioneer on improved seeds, a home to the centre for development of seeds named Kilimanjaro Agricultural Training Centre (KATC) (Monela 2014) and has diverse agribusiness activities. Another reason for the choice of Kilimanjaro is the literacy rate. “region had a total literacy rate of 89 percent, the highest literacy rate was found in Moshi Rural which recorded the highest literacy rate of 91.4 percent” (NBS, 2012:76).

The study will be conducted in Moshi Rural District which is one among of the seven district of Kilimanjaro Region, which is Northern part of the country. The choice of the area is strategically selected to cover the area where the adoption of hybrid seed is higher within the state. To narrow down to the decision of the district is due to the fact that it is dominant among others when it comes to maize production. Moshi Rural is having the largest area of maize production of (30.3%), followed by Same (19.3%), Hai (14.4%), Siha (13%), Mwanga (12.5%), and Rombo (11 %)” (NBS, 2012: 53). Moreover, on the part of agribusiness point of view Northern region which includes Kilimanjaro had several seed companies such as Pannar, and Seed. Co, head quoter at Arusha, as well as the Headquarters of Tanzania Seed Trade Association (TASTA) is at the Northern region, in addition at the area there are various seed institution and research centres such as Kilimanjaro Agricultural Training Centre in Moshi and Selian and Horti Tengeru for seed development. So all of this in one way or another have an influence on hybrid maize seed adaptation in the area, and it will result in data collection.

The study was conducted in Himo, and Mwika villages and the sample population was randomly selected because it was not easy to collect data from all villages of Moshi rural districts due to the time limit. The district has a projected total population of 509,431 whereby men are 246,419 and women are 263,013.

In the same survey conducted by NBS (2012:76), it was found that “the planted area using improved seeds was estimated at 72,160 ha which represented 40 percent of the total area planted with the annual crops and vegetables. The area planted without improved seeds was 108,011ha representing 60 percent of the total area planted with the annual crops and vegetables.” Demographically, “the number of agricultural households in the region was 242,708 out of which 56,710

(23.4%) were involved in growing crops only, 1,700 (0.7%) rearing livestock only, and 184,298 (76%) were involved in both crop production as well as livestock keeping” (NBS 2012:11).

2.2 Research Design

The study used mixed method approach to obtain relevant data because “mixed method helps to utilize the strength of both qualitative and quantitative and there is more insight to be gained from the combination of the two techniques, (qualitative and quantitative) research than either form by itself” (Creswell 2003:203). As the aim of the study relates to understanding the politics of seeds in Kilimanjaro region, this methodology is suitable to generate data for analysis. The choice of the methodology was due to the fact that, the research seeks answers to “about the ‘what’, ‘how’ and ‘why’ of a phenomenon rather than ‘how many’ or ‘how much’ (Brayer 1978). The study investigated the actors involved in promoting and control of hybrid seeds access in the area and the impacts of hybrid maize seeds to the farmer’s household income. In this study, the researcher followed the ethical protocols such as all respondents who participate in the survey were freely consented to participate and respect the rights of the individual (Brayer, 1978).

First, the researcher observed the agricultural activities done in the area where most of the people depended on maize farming, but also do grow other crops such as coffee, banana, horticultural crops and livestock keeping. In addition, there are other economic activities done by small farmers including small business (shops) that supplement income from farming activities. I notice the existence of many agro-dealers in the areas and the positive relationship of farmer’s extension officers, agro-dealers and government officials, in the area as both are the part of the community and majority engaging in maize farming activities. Second, I carried out interviews on the maize seeds (hybrid maize seeds and local maize seeds).

The intended interviewee were small maize farmers, agro-dealers, extension officers, government official, and seeds company representative. Data from interviews with smallholder farmers helped to understand what type of maize seeds were favoured by the small maize farmers, why they used the particular types of the seeds, who introduced the seeds to them, where they get the seeds, what support they got from the government based on the kind of seeds they used and what challenges they faced on using local or hybrid maize seeds to the household income. Similarly, the interview with extension officer was on the services they offered to the small maize farmers, their influence on using hybrid or local seeds and the challenges they faced from farmers who used hybrid or local maize seeds.

Furthermore, the interview with government official was to help understand how they supported small maize farmers in the area, their influence on the use of hybrid maize seeds, the support they offered to agro-dealers and grains companies to be interested in investing in the area. Lastly, the interviews of agro-dealers and seeds company representative were to understand why they did business in the area, how they got customers, how they influenced farmers to use hybrid maize seeds, the support they got from the government and the challenges they encountered from small maize farmers who used their seeds. These five-interviewed groups; farmers, government officials, extension officers, agro-dealers and seed company representatives are the primary actors that influenced the accessibility, and the use of a type of seeds in the community and data from discussions with them helped to answer the research question.

2.3 Sampling

Due to time and resource constraint, this study was conducted using a sample because “sampling is central to the practice of qualitative methods” (Robinson 2014: 25). The study followed the sampling process suggested by Robinson (2014) that first define a sample, i.e. who will be included and who will be excluded, then deciding on a sample size, followed by selecting a sampling strategy and finally sample sourcing. The study sample five-interviewed groups; farmers, government officials, extension officers, agro-dealers and seed company representatives. These are twenty small maize farmers, eight agro-dealers, two extension officers, two regional government office representatives and one seeds company representative.

The selection of participant was purposeful for only farmers who cultivate maize in the area. The reason for this choice was participants are selected because they are likely to generate useful data for the study (Brayer, 1978). This was achieved with the help of the village leaders who knew well their people from both two villages. The chosen maize farmers were both male and female due to the nature of the agricultural activity in the area whereby both men and women were involved. Although the interview was conducted from farmers’ houses, the village leaders helped to send information to them on the day the interview was planned, and this made the interview process easy and fast. This approach was used based on documented reason by Robinson (2014: 11) that “In interviews, extensive intimate self-disclosure is sometimes required and this is likely to lead to a sample containing individuals who are more open, more patient and more interested in the topic than the general sample universe”.

Similarly, in the case of eight selected agro-dealers, the market leader helped me to choose among the dealers in the area who would be available on the interview day and who were willing to participate. This was because not all the businessmen/ women were willing to give out information on their businesses.

However, the sample selection was deferent for government officials, whereby I sent the introduction letter to their office explaining the reason I was in the villages and made an appointment. Among themselves, they appointed representatives who had enough knowledge about the seeds issues. These were, therefore, the two-government official of both communities. As planned in the research proposal, the study was intended to interview one representative from a seeds company. Unfortunately, there were no seed company representatives in the study area. Instead, there was a seed agent supplier who supplied seeds to the agro-dealers and also acted as the representative of Seeds Company in the area.

2.4 Primary Data

In this study, the definition of primary data is “the data that are collected for specific research problem at hand, using procedures that fit the research problem at best” (Hox and Boeijs 2005: 593). The reason to collect the primary data was to contribute data to the social pool of knowledge. Primary data was sourced through fieldwork by interviewing farmers, extension officers, agro-dealers, local government officers from Regional Commissioner’s office and seeds company’s representative. Farmers’ household interviews were conducted with the maize farmers only through a key informant. These were head of the household or a person who was engaged in maize farming and had knowledge about maize seeds they used. The study used in-depth interviews with semi-structured open-ended questions and questions were framed along the central themes of the research.

The choice of the interview type was based on the argument that “Semi-structured interviews consist of several key questions that help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail” (Gill et al., 2008:291). Also based on the fact that the “semi-structured interview in one hand is not entirely fixed but on the contrary, it is not completely free, and hence it is perhaps best seen as flexible” (O’leary 2004: 164).

The questions aimed to understand why farmers opt to use hybrid seeds, where and how they get hybrid seeds, the household economic impact of using hybrid seeds (See Annex One: The Questionnaires Used). The interview included 20 small-scale maize farmers who live and grow maize in two villages. The meeting was conducted using local language (Kiswahili) which is the national language. This was achieved by first translating all questionnaires from English to the Kiswahili language. (See Annex Two: Kiswahili Questionnaires.).

In some cases, the tribal language Chaga was used by the help of a translator who lived in the village to make the respondents more comfortable to participate in the interview. Moreover, two village extension officers were interviewed to understand their roles in influencing the use of hybrid maize. Their tasks included advice and knowledge they provided to farmers, their relations with agro-dealers and seeds companies. The officers revealed how farmers reacted on using hybrid seeds and the challenges they got from the farmers who used hybrid seeds and those who did not. Also, one seeds company's representative was interviewed to obtain information on the reason behind their decision to start a business in that area, education programs they provided to farmers about hybrid maize seeds, and if there were experimental programs on hybrid seeds offered to the farmers beforehand. Similarly, agro-dealers were interviewed to obtain the types of seeds they sold most, any incentive or support packages they provided to farmers who were using hybrid seeds, how agro-dealers met farmers and what kind of support they received from the government.

Two Regional Government officers were also interviewed to obtain data about the development programs and relief seeds program on the area, extension services on the best choice of the seeds and if they provided subsidies for farmers who used hybrid seeds, the way they maintained the seeds companies in the area and the agro-dealers.

Finally, the observation method was used to counter check and validate responses from respondents. The reason to apply this technique was "what people say they do and what they do is not the same" (Blomberg et al. 1993). During the interview, the researcher observed body language, gestures, cues that lend meaning to words. The setting of location and presence and absence of other people who might influence respondent's answers was also considered. The choice of what to observe was influenced by works of scholars (Crang and Cook 2007). Both interview and observation were noted down in field notes.

2.5 Secondary Data

In this study, secondary data means the data that was created by other researchers but were used in this study (Hox and Boeije 2005). These data were used for the description of seed politics historical attributes and to support the result obtained in the field. Secondary data were collected from the extension officer's office. The aim of this data was to identify numbers of farmers in the area, which farmers used hybrid seeds and who did not. Also, the data were collected from previous research reports obtained using keywords hybrid seeds, Kilimanjaro and Tanzania on Google Scholar.

2.6 Limitation

Despite the successful data collection from planned respondents, the study also faced limitation. One is the time for data collection; this is due to the nature of agricultural activities, most of the small maize farmer's respondents were only available during evening hours after returning from their farming activities. This resulted in difficult for a researcher to finish the interview on the planned days. This is because the intended number of interviews for a day for farmers reduced due to the time limitation to the farmers.

Two was fact checking. Majority of the small maize farmer's respondents does not keep the record of the production cost during the maize cultivating seasons. Hence it was challenging to cross-check their replies with actual data. However, the sufficiently alternative estimated method was used to analyse the income and expenditure of the household by asking how much seeds (in Kg) and fertiliser they use (prices are available at the agro-dealers). Also, how many people work to the farm if they pay them or not they use of their income and expenditure were used, and this made hard for the study to analyse the household income and expenditure effects of hybrid maize seeds to them.

The third challenge came from Agro dealers who were less cooperative in giving the information about hybrid seeds sales data despite the formal introduction letter and the help of the market leader. A similar situation happens to the big seeds agent representative who also refused to give the data on hybrid maize seeds sells which would help on comparing the sales of hybrid maize seeds if it is true the people favoured seeds in the area as they claim.

Another major setback was the experience of a researcher. Being a student and new to the field posed challenges when it comes to data analysis and discussion, especially linking the results obtained from the field with the existing research works in the same industry.

Chapter 3 : Literature Review and Conceptual Framework.

3.0 Introduction

This chapter reviews different scholarly research works done in the past in the same field of study. The chapter is divided into two major sections with a subsection of each section. The first section covers the literature review, which is subdivided into subsection one dealing with politics of the seed, subsection two reviews the role of the state in promoting hybrid seeds and subsection three reviewing the corporate ownership of seeds. The second section is the conceptual framework with subsection one working on privatisation concepts, subsection two on the concepts on the role of the state in promoting the hybrid seeds and the third subsection reviewing concepts on small-scale farmer's livelihood.

3.1 Literature Review

3.1.1 Politics of seeds

The politics affect the framing of the seed system, influencing what elements are given priority over other. Politics determine where investments are channelled, what institutional arrangements have the power to govern seed policy and practice as well as how the overall narrative of system objectives is constructed and also, affects the interaction between the elements (Scoones and Thompson 2011). Different justifications and views are published by various authors about Politics of the seeds. The scholarly focus has been on Intellectual property and seed company's rapid consolidation (Howard 2015), on the political economy of commodification, capitalism sought, division of labour within the plant breeding/seed production sector and extreme asymmetry of germplasm transfer (Kloppenburg 2008) and on the central issues of power, control, risks and benefits (Scoones and Thompson 2011) in the seed/food political space. Under politics lens, seed industry is among the state priorities based on the policies and agricultural programmes which directly support the improvement of certified seed in Tanzania such as Kilimo Kwanza policy under the support of Tanzanian President Jakaya M. Kikwete in collaboration with another seed stakeholder.

Seeds are at the acute part of an elaborate political dynamic among seed stakeholders. Access to seeds concerns the balance between private right and public responsibilities, private ownership and the public domain, commercial versus humanitarian objectives (Sell 2009). The study applies political economy approach to analyse the political economy of hybrid maize seeds critically, aims

to explain who benefits and who loses on hybrid seed adaption on agricultural productivity based on the role of state promotion of hybrid seed, corporate ownership of seed and smallholder farmer's livelihood on question of who owns what, who does what, who gets what and what they do with the surplus (Bernstein 2010). The study assists in understanding and obtaining knowledge of power relationships and politics that authorize and enforce rules and regulations on seeds sector among the seed stakeholders.

3.1.2 The role of the state in promoting hybrid seeds.

Seeds are a significant input in agriculture production, yet few African countries have succeeded in developing effective seeds production and supply system (Jaffee and Srivastava 1994). The Tanzanian seed sector has a wide variety of public, private sector and civil society actors managed and acting under policies, laws and regulation enforced by the state (ASARECA/KIT 2014: 5). In this study the two main concepts are adopted from (Wedel et al. 2005) that refer to “public policy is the administrative rules, laws, and judicial rulings about a particular issue” and also by that of (Shah, 2011) that “the laws or rules that are enforced by any level of government, whether central, state or local”.

In many countries, Tanzania included, free seed production was initiated with the goal of facilitating modern farming through the provision of improved crop varieties. Gamba (2015) argue that seed stakeholders such as public, private and social members differ in their acceptability of ideal or balance regulatory reforms. However, governments act as a bridge between the two sectors, Dorward and Chirwa (2011) point out that sometimes government act as a catalyst to promote proprietary seeds through regulations and subsidy programmes.

Involvement of the private seed sector is essential if there is to be a sustainable access by farmers to quality seed of locally-improved cultivars (Mushongi, 2012). Participation of farmers and breeders in the development of varieties would result in the use of new variations that impact positively on grain yield because farmers and seed breeders have different selection criteria (De Groote et al. 2002, Witcombe et al. 2005).

Governments play a crucial role in bringing these two sides together. However, government development of property right to the breeder originator of the seed company of the hybrid seed ensures ownership right and market for them (Jaffee and Srivastava 1994: 105).

Although, the informal seed sector and seed supply schemes of government and non-governmental organizations (NGO) continue to play a role, particularly in those countries [such as Tanzania]

where the formal seed sector is poorly developed (MacRobert, 2009), government influence farmers via input subsidy programs. This is where a government offer farmers access to a fertiliser at less than the market price to increase the maize yields at both household and national levels (Chinsinga 2011). However, Tripp and Rohrbach, (2001) argue that “government and donor plans provide large amounts of free or subsidized seed that further discourages seed enterprise development”. This, however, is in contrary to what Chinsinga (2011) observed that “sales of improved seed are at their peak following government’s implementation of the fertiliser subsidy programme.” On the other hand, Chinsinga, (2011) reports that “the seed component of the subsidy programme is almost always supported by donors who regard seed offered by the multinational companies as being intrinsically superior”. This can be viewed as an advantage to multinational companies, and loss to local producers. Thompson (2012) narrated international organization programme such as Green revolution, AGRA primary objective is working with developing nations on promoting the availability and supply of certified seed (hybrid included). In addition, the support of this multinational programme is in providing support for the agro-dealers and extension offices who play a role in providing knowledge about hybrid seed (Jaffee and Srivastava 1994).

3.1.3 Corporate ownership of seed

Seed is the key input for agricultural production and having seed ownership rights provide the power to control agricultural production. Seed ownership can be categorized into two as individual owned or community owned. Today scholars around the world such as Tansey ((2011) and Scoones and Thompson (2011) focus their attention on the political seed space. Kloppenburg, (2010: 368) argue that “Seed is the critical nexus where contemporary battles over the technical, social and environmental conditions of production and consumption converge manifest. The works of Kloppenburg (2008) and Harvey (2003) recognise the concentration of corporate power in research, development and distribution of hybrid seeds as well as the global imposition of intellectual property rights (IPRs) as the new form of accumulation by disposition. The same is argued by Mascarenhas and Busch, (2006: 126) that “the development of hybrid seed varieties produce a natural form of intellectual property exposed as development in the industrial capital as well as having full management over the biological production of seed”.

Kloppenburger (2008) points out that before the establishment of intellectual property protection on seeds, seeds companies were not making much profit. Thanks to the rapid domination of the seeds sector by private seed companies and the fall of traditional seed market that was stimulated

by the Intellectual property right (Mascarenhas and Busch 2006). Seed companies such as Monsanto and Syngenta and DuPont, are working aggressively to separate farmers from self-provisioning of that most fundamental means of the seed production (Kloppenborg 2010: 370).

In the United States of America, Plant Protection Act play a significant role in the adjustment of many seeds companies into the corporate folds ((Mascarenhas and Busch 2006: 127). The effect has resonated across the world, in Africa, for example, The African Union and the Pan-African Parliament, while at a sub-regional level COMESA, SADC, ARIPO and OAPI are also working to create new rules for the exchange and trade of seeds (ACB 2015; Grain 2015:3). General uniform seed laws as currently discussed in the Africa Development Community, facilitate global corporate access to farmer's seeds while diminishing any common ideas of benefit sharing back to farmers whose talent and innovation are the source of genetic wealth (Thompson 2012).

Scholars such as (De Jonge and Munyi 2016, McMichael and Schneider 2011) point out risks of abandoning traditional farmers seed systems. Improved and hybrid seeds are more expensive than conventional farmer's seeds after adding all cost of agricultural inputs required for hybrid seeds (Mascarenhas and Busch 2006). Kloppenborg, (2010) argue that "Seed is the critical nexus where contemporary battles over the technical, social and environmental conditions of production and consumption converge and are manifested. Who controls the seed, gains a substantial control over the shape of the entire food system" (Kloppenborg 2010: 368) while Kneen (1993) and Peekhaus (2013) point out that as privatization increases, the right to save and replant seeds has been progressively constrained. Gradually growth of seed companies has impacts of public policy through enhancing changes of the policies based on their interest for instance through establishing a property right in new varieties of plants and seeds succeeding with series of victories that include the plant patent Act 1930, the plant variety protection Act of 1970 (Kloppenborg 2008).

3.2 Theoretical framework

There are different models which can be used to investigate the seed politics in both developed and developing countries. These models help to shade the light, on who gains and who loses as far as hybrid seeds are concerned. This section presents the theoretical models on seed privatisation, the role of state and farmers livelihood. The theoretical models are not independent of one another, as they sometimes overlap.

3.2.1 Seed Privatisation.

For several decades, privatization has become one of the most critical elements of structural reform programs in both developed and developing countries (Sheshinski & Lbpez-Calva, 1999). Historically, privatisation was introduced by the United Kingdom in the 1980s, and since then, it has had an outstanding impact on the society (Lee et al. 2013). In theory, “privatization helps establish a free market and foster competitions which, in turn, give the public greater choices at a competitive price” (Carter, 2013).

Privatization has been given a variety of definitions (Dinavo 1995). According to Malope (2011: 504), privatisation can broadly be defined as “encompassing all measures and policies aimed at strengthening the role of the private sector in the economy”. Makdissi and Wodon (2004) strengthen this concept that “these policies included a push towards the privatization of state-owned enterprises, with the aim of improving production efficiency, reducing the risk of corruption, and promoting competition.” Narrowly, Vavrus, (2005) defines privatisation as “selling of the publicly owned enterprises including an agricultural system to the private sectors.” On their side, Vickers and Yarrow, (1988) define privatisation as placing of SOEs under private management through leases and management contracts.

The “role of the private sector as a producer and distributor of seed is seen as key” (ACB, 2015:6). Private seeds companies are the majority owners of the hybrid seeds and have the strong power over the seeds industry as they control the industry (Scoones and Thompson 2011). In Tanzania for example, “the private sector (seed companies, organized in TASTA) produces and markets certified seed, and some basic seed and Agro-dealers are involved in the retail of certified seed produced by various seed companies” (ASARECA/KIT 2014: 5). Private seeds companies drive the organization of value chains that bring the market to smallholders and a commercial farm and give an opportunity for farmers to engage in market freely, access the right to adopt free seeds varieties in the market and improve their productivities (Scoones and Thompson 2011). Kloppenburg (2010) argue that privatisation of seed systems is a form of ‘biopiracy’ because there are no direct benefits to all from privately held ‘common heritage of mankind’.

The nature of property is called into question when the individuals or communities identified as prospective ‘owners’ reject the very notion of owning seeds or plants that they may regard as sacred or as a collective heritage (Salazar et al. 2007). Tanzania Agricultural Seed Agency (ASA) reports that there are 49 registered seed companies. This is significant increase as Monela (2014: 3) states that these companies were about 15 in 2009. ACB (2015:6) reports that “seed industry is not a

homogenous bloc, but consists of numerous layers of companies, including the largest multinational companies, Monsanto, DuPont Pioneer, Syngenta and Vilmorin & Cie". These seed companies came into the picture in 1989 and supply over 70 percent of all certified seed (ASARECA/KIT 2014: 6).

From the theory of Privatisation put forward by (Carter, 2013), Tanzania should have the competitive price due to increased investment in the private sector. However, Scholars argue that commercial industry is underdeveloped and they depend on donor funds instead of investing in it from own resources. Tripp and Rohrbach, (2001: 174) writes that "donor investments target the establishment of community seed projects, subsidize seed delivery or distribute free seed under relief programs" and that "commercial channels for retail seed trade remain grossly underdeveloped and private seed companies devote their efforts to speculating on the level and timing of the next relief program" and Malope, (2011: 510) argue that "Free seed programs increase demand for seed, but the private sector remains reluctant to invest in producing good quality seeds due to uncertainty about consistency of seed demand."

Tripp and Rohrbach, (2001: 174) document that "the seed business is full of risks, and there are many uncertainties about the potential level of seed demand in Africa" and Malope (2011: 510) noted that government systems to free distribution via subsidy programmes create artificial demand and "limits the market available for the private sector."

3.2.2 The role of the state in the seed industry.

Under this subsection, the study evaluates different narratives that frame the thinking around the role of government to improved seeds and the meaning of political agronomy in Tanzania. This section looks in detail both permissible and regulatory structures that enable the development, access, and availability of improved maize seeds that will influence the seed value chain from researchers to breeders to distributors to small-scale farmers.

In this study the two central concepts are adopted from (Wedel et al. 2005) that "Public policy are the administrative rules, laws, and judicial rulings on a particular issue" and also by that of (Shah, 2011) that "the laws or rules that are enforced by any level of government, whether central, state or local". In Tanzania, the government under its Ministry of Agriculture, Livestock and Fisheries (MALF) put in place policy, Act, Rules, Regulations and Guidelines to ensure that the seed industry is appropriately regulated and contributes to food security. Currently, the government has these measures in the seed industry. One is the Seeds Act of 2003 and its Regulations of 2007, two is

Protection of New Plant Varieties (Plant Breeders' Rights) Act (2002), and three is Plant Breeders' Rights Regulations (2008).

Other state-level legislation influencing the seed sector as documented by ASARECA/KIT (2014: 13) in "The Executive Agencies Act No 30 of 1997, Executive Agencies Act [Cap.245 R.E. 2002], which facilitated establishment of the Agricultural Seed Agency in June 2006 as a semi-autonomous MAFSC; The Protection of New Plant Varieties (Plant Breeders' Rights) Act, No 22 of 2002, which encourages breeders' exemption and farmers' privileges; The Plant Breeders Right Regulations 2008 that ensures compliance to UPOV; The new Plant Breeders' Rights Act of 2013; The Environmental Management Act of 2004, which provides the legal authority for the Ministry of Environment to regulate GMOs; and National Biotechnology Policy 2010, which refers to conservation and exchange of plant genetic resources." Furthermore, policies and regulations were created to establish a conducive business environment for the private seed companies and facilitated attraction of investors for seed production and trade in Tanzania which increased seed supply (Otunge 2012).

Also, according to USAID (2013: 14), the Tanzania government signed various international and local agreements to improving business environment for seed industries, such as under the New Alliance for Food Security and Nutrition which include lowering taxes on seed and seed packaging, reducing the time required for seed variety registration and release, facilitate private seed companies access to breeder seed of public varieties and making fundamental revision to the Act 2003 and its regulation. Provision tax break, and other incentives by government to private companies to invest in agricultural sectors (seeds companies, private agricultural research institution) to better obtain knowledge, secure transmission as well as ensuring sufficient supply of agro-inputs. In addition, Thompson (2012) points out that state/government established various agricultural projects for improving seed industry production and supply cooperation. The state also signed difference contract with the private sector, one of the living examples is from Bill and Melinda Gate Foundation that financed various national research institution which works for seeds projects and some launched different drought resistance maize varieties which now owned by the funded company.

Moreover, the establishment of agricultural inputs by the government and other donors influence farmers purchasing power of improved/hybrid seed and fertilizer as well as promoting seed industry (Chinsinga 2011, Scoones and Thompson 2011).

3.2.3 Farmers Livelihood.

The theory of sustainable livelihood was coined and promoted by Department for International Development (DFID) in the late 1990s with a refocus on assistance to the poor (Solesbury 2003). In this study, “a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living, a livelihood is sustainable which can cope with or recover from stress and shocks, maintain or enhance its capabilities and assets and provide sustainable livelihood opportunities for the next generation; and which contribute to net benefits to other livelihood at the local and global levels and in the short and long term” (Chamber and Conway 1992: 6). On the other hand, livelihood “encompasses income both cash and kind as well as the social institution, gender relation, and property right required to support and sustain a given standard of living” (Ellis 1998: 4).

The agricultural development provides an effective means for reducing poverty, enhance food security and accelerate economic growth (Dixon et al. 2001) as more than 75% of the Sub Saharan African population are rural people and farmers depending on agricultural activities for their livelihood. Improving seed quality production, distribution and accessibility to farmers accelerate agricultural development.

Theoretically, “a seed business that is profitably supplying quality seed of improved, adapted and appropriate varieties to farmers will make a significant difference to farmer livelihoods and national economies” (MacRobert, 2009). This theory does not mean farmers have a choice whether to adopt or not as note by Monela (2014) that ‘if farmers do not adopt improved seed varieties, while their main source of livelihood is agriculture, it is very likely that they will remain poor’ (Monela 2014). In contrasts, Bezner (2013) points out that promotion of hybrid maize seed rises living expenses of smallholder farmers as farmers purchase hybrid seed each crop season (Mascarenhas and Busch 2006).

The introduction of hybrid seeds has direct impacts on the smallholder farmer’s livelihood. This is in particular on their source of income as well as the level of expenditure in their household. As the nature of the hybrid seeds not owned by the farmers and farmers must purchase the seeds from the seeds owner every cultivation seasons, it creates the dependence of farmers to the seeds owner companies. This raises the burden to the farmers as agricultural activities became expensive despite the fact that majority of small farmers are poor and must work hard to be able to get the financial inputs for the seeds purchase noting that they depend on the agricultural activities as a source of their income. Most of the smallholder farmers do not have the tendency of keeping cost

records or calculating the production cost as agricultural activities are carried out as part of a family undertaking with the majority of the farms managed by the family members.

Chapter 4: Result and Discussion.

The primary objective of this study is to analyse the politics of hybrid maize seed in Moshi Rural District, the primary stakeholders who promote the adaptation of hybrid maize seeds as well as factors influencing smallholder farmers to use hybrid maize seed and the impacts of hybrid maize seed to their household economy. To achieve the objective of the study the primary research question was broken down into specific questions to allow analysis of the variables that influence the study. The study, therefore, established reasons why smallholder maize farmers in Moshi Rural District use hybrid maize seeds. The study also demonstrated how the government and corporate actors influence farmers' decisions regarding the use of hybrid maize seed. The study also established the impact of using hybrid maize seed in the household economy for the smallholder maize farmers based on their expenditure and income.

4.1 Socio-Demographic Characteristics of the Respondents.

The socio-demographic characteristics of the respondent's interviewee are presented in Table 1 below. The total respondents were 33, whereby 17 (52%) were male, and 16 (48%) female. The respondents were 20 small maize farmers whereby 14 women and six men, eight agro-dealers whereby one woman and seven men, two extension officers whereby two men and zero women, two government officials whereby one man and one woman and one seed company representative who was a man.

In terms of age groups, there were 1 respondent (3%) with age between 21 to 30, 7 respondents (21.2%) aged between 31 and 40, 9 respondents (27.3%) aged between 41 and 50, 11 respondents (33.3%) between 51 and 60 and 5 respondents (15.2%) with age above 60 years.

Table 1 : Demographic and Social economic characteristics of respondents (n=33).

VARIABLE	CATEGORY	FREQUENCY	PERCENTAGE
SEX	Male	17	52%
	Female	16	48%
AGE	21-30	1	3%
	31-40	7	21.2%
	41-50	9	27.3%
	51-60	11	33.3%
	>60	5	15.2%
EDUCATION LEVEL	No formal education	2	6.1%
	Standard 1 to 4	0	0%
	Primary education	8	24.2%
	Secondary education	10	30.3%
	Tertiary	13	39.4%
MARITAL STATUS	Single	6	18%
	Married	18	55%
	Widow	7	21%
	Widower	2	6%
	Separated	0	0%
MAIN OCCUPATION	Farmer (only crop planting)	8	24.2%
	Both crop and live-stock keeping	7	21.2%
	Crop production and self-employment	5	15.2%
	Government employee	2	6.1%
	Extension officer	2	6.1%
	Business person	1	3%
	Agro dealer	8	24.2%

Source: (Author's field data)

4.2 Small maize farmers and hybrid maize seeds adaptation.

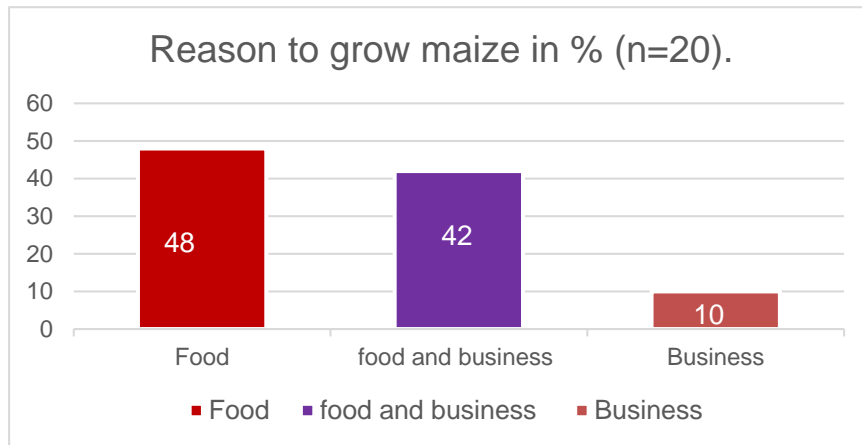
In this part of result discussion, the study focus on the small maize farmers in Moshi Rural District and the factors influences them to use hybrid maize seed. The first part focuses on farmer's reasons to grow maize in the area, then the seeds actors who introduced hybrid maize seed to small maize farmers as well as farmer's reaction to the hybrid varieties. The second part based on the reasons for small maize farmers to prefer hybrid seeds over local seeds as well as the factors influencing the respondent's farmers to use the type of seed they use.

Since the privatisation and seed liberation market in the 1990s, the Tanzanian government opening the door for the private seeds company to invest in seed sector, more efforts were directed on improved hybrid seed production (Lyimo et al. 2014). Various hybrid seeds were introduced to the farmers with the reasons that these seeds would produce high yield and increase farmer's production, and that they were drought resistant (ASARECA/KIT 2014)

Despite the high level of effort and support from the government, seeds companies even the international organisations and projects, yet not all farmers were ready to adopt hybrid seeds, and the reasons varying adoption differ from one farmer to another and from one place to another.

Despite the fact that Kilimanjaro region is famous for coffee cultivation and banana as a food crop, there has been a gradual change, with more farmers now shifting from coffee and banana cultivation to maize farming (Lyimo et al. 2014). The main reasons included climatic change, where maize was easy to grow with even shorter rains, and that maize could be stored longer than a banana. Thus more than 80% of the population in Kilimanjaro participate in maize farming as a cash crop or for food (Kathage et al. 2012). From the study findings, 48% of respondents grew maize for food only, 42% grow maize for food and as a commercial crop (they sold the excess), and only 10% grow maize for business (See Figure 1).

Figure 1 : Respondent's reasons on why they grow maize

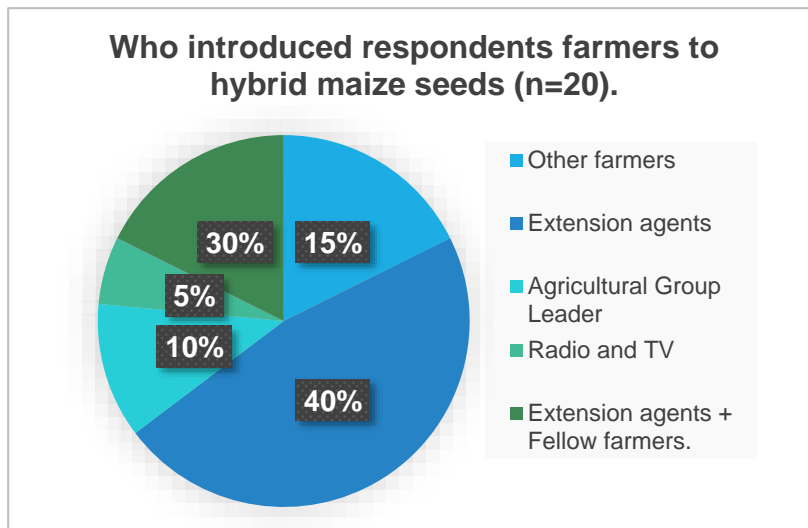


Source: (Author's Field Work, 2017)

Due to the increase in a number of maize farmers in the Northern part of the Tanzania, public and private seeds companies have investments in the area and also research centres and institutions for seed development are in place (ASARECA/KIT 2014). These have increased hybrid maize seed supply and availability. There were also efforts made to introduce hybrid seeds to farmers. The efforts made included seminars and extension services provided by extension officers and seed companies to farmers, the establishment of demonstration farms projects and availability of agro-dealers in the area.

The study findings based on who introduced the respondent's farmers to hybrid seeds (See Figure 2) point out that three farmers (15%) were introduced by their fellow farmers to use hybrid seeds. Eight farmers (40%) were introduced to hybrid maize seeds by the extension agents, two farmers (10%) by their agriculture group leader and one farmer (5%) was introduced to hybrid seeds through radio and television programmes. Also, there were six farmers (30%) who got the initial information about hybrid seeds from both extension agents and their fellow farmers. However, three farmers opted to continue using local seeds even though they were aware of hybrid seeds.

Figure 2 : Who introduced farmers to hybrid seeds?



Source: (Author's Field Work, 2017)

The farmer's reaction to hybrid seed adoption as (Moshi and Isinika, 2016) argue positively adopted, and the estimated rate was 66% of the total maize seed used in the region. Other scholars report the rate of hybrid seed adoption is influenced by the politics of the seed thus more effort behind the hybrid seed adoption is influenced by state policies and regulations, establishment of agricultural development programmes for inputs which were supported by various international and local donors as well as the role played by corporate seed owners through development of improved hybrid seed production and increases its supply and availability (Lyimo et al. 2014, Chinsinga 2011). The seed industries played different tactics to inspire farmers on improved seeds including easy access to hybrid seeds (Howard 2015). Similar, Thompson (2012) argue that seed companies use climate change as an opportunity for them to exploit more farmers to use hybrid seeds.

The interview done to small maize farmers (20 farmers) on why they preferred hybrid maize seeds over local maize seeds, shows that 60 percent of respondents preferred hybrid seeds over local seeds. However, 40 percent of farmers did not prefer hybrid seeds although 25 percent used them as well. The study also identified various reasons (Table 2) on why those respondent farmers (60% of all respondent farmers) preferred hybrid maize seed over local seeds. The main reasons reported was the subsidy incentive from the government which they got on hybrid seeds and fertilisers. The results resemble that obtained by (Chinsinga 2011) that more farmers preferred hybrid seeds over other types of seeds due to agriculture subsidy programmes and that the discount vouchers helped

to increase the farmers purchasing power of the hybrid seeds. In this study, one of the farmers from Mwika village described the reasons for using hybrid maize seeds as:

Agricultural activities are costly, and due to unpredictable rainfall, you must use hybrid seeds and fertilisers for an excellent production. The inputs are costly but thanks to the government for providing the inputs subsidies on seeds and fertilisers. We list names, and they give us vouchers which we use to collect seeds and fertilisers from agro-dealers' shops.”

Another reason for preferring hybrid maize seeds, from the respondent farmers was that the hybrid maize seeds take a short time to mature (90 days) instead of (120 days for local seeds). Since climate change caused fluctuation in rainfall, farmers preferred hybrid seeds over local ones, as Chinsinga (2011: 19) argued that “Farmers’ preference for the hybrid maize system revolves around concerns about climate change. Another reason was the declining soil fertility where productivity of local seed continued to perform poorly without adding artificial fertilisers. Since the fertiliser came as a package with improved hybrid seeds, it necessary to use both as a package, in a correct required amount for application at a described time will the hybrid seed meet the expected yield (Thompson 2012)

Lastly, the reason was the high yield from the hybrid maize seeds. Farmers indicated that they got more yield although the cost of production was much higher compared to local seeds. The same results linked to the economy of the seed were observed by (Chinsinga 2011).

Table 2 : Responses of farmers outlining the reasons for preferring hybrid maize seeds over local maize seeds (n=17).

Reason	Frequency	Percentage
We get seed and fertiliser subsidies only if we are using improved seeds (hybrid maize) seed and hybrid maize seeds take a short time to mature unlike Local seeds need more rain full.	6	35%
As the impact of climate change, there are shorter rain-fall periods. This forces us (farmers) to use hybrid seed because they (seed) take a little time to mature, even if the rain season is short we may get some harvest.	4	24%
Hybrid seeds take a short time to mature. Only 90 days while local seeds take a long time, about 120 Days. Moreover, Guaranteed more yields per acre, unlike local seeds which bring back a small amount of harvest.	4	24%

The land we use is losing its fertility every day. Hence local seeds do not perform well, and Local seeds grow to become very tall; this creates difficulties in performing other activities such as harvest.	2	12%
More yield compare to local seed	1	6%

Source: (Field Work, 2017)

4.3 Seeds and Location (land relation)

Tanzania is among the countries in Africa with enough arable land for agricultural activities. However, only 45% of the arable land is cultivated with maize (Lyimo et al. 2014), and the majority of the farmers were smallholders' farmers and poor people. As Mayet (2015) argue that majority of Sub Saharan African farmers owned less than 2 acres of land for farming activities, and they depended on this activity as the source of food and household income.

In this study, we found that in one way or another land location and ownership had an impact on the type of maize seed used by the small maize farmers. Table 3 shows that 7 (35%) of respondent farmers rented a farm to plant maize, 5 of them (25%) were women and 2 (10%) were men. Also, all of the rented lands were used to plant hybrid maize seed. 3 respondent's farmers owned farms, but they still rented land because of hybrid maize seeds because, the land they owned land had other crops such as banana, trees and coffee, and hybrid seed does not grow well with another crop, but the rented land was open with no other crops on it. Farmers reported that if they used local maize seeds, they could mix with other crops such as banana, coffee, beans and they still grew well.

The other reason for farmers to rent farms to grow maize was the production cost. One of the respondent man from Mwika village who cultivated hybrid seeds on a rented farm and local seed on his home farm said,

“the reason we plant hybrid maize seed on the rented farm is that there is a high possibility to harvesting enough maize and cover the cost of renting the farm. I cannot risk growing local seeds on a rented farm, as the possibility of harvest is low, and I might end up with debts to the farm owner. I plant local seeds surrounding the house, this way I also plant banana, coffee and vegetables using livestock manure, even if the harvest is low, this is my farm, I do not pay anyone for it” (Interviewee, 10/08/2017, Mwika Village)

From the 13 (65%) of respondents who owned land, eight used hybrid seeds. Two farmers used both hybrid and local seeds, and three farmers used only local seeds. The latter was all above 60

years, and they only grow maize for food. One of the old female farmers who grow only local seed said;

“I have a small plot which I use to grow maize. I grow maize for food; I use local seeds because the flour is very sweet, compared to those (hybrid) seeds.” (Interviewee, 10/08/2017, Mwika Village)

Despite the fact that from the farmers’ response sample (20 farmers) interviewed where 14 were female farmers and only six were men, in some households, both the husband and wife were available. More information about farming activities and seed issues, the wife (female) was the one who responded to the question. On the part of land ownership, they pointed out that the husband was the one who owned the land. In addition, they explained that even the decision to purchase hybrid maize seeds the husband had more power on that. One of the women from Himo village said:

“All of the money to buy hybrid seeds was provided by my husband because he is the head of the house and he manages all finances. I am the one working on the maize farm, but my husband does the selling of the harvest and buying seed as well as the fertilisers. I can suggest the name of the hybrid maize seed that I need for the season but the decision to purchase it depend on the financial situation of my husband” (Interviewee, 14/08/2017, Himo Village).

This is related to the argument of (Moyo 2017) that most of the Tanzanian women were doing farming activities, but they did not have full power over the land for farming, this is because, in the rural areas, some traditions and cultures do not allow women to own any property including land. as Kessi M (2010:3) emphasis “under the traditional /customary system women have secondary access to land through marriage but upon the dissolution of the marriage /death of the spouse women lose any claims to the land.” In some societies as well, women do not make any significant decision in the household. For example, in the majority of Chaga tribe of Kilimanjaro most of the farming work is done by women, but at the time of selling the harvest, men were the ones keeping the income and controlling household expenditure.

Table 3 : Land ownership and type of seed used (n=20).

LAND OWNERSHIP		FREQUENCY	PERCENTAGE	USE HYBRID SEEDS	USE BOTH HYBRID AND LOCAL SEEDS	USE LOCAL SEEDS
OWN FARM	Male	9	45%	5	2	1
	Female	4	20%	4	0	2

RENT FARM	Male	2	10%	0	2	0
	Female	5	25%	3	2	0

Source: (Field Work, 2017)

4.4 Stakeholders' influence farmer decision-making regarding the use of hybrid maize seed.

For years, scholars have been investigating reasons which influence farmers to decide whether to use improved hybrid seeds or not. This section explores the roles of state, seeds companies, extension officers and agro-dealers influence on farmer's decision on what type of seed to use. The use of improved seeds is affected by physical, socio-economic, and mental factors as well as government supports improved seeds activities via policies and regulation, research of new seeds and organisational bodies (Feder et al., 1985). ASARECA/KIT, (2014) unveiled that in Tanzania "the Seeds Act (No 29, 1973) marked the beginning of the formal seed system" and that "government of Tanzania established "Tanzanian Official Seed Certification Agency (TOSCA) and a publicly owned and run seed company Tanzania Seed Company Ltd.(TSCA)".

4.4.1 Government influence on hybrid maize seed

On supporting the effort of promoting improve certified seeds (hybrid seeds included) and development of a favourable environment of seed industries, Tanzania government established Tanzania Seed Trade Association (TASTA) in 2002. The first association's objective is to manage seed production, distribution and marketing under free and fair trade (ASARECA/KIT 2014). As the majority of seed companies were more interested in hybrid seeds up to 2011, more than 45 seed companies were registered and became a member in the association as this helped them on the trading right, and marketing (ASARECA/KIT 2014). Furthermore, the establishment of different agricultural inputs development programmes under government initiative and support improving farmer's accessibility to improved hybrid seeds.

Various scholars argue that subsidising maize seeds and fertilisers which was initiated and enforced by the government, was another way of government influencing farmers to use improved certified seed (hybrid seed included) (Chirwa 2005, Scoones and Thompson 2011). According to ASARECA/KIT (2014:14) and USAID (2013:15) report on agricultural subsidies fund in Tanzania, agricultural subsidies fund has gradually been increasing in Tanzania from Tshs 7,400 million in 2005/2006 up to Tshs 110,038 million in 2009/2010 and proximately 1,500,00 farmers

from 61 districts in 20 regions and total of 5 percent of cropland was planted benefited from the programme and the value of 12,500 MT of hybrid maize seed and 45 MT of rice seed of subsidies vouchers were distributed. Moreover, the USAID (2013) report indicated that the World Bank survey point that subsidy programme rises the maize production by 1.2 tons/ha.

The results of this study also revealed that 15 respondent farmers out of 20 of respondent farmers receive subsidies inputs from the government office. All respondent farmers who received subsidies confirmed that all seeds they got were improved hybrid maize seeds they collected from the local government office or were provided with vouchers that they used to collect the seeds and fertilizers from agro-dealers. They also pointed out that the benefits they got from the programme were a reduction of the farming costs and increased yield. For example, one of the government officials from the interview responding to why they provided subsidies only in hybrid maize seed said;

“the reason of offering subsidies through improving seeds is that the seeds are certified, and we are more confident and sure of their performance regarding the yield compared to local seeds which their performance is a probability depending on the climate” (District Government Official Interview, 12/08/2017)

However, five respondent farmers said they never received subsidy inputs for maize farming, and the main reason was that the inputs were given not in fair distribution. They said only if you were using improved hybrid seeds, then you were given the subsidy. The farmers who grow local maize seeds were thus not included. This, in turn, influenced the farmers, even if they did not want to use the hybrid seeds to participate for the sake of low prices.

An interview with two government officials on how government influenced farmer’s decision regarding the use of hybrid maize seed revealed few primary approaches the study noted this are; as provision of seed and fertiliser subsidies for improved seeds only as well as coordinating the grant exercise. This was achieved via local government officials listing names of farmers qualifying to receive grants. Farmers were provided with discount vouchers which could be used for selected agro-dealers to claim subsidized fertilisers and seeds. Also due to existence of (TOSCA) body ensuring that the improved seeds on the market were of accepted standard regarding quality and directed prices. This was done via inspection and certification by a government agency (TOSCA). Furthermore, government are responsible for arranging the annual Farmers Day/Fair commonly known as Nane Nane across the country. During this fair, seed companies do demonstrate their innovation as well as having demonstration plots to farmers. Seed companies appreciate the day because (i) all potential buyers (farmers and agro-dealers) do participate (ii) the fair is free of charge

hence lower setup costs to seed companies. The government launched Tanzania Agricultural Development Bank (TADB). The bank finances the agricultural activities and hence, seed companies, have access to capital to increase their production. Lastly, Government ensures enough extension officers are hired and allocated across the country.

4.4.2 Extension officers influence on hybrid maize seed.

Extension officers work to improve agricultural activities through the provision of knowledge and technical assistance and advice to farmers. Over 80 percent of extension services are under government management and offer seeds assistance services. Conny et al., (2002) argue that extension officers play a significant role as the intermediary linking farmers and seed companies and agro-dealers. This related with the responses of an extension officer in Himo village on their relation with seeds companies, explains that;

“Extension officer receives training and sample seeds from seed companies and create demonstration plots to showcase farmers how the maize will perform” (Agricultural Extension Officer interview, 15/08/2017, Himo Village)

These activities influence farmers in adopting hybrid maize seeds. Also, an interview done to small maize farmers regarding who introduced hybrid maize seed to them 14 (70%) respondents out of 20 interviewed farmers revealed that extension officers were the ones who introduced the hybrid maize seed to them. This related to the response on an extension officer at Mwika village on why they advise farmer to use hybrid seeds and the explanation was that;

“We advise farmers to use hybrid seeds because this is part of my job description and annual government plan to make sure that all farmers are aware of improved seeds and use the better agricultural practices” (Extension Officer interviewee, 12/08/2017, Mwika Village)

In addition, extension agents pointed that, the primary reasons for them to advise farmers to use hybrid maize seeds were; the changes of climate and shortage of rainfall, hybrid maize seeds could survive and grow well even with low rainfall. They also indicated that improved hybrid seed was certified before being released to the market. Tanzanian Official Seed Certification Agency (TOSCA) was the body responsible for testing, inspection and verifying the seed quality. The practice guaranteed more yield as compared to the local seeds which were not certified, and the seed quality was poor. This coincides with what Abebaw and Belay (2001) who argued that the extension services were the source of information and increase in the adoption of improved seeds.

The study also, revealed that as the extension offices act as the middlemen between private seeds company/agro-dealers, the primary challenge they faced regarding the hybrid seeds came from two sides. One was from small maize farmers who were advised to use seeds, and their seeds did not perform well due to other reasons, i.e. poor farming practice and a shortage of fertilisers. Unhappy farmers blamed extension officers for the results. Also, not all farmers except to use hybrid maize seeds. The extension officer in Mwika village revealed that;

“The negative reaction of adopting hybrid maize seed comes from old farmers. Old men and women have a high level of traditional farming culture and skills on local seed production and saving; it is next to impossible to convince them otherwise” (Extension Officer interview, 12/08/2017, Mwika Village)

The second group of challenges came from unfaithful agro-dealers who open sealed seed packages and filled them with low-quality seeds. This practice was done in two ways. One was that some poor small-scale farmers who could not afford to buy the whole bag of seeds were ready to buy small amounts from opened seed packages. Unfaithful Agro-dealers thus used the opportunity to sell fake seeds, from unverified sources. The second way was entirely dishonest. Unfaithful dealers and intermediaries fake the seeds and the packaging. A farmer believed that he bought the certified variety X, but in reality, they just bought local seeds, coated with colours and packed to look like improved hybrid seeds.

4.4.3 Private seed company and Agro dealers influence on hybrid maize seeds.

Privatization of seeds results in strong market power influences what type of seeds are supplied to who by whom and sharpen the seed system. The commercial supports the process of adoption of new seed varieties (hybrid seed) via agro-dealer network linked to private seed companies (Thompson 2012). According to ASARECA/KIT (2014) report, private seed companies focus mainly on producing and marketing certified seeds, and agro-dealers play as an agent to these seed companies. The study interviewed 8 Agro dealers, among them 1 (13%) was a woman and 7(87%) men (Table 4). The agro-dealers interviewed were both business owners (30%) and employees (80%). The study found that the business period ranged from three to 14 years, where only two shops were in the business for more than 10years, and 3 had been in operation for less than five years.

Table 4 : Agro dealers interviewed (n=8).

OWNERSHIP		FREQUENCY	PERCENTAGE
OWN AGRO SHOP	Male	2	25%
	Female	0	0%
WORK IN AGRO SHOP	Male	5	63%
	Female	1	13%

Source: (Field Data 2017)

An interview with seed company representative on how they meet small maize farmers as their customers said;

“We do not sell our seeds directly to the small maize farmers; we supply seeds for wholesale customers who supply them to agro-dealers. In seeds value chain, agro-dealers act as our agents for the hybrid maize seeds. We only meet small-scale farmers in seminars and trade shows” (Agro dealer Interview, 16/08/2017, Himo Village)

This is related to the responses we get from all respondents (20 farmers) regarding where they purchased their hybrid maize seed. All farmers mentioned that their principal source of seeds were agro-dealers at Mwika and Himo markets. The study finding shows that seed companies influence farmers on adopting hybrid seed mostly through working with other seed actors such as extensions offices and agro-dealers. These stakeholders are in direct contact with the farmers. Seed companies achieves this by (i) offering seminars and seeds samples to extension officers for demonstration plots as well as for the agro-dealers who provide training through small booklets, brochures as well as seminars about the seeds and (ii) by participating in farmers’ activities such as *Nane Nane* (Tanzania National Farmers Day). During this fair, seed companies get a chance to demonstrate their recent innovation and also put up demonstration plots to farmers. The seed companies favour the show because it brings together existing and potential buyers (farmers and agro-dealers). According to seed company representative, interview explains the significance of working with other seed actor is that private seed companies as powerful and influential as they are, cannot reach all farmers. Hence, using extension officers and agro-dealers increases their reach. The strategy

they use is in the inverted funnel. A single seed company can train a bunch of extension officers often in district extensive seminars, who go and train more farmers and agro-dealers in their location. This widening the people (farmers) who received the information and the practice is affordable, compared to trying to reach all farmers by themselves.

Agro-dealers are one of the actors who facilitate and influence the supply of hybrid seeds at Moshi rural village due to the fact that they sell only improved seeds. This means that any client who seeks seeds from agro-dealers, only have a choice to what brand to buy not between hybrid and local seeds. Majority of hybrid maize seeds varieties available in Mwika and Himo villages are HYBRID H614 and H6302, SEED CO 403 and 627, PANNAR 691 and 628, DK 90-89, 80-53,80-31 and CARGILL HYBRID. Also, all agro-dealers said they only sell improved seeds because their business licence requires them to sell certified seeds only. Impromptu inspection for government officers put agro-dealers in check, making sure they comply.

Furthermore, all eight agro-dealers respondents pointed out that the main reasons for starting a business in that area were because they saw an opportunity in the area and there were few people engaged in the seed business. Also, they noted that farmers walked a long distance to buy farm inputs. One agro-dealer from Mwika market describe that;

“I started a business in this area fifteen years ago, and during that time many customers purchased their inputs from Moshi town (Moshi Mjini) which involved transport cost from Mwika to Moshi (about 6000 Tanzanian shillings plus the long-distance walk to the bus stop). Sometimes the inputs they purchased cost less than the transport cost including the time spent to travel to the town.” (Agro-dealer Interview, 12/08/2017, Mwika Market)

Another agro-dealer in Himo village pointed out that he was working in government and his wife conducted most of the agriculture activities. They used to travel to Moshi town just to buy hybrid seeds and other agro-inputs. When he retired, he used his retirement bonuses to start agro-dealer shop, and this has worked great so far. Our findings resembled those documented by Thompson and Scoone (2011) who emphasizes that agro-dealers have a robust capacity to spread over inaccessible interior rural areas where most of the farmers live and do agricultural activities, through this way can raise the distribution and availability of improved seeds (hybrid seeds) to the small-scale farmers in rural area.

In relations to that, the interview question regarding how agro-dealers met with their customers (small maize farmers) (Table 5) reveals that most of their customers came themselves and this was due to the natural accessibility of the services often located at the centre part of the village. Majority of farmers came with the reference from extension officers and farmers group leaders, however;

extension officers did not offer advice or recommendations on which agro-dealers' shop to buy their inputs (certified seeds and fertilisers) from. One farmer in Mwika village said he was told to go to a specific shop because their prices were lower while in turn, the farmer realized that the shop belonged to extension officer's father-in-law.

Table 5: Respondents of Agro dealers on how they meet their customers (n=8)

Ways of meeting customers	Fre- quency	Percent- age
Farmers come themselves	3	37.5
Farmers come themselves and some from the reference of extension office and farmers group leaders	3	37.5
Farmers come themselves and sometimes visiting them on their farms.	2	25

Source: (Field Data, 2017)

All eight interviewed agro-dealers pointed out that they did offer necessary training and advice on hybrid maize seeds to farmers who came to their shops. The training was primarily on what kind of seeds to use based on farmer's location (some hybrid seeds perform well in a specific kind of environment and climate). Also, on how and when to use them, how to apply fertilisers and also the best farming practice to increase the yield. Supporting agro-dealers' system network appears to be a method of filling the gap of the shortage of public extension offices as well as inputs supply system in rural areas (Scoones and Thompson 2011).

Even though agro-dealers' business facilitated hybrid seed distribution, accessibility and promoting the adoption, they faced some challenges from smallholder maize farmers. From the study findings, the respondents, agro-dealers pointed out three main challenges. Firstly, the higher price of the hybrid seeds which majority of the smallholder maize farmers were unable to afford in every season. Three agro-dealers interviewed, two from Himo market and one from Mwika market explained that;

“They were forced to open the seeds’ packets and sell in small portion to the farmers because sometimes farmers could not afford the whole packet.” (Agro-dealer Interview, 12/08/2017, Mwika Village).

Secondly, farmers did not have enough knowledge on hybrid seeds and often the farmers, did not follow instruction. This, in turn, reduced the germination rate and came back to agro-dealers complaining of having been given fake seeds. Third, unpredictable climate change such as lack of rainfall caused the seeds not to grow well, and farmers blamed the agro-dealers. Agro-dealers have significant impacts on which farmer get access to seeds. Since agro-dealers explained what type of seeds farmers can use. The private seeds companies used agro-dealers to create demand for their agricultural inputs through increasing awareness of their inputs to farmers.

4.5 The impact of using hybrid maize seed in the household economy of the small maize farmers regarding expenditure and income.

Maize is the staple food crop in Tanzania and comprises on an average 16 percent of national household food expenditures (Wilson and Lewis, 2015). Due to its significance on people's livelihood, more farmers were engaged in maize farming activities. Majority of the smallholders' farmers in Tanzania are poor people, and they own less than 2 hectares of land for farming practices, and they depend on this activity as the source of food and household income (Mayet 2015). The decision to use what type of seeds to the smallholder farmers were therefore affected by the income level of the farmer, as the use of hybrid maize seeds had a direct impact on their household income because it involved upfront cash expenditure for the purchase of the hybrid maize seeds.

Based on the findings regarding the reasons on why the responding small maize farmers grew maize, 48% of respondents grew maize for food only, 42% of respondents grew maize for food and business (sold the surplus), and only 10% of respondents grew maize for business (Figure 3). The rate of hybrid maize seeds adoption is therefore related to smallholder maize farmer's reasons for maize farming.

The household economy impact on using hybrid maize seeds to the smallholder maize farmers differed between farmers based on reasons of growing maize. From the study finding, 10% (2) of the respondent farmers grew maize for business, and 42% (8) respondent farmers grew maize for food and business, 8 respondent farmers out of above 10 respondent farmers use only hybrid maize seeds and the two respondent farmers used both hybrid and local maize seed.

Majority of these small maize farmers (10 respondents) were well off compared to other farmers, and they had other sources of income than agriculture, to financing their maize farming activities, some were employees (teachers, nurses, and self-entrepreneur), so they depended on those sources for capital. However, three respondent farmers claimed that they also took some small loans to add up on their capital for maize farming. Furthermore, the respondent farmers (10) said that the

use of hybrid maize seeds required more capital due to costs of hybrid maize seeds and the combination of the use of hybrid maize seeds and fertilizers.

From the study finding responses on how small maize farmers manage to purchase hybrid maize seeds, 17 respondents who use hybrid maize seeds, and grew maize as primary crop either for food or business, the response was that eight small maize respondent farmers depended on surplus sales for maize yield to finance the following maize farming season. The remaining nine smallholder maize farmers pointed out that they sold other crops such as bananas and coffee and livestock or sometimes worked on other farms to fund the next maize season. This increased the household expenses as more income was required for financed maize farming. For example, from the interview done with one of the respondent farmers at Mwika village who grew maize for food only but uses hybrid maize seeds said;

“It is hard for us small maize farmers who depend solely on agriculture to grow maize every year, because of higher costs of buying seeds and fertilisers, I only manage to grow maize on 0.25 of my farming land but the production cost is more than Tsh 100,000 this includes cost of hybrid maize seeds and fertilizers. These inputs are expensive, and in every season of farming, we are required to purchase them because the seeds cannot be replanted and even if you force to do that you get minimal yield or nothing” (Interviewee, 10/08/2017, Mwika Village).

Despite the high production cost of maize crop of the respondent farmers who used hybrid maize seeds, the claims focused on the high price of hybrid maize seeds and the fertilisers cost which are necessary to use on the production. 11 respondent’s farmers admitted that with hybrid seeds, they were able to harvest more maize which could be sold to cover other family expenses. One farmer in Mwika village said;

“If you decide to use hybrid seeds, you must go all the way in. This means hybrid seeds as well as following up the advice of extension officer and proper application of fertilisers. If you do so, there is a possibility to harvest up to 35 bags of maize in a season; however, others get up to 18 bags which is better compared to 6-8 bags of maize for farmers who use local seeds.” (Interviewee, 10/08/2017, Mwika Village).

The introduction of hybrid seeds has direct impacts on the smallholder farmer’s livelihood. This is in particular on their source of income as well as the level of expenditure in their household. As the hybrid seeds are not owned by the farmers, farmers must purchase the seeds every cultivation seasons which creates dependence on seed companies. This creates a burden to farmers as agricultural activities become expensive despite the fact that majority of smallholder farmers are poor. Farmers must work hard or find other income sources to be able to get the financial requirement for the seeds and inputs to be purchased.

Chapter 5. Conclusion

This chapter outlines the conclusion to be drawn from research. The chapter outlines the revealed reasons for farmers to use hybrid maize seeds, shades light to how privatisation and adoption of hybrid seeds are promoted in Himo and Mwika villages of Moshi Rural District (MRD) in Kili-manjaro region in Northern Tanzania, the power politics behind this and who benefits and who loses during the process? To achieve this the study looks on the role of state and corporate actors in promoting hybrid seed privatisation and adaptation to farmers by interviewing extension officers, government officials, agro-dealers, seeds company representative and small maize farmers on the reasons of using hybrid maize seeds by smallholder maize farmers and the household economic impact of using hybrid maize seeds. The primary results and findings of the study are concluded as the following:

From the smallholder maize farmer's respondent, 48% of respondents grew maize for food only, 42% grow maize for food and as a commercial crop (they sold the excess), and only 10% grow maize for business. And from the study findings, it shows that the rate of hybrid maize seeds adoption is related to smallholder maize farmer's reasons for maize farming, based on the interview done with small maize farmers on the respondents preferred hybrid seeds over local seeds shows that 60 percent of respondents preferred hybrid seeds over local seeds. The reasons for the preference are; the hybrid seeds come with subsidy programmer from the government. Farmers pay less and obtain a voucher to collect seeds and fertilisers from agro-dealers. The second reason is time to maturity if a farmer uses local seeds the time to maturity is 120 days, which is 30 days (a month) from 90 days spent by hybrid seed. Time to maturity by itself is not a problem, farmers can wait for 30 days more but due to climate change, rainfall periods are short, and hence, farmers cannot risk it. Another reason revealed was the declining soil fertility where productivity of local seed continued to perform poorly without adding artificial fertilisers. Since the fertiliser came as a package of improved hybrid seeds its fertility.

However, 40% of farmers did not prefer hybrid seeds although 25% used them as well. The reasons for their preference are based on the fact that hybrid seeds depend on fertilisers and modern agricultural practice, higher costs of seeds and some claimed that their flour is lighter such as they need to use more when cooking Ugali (Local meal) than flour from local seeds.

Also, 25% of the respondent small maize farmers who uses both local and hybrid maize seeds, claimed that local grains harvest fetch higher prices in the market because the flour made from local seeds are sweeter and health than that made from hybrid seeds. Another reasons are due to

land ownership, respondent's small maize farmers who own small plots around the house tend to use mixed crop technique. This is when a farmer grows maize, beans, bananas and coffee in the same plot. Since the primary objective of farming is to generate a source of food, it makes sense to use this technique. In the same plot, a farmer can get more than one crop. The challenge is since hybrid seeds perform well in open spaces, farmers are forced to either acquire a farm far from home or rent it from other owners hence majority find themselves use both seeds, i.e. to plants local maize seed at home farm and hybrid maize seeds on the rented land. In addition to that the respondent's farmers who rented land only uses hybrid maize seeds and this is due to cover up the cost of production as hybrid seeds take short time mature (90days) and due to changes in climate, whereby every year, rainfall season becomes shorter and shorter hence they are forced to adopt the hybrid seeds, simple to make sure they harvest something and cover up the production cost.

Furthermore, the study findings show that the successful achievement of hybrid seeds uses by small maize farmers is influenced by the government and private seeds companies who work for a hand in hands with extension officers and agro-dealers to provide information and awareness of hybrid seeds. Over 50% of the respondent's farmers point out that extension officers are the one who introduces hybrid maize seeds to them as well as all of the of the respondent's farmers who use hybrid maize seeds claims that they purchase the seeds from agro-dealers either at Himo market or Mwika market.

The study found that, government influence the use of hybrid seeds via setting up laws and organisations, by providing training to farmers and extension officers in partnership with private sectors, by investing on research and mass production of hybrid seeds, by certifying seeds from both private and public producers and finally by including the hybrid seeds on other programs. On the other side, government agents on the ground, i.e. Extension officers play a significant role in influencing farmers to opt the use of hybrid seeds. They achieve that task by advising the farmers to use hybrid seeds, by attending the seminars and training offered by both public and private seed stakeholders and transfer that knowledge to farmers. Also, extension officers are responsible for creation and maintenance of demonstration plots, whereby they grow maize and show off to farmers what hybrid maize perform. Other significant stakeholders who influence farmers are the agro-dealers which do that by acting as an agent for a seed company. Agro-dealers do more than sell seeds and fertilizers. They are essential training officers on the ground teaching what type of seed to be used in what area, amount and type of fertilizers to be applied and other best farm practice. The politics of seeds in terms of the power of influence comes from large international organisations such as the IMF and World Bank as well as multinational seed companies, i.e. Monsanto,

Pannar and DuPont. The companies have an influence on government into passing laws and regulations that favour them. This is done through privatisation of seeds and ownership of intellectual property. In turn, farmers (even if they could) cannot under the law reproduce seeds hence every growing season; they must buy seeds from these companies or their representatives.

Despite the effort done by various seed stake holders and the tremendous rate of the farmers who use hybrid maize seeds, all the 17 respondent's farmer's claims on the high price of the hybrid maize seeds and the necessity of using artificial fertilizer on the production process, which increases the cost of production and household expenditure as the result forces the farmers to find alternative ways of managing the farming activities as the use of hybrid maize seeds require financial capability for purchasing seeds every year as well as the artificial fertilizers for the hybrid seeds to grow well.

The alternative ways for farmers are to sell their labour power, as well as using the income from other crops sells such as coffee or banana as well as some sell their livestock (pigs, cows and goats). As the result its shows that there is still no clear existence benefit to the smallholder farmers which you can identify due to the use of hybrid maize seeds from the area as the respondent's farmers who use hybrid maize seeds argue that there is an increase in the production maize yield but also the cost of producing that maize increases hence if you calculate the benefit of it you can get little or no benefit compare with the use of local maize seeds. in addition to that not all respondents farmers are able to access and purchase the hybrid maize seeds due to financial difficulties and this resulted in the seeds to be biased only to a type of farmers and not equally distributed, even if the government and other multinational donors contribute on establishing various programme to promote the accessibility of the seeds yet that programme are more favoured to one category of farmers for example based on the subsidies inputs programme the respondents farmers, government official, extension officers and even agro dealers point out that is only for the farmers who use improved seed and especial hybrid maize seed in the area, therefore for those farmers who do not use this type of seed cannot benefit from it.

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Appendices

Appendix 1 : Government Officer interview questions

1. What is the rate of farmers using hybrid seeds and the one not uses in the area?
2. How they influence small maize farmers in the area to use or not use hybrid maize seeds in the area?
3. Do they offer any seminars based on the issues of how to choose seeds for agriculture activities?
4. What kind of subsidies programmes do they offer for the farmers who use or not use hybrid seeds?
5. How they maintain the seeds companies and agro-dealers in the area?

Appendix 2 : Farmers' interview questions

1. Do you own any land for agriculture? If YES: How many acres of farm he/she have?
2. How many acres he/she cultivate maize?
3. What type of maize seeds they use?
4. If Hybrid Seeds: Who introduce them to you?
5. Why do you use that type of seeds?
6. Where do you get seeds which you are using?
7. When did you start using hybrid maize seeds?
8. What the difference between using hybrid seeds and local seeds?
9. What is the impact of using hybrid maize seed in the household economy of the small maize farmers in term of expenditure and income?
10. Did you receive any subsidies from the government on hybrid maize seeds?

11. Did you receive any training and/or free trial when you first start to use Hybrid Seeds?
12. What are the challenges facing on using hybrid seeds?

Appendix 3 : Agro – dealers interview questions

1. When did you start a business in this village?
2. Why did you start a business in this village?
3. What types of education programs do you offer to small maize farmers?
4. How do you meet small maize farmers?
5. Between local maize seeds and hybrid maize seeds which one you sell most and why?
6. What is the farmer's reaction on using hybrid maize seeds?
7. What kind of support did you get from the government to your business?
8. If there is any support, when did it start?
9. How is government support related to local and hybrid maize seeds?
10. What challenges did you face from small maize farmers?

Appendix 4 : Extension Officers' interview questions

1. How many years did you work in this village?
2. What kind of services do you offer to farmers?
3. How many farmers use hybrid maize seeds/ local maize seeds?
4. Between local and hybrid seeds which are preferred by farmers?
5. Did you provide advice to farmers to use hybrid seeds? Why?
6. What is the farmer's reaction when advise them to use hybrid seeds?
7. How many agricultural development programs and relief programs are in the area?
8. How would you describe your relationship with the agro-dealers and seeds companies?
9. Is there any subsidies government offer to small maize farmers?
10. If YES: How they attract and maintains seeds company and agro-dealers in the villages?
11. What are the challenges they get from small maize farmers/ agro-dealers of using hybrid maize seeds?

Appendix 5: Seed Company's interview questions.

1. Why did you start a business in this village?
2. When did you start a business in this village?
3. What types of education programs do you offer to small maize farmers?
4. How do you meet small maize farmers?
5. Are there any trial programs of new seeds you offer to the farmers before starting using them?
6. What is the farmer's reaction on using hybrid maize seeds?
7. What kind of support did you get from the government to your business?
8. What challenges did you face from small maize farmers?
9. What challenges did you face from agro-dealers?